The Other Beaker People:
Funerary diversity in Britain c. 2450-1950 BC

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This thesis is submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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January 2020
I, Anna Bloxam, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signed:

Date:
Abstract

In this thesis I present a novel re-examination of the burial practices of the British Beaker period, c. 2450–1950 BC, along with an exploration of how our understandings of the period should be adjusted in light of this new evidence. I compile a new dataset of burials that are atypical for the period, and which have been excluded from previous narratives, in order to demonstrate that the Beaker Phenomenon in Britain was associated with a high level of funerary diversity. I adopt an interdisciplinary approach, using radiocarbon modelling, archaeological and osteological analyses, and genetic data to demonstrate that insular Neolithic cultural practices continued, in a blended and syncretic form, alongside a wide range of incoming cultural practices across the Beaker period. I argue that this blending of diverse cultural traditions is the reason for diversity within the British Beaker phenomenon and provides an explanation for its divergence from continental Beaker-associated traditions. I explore patterning within the diverse Beaker-period burial traditions, and present evidence for regional cultural traditions, age and gender-related social differentiation, extensive Neolithic referencing, and the centrality of bodily disintegration to the different rites utilised in this period.
**Impact Statement**

This thesis has the potential to make a number of impacts both within and outside academia. Within archaeology, the creation of a novel dataset of period-atypical burials provides a new evidence base for reassessing existing understandings of the Beaker phenomenon in Britain. My initial work based on this dataset presents a new of avenues for further development of new perspectives on the Beaker phenomenon, both within Britain and more widely. It also encourages a wider reconsideration of the Beaker transition across different evidence forms. My methodology, particularly the application of chronological modelling, provides an interdisciplinary perspective of period change and cultural trends that cross period boundaries. This could be adapted and applied to the analysis of cultural continuity and change across different periods and places. In particular, the use of summed probability distribution to analyse changing burial practices is novel and has the potential to be used more widely. This work has so far been presented in part at ten academic conferences. Two academic publications have been submitted for publication, with wider dissemination through additional academic publications to follow.

Outside academia, the results of this project provide a contrast to simplistic models of migration, prehistoric narratives of which are frequently referred to for modern political purposes. In particular, the genomic population replacement within Britain previously identified in this period has to date been interpreted as the result of a wave of mass migration; this has been used to play into nationalist and white nationalist narratives, both within Britain and elsewhere in Europe. My finding that populations and cultural practices are diversified and enriched, rather than replaced, by incoming people and cultural practices, could be used to argue against the narratives of genetic essentialism and ethno-cultural warfare in prehistory. The finding that cultural, genetic, and ethnic groups have a deep history of being diverse, blended and syncretic could be disseminated beyond academia through public outreach, including talks and workshops intended for the general public. There is also potential to use this engaging topic as a means of discussing the use and misuse of science and history in public discourse and contemporary politics.
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Acknowledgements

Thanks are due to the many institutions and people who have helped with this research project over the last four years, without whom it would not have been possible.

Firstly, my thanks go to the museums that allowed me to analyse and take samples from the human remains included in this study, and to the many curators who answered my queries and helped facilitate visits. For sampling visits, I would like to thank: Dorset County Museum, and particularly Richard Breward, for access to the Frampton material; Heritage Eastbourne, and particularly Jo Seaman, for access to the Bailey’s Hill material, as well as Chris Greatorex for assisting with queries about the original excavation; Hull and East Riding Museum, and particularly Paula Gentil, for access to Aldro 53, Garrowby Wold 64, and Painsthorpe Wold 83 from the Mortimer collection; Lewes Barnard Castle Museum, and particularly Emma O’Connor, for access to the Pyecombe material; National Museums Scotland, and particularly Alison Sheridan, who provided a sample from Meldon Bridge as well as a radiocarbon determination for the same; Salisbury Museum, and particularly Valerie Goodrich, for access to the Durrington Down W57 material; and Wrexham Museum and curators Karen Murdoch and Jonathon Gammond for access to Brymbo Man.

Several other individuals provided assistance and information about material held within other collections. For facilitating access to Birmingham Museums and Art Galleries I would like to thank Rebecca Bridgman; and especially Mike Hodder, who provided invaluable assistance and expertise during my visits there, as well as Aisling Nash and Deborah Fox at Worstershire HER for their help in trying to locate the missing Bredon Hill remains. In addition, I wish to thank Jody Deacon at the National Museum of Wales, who assisted with queries about Tooth Cave; Lisa Brown at Wiltshire Museum, who assisted with queries about Figheldean; Glynn Davis at Colchester Museum, who kindly went out of his way to try to locate the missing Little Bentley remains; Paul Garwood for unpublished information about Burton Hastings/Wolvey; Linda Wilson at UBSS for her assistance with trying to locate the Corston Lime Kilns Quarry material; and Jessica Cooper-Dunn for assisting with queries about Babraham Road, as well as kindly providing access to unpublished photographic records of the excavation, used here with permission.

This project would not have been possible without the support of funders, and I particularly wish to thank LAHP (AHRC) for granting the studentship that funded most of the work, as well as providing additional awards to fund data collection visits and conference attendance.
to disseminate results. NERC (NRCF) also kindly provided additional funds for radiocarbon
dating, and UCL IoA awards funded further data collection and conference attendance.

I would also like to thank my supervisors, Mike Parker Pearson and Ulrike Sommer, for their
support, encouragement, and constructive feedback throughout this project; it has helped
strengthen my arguments and broaden my focus. Many other people have provided help and
data: huge thanks are due to Andy Bevan and Enrico Crema, who both kindly gave many
hours of their time to answering my R and \texttt{rcarbon} queries, helped me to develop my
methodology, and provided access to unpublished portions of their datasets. Kevan
Edinborough and Mark Lake kindly provided guidance on Bayesian analysis and aoristic
analysis respectively. Rowan McLaughlin provided his time and code, and provided helpful
discussion of the relationship between different methods of chronological analysis. John
Smythe generously provided his unpublished datasets of prehistoric burials in Kent. Neil
Wilkin has provided helpful insights, discussion, and advice. Tom Booth has been hugely
kind and supportive throughout, has given me access to his unpublished data, and has also
been very generous with his time and experience in discussing this research – several sections
owe much to discussion with him.

Beatrijs de Groot has been very generous with her time and I want to thank her particularly
for reading through some of the chapters, as well as for her support throughout, especially
during difficult times. Also at the Institute of Archaeology I would also like to thank Lisa
Daniel, who has been supportive throughout and provided a huge amount of help over the
last few years. Katie Meheux has also gone out of her way to be helpful on many occasions.

I also want to thank my friends and fellow PhD candidates within the Institute who have
kept me going and provided much-needed sanity during the journey: Laura Adlington,
Hannah Bullmore; Sirio Canos Donnay, Ana Franjic, Carlotta Gardner, Jonny Gardner, José
Garay-Vasquez, Aaron Gasparik, Ikram Ghabriel, Beatrijs De Groot, Barney Harris, Shan
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Dom Pollard, Tom Sick, Lucy Sladen, Christine Spencer, Kate Swinson, Paul Tourle, Chloe
Ward, Li Zhang, and Victoria Ziegler – you all made it fun.

Finally, I want to thank my family, particularly Aileen and Mike, for their ongoing support;
and also my dad, whose unconditional encouragement and support have stayed with me.
Chapter One: Introduction

1. The project, its origins and development

This thesis comprises a reanalysis of the burial practices of the British Beaker period and, leading on from this, a reconsideration of the nature of the Late Neolithic–Chalcolithic–Early Bronze Age transitional period in British prehistory. I present evidence for widespread funerary diversity in a period that is traditionally associated with a standardised burial rite, and explore the significance of this for our understandings of the Beaker phenomenon.

I define the ‘British Beaker period’ as the period c. 2450-1950 BC; a range intended to capture the introduction and *floruit* of the Beaker phenomenon in Britain following its spread from continental Europe. The Beaker phenomenon has been the subject of intense study for more than a century and is best known for its distinctive burials, in which the eponymous Beaker vessels are found; a history of British Beaker studies is covered in the next chapter. The British Beaker-associated burial practice is distinctive partly because its homogeneity allows for easy recognition: classic or ‘typical’ Beaker burials are crouched or flexed articulated single inhumations, either covered by a round barrow or in ‘flat’ graves, and accompanied by a characteristic ‘package’ of associated grave goods including the Beaker. It is also distinctive because it marks a clear change from the unaccompanied cremation burials of the preceding Late Neolithic. The advent of the Beaker phenomenon is also associated with wider changes including the introduction of new technologies and sees Britain shift from relative insularity in the Late Neolithic to being part of cross-continental networks of connectivity in the Chalcolithic and Bronze Age. Beaker burials hold extensive interpretive value: the bodies, the burial practices, the grave goods, and the associated traditions of monumental funerary construction have all been used to make inferences about both the nature of the Beaker phenomenon and wider societal changes occurring during this period. These topics will be addressed in more detail in Chapter 2.

This research project was initially intended to answer the question of what happened to cremation practices during the British Chalcolithic. The burial practices of both the preceding Late Neolithic and the subsequent Early Bronze Age are characterised by a predominance of cremation rites; I had suspected that the existing narrative of a 300-year hiatus in cremation during the Beaker period (c. 2450-2150 BC) was more likely a reflection of a typologically-based periodisation of burials than a genuine interruption to the practice. Cremation burials, when excavated, are typically assumed to belong to one of the periods for which they are typologically ‘correct’ – even when their radiocarbon dates are spread across the boundaries
between periods, meaning they could belong to a typologically ‘incorrect’ phase. Prehistoric period boundaries are artificial constructs – culture change is a process, not an event that can fall either side of a date. Previous Beaker research has recognised that not all Beaker burials match the expected image of the ‘typical’ Beaker burial. Clarke’s (1970) corpus of Beaker funerary vessels, for example, lists rare examples of Beaker-associated cremation burials. However, these deviant or ‘atypical’ burials have never been incorporated into theorisations of the period and are, for the most part, ignored as outliers to the expected narrative. On the occasions where atypical Beaker burial practices are considered, specific burials tend to be used as case study examples; no previous research project has provided the broad-scale overview of burial practices that is necessary to contextualise the role of these ‘outliers’ within the practices of the period as a whole.

I had suspected that closer investigation, facilitated by a systematic study of the burial evidence, would reveal greater numbers of cremation burials that could belong to the Chalcolithic, and that these could be used to discuss continuity and change across the relevant period transitions. Early in the research I discovered that the traditional narrative of Beaker burials tended to also exclude evidence for diversity within inhumation rites, and as a result decided to incorporate evidence for all burial practices that deviate from the typical Beaker burial stereotype of a crouched articulated single inhumation, working from an osteological perspective. As such, my work both builds upon and challenges the recent ‘Beaker People Project’, which considered typical Beaker burial only.

However, the publication in 2018 of a major ancient DNA study looking at population dynamics in the Beaker period caused me to re-frame my existing research questions. Olalde et al. (2018) revealed, in a finding that came as a surprise to most researchers of the period, that the arrival of the Beaker phenomenon in Britain was associated with a 90% or more genomic population replacement. As a result, the previous 40 years of Beaker research, since Burgess and Shennan (1976) first suggested that the spread of the phenomenon might be due to the diffusion of ideas rather than a mass migration, needed re-evaluating. My original research questions (what happened to cremation?) were still valid, but now needed to be addressed in a context of the interaction between two or more populations; the incoming Beaker-associated group(s) from the European continent and the pre-existing insular Neolithic people(s) of Britain. Relatively few archaeological responses have yet been published to the aDNA research, and little work has yet been carried to re-evaluate how it may impact previous (archaeological) understandings of the period. This project is therefore one of the first major archaeological re-evaluations of the Beaker period to be carried out in the post-DNA landscape.
1.1. Project approach

My two main foci for this project have therefore been: 1) reconsidering the nature of the burial evidence, and 2) exploring if and how this can help inform our understanding of the cultural and population transitions that occurred in the centuries after 2450 BC (see Chapter 2 for a more detailed chronology of the period). I aim to avoid the constraints of the typological periodisation of burial practices: while it has an important role in broadly characterising the rites of different periods, it tends to result in the stereotyping of evidence from each period, rejection of variability as ‘noise’, and places an emphasis on disjuncture rather than continuity over time. In order to examine the nature of transition and change it is important to avoid assumptions about what the evidence ‘ought’ to look like in any given period and to consider the burial evidence on its own terms.

In terms of the methodological approach, I have sought to provide a multi-disciplinary assessment of the available burial evidence, using archaeological, osteological, and radiocarbon analyses to provide different perspectives that can be drawn together for discussion (see Chapter 4). I have adopted and adapted methods of analysis that have not previously been applied to the burial evidence from this period (or to burial practices elsewhere, to my knowledge), in particular summed probability distribution (SPD) analysis of radiocarbon determinations. I have focused on evidence from the Beaker period of Britain but have placed this within its broader temporal and spatial context, covering the Late Neolithic and Early Bronze Age of Britain as well as contemporary evidence from across continental Europe. While I have used mainstream archaeological (and osteological) methods, the project also contains ‘big data’ analysis (datasets of thousands of radiocarbon determinations) to provide a multiscalar and multidisciplinary analysis of the burial evidence from across the period.

