

Did the MPs' voting pattern in the indicative votes on Brexit have any structure?

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On 27 March 2019, Parliament held indicative votes on eight different Brexit options:

- Baron: No Deal
- Fysh: Managed No Deal
- Eustice: Efta and EEA
- Boles: Common Market 2.0
- Clarke: Customs union
- Corbyn: Labour's plan
- Beckett: Confirmatory public vote
- Cherry: Revoke to avoid No Deal

MPs were able to cast votes on all of these options. Rather than ranking the options in an order of preference, MPs were asked to vote for as many or as few options as they liked. For each option, they could indicate their approval or disapproval (with abstention allowed). Thus, they were asked to cast what social choice theorists call "approval ballots". In this context, a vote for any given option is best interpreted as expressing an opinion to the effect that this option is in principle acceptable (even if it may not be the relevant MP's most preferred option).

From a political-science perspective, whenever some individuals vote on several options, it is interesting to ask whether there is any systematic structure in their pattern of votes. For example, we may ask whether those votes can be explained in terms of disagreements about the ideal position on some underlying political dimension (the simplest example of such a dimension being the conventional socio-economic left-right dimension).

If MPs had ranked the options in a complete order of preference (indicating their most preferred option, their second most preferred option, their third most preferred option, and so on), we would have been able to analyse whether their preferences were "single-peaked". That is to say, we would have been able to ask whether the options can be arranged on a single left-right axis such that each MP has a most preferred position somewhere on that axis with decreasing preference for options as they get more distant in either direction from his or her most preferred position.¹ (Of course, the left-right axis here need not necessarily coincide with the conventional socio-economic left-right dimension.) More generally, we might have been able to look for single-peakedness within some multi-dimensional political space. Given the kinds of votes that were cast, however, this analysis is not possible (and certainly not without some further *ad hoc*

¹ For an example of this kind of analysis, see List, Luskin, Fishkin, and McLean, "Deliberation, Single-Peakedness, and the Possibility of Meaningful Democracy: Evidence from Deliberative Polls", *Journal of Politics*, 2013.

assumptions). The notion of single-peakedness is not applicable in the case of approval ballots of the present kind.

But there is another structural condition that is applicable in the present context, and that is the notion of “unidimensional ordering”. A combination of approval ballots on some options across a set of voters is called “unidimensionally ordered” if and only if the following pattern holds:

The voters (not the options) can be aligned from left to right on a single axis such that, for each option under consideration, the voters approving that option form an adjacent block on that axis. (Adjacency of the voters approving an option simply means that whenever voters i and j approve a particular option, then all voters who lie in between i and j on the given axis also approve that option.)

As in the case of single-peakedness, the notions “left” and “right” are used in a purely geometrical sense here: “left” and “right” can in principle have many different interpretations. In the case of Brexit, the alignment of voters could be from most pro-Brexit to most pro-Remain, for example.

The following simple example with nine voters and five options illustrates what a profile of unidimensionally ordered approval ballots might look like.

	Voter 1	Voter 2	Voter 3	Voter 4	Voter 5	Voter 6	Voter 7	Voter 8	Voter 9
Option 1			Approve	Approve	Approve				
Option 2	Approve	Approve	Approve						
Option 3							Approve	Approve	Approve
Option 4			Approve	Approve	Approve	Approve	Approve		
Option 5		Approve	Approve	Approve	Approve	Approve			

Table 1: An Example of Unidimensional Ordering

We can think of “unidimensional ordering” as corresponding to a certain kind of “meta-consensus”: a consensus, not on which option to approve, but rather on an underlying normative or cognitive dimension that structures the disagreement between the voters.

When a combination of approval ballots is “unidimensionally ordered”, this has two significant implications from a social-choice-theoretic perspective:²

- (1) The set of majority-approved options is always a subset of the set of options approved by the median voter with respect to the given left-right alignment. In the example of Table

² See Dietrich and List, “Majority Voting on Restricted Domains”, *Journal of Economic Theory*, 2010, where the notion of “unidimensional ordering” was first defined, extending the definition of “unidimensional alignment” in List, “A Possibility Theorem on Aggregation over Multiple Interconnected Propositions”, *Mathematical Social Sciences*, 2003.