1.2. Original contributions

This project provides a number of original contributions, both in terms of data and findings. Regarding new data, I have carried out several new osteological analyses of remains from Beaker-period burials (as well as some that I subsequently dated to other periods). In some cases my analysis provides the first modern osteological report for the remains, and in others it provides new data to add to existing analyses. In addition, I have obtained new radiocarbon determinations as part of this study (11 funded by NERC; one facilitated by National Museums Scotland and funded by LAHP), providing dates for several burials which had previously been either undated or had only indirect or low-resolution determinations. In some cases the determinations help to clarify the date of different features within sites, and
in others they invite a reanalysis of site chronologies. I have also compiled a new dataset of 272 atypical Beaker-period burials, identified through a systematic search of published and unpublished excavation reports from across Britain. The dataset contains standardised information on a broad range of variables relating to the archaeological and osteological information available for each.

Regarding findings, I have explored and demonstrated the ways in which a range of different spatio-temporal approaches, which have not previously been applied to funerary practices, can provide a robust quantification of ritual change over time. The use of summed probability distribution and aoristic analysis both provide new perspectives on the temporality of funerary rites across period boundaries. The analysis of the osteological and archaeological data for the atypical burials provides new information about the nature of funerary practices in the British Beaker period, in particular revealing widespread evidence for funerary diversity. This thesis presents the first systematic review of the burial evidence and quantifies and qualifies the nature of funerary diversity in this period. Further, the osteological evidence gathered here challenges existing interpretations of the demographic profile of individuals receiving burials in this period. My analyses and interpretations, presented in chapters 5 to 8, contribute to understandings of this period as a whole, and take into account the latest archaeological and genomic information.

1.3. Thesis structure

Following the current introductory chapter is Chapter 2, which explains the topic of research and provides a background to the wider context within which it is situated. It covers relevant aspects of the chronology of the British Late Neolithic, Chalcolithic, and Early Bronze Age, and provides an overview of Beaker burials in Britain and in continental Europe. It covers the current state of research into the Beaker phenomenon and situates the current project within this literature. Following this, Chapter 3 states the research questions that this thesis aims to address.

Chapter 4 provides a detailed methodology for the project and is split into two main sections: osteological and archaeological methods, and (spatio-)temporal methods. Within the first section, I cover my data collection methodology, osteological analysis, and my radiocarbon sampling method. In the latter, I cover the range of approaches I have taken for analysing radiocarbon data, including Bayesian phase analysis, Summed Probability Distribution, two approaches to Kernel Density Estimation, and aoristic analysis. I also cover the methods used for mapping.
The next three chapters present the results of my analyses. Across each, results are presented for Britain as a whole as well as for three comparative case study regions: Eastern Scotland, the area around the Yorkshire Wolds, and Wessex (Figure 1.1). Chapter 5 presents the results of the various temporal and spatio-temporal analyses of the burial radiocarbon data, incorporating cross-comparison and discussion of the similarities and differences between the results for each method. The chapter ends with a consideration of the evidence for changes to population levels in this period, assessed using the same methods. Chapter 6 presents the results of the archaeological analysis of the 272 atypical Beaker-period burials identified through this project. It covers variation in treatment of the body, burial sites and monuments, below-ground structures and containers for the body, and associated grave goods, including Beakers. The results are discussed, and their significance considered, throughout the chapter, with key points being referred for further discussion later in the thesis. Chapter 7 presents the osteological results for the burials, where this is available. It covers the demographic profile of the individuals found in typical and atypical burials, the minimum number of individuals present in burials, and the evidence for pathological and traumatic changes on the remains.

Chapter 8 draws together the findings of the three results chapters into two sections, addressing the research questions raised in Chapter 3. The first section deals with the nature of Beaker period funerary diversity. It covers discussion points raised in the previous three chapters, including the evidence for fragmentation of the body, the role of grave goods, and the expression of different social roles through burial rites. The second section forms a discussion of what the evidence presented in the previous three chapters can tell us about the nature of continuity and change in Britain across the Beaker transition, in terms of both culture and population. The final chapter, Chapter 9, brings together conclusions from the research and provides suggestions for several future directions that would build on these findings.

Following this, a printed appendix (Appendix I) contains a list of the burials included in this project. On CD, four further appendices contain: the project database; a list of sites considered for inclusion but ultimately rejected; a list of sources searched systematically during data collection; and the results of new osteological analyses.
Figure 1.1 – The three case study regions used in this study
Chapter Two: Background

2. The Beaker Phenomenon: a brief history of research

The origins of the study of the Beaker phenomenon in Britain can be traced to the early 19th century, when ‘drinking-cups’ were first identified as a distinct type of prehistoric pottery that was most commonly found in burial contexts (Colt Hoare, 1812). Following an early attempt at stylistic subdivision by Thurnam (1871), Abercromby (1912) coined the term ‘Beaker’ for these vessels (in contrast to the later Early Bronze Age style he referred to as ‘Food Vessels’) and devised a more complex typology. As is suggested by the name, Beakers were initially presumed to be personal drinking vessels; the label has stuck, despite there being little evidence to support this suggestion (Guerra-Doce, 2006; Šoberl et al., 2009). Since this early research, the British Beaker typochronological sequence has been refined – or completely re-invented – by successive authors including Clarke (1970), Lanting and van der Waals (1972), and Boast (1995). The most recent typochronology is that of Stuart Needham (2005), who takes into account the radiocarbon-dating evidence to produce a scheme of ceramic development that is tied into wider archaeological changes seen across Britain in the 3rd to 2nd millennia BC.

From the earliest studies onwards, Beakers have been recognised as belonging to a pan-European tradition or culture, now referred to in the British archaeological tradition as the ‘Beaker phenomenon’ (Figure 2.1). Beakers, or Bell-Beakers as they are most commonly referred to in continental European archaeological traditions, to differentiate them from other Neolithic and Bronze Age forms (which are not found in Britain), are found across western, southern and central Europe and into northwest Africa (Abercromby, 1912, pp. 9–16; Turek, 2012; Vander Linden, 2007). Though the Beaker phenomenon is not uniform across this range, it shares enough common features to be distinctive and recognisable in the archaeological record. In most regions, Beakers are found primarily in burial contexts, with limited evidence for contemporary domestic or settlement sites (for Britain see Gibson, 1982, 2019). As a result, the domestic world of Beaker-period Britain is relatively poorly understood, and most interpretations of the period, by necessity, rely heavily on the evidence obtained from burials (Parker Pearson, 2018).
The British Beaker burials have long been recognised as containing an associated range of other, related, grave goods (Abercromby, 1912, pp. 52–63; Clarke, 1970, pp. 447–8). Now commonly referred to as the ‘Beaker package’, following Burgess and Shennan (1976), the Beaker-associated artefacts comprise a variety of tools, weapons, and personal ornaments which are collectively seen as symbolic of the wider Beaker phenomenon (Figure 2.2). The Beaker package is not complete in every burial; rather it is seen to represent a network of associations, with the presence of some objects from the group referencing the wider concept of the Beaker burial (Barrett, 1994; Clarke, 1970, p. 448; Needham, 2005, pp. 200–201).
However, the items included within the Beaker package varies between countries and between authors and has broadened slightly over time as more burials have been excavated. In order to avoid pre-emptively deciding which artefacts form a package among the atypical burials, I have used a longer list of all known artefact types associated with Beaker-period burials (Table 2.1). This includes some artefacts that form part of the classic Beaker package but also a wide range of more unusual or more mundane objects. For the identification of these artefacts I have largely followed the Beaker People Project’s list of artefacts (and categorisations of these) as this forms the most complete list available (see Parker Pearson et al., 2018b, pp. 172–99; which expands on the categories used by Woodward and Hunter, 2015).

Some Beaker package objects occur frequently: flint flakes, tools, and arrowheads, and tools of bone and antler are some of the most commonly found grave goods (Clarke, 1970, p. 448; Parker Pearson et al., 2018b). These artefacts are all made of materials that survive relatively well in the burial environment: organic materials, including skins, hides, woven fabric, and basketry are occasionally known from burials with exceptional preservation and may be missing components of the Beaker package as it appears archaeologically (Jones, 2017; Lelong, 2014).
<table>
<thead>
<tr>
<th><strong>Table 2.1 – Artefacts associated with Beaker burials in Britain</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>Weapons (including ceremonial weapons and weapon accoutrements)</strong></td>
</tr>
<tr>
<td>Flint arrowheads (barbed-and-tanged)</td>
</tr>
<tr>
<td>Stone wristguards (or bracers)</td>
</tr>
<tr>
<td>Copper and bronze daggers and knives, including pommels</td>
</tr>
<tr>
<td>Flint daggers</td>
</tr>
<tr>
<td>Stone battle-axeheads and mace-heads</td>
</tr>
<tr>
<td>Weapon: Other</td>
</tr>
<tr>
<td><strong>Tools</strong></td>
</tr>
<tr>
<td>Bronze axeheads and axehead-chisels</td>
</tr>
<tr>
<td>Flint tools and flakes (inc. knives, scrapers, strike-a-lights)</td>
</tr>
<tr>
<td>Spatulæ and rods of antler and bone</td>
</tr>
<tr>
<td>Copper and bronze awls</td>
</tr>
<tr>
<td>Bone points</td>
</tr>
<tr>
<td>Tool: Other</td>
</tr>
<tr>
<td><strong>Ornaments</strong></td>
</tr>
<tr>
<td>Bone and antler toggles Dress pins of bone and antler</td>
</tr>
<tr>
<td>Pig tusks</td>
</tr>
<tr>
<td>Dress pins of copper, bronze, bone and antler</td>
</tr>
<tr>
<td>Rings (belt, pulley belt, ribbed) of bone, jet, shale and amber</td>
</tr>
<tr>
<td>Gold ornaments</td>
</tr>
<tr>
<td>Copper and bronze ornaments (excluding pins)</td>
</tr>
<tr>
<td>Buttons of jet, lignite, shale, gold and amber</td>
</tr>
<tr>
<td>Studs of fired clay, jet, shale, lignite, stone, and wood</td>
</tr>
<tr>
<td>Necklaces</td>
</tr>
<tr>
<td>Ornament: Other</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
</tr>
<tr>
<td>Objects of osseous materials and unworked animal bones</td>
</tr>
<tr>
<td>Miscellaneous stone objects</td>
</tr>
<tr>
<td>Shells and fossils</td>
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<tr>
<td>Organic remains</td>
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<tr>
<td>Misc: Other</td>
</tr>
<tr>
<td><strong>Other</strong></td>
</tr>
<tr>
<td>Charcoal</td>
</tr>
<tr>
<td>Cramp or fuel ash slag</td>
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</tbody>
</table>

It is, however, the far rarer gold ornaments and copper daggers that tend to attract greater attention (see Woodward and Hunter, 2015 for details of many Chalcolithic and Early Bronze Age grave good types). The metal artefacts associated with the Beaker phenomenon are the earliest to appear in Britain, with their arrival bringing about the end of the British Neolithic and the start of the Chalcolithic (Needham, 2012). While the arrival of the Beaker phenomenon represents a clear shift in some areas of archaeological evidence, most notably burial practices and certain artefact types, the patterns of similarities and differences seen after the appearance of the Beaker phenomenon varies across Europe. There are regional variations both in its expression and in the extent to which pre-existing practices and material cultural forms are retained or adapted when the Beaker phenomenon appears (Bartelheim and Krauß, 2012; Czebreszuk, 2004; Needham, 2002; Salanova, 2001).
While the Beaker package is easily recognisable, how it should be interpreted is still debated. Many authors have considered Beaker burials to represent formalised displays of wealth and status, with rare or otherwise precious artefacts reflecting exchange networks of prestige goods (Heyd, 2007, pp. 101–2; Shennan, 1982; Thorpe and Richards, 1984). However, a focus on competition and individualism reflects modern capitalist understandings of the concepts of prestige and status and may result in misleading and anachronistic interpretations of the evidence (Brück, 2019, pp. 3–5). Explanations focusing on the ‘prestige’ element of certain grave goods fail to explain the recurring associations between the highly circumscribed selection of objects that forms the Beaker package, or why these were placed almost exclusively in highly standardised burial contexts in particular locations (see Fokkens, 2012a). Most burials do not contain the ‘high-status’ gold and copper artefacts often associated with this period, and a focus on those that do can result in a reductionist view of the evidence that limits our understanding of the attributes and meanings of the less dramatic ‘everyday’ artefacts that are more commonly associated with bodies in this period (Brück, 2019, pp. 5–7). More recent interpretations have tended to consider that artefacts within the Beaker package may have had particular symbolic significance (Thomas, 1991). Interpretations of aspects of the Beaker package include that it may portray an idealised masculine warrior identity (Heyd, 2007), that it represents symbolic hunting imagery (Case, 2007), that it references a symbolic or real journey through the afterlife (Teather and Chamberlain, 2016), or that it reflects a shared pan-regional understanding of cosmology (Carlin, 2018, pp. 210–11).

The reasons for and method of the spread of the Beaker phenomenon across Europe have also been debated throughout the history of Beaker studies. In some cases the theorised significance of the Beaker package artefacts has played into these narratives. However, in many cases wider theoretical trends affecting the discipline as a whole, not to mention the wider political climate within which researchers are operating, have been played out with respect to the Beaker evidence (see Anthony, 1997). The Beaker package is first seen in continental Europe in the early-to-mid 3rd Millennium BC, though the region of origin for the phenomenon, should such a single point exist, is still not conclusively resolved: the Rhine Valley in the Netherlands (Lanting and van der Waals, 1976; van der Beek and Fokkens, 2001) and the Tagus Estuary in Portugal (Harrison, 1988; Müller and van Willigen, 2001) are the two main ‘camps’ in this debate (see discussion in Vander Linden, 2006, pp. 10–14). The reliability and relevance of many of the earliest continental Beaker dates has been questioned, as has the attribution of some of the early finds to the Beaker phenomenon rather than earlier cultural traditions; and each region claims to have the earliest evidence on different grounds.
An origin in the Rhine valley has perhaps been favoured more in the international literature (e.g. Vander Linden, 2012a, p. 22), though by no means universally so (e.g. Fitzpatrick, 2013).

Following its initial appearance, the Beaker package spread rapidly across Europe, with modelled radiocarbon dates for Beaker-associated burials indicating that it probably reached Britain in 2475–2360 cal. BC (Jay et al., 2018). Its spread was historically considered to be indicative of the spread of the group of people who used Beakers (and who were placed in Beaker burials). These ‘Beaker folk’ were conceptualised under the culture-historical paradigm as a ‘race of invaders’ (Bradley, 1909, p. 54), ‘energetic conquerors’ (Hawkes and Hawkes, 1947, p. 54), or successive ‘contingents of intruders’ (Childe, 1950b, p. 321). The ‘Beaker Culture’ was therefore seen to spread across Europe as the result of migratory activity by a people who were perceived to be in some way (culturally or perhaps ethnically) suited to conquering swathes of territory and reproducing their own culture in new regions. The suggestion that the appearance of the Beaker phenomenon in Britain was associated with a change in population appeared to be supported by craniological studies indicating that the individuals in Beaker burials under round barrows were morphologically distinct from those buried in Neolithic long barrows (Thurnam, 1871).

This equation of ‘pots with people’, the assumption that the spread of an archaeological culture necessarily indicates the movement of a people, was problematized by the New Archaeology from the 1960s onwards (Vander Linden and Roberts, 2011, pp. 29–31). Clark (1966) identified this shift as it was occurring and suggested that the shift away from the earlier ‘invasion neurosis’ should be seen as part of wider attitudinal shifts within Britain. It was suggested that the spread of archaeological cultures could instead be interpreted as the movement of ideas and practices. Though the origin of the Beaker culture in Britain was still seen to involve some migratory activity, its development could be seen as ‘the product of indigenous growth’ (Clark, 1966, p. 178). The possibility that people would adopt elements of new cultures if the conditions were favourable removed the need for a race of invading Beaker folk, and allowed for the Beaker package artefacts and practices to be spread through exchange and trade and adopted by the existing peoples of each region (Burgess and Shennan, 1976; Clarke, 1976).

The idea that the spread of the Beaker package primarily indicates the movement of ideas has since been developed into a range of different explanatory theories. The phenomenon may have spread, for example, due to the exchange of marriage partners, who introduced new ideas into their new communities (Brodie, 2001); as part of the re-establishment of
exchange networks with groups in continental Europe following a period of relative insularity in the British Late Neolithic (Wilkin and Vander Linden, 2015); or as the gradual result of interaction and exchange at different cultural ‘frontiers’ across Europe (Needham, 2007). Several other theories exist, most of them proposing a small component of human movement – particularly of mobile craftspeople, smiths, or metal prospectors – and a larger component of ideological shifts occurring beyond these mobile populations (see Vander Linden, 2012a).

Archaeological evidence for this small component of human movement in the Beaker-period has been sought out using a variety of approaches. Similarities between burials and Beakers in the Netherlands and Scotland have been argued to support localised migratory activity (for example, Sheridan, 2008). Isotopic analyses of skeletal and dental remains from Beaker-package-associated burials have also provided strong evidence for occasional long-distance migrants in the Beaker period. Analysis of Strontium and Oxygen stable isotopes revealed that the Amesbury Archer, an adult male in an unusually well-furnished burial in Wiltshire, may have originated in the Alps (Fitzpatrick, 2011). The Beaker People Project (BPP) has also found evidence for a small number of long-distance ‘isotopic migrants’ (Parker Pearson et al., 2016; Pellegrini et al., 2016). These findings correspond with similar results for individuals from Beaker burials on the continent (Price et al., 2004).

However, a large aDNA study published in 2018 revealed that theorisations of the Beaker phenomenon advanced over the last 50 years may have vastly under-estimated the scale of human mobility associated with its spread; this appears to be particularly the case for Britain (Olalde et al., 2018). The genetic analysis of 37 Beaker-associated and 51 Neolithic individuals from Britain revealed that a minimum 90±2% genomic population turnover occurred during the course of the Chalcolithic and Early Bronze Age (Figure 2.3). The dramatic shift away from the genetic signature of the Neolithic inhabitants of Britain indicates that an influx of people must have occurred during this period (from c. 2500-1500 BC).
Figure 2.3 – Modelled genomic admixture between British Neolithic populations and incoming Beaker-associated groups across the British Neolithic and Early Bronze Age. Modified from Olalde et al. (2018, fig. 3)
The genomic signature of the Chalcolithic and Bronze Age samples in the Olalde study is indicative of admixture between the pre-existing Neolithic inhabitants of Britain and an incoming group of people who shared genetic affinities on a population level with Beaker-associated groups in the Netherlands (ibid.). According to the authors this genetic signal spread westwards across Eurasia from a Steppe origin, likely in association with the westwards expansion of Yamnaya and later Corded Ware-associated peoples (ibid.). The very earliest Beaker-associated individuals in Britain carried a mixed genetic signature, though during the early Beaker period there was more variability in terms of the precise level of admixture between individuals. By the Early Bronze Age, around 300 years later, all individuals included in the study show a consistent level of population admixture, with the ‘incoming’ Beaker-phenomenon-associated DNA representing a stable 90±2% of their genomes (ibid.).

The results indicating a dramatic population shift in Britain are not typical for the arrival of the Beaker phenomenon in all areas: the extent of genomic change associated with culture change also varies both within and between European regions (Olalde et al., 2018). Some areas, such as the Iberian Peninsula, display a far lower level of genetic turnover in association with the beginning of the Beaker phenomenon, with a much lower proportion of Steppe-derived ancestry being identified. In other places, such as Hungary, the study found evidence for a high variability in the proportion of Steppe-derived ancestry between contemporary individuals at the same sites, in contrast to the British samples’ relative homogeneity (ibid.). The aDNA evidence for the British Beaker burials will be returned to and considered further in Chapter 8.

Several aDNA studies have also found, for Britain and for elsewhere in Europe, that the Beaker transition is associated with a sex-biased genomic shift, with many areas seeing a near-total replacement of existing Y-chromosome haplogroups by the R1b haplogroup (Goldberg et al., 2017a; Olalde et al., 2018, 2019). It is possible that this latter finding is the result of migrating groups being strongly male-dominated (Goldberg et al., 2017a). This would follow the general rule of migration as being “a behaviour that is typically performed by defined subgroups (often kin-recruited) with specific goals” (Anthony, 1990, p. 895). The BPP found evidence for both male and female Early Chalcolithic long-distance isotopic migrants (in very small numbers), indicating that the patterns of human mobility associated with the first appearance of the Beaker phenomenon in Britain do not reflect only male activity (Parker Pearson et al., 2018a, p. 451). In terms of shorter-distance migration during the period, for which the BPP found much greater evidence, there are no sex differences between mobile and non-mobile individuals (ibid.). Snoeck et al. (2018) recently demonstrated that strontium
isotopes can be used to assess patterns of mobility among individuals who have been cremated: though their initial study examined only 25 individuals buried at Stonehenge, they found that ten of these were ‘non-local’ to the Wessex chalk. This may indicate that within-Britain mobility was equally common within the British Late Neolithic, though given the exceptional nature of the burial site it should also be considered that particular individuals (who may or may not have had mobile lifestyles while alive) were transported long distances for burial at this location.

This matches the findings of Price et al. (2004), who found that Beaker-associated individuals from across central Europe of all age and sex categories were equally likely to show isotopic evidence of translocation. The BPP combines long- and short-distance isotopic ‘movers’ in their quantification of mobility during the period. While short-distance movement practices such as transhumance may have played a role in the spread of the Beaker phenomenon within Britain, it should not be assumed that this form of mobility is related to the initial spread of the phenomenon. A punctuated pattern of movement, with short-distance mobility interspersed with long-distance ‘leaps’ or ‘Lévy flights’ by ‘colonising pioneers’ could potentially have played a key role (Anthony, 1990, pp. 901–2; Shennan, 2018, p. 58).

That the arrival of the Beaker phenomenon in Britain involved some degree of migration from the continent is clear from the genetic evidence. However, the human scale of this migratory activity is as yet still unclear. Loog et al. found that spatiotemporal modelling of large-scale Western Eurasian genetic datasets indicates that the start of the Beaker period saw a higher level of human mobility than any previous point in time, including the Neolithic transition (Loog et al., 2017, fig. 4; see 5000-4500 BP, referred to in text as the start of the Bronze Age). This supports the suggestion of very high levels of mobility across Europe during this period. However, the British archaeological evidence does not appear to reflect a large-scale invasion as was envisaged in the early culture-historical accounts of the Beaker phenomenon (Furholt, 2018; Wilkin and Vander Linden, 2015). While high levels of inward migration are still possible, alternative mechanisms by which the population could have been replaced should also be considered. Thomas et al. (2006) demonstrate, for example, that the genomic transition associated with another putative invasion, that of Anglo-Saxon immigration into 5th-century AD Britain, could have resulted from differential reproductive success between the incoming and pre-existing populations, rather than a massive migration. The incoming Beaker-using groups could similarly be hypothesised to have had a reproductive advantage over the insular Neolithic population, which could have resulted in the incomers becoming the numerically, genetically, and culturally dominant group, even if relatively few individuals actually migrated into Britain (see Needham, 2007). These reasons
have been suggested for the similar finding that incoming Early Neolithic farming groups genetically replaced the pre-existing Mesolithic peoples of Britain during the Neolithic−Mesolithic transition (Brace et al., 2019). Several authors have considered the role of marriage exchange networks in the spread of the Beaker phenomenon (Brodie, 1997, 2001; Needham, 2005, pp. 207–8; Vander Linden, 2007). Tied in with the evidence for Y-chromosome haplogroup replacement alongside continued mitochondrial DNA diversity (Olalde et al., 2018), it is possible to suggest that reproductive success of the incoming group could have been influenced (or compounded) by preferential access to female marriage partners from both the incoming and indigenous populations.

Alternatively, the replacement could have been in part a product of the relative scale of the populations: if the Late Neolithic insular population was small in number and sparsely distributed, they could have been absorbed into the incoming group without the need for the separate population structures posited by Thomas et al. (2006). The nature of the Late Neolithic and Beaker period evidence, with relatively small numbers of individuals present in burials and limited evidence for contemporary settlement sites, means that the relative population size for the two periods cannot readily be estimated using osteological approaches (see Duffy et al., 2019; Ubelaker, 1974). Stephen Shennan has developed Rick’s (1987) method of assessing relative fluctuations in population size using the summed probability of radiocarbon dates for human activity: if the level of dated human activity increases this is taken to indicate an increase in population, and vice versa (Shennan, 2013). Using the summed probability method, Stevens and Fuller (2012) show a shift in the Middle Neolithic away from cereal cultivation that can be associated with a contemporaneous decline in population levels. Bevan et al. (2017) further show that the effects of this decline persisted throughout the Late Neolithic, with population levels continuing to be significantly lower than predicted until the arrival of the Beaker phenomenon. The role of population size in the Beaker transition will be considered in more detail in Chapter 5.

One problem with establishing the human scale of inward migration, and thus the most likely mechanisms involved in the observed genomic transition, is that the rate at which the population transition occurred is unclear. While the earliest appearance of the genomic signature of continental Beaker-using groups can be modelled using the radiocarbon dates for their burials, the delay between these first appearances and the dominance of the associated genotype in the British material is uncertain. The population transition could have been relatively sudden at the beginning of the Chalcolithic (implying a more dramatic event, such as a large inwards migration, invasion, or the decimation of the insular population) or
the result of a more gradual and prolonged process (suggesting a difference in the initial size of the populations or in their reproductive success over time).