1, the median voter is voter 5, and indeed there are two majority-approved options here, namely options 4 and 5. Both are approved by the median voter.³

- (2) If there are any logical relationships between the options (so that some combinations of options are mutually inconsistent in the sense that it would be irrational to approve them simultaneously as being acceptable), the set of majority-approved options is consistent, as long as the median voter is consistent in his/her set of individual votes across the options. (This is particularly relevant when collective decisions are made on multiple related proposals and we are looking for an overall consistent package of decisions.)

Implication (1) means that, given unidimensional ordering, only those options that are interpretable as a centrist compromise (by being approved by the median voter on the relevant left-right axis) have a chance of being majority-approved. Implication (2) means that unidimensional ordering is sufficient for consistent majority decisions in those cases where there are mutual compatibility constraints between the options. (In general, as is well known, majority voting does not ensure consistent outcomes across multiple options, and so it is significant that unidimensional ordering implies that the majority outcome will be consistent.)

We looked at whether the MPs' indicative votes on 27 March 2019 were unidimensionally ordered. Specifically, we focused on all those MPs who did not universally abstain (i.e., those who voted either "yes" or "no" on at least one of the eight options). The total number of MPs considered on the basis of this criterion was 602.

What were our results?

First of all, we were not able to arrange *all* of the 602 MPs on a single left-right axis such that the pattern of unidimensional ordering was satisfied. In that sense, Parliament as a whole lacks a meta-consensus. There is not only no agreement on which options to approve (i.e., no

³ Note that when a given combination of approval ballots is unidimensionally ordered, the left-right axis with respect to which the relevant pattern holds may not be unique. Therefore, the median voter may not be unique either. Crucially, however, the claim that the set of majority-approved options is a subset of the set of options approved by the median voter is true *for any left-right axis with respect to which the relevant pattern holds*. Furthermore, there is an important special case of unidimensional ordering, called "unidimensional alignment", in which some of the present claims can be strengthened. (See the previous footnote for references.) A combination of approval ballots is called "unidimensionally aligned" if and only if the following pattern holds: the voters can be aligned from left to right on a single axis such that, for each option under consideration, the voters approving that option lie on the opposite side of those not approving it. Note that unidimensional alignment implies unidimensional ordering (insofar as the set of voters approving each option will form an adjacent block when there is unidimensional alignment), but the converse does not hold (insofar as the set of voters approving a given option may form an adjacent block, but this block may be surrounded on both sides by voters not approving the option). When a combination of votes is unidimensionally aligned, the set of majority-approved options is not merely a *subset* of the set of options approved by the median voter, but it *coincides* with the set of options approved by the median voter.

“substantive consensus”), but also no agreement on a single shared dimension structuring the MPs’ disagreement in a unidimensionally ordered form (i.e., “no meta-consensus”).⁴

Secondly, however, there was a significant “proximity to unidimensional ordering”, meaning that we were able to arrange a significant number of the MPs (namely, 511 of them) on a single left-right axis such that their voting pattern was unidimensionally ordered.

The table on the following page (Table 2) describes the way in which 511 MPs can be arranged from left to right so as to subsume their votes under the pattern of unidimensional ordering. As in Table 1, rows represent options, and columns represent voters, here: groups of MPs. Each column lists a group of MPs who approved the same set of options. For each option, the highlighted region in green corresponds to the group(s) of MPs who voted in support of that option. Subsequently, for completeness, we also include a list of all MPs whose votes did not fit into this pattern, namely 91 out of 602 (Table 3).

Although one must be cautious not to over-interpret the present results, there are some potentially useful lessons to be learnt here.

First of all, the MPs’ voting pattern is closer to a unidimensional structure than one might have expected. As many commentators have noted, Parliament is extremely fragmented. Yet, approximately 85% of the non-abstaining MPs (namely, 511 out of 602) can be systematically aligned on a single axis such that their voting pattern across all eight options comes out as “unidimensionally ordered”.