In recent years an additional causative factor behind prehistoric migration has been suggested, which could tie into either of these possibilities: *Yersinia pestis*. Genetic analysis by two different research groups has revealed the presence of *Y. pestis* (plague) bacteria in individuals from Beaker-associated and earlier Corded Ware-associated graves (Andrades Valtueña et al., 2017; Rascovan et al., 2019; Rasmussen et al., 2015). Both groups suggest that the plague bacteria spread across western Eurasia in association with the multi-regional Corded Ware Complex, though disagree if it was more likely linked to a westward migration of these peoples (Andrades Valtueña et al., 2017) or cross-Eurasian contacts facilitated by the long-distance trade networks in use at this time (Rascovan et al., 2019). Both teams agree that *Y. pestis* had not yet mutated to its bubonic form and was likely spread person-to-person in its pneumonic form instead. It is possible to consider the role of endemic *Y. pestis* in Neolithic Eurasian populations as a potential ‘push’ factor in mass migration: people moved to escape the disease (and of course took it with them). However, the data uncovered by each team do not support this, and instead lend weight to the postulated ‘slow’ processes of genomic change. Firstly, the effect of endemic plague would be to reduce the population level in affected communities: this could lead to, or at least be a factor in, the population decline seen in the Middle Neolithic that may have led to a disparity in population sizes at the Beaker transition (Rascovan et al., 2019). In addition, populations with longer histories of plague exposure would have higher levels of resistance to the pathogen: this effect is seen in modern European populations; the descendants of those who survived the black Death (Laayouni et al., 2014). As a result, incoming Beaker-using groups from continental Europe would likely have had a higher level of resistance to diseases they brought with them than would the insular Neolithic population, who had been relatively isolated from continental Europe for several hundred years. Though plague may have played a role in both the Neolithic decline and the Beaker transition, there have not yet been any studies demonstrating its presence (or prevalence) within prehistoric Britain. As such, any potential role of endemic disease in these processes must remain speculative.

Olalde et al. (2018) provide an additional factor that may affect our understandings of the timing (and process) of the Beaker transition. They note that if different burial traditions were being practiced by different populations during the Chalcolithic (with the incomers inhuming their dead and the insular groups cremating), there would be a resulting sampling bias against the ‘local’ individuals which would exaggerate the apparent speed of the genomic transition (Olalde et al., 2018). This scenario would be unlikely to account for any long-term
sampling bias, as it would require the insular population to remain genetically isolated when it is clear from the genetic evidence that the groups interbred to some extent. However, it is possible from the genetic evidence that some separate insular groups persisted for a short time, until the Early Bronze Age, allowing for a transition to occur over centuries rather than decades (see Booth, 2019, pp. 4–5).

The BPP's isotopic analyses have identified few first-generation migrants among Beaker-associated burials (Parker Pearson et al., 2018a). Of the 21 Beaker-associated burials dating to the Early Chalcolithic included in the study, seven (33.3%) appeared likely to have migrated to Britain from the continent during their lifetime (ibid. pp.445-7). Few potential continental migrants were identified dating to the Late Chalcolithic or Early Bronze Age, with the adult male Sk200 from Bee Low being the only probable example (Montgomery et al., 2018, p. 401). This suggests that the main phase of inward migration may have been relatively short-lived, with long-distance migration into Britain being less common after an initial phase of higher activity. This would indicate that even if the initial genetic input was through large-scale migration, the subsequent genetic homogenisation of the population was an insular process. It should also be considered that, in the absence of a study looking for continental evidence of long-distance migrants from Britain, the extent, timing, and persistence of long-distance migration outwards from Britain (or return migration) is unknown (Anthony, 1990, pp. 904–5).

The most recent trend in Beaker studies responds to recent aDNA papers (and media portrayal of their findings). There has been concern among researchers in the field that the recent wave of aDNA studies, many of which have indicated a link between genomic change and culture change, could lead to the re-adoption of simplistic and potentially harmful culture-historical narratives for the period (Heyd, 2017; Hofmann, 2015). Concerns have been raised that equating ‘pots with people’ in the current political climate, with added modern legitimacy lent by the involvement of genetic data, can play into present-day ethn-nationalist narratives (Heyd, 2017), be (mis)appropriated for unintended political ends (Brophy, 2018), and can be used to lend support to far-right ideology (Hakenbeck, 2019). Brück (2019, p. 240) points out that even when not actively misused, the Bronze Age plays an active role in our contemporary origin myths; the way it is presented has modern-day implications. Geneticists working with the material have noted the need for care to be taken when naming genetic clusters in order to avoid the equation of genetic and cultural groups (Eisenmann et al., 2018). It has also been noted, however, that the same process of politicisation has occurred with the archaeological study of cultural groups prior to the involvement of aDNA research: placing the blame on genetics can lead to complacency.
about the role of archaeologists in the consequences of our work (Booth, 2019, pp. 11–12; Chapman and Hamerow, 1997; Richardson and Booth, 2017; Shennan, 1989, 1991). My research seeks to address the changing burial rites across the Late Neolithic, Chalcolithic, and Early Bronze Age without tying these to the practices of any one group of people, whether defined by their ‘culture’ or genetics. Instead, I explore the syncretic practices that emerge during a period of transition and interaction within a diverse mixed-origin society.

2.1. Chronology of the British Late Neolithic to Early Bronze Age

The appearance of the Beaker phenomenon and its associated metal artefacts marks the end of the British Neolithic – though whether the initial Beaker-using phase should be considered a separate ‘Chalcolithic’ or Copper Age is the subject of some disagreement among researchers (see papers in the edited volume ‘Is there a British Chalcolithic?’: Allen et al., 2012). The modelled earliest date for Beaker burials in Britain is 2475–2360 cal BC (at 95% probability), though I use c.2450 BC as the start of the Beaker period as a shorthand for this (Parker Pearson et al., 2016, p. 622). It is likely that this modelled start date is later than the actual first arrival of Beaker material culture in Britain, and the people who carried and made the objects characteristic of the Beaker package, for two reasons. Firstly, the nature of Bayesian phase modelling, the process by which the modelled start date has been calculated, tends to restrict the chronological range of the features being dated; this will be explained further in Chapter 4 and its effects will be demonstrated in Chapter 5. The second reason is that it is unlikely that the very first instances of Beaker burials have been excavated or radiocarbon-dated. Fokkens (2008, 2012b) discusses Rogers’ (2003) concept of ‘critical mass’ in the diffusion of innovations as it applies to the archaeological detection of culture change. Fokkens argues that archaeological cultures will not be visible until the ‘visibility phase’ of their adoption trajectory, after a critical mass of adoption has been reached (Figure 2.4). From this point the sharp increase in adoption will likely be seen archaeologically as a migration or a ‘revolution’ (Fokkens, 2008, p. 19).

In Britain, there has been limited discussion of the nature of the transition between the Late Neolithic and the Chalcolithic. Although the mechanisms of the spread of the Beaker phenomenon have been intensively researched, what occurred immediately after its arrival in Britain is somewhat under-theorised. The Neolithic to Chalcolithic transition is often discussed as if it were an event rather than a process. This can be contrasted with the Mesolithic–Neolithic transition, at the other end of the Neolithic, the process of which has received much greater scrutiny (significant contributions from the last year include: Ray and Thomas, 2018; Shennan, 2018; Whittle, 2018). The discussion of the role of indigenous
acculturation compared to exogenous change in the Neolithic, along with the role of new aDNA results in this debate (see Brace et al., 2019), can be used to directly inform suitable approaches to take when assessing the Beaker transition.

It is possible to highlight some of the key areas of similarity and difference before and after the watershed of c.2450 BC. Monumental and domestic architecture traditions appear to have remained unchanged across the transition, though it should be noted that there are few published domestic structures across most of Britain that can be dated to this period (Gibson, 2019). However, there are clear changes in burial practices and funerary monuments, as well as in material culture and technologies between the Late Neolithic and the Chalcolithic/Early Bronze Age (see Needham, 2005, Table 1.8 for a brief summary). There is also a notable shift in the apparent quality and quantity of trade and exchange networks. In the Late Neolithic, Britain (along with Ireland) appears to have been relatively inward-looking and isolated from mainland Europe, whereas the arrival of the Beaker phenomenon marks its incorporation into long-distance networks across continental Europe, which last throughout the Chalcolithic and Early Bronze Age (Bradley et al., 2016, pp. 115–117; Vander Linden, 2012b; Wilkin and Vander Linden, 2015, pp. 100–107).

![Figure 2.4 – The adoption of archaeological innovations, redrawn figure combining Fokkens (2008, fig. 2.6) and Rogers (2003, fig. 8.5)](image)

Late Neolithic burial practices are, in comparison to those of the Beaker period, poorly understood; few burial sites have been examined in great detail. Those that date to the end of the Neolithic (post-3000 BC, but particularly in the centuries immediately prior to 2450 BC) tend to be cremation burials, with no associated grave goods, and are often deposited at
large ceremonial monuments: Stonehenge (Willis et al., 2016), Dorchester-on-Thames (Whittle et al., 1992), and Forteviot (Noble and Brophy, 2017) all have large numbers of Late Neolithic cremation burials. Radiocarbon-dating schemes do on occasion identify Late Neolithic inhumation burials. These can be found under round barrows, including Duggleby Howe (Gibson and Bayliss, 2009), in caves such as Totty Pot (Schulting et al., 2010), and in chambered tombs such as Isbister (Olalde et al., 2018 SI 3, pp.56-8). However, cremation still appears to be the most common of the archaeologically-visible rites for this period, and it is arguably the burned, fragmentary, and unaccompanied nature of these burials that has led to them being under-researched.

I refer to the period immediately following the Late Neolithic, when Beaker burials were current, as the ‘Beaker period’. The Beaker period can be subdivided into shorter phases; in particular it is possible to separate the Chalcolithic from the Bronze Age proper, the latter beginning around 2200 BC. I follow Stuart Needham’s chronology, which divides the Chalcolithic and Early Bronze Age into numbered ‘periods’ (Table 2.2). Period 1 is the Chalcolithic, in which Beaker burials are first seen to appear in Britain. The earliest dated Beakers appear in a small number of locales: Wiltshire probably sees the earliest burials, followed closely by Hampshire, Aberdeenshire, and Oxfordshire (Jay et al., 2018). Though these earliest burials are found only in a small number of areas, the earliest evidence in England (in Wiltshire) and Scotland (in Aberdeenshire) appears to be roughly contemporaneous. This suggests that Beaker presence reached critical mass in these regions sometime in the 24th or 25th century BC. These early regions could represent the ‘islands of settlement’ formed by a leapfrogging migration pattern – as opposed to the gradual spread of a wave-of-advance (Ammerman and Cavalli-Sforza, 1973; Anthony, 1990, pp. 902–3). However, though the phenomenon appears slightly later in other regions, it is possible that it was already present at sub-critical-mass levels at this early stage in a wider spread across Britain. Needham describes the small numbers of Beaker burials in this early phase as reflecting a “circumscribed, exclusive culture,” which accords well with the start of the ‘visibility phase’ in Fokkens’ model (Fokkens, 2008, p. 19; Needham, 2005, p. 209).
Table 2.2 – Chronological overview of the study period in relation to the Beaker phenomenon (adapted from Needham, 2012, p. 9, table 1.2; and Needham et al., 2010a, p. 365 table 1).

<table>
<thead>
<tr>
<th>Needham period</th>
<th>Cal. BC</th>
<th>Period</th>
<th>Beaker sequence</th>
<th>Predominant burial rite</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cremation</td>
</tr>
<tr>
<td>1</td>
<td>2450-2300</td>
<td>Chalcolithic</td>
<td>Pioneering</td>
<td>Inhumation</td>
</tr>
<tr>
<td></td>
<td>2300-2200</td>
<td></td>
<td></td>
<td>Fission horizon</td>
</tr>
<tr>
<td>2</td>
<td>2200-2150</td>
<td>Chalcolithic/EBA</td>
<td>Floruit</td>
<td>Inhumation</td>
</tr>
<tr>
<td></td>
<td>2150-1950</td>
<td>Early Bronze Age</td>
<td>Floruit</td>
<td>Inhumation</td>
</tr>
<tr>
<td>3</td>
<td>Post-1950</td>
<td>Early Bronze Age</td>
<td>(Late use/reuse)</td>
<td>Cremation</td>
</tr>
</tbody>
</table>

Following this initial phase there is what Needham (2005) terms a ‘fission horizon’, where the presence of Beaker burials becomes more common, spreads geographically to incorporate new regions of Britain, and the forms of the Beaker ceramics themselves begin to diversify into a wider range of subtypes (Figure 2.5).

The date for the fission horizon is less clearly defined but appears to be broadly in the 23rd century BC, i.e. around 200 years after the first appearance of the phenomenon in Britain (Needham, 2012, p. 11; revised from estimates in Needham, 2005 and Needham et al., 2010a of the 22nd/21st centuries BC). The timing of the British fission horizon corresponds well with the diversification of Beaker practices elsewhere in Europe (Wilkin and Vander Linden, 2015, p. 112).

Following this is period 2, which sees the Beaker floruit, the peak of the Beaker phenomenon in Britain; the phase to which most Beaker burials can be dated (see Jay et al., 2018). Period 2 lasts from the end of the fission horizon to around 1950 BC and encapsulates the Chalcolithic to Early Bronze Age transition. Needham describes this phase as ‘Beaker as instituted culture’, and argues that it is within this phase that ‘Beaker cultural values, both material and conceptual, insidiously overcome pre-existing values and become the prevailing cultural ethos’ (Needham, 2005, p. 209). The sharp increase in Beaker presence in this period would match the steepest part of Rogers’ adoption curve.

The final phase of Beaker use, period 3, is from 1950 BC onwards, with the end of the phenomenon being completed by 1805-1650 cal BC (Jay et al., 2018, p. 78). Needham describes this final phase, in which Beaker material culture plays an increasingly minor role, as ‘Beaker as past reference’ (Needham, 2005, p. 210). The Rogers model only addresses the adoption of innovations; however, Manning et al. (2014) demonstrate that the currency of
archaeological cultures follows a broadly symmetrical normal distribution, with the decline in prevalence matching the initial process of adoption. Following nearly 500 years of Beaker dominance, the phenomenon thus started to decline and was gradually replaced by Early Bronze Age material culture (Wilkin, 2013, pp. 7–8).

Figure 2.5 – Needham’s Beaker typochronology (Needham, 2005, fig. 13)
The chronological range of the current project, c.2450-1950 BC, covers periods 1 and 2 in Needham’s scheme (2005, 2012). This range captures the introduction and *floruit* of the Beaker phenomenon as well as the introduction of the new Early Bronze Age material culture. The study does not include Needham’s period 3: in this final phase of decline Beaker material culture and burials are difficult to isolate from the majority (Early Bronze Age) material culture and burial practices (Needham, 2005, pp. 206–7).

The first insular Early Bronze Age ceramic style to develop was probably the Food Vessel, from the 22nd century BC (Needham, 2005; Sheridan, 2004; Wilkin, 2013, pp. 36–40). Food Vessel Urns likely developed at around the same time, with Collared Urns being slightly later, but still within period 2 (Longworth, 1984; Sheridan, 2004; Wilkin, 2013, pp. 40–43). While it is clear that Food Vessels are an insular ceramic type, their precise origins are unclear: they show stylistic similarities to Neolithic Peterborough Ware vessels but there is a lengthy chronological separation between the two (Ard and Darvill, 2015; Wilkin, 2013, pp. 44–9). Food Vessels can be found alongside Beakers in periods 2 and 3, and Wilkin discusses ‘Beaker-Food Vessel hybrids’ that have been identified from the same period; he argues that late Beakers and these ‘hybrid’ vessels share similar depositional contexts within eclectic grave good traditions that mark a diversion from the earlier homogeneous Beaker rites (Wilkin, 2013, pp. 51–2).

Though the Early Bronze Age displays evidence for the insular development of new artefact styles, there is widespread evidence for extensive connections with continental Europe, continuing the interconnectedness of the Beaker period rather than returning to the insularity of the Late Neolithic (Bradley et al., 2016, pp. 152–55). Many of the artefact forms introduced as part of the Beaker package underwent changes in the Early Bronze Age, both stylistically and in material choices, but continued to be placed in graves even as Beakers were replaced by the Early Bronze Age vessel types (Woodward and Hunter, 2015). While inhumation continued to be practiced in the Early Bronze Age, the new artefact styles occurred increasingly frequently alongside cremation burials: these gradually increased in prevalence as the rate of inhumation declined until cremation became near-exclusive in the Middle Bronze Age (Caswell and Roberts, 2018). The trend seen in Britain is matched by the ‘gradual but steady’ shift from inhumation to cremation practices seen across much of continental Europe during the course of the Bronze Age (Wilkin and Vander Linden, 2015, p. 112).
2.2. British Beaker burials

Though the Beaker phenomenon has been the subject of research for more than a century, work has tended to focus either on the patterns and mechanisms of spread or on the establishment of typochronological sequences. Despite the fact that the Beaker phenomenon is primarily identified in funerary contexts, relatively little work has been devoted to examining these burials themselves (Bradley et al., 2016, p. 43). A large proportion of ‘Beaker burials’ were excavated and described by antiquarians in the 19th to early 20th centuries (e.g. Bateman, 1848; Greenwell, 1877; Mortimer, 1905). Through this work, an image of a very particular, almost stereotypical, burial rite emerged; this ‘typical Beaker burial’ has long been synonymous with the Beaker phenomenon in Britain and, in turn, with this period of prehistory. The stereotypical Beaker burial rite in Britain can be described as a crouched, articulated, inhumation burial, typically of a single individual, who is most often an adult male and buried under a round barrow or cairn (Figure 2.6).

Some recent Beaker research has included projects that do focus on the bodies and their burials, aiming to seek a greater understanding of the people who are found in these graves. Analysis of burial rites has been used to suggest changing understandings of personhood, social status, and gender roles in this period (Brück, 2009, 2014). Studies have also highlighted patterns in the positioning and orientation of burials, particularly regional and gender-related variations in practice (Heise, 2014; Shepherd, 2012). Craniology has been used to demonstrate population transitions, but also occasional evidence for cultural practices such as cranial modification (Brodie, 1994; Thomas in Deter et al., 2018). Stable isotope analyses have been used to examine diet and mobility across Beaker-period Britain (Jay and Richards, 2018; Montgomery et al., 2018; Pellegrini et al., 2016). Further afield, in the Lech Valley of Bavaria, southern Germany, combined genomic and isotopic analyses have been used to argue for social practices including patrilocality and female exogamy (Knipper et al., 2017; Mittnik et al., 2019). Genomic analysis has further revealed familial links between individuals buried together, providing insights into the presentation of these relationships in death (Olalde et al., 2018 supplementary information). However, while these studies and others have expanded our understanding of the Beaker phenomenon, the ‘Beaker people’, and their social world, it is still rare for studies to look beyond the evidence from typical Beaker burials. No study has attempted to compile a complete catalogue of British Beaker-period burials and as a result new work is still positioned in relation to the classic image of Beaker burials that developed through earlier antiquarian and typological studies.
The stereotyped nature of the typical Beaker burial results in the conceptualisation of a clearly-defined practice that can be separated from the rites of adjacent periods with ease. Though the Early Bronze Age transition in funerary practices is difficult to unravel, with cremation rites and new material culture forms both appearing concurrently with typical Beaker burials, the Neolithic to Chalcolithic transition is often seen as one of stark contrast: a cremation rite is replaced by a distinctive inhumation style. The sequential shift from one burial practice to another at period boundaries was identified by antiquarian excavators and broadly followed since then; by the 1970s the emphasis of differences between periods and cultures was argued to be a typical feature of European archaeology (see Adams et al., 1978). Recent radiocarbon-dating programmes have refined the chronology of burials from across this period. The Late Neolithic has relatively little dated burial evidence, but the largest sites are large monumental complexes associated with multiple deposits of (largely unaccompanied) cremated bone (Noble and Brophy, 2017; Willis et al., 2016). The burials of the Chalcolithic and the Early Bronze Age are better attested, with the large Beaker People Project covering inhumation burials, and smaller studies dating the cremated remains associated with vessel forms including Food Vessels and Collared Urns, which are now securely dated to the Early Bronze Age (Parker Pearson et al., 2018c; Sheridan, 2004; Wilkin,
of 2013). However, most known burials are still assigned to a period on the basis of their form, and the progression of one burial form to another at the period boundaries is still accepted.

Under the existing scheme, a cremation burial in a prehistoric context could be placed in either the Late Neolithic or the Early Bronze Age: the latter is more likely if accompanied by artefacts, the former if not. It would not be assigned to the Chalcolithic, the short period between these, because that would not fit the accepted sequence (see Table 2.2). However, radiocarbon dating can return unexpected determinations and there are a growing number of ‘anomalies’ outside the accepted series. Of the 193 inhumation burials dated for the BPP, for example, 28 fell outside the project’s chronological range: dates from the Early Neolithic through to the Medieval period were returned for burials that were identified as probably belonging to the Beaker period based on their appearance (Parker Pearson et al., 2018c). Conversely, a growing number of burials that do not meet the Beaker burial stereotype are returning Chalcolithic dates. These take a wide variety of forms, including practices such as disarticulation, excarnation, and multiple burial, all of which would traditionally be associated with the Neolithic rather than the Beaker phenomenon. Practices including cremation burial, in some cases within a (Beaker) vessel, are also attested; rites that would more commonly be associated with the Early Bronze Age.

The evidence suggests that the typical Beaker burial is a stereotype that does not accurately reflect the burials of the period, with the definition of periods and cultures at this point representing a classic case of an overemphasis on ‘index fossils’ (see Adams et al., 1978, p. 499). This has been recognised, to some extent, for many decades: Manby (1969) and Clarke (1970, pp. 453–4) both listed Beaker-associated cremation burials, showing that not all Beaker burials fit the stereotyped ideal of articulated inhumation. Petersen (1972) and Lucas (1996) have further discussed the phenomenon of multiple burial in the Beaker period, recognising that even the inhumation burials were variable and could deviate from expected norms. Modern excavations, particularly those in advance of construction, have more recently led to the discovery of greater numbers of burials which reveal a broad range of variation in funerary treatments across the Beaker period. The famous Boscombe Bowmen burial, for example, contains multiple individuals – articulated, disarticulated, and cremated – buried together in a wooden chamber. The published report of this discovery placed it into an international context of similar Beaker burials, showing that burials such as this which deviate from expected norms should not be considered unique anomalies but rather fit into broader contemporary practices (Fitzpatrick, 2011).
Alex Gibson recognised in his ‘Beaker veneer’ papers (2004, 2007) that Neolithic and Bronze Age burial practices are far more ‘intricate or multifarious’ than the stereotypes for each period would suggest. He pointed to a wide variety of burial practices occurring throughout the Beaker period, including those that would typically be identified as ‘Neolithic’ in character, and argued that typical Beaker burials were a distracting ‘veneer’ over a broader pattern of continuity. Appleby (2013) points to the growing recognition and acceptance that not all Beaker-period burials are ‘typical’ Beaker burials. In their study of Mesolithic and Neolithic burials in Sweden, Larsson and Nilsson Stutz (2014) similarly recognised that the stereotypes we as researchers hold about the expected evidence from different periods and places means that ‘the research process itself has continued to reproduce a dichotomy that probably failed to capture the complexity of past practices’: they argue that we should ‘rethink both our understanding of the mortuary practices in these prehistoric periods and our archaeological categories’. However, previous studies of the British Beaker evidence, including Gibson’s reviews, provide only scattered examples of unusual burials from the period; there has to date been no attempt to systematically review the evidence for Beaker-period funerary diversity across Britain.

Therefore, I decided to carry out such a review, in order to establish the prevalence, chronology, and distribution of each burial practice within the suite of diverse rites visible within the period. This systematic review is necessary as the starting point for assessing the accuracy of existing Beaker stereotypes, and for establishing the role of non-normative burial rites within the period. It further allows an exploration of the consequences of incorporating the information from atypical burials into our understandings of the Beaker period more widely; these avenues of investigation form the basis of this thesis.

The evidence from modern excavations and the improving accessibility of radiocarbon dating is increasingly indicating that the conception of the ‘typical Beaker burial’ defining the ‘Beaker period’ is no longer tenable. It could also suggest that the arrival of the Beaker phenomenon did not result in as dramatic a departure from the trajectory of insular British development as has been previously believed. It seems unlikely that the existing Late Neolithic burial practices found across Britain would have disappeared with the first pioneering appearance of Beaker-using peoples. This raises the question of what happened to the indigenous practices, such as cremation, and why they are not featured in our narrative of the Chalcolithic transition. As noted by Gibson (2004), if the homogeneity of the Beaker burial is challenged, then evidence for Neolithic influences in the Beaker period, and the nature of the Neolithic-Chalcolithic transition, can be re-evaluated. The same questions of the scale of migration, the nature of inter-group interaction, and the origins of subsequent
cultural forms have arisen in the discussion of other periods traditionally associated with migration (see Hamerow, 1997 for a discussion of migration, diffusion, and indigenous acculturation and assimilation in studies of Anglo-Saxon England). The question of whether a persisting indigenous population can be identified through burial evidence has been considered (again in an Anglo-Saxon context) by Crawford (1997), who emphasises the importance of considering the British evidence in comparison to that seen in the putative source region for the incoming migration-associated practices.

2.3. The wider European context

While the typical Beaker burial in Britain is a crouched articulated inhumation this is not the case across all (Bell-)Beaker-using regions: the normative rites associated with the Beaker phenomenon vary greatly across different regions of Europe (Vander Linden, 2004). Shennan argued in 1976 that the first stage of Beaker studies – the recognition that Bell Beakers represented a unity that required explanation – had passed, identifying the next step in research to be the recognition and explanation of differences in the expression of the Beaker culture in different regions across Europe (Shennan, 1976). I would argue that we are now in the third stage, which requires the recognition and explanation of variability of Beaker-period rites within each region. The continent-wide variability of Beaker practices has implications for our understanding of British Beaker burials: burial practices that may be considered typical of the British Neolithic, such as cremation and disarticulated burial, can also be found as normative practices of the Beaker phenomenon in different regions. As there is evidence for widespread interconnectivity across Europe during the Beaker period, the British evidence cannot be analysed in a vacuum, with all sources of variability and diversity being assumed to be insular in origin.

The inhumation rite that appears in Britain in association with the Beaker phenomenon closely matches the (Bell-)Beaker-associated burial practices of several areas of continental Europe, including the Netherlands and Germany (Lanting and van der Plicht, 1999) and north-eastern France (Lefebvre, 2009). The burials of the Bell-Beaker phenomenon in these regions can be seen as a continuation of earlier burial practices: the Corded Ware culture, which covered large swathes of central and eastern Europe in the Late Neolithic, is typified by crouched articulated inhumations in single burials (albeit with different orientation to the later Beaker inhumation practice), accompanied by ceramic vessels, tools, and weapons (Furholt, 2014a). In the Netherlands, Northern Germany, and Denmark, the later phases of the Corded Ware culture are referred to as the Single Grave Culture (SGC) and form part of the ‘Beaker cultures’ stretching from the local Final Neolithic through to the Early Bronze
Age: the Bell-Beaker culture is seen as being just one phase in this process of development (Fokkens, 2012a; Furholt, 2019).