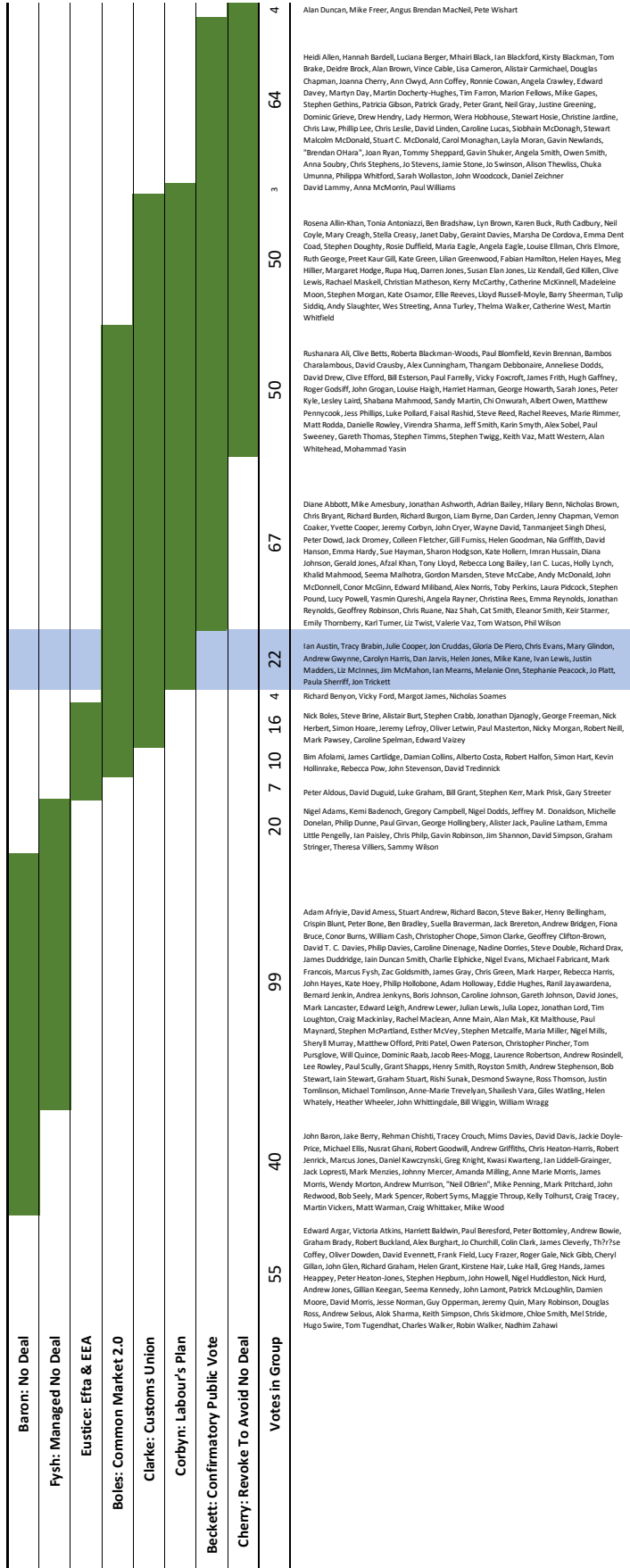
Secondly, the identified alignment of MPs allows us to visualize in simple terms which MPs have relatively similar positions across the eight options (insofar as they are close to one another on the relevant axis), and which MPs have relatively distant positions. Presumably, MPs with relatively similar positions will more easily be able to find some common ground and agree on certain compromise positions. Our table further suggests that, at least as far as the voting pattern is concerned, it may be possible to achieve a majority on some compromise options by combining adjacent voting blocks.

Finally, the options approved by the median voter on the given alignment have the greatest chance of achieving majority support, after further deliberation and negotiation. (Of course, right now, no option commands a majority.)

It will be interesting to discuss whether any additional lessons can be learnt from the analysis.

⁴ On the distinction between substantive and meta-agreement, see List, “Two Concepts of Agreement”, *The Good Society*, 2002.

Unidimensional Ordering of Indicative Votes



Median

Table 2: Unidimensional Ordering in Parliament

Alan Duncan, Mike Freer, Angus Brendan MacNeil, Pete Wishart

Heidi Allen, Hannah Bardell, Luciana Berger, Mhairi Black, Ian Blackford, Kirsty Blackman, Tom Brake, Debbie Brock, Alan Brown, Vince Cable, Lisa Cameron, Alistair Carmichael, Douglas Chapman, Joanna Cherry, Ann Cooney, Ann Coffey, Ronnie Cowan, Angela Crawley, Edward Davey, Martyn Day, Martin Docherty-Hughes, Tim Farron, Marlon Fellows, Mike Gapes, Stephen Gethins, Patricia Gibson, Patrick Grady, Peter Grant, Neil Gray, Justine Greening, Dominic Grieve, Drew Hendry, Lady Hermon, Wera Hobhouse, Stewart Hosie, Christine Jardine, Chris Law, Philip Lee, Chris Leslie, David Linden, Caroline Lucas, Siobhain McDonagh, Stewart Malcolm McDonald, Stuart C. McDonald, Carol Monaghan, Layla Moran, Gavin Newlands, "Brendan O'Riada", Joan Ryan, Tommy Sheppard, Gavin Shaker, Angela Smith, Owen Smith, Anna Soubry, Chris Stephens, Jo Stevens, Jamie Stone, Jo Swinson, Alison Theewiss, Chuka Umuuna, Philippa Whitford, Sarah Wollaston, John Woodcock, Daniel Zeichner