Though the Beaker-period burial practices of these areas are part of an extended tradition, they still exhibit funerary diversity. Drenth and Hogestijn (2001) note rare examples of Beaker-associated burials in Dutch megalithic contexts, as well as disarticulated remains in graves under barrows. However, the more numerous minority rite in the Netherlands is cremation: Drenth (2014) identifies 25 Bell-Beaker-associated cremation burials (see also Beckerman, 2011). The Dutch cremated remains are found with Beakers but never inside them, though examples of this practice can be found nearby in north-western Germany (Lanting, 2007) and in Saxony-Anhalt (Hille, 2001). There is also a Dutch phenomenon of Beaker *brandskelet* graves, where graves the same size as those for inhumed remains contain unbroken burned bones, in some cases in anatomical order; as cremated bones are friable this suggests the bones had not been transported and the body may have been burned within the grave (Lohof, 1994, p. 106; Lohof and Drenth, 2016, p. 72). Cremation burials are rarer in north-eastern France, though examples do exist (Lefèbvre et al., 2011).

Cremation burials are extremely rare in Final Neolithic Corded Ware contexts: Drenth and Hogestijn (2014) note just three cremations that they assign to the Single Grave Culture (on the basis of their association with All-Over-Ornamented Beakers; in the British tradition this would place them in the early Beaker phenomenon), but suggest that these examples mark the genesis of the (Bell-)Beaker-associated atypical cremation tradition in the region. In Saxony-Anhalt, there is some evidence that earlier Corded Ware-using communities may have encountered cremation traditions through other means. Muhl et al. (2010) make the somewhat speculative suggestion, repeated by Kristiansen et al. (2017), that the individuals in the Corded Ware ‘family massacre’ graves at Eulau (see Haak et al., 2008) were killed by members of the neighbouring Schönfeld culture on the basis of the morphology of an arrowhead embedded in one of the buried individual’s vertebrae. The Schönfeld culture, which displays features suggesting a mix of Bell-Beaker and Funnel Beaker Complex (Furholt, 2014b) influences, is associated with cremation as the normative burial rite (see

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1 I use the term Bell-Beaker here to distinguish these cremation burials from those with All-Over-Ornamented (AOO) Beakers and Barbed Wire Beakers, which are considered in the Netherlands to be Final Neolithic and Early Bronze Age forms respectively (Fokkens et al., 2016, pp. 21–22). In both Britain and Germany AOO Beakers are instead categorised as belonging to the earliest stages of the (Bell-)Beaker tradition. See Furholt (2014a) for a clear overview of the cultural sequences followed by different archaeological traditions across Europe, and van der Beck and Fokkens (2001) for a succinct summary of the Dutch understanding of the local sequence.
Wetzel, 1979). This raises the possibility that the Dutch and German Beaker cremation practice originated from an external source.

While some burials in the Netherlands, Germany, and north-west France deviate from the ‘typical’ Beaker pattern, other Beaker-using regions exhibit entirely different normative rites. In France, Beaker burials show a clear north–south divide, with most Beaker burials in the southern regions of the country being placed in collective burials in megalithic tombs (Lemercier, 2014). Radiocarbon dating campaigns for these megalithic burials reveal that in some cases Beaker period activity forms a secondary phase of deposition, long after the original construction of the monuments in the Neolithic (Salanova et al., 2017). In some regions, particularly north-western France, the Beaker-period burials lack close associations with Beaker material culture; it has been argued that the Beaker phenomenon was not fully integrated into the funerary sphere in these regions, despite Beakers being deposited in contemporary ceremonial contexts (Salanova, 2004). It has been argued that the differences seen in the features of the Beaker phenomenon across France can be mapped to the territories of the preceding Neolithic groups, with pre-existing inter-regional cultural differences persisting through the Beaker transition (Cauliez, 2015; Lemercier, 2012). Similarly, it has been argued that the character of the Beaker phenomenon in Ireland is the result of a strong influence of continuity from Late Neolithic social and depositional practices (Carlin, 2018, pp. 202–5).

The megalithic collective burial tradition is also typical of the Beaker phenomenon in other regions, including Iberia, where reuse of megalithic monuments can in some cases occur alongside individual inhumation burials, suggesting that communities employed multiple burial rites (Vázquez Liz et al., 2015). There is evidence for a period of co-existence between individuals with local (Iberian) ancestry and incoming groups with Steppe-derived ancestry during the Beaker period (Olalde et al., 2019). However, it is debatable whether parallels should be drawn between genetic ancestry and cultural practices (such as burial rites) in this or any period (Harland, forthcoming).

In Ireland Beakers are, unusually, not typically found in funerary contexts, being more commonly associated with domestic contexts (Carlin, 2011). When they are, these are most commonly burials of cremated bone or, less commonly, disarticulated bone in collective depositions, placed either in megalithic tombs or in cists. The burials often display evidence for an extended series of processes designed to transform the body, including dismemberment and excarnation (Carlin, 2018, pp. 124–5). These burials differ from the Beaker-period megalithic burials of Atlantic and Mediterranean Europe: rather than
secondary depositions in Neolithic tombs, the Irish megalithic (wedge) tombs used for Beaker burials were constructed during the Beaker period (following a lengthy hiatus in megalithic construction in Ireland). Carlin argues that the origins of the Irish wedge tomb burials can be found in Neolithic Irish practices, rather than in the French *allées couvertes* megalithic tombs that are traditionally seen as their point of origin: he suggests that the similarities between wedge tomb and *allées couvertes* burials can be explained by both forms having origins in the earlier north-western European tradition of passage tombs (Carlin, 2018, pp. 125–6).

Some regions in central Europe also display cremation as the majority rite. In the western Hungarian Csepel group, for example, most Beaker-associated burials are cremated and buried in urns, though scattered cremated remains and crouched articulated inhumation burials can also be found, with material culture showing strong influences from contemporary local Early Bronze Age forms (Machnik, 1991). The cremation burials of this region are in some cases accompanied by Beakers and Beaker-package artefacts, but are often also accompanied by artefacts and ceramics of other local cultural groups: "Cultural diversity, complexity and syncretism formed the basis of the Bell Beaker Csepel Group’s self-identity" (Endrődi, 2014, p. 274). The finding of *Begleitkeramik*, or local vessel forms, alongside Beaker burials is the norm in many regions of Europe and the absence of any other ceramic form in the Chalcolithic of Britain is unusual (Besse, 2004; Gibson, 2019, p. 310). Cremation is similarly the norm in Beaker contexts in the Czech Republic, with a high level of variability being displayed among these (Turek, 2008). Turek notes, however, that the ratio of cremation to inhumation graves varies greatly between individual Beaker communities in this ‘Bell Beaker eastern province’ (Turek, 2008, p. 279).

The overall pattern of Beaker burials, then, is that the dominant form of burial varies greatly between different regions across Europe, and while the dominant tradition varies, the variability and diversity are consistent features. The crouched articulated inhumation practice seen in Britain can be associated with a wider north-central European rite, but differs from other nearby practices including those seen in Ireland and north-west France. Across the extent of the Beaker phenomenon there is also evidence for diversity within each region, with locally non-normative practices being relatively common in some areas, and other areas being characterised by their variability.
Chapter Three: Research Questions

3. Project aims

The aims of this research project are to describe the burial practices of the British Beaker period and to explain the implications of these findings for our understandings of the period. I do this through the interrogation of a new dataset of ‘atypical’ burials that I have identified from across Britain, considered in relation to existing datasets of the ‘typical’ burials in order to present a revised picture of Beaker-period funerary practices.

3.1. Research Questions

The main research questions of this project are:

- What funerary practices were carried out in Britain across the core Beaker period (c.2450-1950 BC)?
- Are there any meaningful variations in funerary practice in this period? This may be in terms of when, where, or to whom different practices were applied.
- What can be inferred about the Beaker phenomenon from the funerary evidence?
- How does the evidence for Beaker-period funerary practices compare to the evidence for Late Neolithic and Early Bronze Age practices in Britain?
- Is the burial evidence suggestive of cultural continuity or change across the Beaker transition?
- What can be inferred about the relationship between the Beaker phenomenon in Britain and the indigenous Neolithic peoples of Britain?
- What can be inferred about the origins of insular Early Bronze Age cultural forms in Britain?

3.2. The null hypothesis

In addition to the research questions above, a null hypothesis must be formulated in order to provide a testable statement for quantitative analysis.

As noted in the previous chapter, the current established narrative for burial practices across the study period is:

1. Late Neolithic: cremation was the main burial practice;
2. Chalcolithic: the Beaker phenomenon arrived in Britain and cremation was replaced by crouched, articulated, inhumation burial;
3. Early Bronze Age: cremation gradually began to reappear (initially alongside inhumation) and increased in prevalence until it became the dominant rite.

A key focus of my research is examining the validity of this narrative. While it is possible to establish the existence of burials that deviate from this expected pattern, the significance of these requires testing. In order to test the chronological component of the narrative, I have adopted several approaches to testing the chronological relationship between the different burial practices across the period (see section 4.3 in the next chapter). The established narrative includes a hiatus in the practice of cremation burial for the duration of the Chalcolithic (around 300 years), and I have decided to focus on this feature as a testable component of the narrative. While disarticulated burials are also considered to have seen a hiatus in the Chalcolithic, they are more difficult to identify unequivocally: they must not be confused with the results of later disturbance, for example. Cremated remains, however, are easily identifiable. It is therefore relatively easy to score a burial on the binary characteristic of presence/absence of cremated bone. The presence of cremated bone alongside articulated Beaker inhumations would provide evidence of funerary diversity in the period and may also provide evidence of the continuity of Late Neolithic burial practices.

I have therefore decided to test the absolute level of cremation activity and the relative level of cremation activity (in relation to other burial types) in order to establish whether there was a hiatus in cremation over the British Chalcolithic.

My null hypothesis is that there was a hiatus in cremation during the Chalcolithic.

The chronological component is key to this hypothesis. To disprove the null hypothesis, cremated remains must at a minimum be shown to date to the Chalcolithic. However, to disprove the presence of a hiatus, cremation should be shown to persist throughout the period (see discussion in Chapter 4). I also consider the chronological evidence for disarticulated and articulated burial throughout the period in order to build a picture of changing funerary diversity; this is used to inform the responses to the broader research questions of the project.
Chapter Four: Methods

4. Methodology of the Project

In order to develop a comprehensive and integrated assessment of changing burial practices over the Beaker period, and address each of the research questions laid out in the previous chapter, I have utilised several different approaches, applicable at different scales. The approaches taken can be broadly separated into three groups: literature-based archaeological assessments, osteological analysis, and statistical (spatio-)temporal analyses. It is under these headings that I will describe them in turn, with an additional subsection addressing the issue of the ‘old wood effect’ as it pertains to the radiocarbon-dating of cremated remains.

4.1. Archaeological assessments

In order to provide a reassessment of the burial evidence for Beaker-period Britain, it was first necessary to compile a new database of atypical Beaker burials. While burials displaying the ‘typical’ Beaker rite of crouched articulated inhumation (with or without items from the classic ‘Beaker package’ of artefacts) have been described in some detail for this period (Parker Pearson et al., 2018c), there has been no previous systematic study of the atypical Beaker-period burial evidence. I have compiled this dataset following a comprehensive literature search that aimed to identify any excavated deposits of human bone that are likely to belong to the period between c.2450 – 1950 BC and which could be considered ‘atypical’ for this period (see pp.56-57 for specific criteria).

Although Clarke (1970) lists nearly 2000 Beaker vessels from probable funerary contexts, many of these have no reported human remains in association with them. The Beaker People Project (BPP) has compiled a sizeable dataset of 373 individuals (Parker Pearson et al., 2018c). I have excluded some of the BPP burials from my study on the basis of their radiocarbon determinations falling outside the period 2500-1500 BC; I use a slightly reduced dataset of 335 individuals that probably belong to the Chalcolithic or Early Bronze Age: these are all the individuals for which the BPP have listed the time period as certainly or possibly ‘core’ (i.e. 2500-1500 BC). The true number of Beaker burials excavated to date likely lies somewhere between this figure and Clarke’s. The 335 burials include some that have been assigned numbers but not studied further by the BPP: I have returned to their original publications to collate information. As a result of having access to the BPP data, I largely avoided collecting any further information on these burials, but did incorporate information from the aDNA study by Olalde et al. (2018), which relates to both my dataset and the BPP’s. I have also added additional fields to the BPP dataset, to indicate the form of the burial.
(structure and container) as well as treatment of the body. I have used this modified BPP evidence for comparative purposes.