Rosena Alin-khan, Tonio Antoniazzi, Ben Bradshaw, Lyn Brown, Karen Buck, Ruth Cadbury, Neil Coyle, Mary Creagh, Stella Creasy, Janet Daby, Geraint Davies, Marsha De Cordova, Emma Dent Coad, Stephen Doughty, Rosie Duffield, Maria Eagle, Angela Eagle, Louise Ellman, Chris Elmore, Ruth George, Preet Kaur Gill, Kate Green, Lillian Greenwood, Fabian Hamilton, Helen Hayes, Meg Hillier, Margaret Hodge, Rupa Huq, Darren Jones, Susan Elin Jones, Liz Kendall, Ged Killen, Clive Lewis, Rachael Maskell, Christian Matheson, Kerry McCarthy, Catherine McKinnell, Madeleine Moon, Stephen Morgan, Kate Oramor, Ellie Reeves, Lloyd Russell-Moyle, Barry Sheerman, Tullip Siddiq, Andy Slaughter, Wes Streeting, Anna Turley, Thelma Walker, Catherine West, Martin Whitfield

Ruzhanara Ali, Clive Betts, Roberta Blackman-Woods, Paul Blomfield, Kevin Brennan, Bambang Charalambous, David Crausby, Alex Cunningham, Thangam Debbanai, Anneliese Dodds, David Drew, Clive Efford, Bill Esterson, Paul Farrelly, Vicky Foxcroft, James Frith, Hugh Gaffney, Roger Goddard, John Grogan, Louise Haigh, Harriet Harman, George Howarth, Sarah Jones, Peter Kyle, Lesley Laird, Shabana Mahmood, Sandy Martin, Chi Onwurah, Albert Owen, Matthew Pennycook, Jess Phillips, Luke Pollard, Faisal Rashid, Steve Reed, Rachel Reeves, Marie Rimmer, Matt Rodda, Danielle Rowley, Virendra Sharma, Jeff Smith, Karin Smyth, Alex Sobel, Paul Sweeney, Gareth Thomas, Stephen Timmins, Stephen Twigg, Keith Vaz, Matt Western, Alan Whitehead, Mohammad Yasin

Diane Abbott, Mike Amesbury, Jonathan Ashworth, Adrian Bailey, Hilary Benn, Nicholas Brown, Chris Bryant, Richard Burden, Richard Burgon, Liam Byrne, Dan Carden, Jenny Chapman, Vernon Coaker, Yvette Cooper, Jeremy Corbyn, John Cryer, Wayne David, Tanna Jeet Singh Dhesi, Peter Dowds, Jack Dromey, Colleen Ffionka, Gill Ferris, Helen Goodman, Nea Griffith, David Hanson, Emma Hardy, Sue Hayman, Sharon Hodgson, Katie Hollern, Imran Hussain, Diana Johnson, Gerald Jones, Afzal Khan, Tony Lloyd, Rebecca Long Bailey, Ian C. Lucas, Holly Lynch, Khalid Mahmood, Seema Malhotra, Gordon Marsden, Steve McCabe, Andy McDonald, John McDonnell, Conor McGinn, Edward Milliband, Alex Norris, Toby Perkins, Laura Pidcock, Stephen Pound, Lucy Powell, Yasmin Qureshi, Angela Rayner, Christina Rees, Emma Reynolds, Jonathan Reynolds, Geoffrey Robinson, Chris Ruane, Naji Shah, Cat Smith, Eleanor Smith, Keir Starmer, Emily Thornberry, Karl Turner, Liz Twist, Valerie Vaz, Tom Watson, Phil Wilson

Ian Austin, Tracy Brabin, Julie Cooper, Jon Cruddas, Gloria De Piero, Chris Evans, Mary Gildon, Andrew Gwynne, Carolyn Harris, Dan Jarvis, Helen Jones, Mike Kane, Ivan Lewis, Justin Madders, Liz McInnes, Jim McMahon, Ian Mearns, Melanie Orr, Stephanie Peacock, Jo Platt, Paula Sheriff, Ian Trickett

Richard Benyon, Vicky Ford, Margot James, Nicholas Soames

Nick Boles, Steve Brine, Alistair Burt, Stephen Crabb, Jonathan Djanogly, George Freeman, Nick Herbert, Simon Hoare, Jeremy Lefroy, Oliver Letwin, Paul Masterton, Nicky Morgan, Robert Neill, Mark Pawsey, Caroline Spelman, Edward Vaizey

Bin Afolami, James Cartledge, Damian Collins, Alberto Costa, Robert Halfon, Simon Hart, Kevin Hollinrake, Rebecca Pow, John Stevenson, David Tredinnick

Peter Aldous, David Duguid, Luke Graham, Bill Grant, Stephen Kerr, Mark Prisk, Gary Streeter

Nigel Adams, Kemi Badenoch, Gregory Campbell, Nigel Dodds, Jeffrey M. Donaldson, Michelle Donelan, Philip Dunne, Paul Girvin, George Hollingbery, Alister Jack, Pauline Latham, Emma Little Pengelly, Ian Paisley, Chris Philp, Gavin Robinson, Jim Shannon, David Simpson, Graham Stringer, Theresa Villiers, Sammy Wilson

Adam Afriye, David Amess, Stuart Andrew, Richard Bacon, Steve Baker, Henry Bellingham, Crispin Blunt, Peter Bone, Ben Bradley, Suella Boverman, Jack Brereton, Andrew Bridgen, Fiona Bruce, Conor Burns, William Cash, Christopher Chope, Simon Clarke, Geoffrey Clifton-Brown, David T. C. Davies, Philip Davies, Caroline Dinenage, Nadine Dorries, Steve Double, Richard Drax, James Duddridge, Iain Duncan Smith, Charlie Elphicke, Nigel Evans, Michael Fabricant, Mark Francois, Marcus Fysh, Zac Goldsmith, James Gray, Chris Green, Mark Harper, Rebecca Harris, John Hayes, Kate Honey, Philip Hollobone, Adam Holloway, Eddie Hughes, Ramil Jayawardena, Bernard Jenkin, Andrea Jenkyns, Boris Johnson, Caroline Johnson, Gareth Johnson, David Jones, Mark Lancaster, Edward Leigh, Andrew Lewer, Julian Lewis, Julia Lopez, Jonathan Lord, Tim Loughton, Craig Mackinlay, Rachel Maclean, Anne Main, Alan Mak, KE Mahhouse, Paul Maynard, Stephen McPartland, Esther McVey, Stephen Metcalfe, Maria Miller, Nigel Mills, Sheryll Murray, Matthew Offord, Priti Patel, Owen Paterson, Christopher Pincher, Tom Purslow, Will Quince, Dominic Raab, Jacob Rees-Mogg, Laurence Robertson, Andrew Rosindell, Lee Rowley, Paul Scully, Grant Shapps, Henry Smith, Royston Smith, Andrew Stephenson, Bob Stewart, Iain Stewart, Graham Stuart, Rishi Sunak, Desmond Swayne, Ross Thomson, Justin Tomlinson, Michael Tomlinson, Anne-Marie Trevelyan, Shailesh Vara, Giles Watling, Helen Whately, Heather Wheeler, John Whittingdale, Bill Wiggan, William Wragg

John Baron, Jake Berry, Rehman Chishti, Tracey Crouch, Mims Davies, David Davis, Jackie Doyle-Price, Michael Ellis, Nusrat Ghani, Robert Goodwill, Andrew Griffiths, Chris Heaton-Harris, Robert Jenrick, Marcus Jones, Daniel Kawczynski, Greg Knight, Kwasi Kwarteng, Ian Liddell-Grainger, Jack Lopresti, Mark Menzies, Johnny Mercer, Amanda Milling, Anne Marie Morris, James Morris, Wendy Morton, Andrew Murrison, "Neil O'Brien", Mike Penning, Mark Pritchard, John Redwood, Bob Seely, Mark Spencer, Robert Syms, Maggie Throup, Kelly Toohun, Craig Tracey, Martin Vickers, Matt Warman, Craig Whittaker, Mike Wood