There are issues with using the BPP as a comparative dataset. Though it contains a reasonable proportion of the known typical Beaker-period burials, their sample selection was biased by the project’s research agenda. The project focused on the ‘typical’ crouched articulated inhumations and primarily included individuals with intact enamel on their second (permanent) molar, for stable isotope sampling. This biases the sample against subadults, who have not yet developed this tooth, and old adults, who are more likely to have lost it in life. Additionally, the BPP preferentially sampled female adults in an attempt to counter the existing stereotype of Beaker individuals being primarily male (Mike Parker Pearson *pers. comm.*). Though these choices will have introduced bias into the demographic profile of their sample, the large size of the BPP dataset mitigates to some extent against bias in other areas. They sought to identify burials both with and without associated items of Beaker material culture, and collected evidence on the burial form and context, osteology, artefact typology, radiocarbon dates and, in many cases, isotopic data (carbon, nitrogen, strontium, oxygen, and sulphur isotopes). The aDNA evidence pertaining to these and other individuals from across the European Neolithic and Bronze Age will also be discussed, following a number of recent studies shedding light on the population genetics of this period (Allentoft *et al.*, 2015; Andrades Valtueña *et al.*, 2017; Brace *et al.*, 2019; Olalde *et al.*, 2018; Szécsényi-Nagy *et al.*, 2017; Valdiosera *et al.*, 2018).

As the BPP collected typical Beaker burials, my own data collection process excluded these and focused on atypical burials for the period. I have also excluded any burials associated with Early Bronze Age funerary ceramics such as Collared Urns and Food Vessels. These types first appear during Needham’s Period 2, and therefore fall within the range of the study period. However, cremation is an accepted part of the Early Bronze Age funerary repertoire; as is funerary diversity more broadly. As such, cremated and disarticulated burials are not ‘atypical’ within these ‘Early Bronze Age’ contexts (as indicated by material cultural associations, rather than chronology *per se*); it is only within the Beaker material cultural sphere that cremation and disarticulated burial are seen as conflicting with the normative expectations for burial practices. As with the Beaker-related evidence, there is no comprehensive catalogue of the burials associated with Early Bronze Age funerary ceramics. Comparative material can be found in sources that focus on the associated ceramic forms, for example Neil Wilkin’s PhD thesis on Northern English Food Vessels (2013) and Alison Sheridan’s overview of the Scottish evidence (Sheridan, 2004), with the "Atlantic Europe in the Metal Ages" (AEMA) dataset (aemap.ac.uk/en) providing supplementary information.
However, a detailed analysis of the later Early Bronze Age burial evidence is beyond the scope of this thesis. For British Late Neolithic burial practices, to which I also refer for comparison with my study material, there is similarly no comprehensive database. For an overview of the evidence I use Frances Healy’s (2012) collation of burial radiocarbon dates and the recent review of Late Neolithic cremation by Noble and Brophy (2017), with the work of Christie Willis et al. (2016) providing useful information about the evidence from Stonehenge. It was not possible in the time available to extend my own systematic data collection process into the Late Neolithic or the later Early Bronze Age, though this would be a useful avenue for future research.

Excluding the categories of ‘typical’ burial across the study period (Late Neolithic cremation, Beaker crouched inhumation, and Early Bronze Age diversity), my own data collection therefore sought to include any deposits meeting the following conditions:

- There must be bone present that is identifiably human.
- There must be some evidence to suggest it is Beaker period:
  a. If radiocarbon dated, the calibrated $2\sigma$ (95%) range must overlap the date range 2450 – 1950 BC by 5 years or more, unless there is evidence to suggest the existing date is inaccurate;
  b. If undated but accompanied by Beaker material culture, this must not be of a form that belongs predominantly or exclusively to Period 3 (see Needham, 2005 for Beaker typology; and Woodward and Hunter, 2015, for many Chalcolithic and Early Bronze Age artefact types);
  c. The deposit must not be accompanied by a (non-Beaker) Early Bronze Age ceramic form, unless there is evidence to indicate that it is intrusive;
  d. If the burial has no associated artefacts, it must not be from a site where the remaining finds belong exclusively to another period;
  e. If there are no associated diagnostic artefacts or radiocarbon determination, there must be archaeological evidence (stratigraphic or otherwise) that suggests the deposit is more likely to belong to the Beaker period than to any other period.
- The deposit should not be a crouched/flexed articulated inhumation burial, unless:
  - It has been identified as a possible mummy;
  - The articulated body has been burnt in situ in the grave; or
  - The remains have otherwise been positioned unusually
If the human remains appear to be disarticulated, there must be evidence this was done around the time of burial, rather than being the result of disturbance in a later period.

In some cases the material meeting these criteria takes the form of a discrete burial of human remains in a funerary context. However, in others, the material can be isolated fragments of human bone. For this reason the term ‘deposit’ (of human bone) is preferred over ‘burial’, but the two terms are used interchangeably.

Between the group of deposits I have categorised as ‘atypical’ and the BPP’s primarily ‘typical’ dataset lies a third group of burials. These deposits are in some way unusual for the period but fall short of my ‘atypical’ definition, which is relatively strict and focuses on atypicality in terms of treatment of the body. Burials can, however, diverge from the normative image of rites in this period in various other ways. Deposits that might fall into this ‘in between’ category include: double burials containing two crouched articulated inhumations (with no disturbance to either); crouched articulated inhumations that have been deposited in unusual places (such as within Neolithic long barrows); and burials with unique artefacts as grave goods. The scope of the project did not allow for a full inventory of Beaker-period burials and there is room for further research to explore these other unusual burials.

This literature-based data collection was divided by geographical region to ensure all areas of Britain were investigated equally. There will inevitably be regional disparities in the level of evidence available but I have tried to avoid compounding the existing differences in preservation, excavation, and research agendas. The geographical divisions used for this were those of the EU Nomenclature of Territorial Units for Statistics 2013. My research area includes the mainland and islands of England, Scotland, and Wales, but not the Channel Islands, the Isle of Man, or the island of Ireland. The literature searched for each region includes: ‘grey literature’ excavation reports; excavation report monographs; antiquarian monographs; articles in all relevant local, national, and international journals; chapters in relevant edited volumes; Historic Environment Record (HER) databases; Regional Research Frameworks; and any other regional surveys by monument or burial type; see Appendix IV for a list of the sources searched systematically from each region. Data collection was carried out manually rather than via webscraping or similar methods; most sources consulted have never been digitised. The data collection phase of research was completed by the end of 2017; some key sources published subsequent to this have been incorporated (for example the data from Olalde et al., 2018) but subsequent grey literature and local journals have not
been searched in detail. Likewise, most sites where excavation is either ongoing or completed too recently for a site report to be available have not been included. In addition to recording deposits that do match my selection criteria, I have also recorded deposits that I have considered but rejected for inclusion, along with a brief indication of the reason for this; I have included the relevant ongoing excavations in this as they may be of interest for future research (Appendix III). The only region for which this methodology differs is north east England, where Chris Fowler has recently carried out a similar programme of data collection, seeking to catalogue all burial evidence over the Chalcolithic and Early Bronze Age, and made the results available online (Fowler, 2012).

I have designed an Access database for collection and storage of my catalogue of atypical burials; the fields and tables I have used cover the archaeological and osteological information collected about each deposit, sources for this information, and rating systems which were used to identify suitable deposits for further sampling (Figure 4.1).

Most of my archaeological information is qualitative and primarily serves the purpose of demonstrating the range and variability of observable practices during the period. Summary statistics are used to highlight potentially meaningful patterns in these data in relation to my key areas of interest: regionality, monumentality, demographic patterning, and material cultural associations (which are considered partly in terms of potential ‘status’ signalling). I have focused on identifying trends, with qualitative discussion of patterns of similarity and difference, rather than attempting to assign significance values to differences, particularly when dealing with case studies. Some data collected through the osteological analyses are quantitative, in interval (e.g. MNI) or ratio formats (e.g. weight); in these cases I test differences for significance using T-tests or ANOVA as appropriate.

I have also used correlation matrices to draw out patterns in the data, using and corrplot and Hmisc (Harrell and others, 2018; Wei and Simko, 2017). I have calculated and plotted a correlation matrix for grave goods to identify groupings that might reflect different ‘packages’ of grave goods among the atypical burials (e.g. Clarke, 1970, pp. 447–8; Needham, 2005, pp. 200–206; Thomas, 1991). In addition, I have calculated and plotted co-presence of artefacts by count, as many of the artefacts occur in very low numbers. Those present in low numbers can gain a misleadingly high correlation score with a smaller number of co-occurrences. I have also used the Jaccard dissimilarity coefficient, a measure of similarity and diversity of datasets, to be viewed in conjunction with the correlation and co-occurrence data. I have calculated and plotted these using R code published by Riris and Oliver (2019).
as supplementary data. Their method further allows the plotting of a network of Jaccard similarity, enabling artefact relationships to be plotted in a quantifiable manner.

All deposits have associated geographical location data. I use QGIS (QGIS Development Team, 2016) primarily for data visualisation and to address the research question of geographical variations in burial practices; however, I also address this by using different scales of geographic division as a nominal variable in the exploratory data analysis. More sophisticated analyses of spatial variation in relation to temporal data are covered below in section 4.3. The Beaker People Project’s dataset is spatially clustered in particular regions that are conducive to bone preservation; the project largely avoided samples from outside these areas where preservation was worse. As such, the BPP data are not suitable for spatial analysis. I have instead digitised and georeferenced the maps in Gibson’s study of domestic Beaker sherds (Gibson, 1982, p. 337) and Clarke’s Beaker typology (Clarke, 1970, pp. 557–566) and created shapefiles of the points in each for spatial comparison with my own dataset.
Figure 4.1 – Relationship map of the project Access database.
4.2. Osteological analysis and sampling procedure

Following data collection it became clear that the quality of information available about the atypical burials was often very poor. In particular, while the BPP has recently carried out Accelerator Mass Spectrometry (AMS) radiocarbon dating of a large number of individuals, resulting in a list of nearly 300 dates for the typical burials, far fewer atypical burials have been dated. Only 100 of the 272 deposits in my dataset (37%) had been reliably radiocarbon dated; a particularly low proportion considering that the presence of a radiocarbon date was a key factor in identifying deposits belonging to the correct period. An additional 35 deposits were associated with dates that I have judged to be less reliable for a variety of reasons. In most cases these are older radiocarbon dates, often on bulk charcoal samples and with large associated errors, though in some cases they are relatively recent determinations which date something from the burial context other than the body itself. This is a particular problem when there is evidence for disarticulation, but even for articulated burials a short interval between death and deposition cannot be assumed (see Booth et al., 2015). The same problem applies to the dating of wood from coffins, or other structural features of the grave, as burials do not necessarily date to the construction of the burial context.

In order to build a meaningful comparison of the different burial practices over time, I expanded the dataset by commissioning new radiocarbon dates. In order to identify the best candidates for (re-)dating, I scored burials according to their likelihood of belonging to the correct period and attempted to locate the human remains in museum collections. As radiocarbon dating has become more widely accessible and affordable over time, the undated burials in my dataset tended to be from older excavations. These often had complex post-exavation histories and as such were often difficult to trace to any current museum collection: of the 164 I attempted to trace, 132 were located to a collection (82 of these confirmed with the relevant curator) and 32 can be confirmed as either irretrievably lost or destroyed. In most cases this is because the remains were apparently not retained by the excavator, or were otherwise lost prior to museum accession, although several instances were encountered of loss resulting from bomb damage to museums in the Second World War. Of the 132 locatable burials, I identified 20 as appropriate candidates for (re-)dating. I was able to negotiate access to eight of these, across six museums, to take a total of 11 radiocarbon samples. This included eight samples of unburned bone and three samples of cremated bone (see Table 4.3). All museums were provided with sampling protocols following English Heritage destructive sampling guidelines prior to my visits and will be given the results of analyses and a copy of this thesis and any related publications (Mays et al., 2013).
Samples of 1-2g of bone were taken from each deposit. In all cases, the remains were sufficiently fragmentary that a piece of the correct weight could be selected without the need for cutting equipment. The radiocarbon dating of these eleven samples, including all sample preparation and pre-treatment, was carried by the Oxford AMS facility (ORAU) following a successful application for NCRF funding (grant reference NF/2017/2/12). One further sample was kindly taken and submitted for radiocarbon dating to the Scottish Universities Environmental Research Centre (SUERC) AMS Facility separately by Alison Sheridan of National Museums Scotland (NMS); funding for this determination was provided by the London Arts & Humanities Partnership (LAHP).

The poor quality or absence of osteological information for the deposits in my dataset, particularly the cremated remains, limits what can currently be said about any demographic differences between groups receiving different funerary treatments. One hundred and fifty-three deposits have some osteological information, though in many cases this is minimal; only half of these (76, 28% of the dataset) had a modern osteological analysis with a higher level of detail. I have recorded any information available about the biological profile of
individuals (age, sex, etc.) wherever this is indicated, though in some cases all that is available is an antiquarian assessment, which should be treated with caution. I would generally consider analyses from the 1980s onwards for inhumations and from the mid-1990s onwards for cremations to be the most likely to be reliable. In order to improve the demographic information available for my dataset I therefore decided to carry out new osteological analyses wherever possible when sampling for new radiocarbon dates.