Edward Argar, Victoria Atkins, Harriett Baldwin, Paul Beresford, Peter Bottomley, Andrew Bowie, Graham Brady, Robert Buckland, Alex Burghart, Jo Churchill, Colin Clark, James Cleverly, Thérèse Coffey, Oliver Dowden, David Evennett, Frank Field, Lucy Frazer, Roger Gale, Nick Gibb, Cheryl Gillan, John Glen, Richard Graham, Helen Grant, Kirstene Hair, Luke Hall, Greg Hands, James Heapey, Peter Heaton-Jones, Stephen Hepburn, John Howell, Nigel Huddleston, Nick Hurd, Andrew Jones, Gillian Keegan, Seema Kennedy, John Lamont, Patrick McLoughlin, Damien Moore, David Morris, Jesse Norman, Guy Opperman, Jeremy Quin, Mary Robinson, Douglas Ross, Andrew Selous, Alok Sharma, Keith Simpson, Chris Skidmore, Chloe Smith, Mel Stride, Hugo Swire, Tom Tugendhat, Charles Walker, Robin Walker, Nadhim Zahawi

Baron	Fysh	Eustice	Boles	Clarke	Corbyn	Beckett	Cherry	Size	MPs
									Debbie Abrahams, Margaret Beckett, Dawn Butler, Alan Campbell, Nic Dakin, Julie Elliott, Barry Gardiner, Margaret Greenwood, John Healey, Graham P Jones, Barbara Keeley, Karen Lee, Pat McFadden, Alison McGovern, Jessica Morden, Teresa Pearce, Bridget Phillipson, Nick Smith, Mark Tami, Nick Thomas-Symonds
0	0	0	0	1	1	1	0	20	Sarah Champion, Rosie Cooper, Judith Cummins, Jim Fitzpatrick, Yvonne Fovargue, Mike Hill, Kevan Jones, Emma Lewell-Buck, Ruth Smeeth, Laura Smith, Gareth Snell, John Spellar, Derek Twigg, Chris Williamson
0	0	0	0	1	1	0	0	14	Bob Blackman, Maria Caulfield, Robert Courts, Chris Davies, Glyn Davies, Gordon Henderson, Scott Mann, Neil Parish, Derek Thomas, David Warburton
1	1	1	0	0	0	0	0	10	Kevin Barron, Alex Chalk, Oliver Heald, Anne Milton, Victoria Prentis, Rory Stewart
0	0	0	0	1	0	0	0	6	Ronnie Campbell, Kevin Foster, Trudy Harrison, Dan Poulter, Ben Wallace
1	0	1	0	0	0	0	0	5	Michael Fallon, Mark Garnier, Julian Knight, Julian Sturdy
0	1	1	0	0	0	0	0	4	Jonathan Edwards, Ben Lake, Liz Saville
0	0	0	1	0	0	1	1	4	Roberts, Hywel Williams
0	0	0	0	0	1	0	0	3	Caroline Flint, John Mann, Grahame Morris
1	1	1	1	0	0	0	0	3	George Eustice, John Penrose, Andrew Percy
0	0	0	0	0	0	1	0	2	Sam Gyimah, Joseph Johnson
0	0	1	0	1	0	0	0	2	Damian Green, Sarah Newton
0	0	0	1	1	1	0	1	2	Kenneth Clarke, Lisa Nandy
0	1	0	0	1	0	0	1	1	Mark Field
0	0	1	0	1	0	1	1	1	Guto Bebb
0	0	0	1	0	0	1	0	1	Fiona Onasanya
0	0	0	1	0	1	1	0	1	Jim Cunningham
0	0	0	1	1	0	1	0	1	Norman Lamb
0	0	0	1	1	0	0	1	1	Richard Harrington
0	0	0	1	1	0	1	1	1	Ian Murray
0	1	0	1	1	1	0	0	1	Ian Lavery
0	0	1	1	1	0	1	0	1	Antoinette Sandbach
0	0	1	1	1	0	0	1	1	Stephen Hammond
0	0	1	1	1	1	0	0	1	Stephen Kinnock
0	0	1	1	1	1	0	1	1	Stephen Lloyd
0	0	1	1	1	1	1	1	1	Mark Hendrick
1	0	0	0	0	0	1	0	1	Huw Merriman
1	1	0	0	1	0	0	0	1	Andrew Mitchell
1	0	1	0	0	1	0	0	1	Dennis Skinner

Table 3: MPs whose votes do not fit into the unidimensional ordering