The BPP has included osteological re-analysis of most of their individuals, but mostly limited this to age and sex assessments, with little assessment of any pathological changes (Deter et al., 2018; Parker Pearson et al., 2018a, p. 431). They instead provide a general discussion of illness through reference to Roberts and Cox’s (2003) meta-analysis of the evidence for pathological conditions among British burial sites. I have discussed the evidence for illness and injury found among atypical burials and used the same data from Roberts and Cox’s Neolithic and Bronze Age sections for contextualisation and comparison. For this review of the pathological evidence, I have only used burials which have received a modern osteological analysis. While some older analyses mention signs of illness and injury, they rarely indicate any negative results, meaning they are unsuitable for compiling prevalence data. While I am generally sceptical about the reliability of the osteological assessments provided by most antiquarian writers, the BPP analysis of crania retained by Canon Greenwell has, however, found that their reanalyses matched the original sex determinations in the majority of cases (Mike Parker Pearson pers. comm.). The re-analysis of remains from antiquarian excavations in north east England by Michelle Gamble and Chris Fowler has highlighted the value of having access to the entire skeleton, however (Fowler, 2015; Gamble and Fowler, 2013). Their reanalyses have identified previously unrecorded funerary practices in burials whose original excavation reports were unremarkable: their findings suggest that, in some cases, ‘diversity’ may be hiding in plain sight.

I carried out osteological analyses during my museum sampling visits where this was possible. The remains of Brymbo Man are on permanent display at Wrexham Museum and have recently been analysed; as such I did not reassess these myself. At Hull and East Riding Museum I was only able to make a brief assessment of the remains present prior to sampling, returning at a later date to analyse the material more fully. As the Meldon Bridge K21 deposit contained a very small quantity of bone, it was agreed that Alison Sheridan would take and submit the sample and I did not visit NMS to analyse this material myself. In one case, my osteological analysis of the remains precluded sampling as it became clear that the material did not match that described in the original report. In all other cases, the burials sampled for
radiocarbon dating were analysed prior to sample selection: results are included in Appendix V.

The main aim of this analysis was to establish a basic demographic profile of the individuals receiving different funerary treatments. The fragmentary nature of the material meant that it was rarely possible to take many (if any) of the metric observations recommended for standard practice (see Brickley and McKinley, 2004; Mitchell and Brickley, 2017). I did not attempt to systematically score non-metric traits or enthesal changes. For each deposit I therefore recorded the skeletal elements present, determined the minimum number of individuals (MNI) on the basis of any duplications and/or age disparities, and assessed the remains for age, sex, any observable pathological changes, and any observations that could inform about funerary treatment.

For the estimation of the age and sex of adult individuals, I initially aimed to follow the same methodology as the BPP, which primarily focused on visual scoring methods, in order to increase the comparability of my results with theirs and to facilitate rapid assessment under time constraints (Deter et al., 2018, pp. 253–6). However, in some cases the fragmentary and incomplete nature of the remains meant that less preferred methods were required. For adult sex estimation, I focused on pelvic and cranial morphology where these elements were present. The subpubic features of the pelvis were scored according to Phenice (1969) and other pelvic morphology was recorded following Ferembach et al. (1980). Cranial traits were scored following Buikstra & Uberlaker (1994), with the reservations of Brickley & McKinley (2004, p. 23) noted regarding the value of scoring the mental eminence of individuals from British assemblages. Sex estimation was not attempted for juvenile remains.

Adult age estimation relies on observation of signs of skeletal maturation and subsequent degeneration; these factors differ between individuals and between populations, and it is often unclear both how biological age related to chronological or social age in past populations and how this can be related to the artificial age categories used by osteologists (Buckberry, 2015). It is also unclear how age estimates with often widely differing results, precision, and accuracy should best be combined and understood (O’Connell in Mitchell and Brickley, 2017). Due to the nature of the assemblage being studied, forming individual burials rather than cemetery populations, it would not be possible to use the corrective methods based on probability densities favoured by palaeodemographic studies (Buckberry, 2015, pp. 329–30). With these concerns in mind, I decided to follow the widely-used age categories recommended by the American Recording Standards, which were also supported by the original British Standards of BABAO/CIFA (Brickley and McKinley, 2004, p. 18; Buikstra
and Ubelaker, 1994, p. 9). It should be noted that the authors of the BPP have chosen to use age categorisations that differ from these standards (Table 4.2). These are close to, but not the same as, those recommended by Museum of London Archaeology (Powers, 2008). To facilitate comparison between datasets, I have used the numerical age estimates provided by the BPP and converted these into standard age categories, rather than using the categories as they are given by the BPP. Where age ranges cross categories, I have ‘binned’ the individuals probabilistically across the relevant categories using the same aoristic approach as described in the spatio-temporal methods (section 4.3). Numerical age estimates are avoided in the text to avoid suggesting an unsupported degree of precision.

Table 4.2 – A comparison of the age categories used in the American Recording Standards (Buikstra and Ubelaker 1994) with those used by the Beaker People Project (Deter et al., 2018, p. 255).

<table>
<thead>
<tr>
<th>Standard age categories</th>
<th>BPP age categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foetus</td>
<td>-</td>
</tr>
<tr>
<td>Infant</td>
<td>Infant 1 week – 13 months</td>
</tr>
<tr>
<td>Child</td>
<td>Early Child 14 months – 5 years</td>
</tr>
<tr>
<td>Adolescent</td>
<td>Late Child 6 – 12 years</td>
</tr>
<tr>
<td>Juvenile</td>
<td>Adolescent 13 – 17 years</td>
</tr>
<tr>
<td>Young Adult</td>
<td>Subadult All non-adult categories combined</td>
</tr>
<tr>
<td>Middle Adult</td>
<td>Young Adult 17 – 25 years</td>
</tr>
<tr>
<td>Old Adult</td>
<td>Middle Adult 26 – 45 years</td>
</tr>
<tr>
<td>Adult</td>
<td>Old Adult 45+ years</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

As with sex estimation, preferred methods involved the visual scoring of morphological traits. Pubic symphysis morphology was scored following Brooks and Suchey (1990) utilising the revisions of Hartnett (2010). Though these revisions had not been adopted by the BPP, Hartnett’s analysis showed that inter-observer error using the Suchey-Brooks method is high, and as such her improved method was favoured over matching the BPP. Auricular surface morphology was scored following Buckberry and Chamberlain (2002). As the ribs were usually highly fragmentary and incomplete, methods utilising sternal rib end morphology were not used. The BPP methodology utilised cranial suture fusion for aging, but I did not use this method in my work due to its extremely low precision and reliability, following the guidance of O’Connell in Brickley & McKinley (2004), among others. Dental attrition was scored following Miles (1963) as well as Lovejoy (1985).

For the age estimation of non-adults, skeletal maturation, dental development, and epiphyseal fusion were scored following the various methods in Schaefer et al. (2009), as appropriate for the material available. For infant and foetal remains I also consulted the
handbook prepared by Simon Hillson for the Astypalaia Bioanthropology Fieldschool, which focuses on the identification and age estimation of foetal and neonatal remains (Hillson, 2016).

Where possible without extensive reconstruction, I also took measurements to calculate the cranial index of adult individuals (maximum cranial breadth*100 / maximum cranial length), as this had the potential to help separate out any earlier Neolithic populations from my sample (see Brodie, 1994). It can also help to identify any examples of artificial cranial modification, which have been identified among some of the BPP individuals (Parker Pearson et al., 2018a, pp. 433–5). Cranial indices have been categorised following Brothwell (1981, p. 87) (Table 4.3).

Table 4.3 – Cranial shape categories based on cranial index calculations, following Brothwell (1981).

<table>
<thead>
<tr>
<th>Cranial shape category</th>
<th>Meaning</th>
<th>Cranial index range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolicocephalic</td>
<td>Long-headed</td>
<td>&lt; 75.0</td>
</tr>
<tr>
<td>Mesocephalic</td>
<td>Medium proportion</td>
<td>75.0 – 79.9</td>
</tr>
<tr>
<td>Brachycephalic</td>
<td>Round-headed</td>
<td>80.0 – 84.9</td>
</tr>
<tr>
<td>Hyperbrachycephalic</td>
<td>Very round-headed</td>
<td>≥ 85</td>
</tr>
</tbody>
</table>

For both cremated and unburned bone, analyses were carried out with a view to assessing the evidence for funerary practices as well as establishing a biological profile and generally quantifying the material. Assessment of features that might provide evidence for mortuary treatments, such as cortical preservation/weathering, evidence for any heat exposure, cut marks, or other peri- or post-mortem alterations to the bone, were recorded following standard guidelines (Brickley and McKinley, 2004; Knüsel and Robb, 2016; Mitchell and Brickley, 2017).

I followed the standard cremation analysis methodology set out by McKinley, which is based on quantification and visual morphological assessment of the remains (Brickley and McKinley, 2004, pp. 9–13; see particularly McKinley, 1994, pp. 5–11; Mitchell and Brickley, 2017, pp. 14–19). I followed the age and sex methodologies as described above as far as possible, scoring morphological characteristics of elements wherever they were identifiable in the material, though noting Thompson’s (2002) recommendations of caution regarding this approach. McKinley’s methodology focuses on the assessment of features that can inform about choices made during the funerary process, such as what proportion of the body and which skeletal elements to collect and bury (Gonçalves et al., 2015; McKinley, 1993; Silva et al., 2009). It is also possible to gain information about pyre technology, such as the efficiency of cremation; I recorded colour of the bone through simple visual recording, though did not attempt to match this to an absolute temperature range (Ellingham et al.,
Types and patterns of visible heat-related fractures were recorded, although current research indicates that fracture type probably cannot be used to distinguish between bone that was burned 'wet' or 'dry' (i.e. following excarnation) (Gonçalves et al., 2011).

Remains were examined for signs of pathological changes or trauma, following the updated British Standards (Roberts in Mitchell and Brickley, 2017; Roberts and Connell, 2017), with reference to textbooks by Waldron (2009) and Ortner (2007).

4.2.1. The 'old wood' effect

Deposits selected for radiocarbon dating include three containing cremated bone. Although only one of these was successful, many more radiocarbon determinations on cremated bone are included in my chronological analyses (see next section). Radiocarbon dating of cremated bone has recently been shown to be more problematic than was previously appreciated. During cremation, carbon is exchanged between the structural carbon in the bone and carbon released from the pyre fuel; this includes pyre wood, any additional fuel sources, and any other organic items placed on the pyre alongside the body (Huës et al., 2010; Van Strydonck et al., 2010; Zazzo et al., 2009). A small systematic age offset to any dates returned on cremated bone is very likely: the remains will display any ‘old wood’ effect that would be seen in the carbon fuel source (Olsen et al., 2013; Schiffer, 1986; Snoeck et al., 2014).

One way of determining the risk of a large age offset in cremated remains is by assessing the $\delta^{13}$C value. Snoeck et al. (2014) found that a drastic but variable decrease in $\delta^{13}$C values occurred when bone was cremated, with the most depleted $\delta^{13}$C values indicating the greatest degree of carbon exchange with the fuel source and therefore the greatest potential to be affected by older carbon sources. This pattern is seen in the dates included in the wider dataset of burial dates used for this study (see ‘spatio-temporal analyses’ section), with an ANOVA finding the difference in $\delta^{13}$C between the determinations taken on charcoal, cremated bone, and unburned bone to be significantly different at $p<0.001$ (Table 4.4). The mean value for cremated bone lies between that for charcoal and unburned bone, and the variance in the cremated bone values is far greater than that of the other groups, echoing Snoeck’s findings.

There are some circumstances in which these age offsets could be severe, for example if coal or peat were used to fuel a pyre, or if plants or animals with marine carbon reservoir effects were burned alongside the bone (seaweed, shellfish). O’Donnell’s (2016) study of pyre material in Bronze Age Ireland identifies a variety of wood species across Irish sites, as well as highlighting British and continental European comparanda. The most common woods used for British and Irish Bronze Age cremations appear to have been oak and pomaceous
fruitwood, with many graves containing a mixture of different species. While Snoeck *et al.* (2014) highlight the variability of carbon exchange effects, they argue that in most cases, with standard fuel sources (“dead branch wood, brush, and small felled trees”), akin to those identified by O'Donnell, the age offset should be minimal.

If funding allowed, it would be preferable to date multiple samples from a large number of cremation deposits in order to assess the variability of dates for each. I have revisited the list of paired bone/charcoal samples presented by Lanting *et al.* (2001: Table 1) in their initial paper demonstrating the validity of dating cremated bone. I have calculated that these paired determinations display a mean offset of 93.6 radiocarbon years from each other. However, unexpectedly, they are roughly evenly split between those where the charcoal date is older or younger than the cremated bone date: 17 with the bone date older, 21 with the charcoal date older. These results suggest that in the absence of a method for determining the presence, degree, or direction of an age offset in any given archaeological cremation sample, the most conservative approach is to avoid making any attempts to correct for this potential effect.

The potential implications for this will be discussed in my results section, though the evidence available does not suggest that cremation date offsets have substantively impacted my results or conclusions.

Table 4.4 – The results of a single-factor analysis of variance (ANOVA), testing the difference between the reported $\delta^{13}C$ values for charcoal, cremated bone, and unburned bone associated with radiocarbon determinations for burials c.5000-2500 uncal. BP.

<table>
<thead>
<tr>
<th>Summary</th>
<th>Count</th>
<th>Sum</th>
<th>Average</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>unburned bone</td>
<td>1233</td>
<td>-26653.82</td>
<td>-21.62</td>
<td>3.90</td>
</tr>
<tr>
<td>cremated bone</td>
<td>383</td>
<td>-9027.43</td>
<td>-23.57</td>
<td>6.05</td>
</tr>
<tr>
<td>charcoal</td>
<td>242</td>
<td>-6234.85</td>
<td>-25.76</td>
<td>2.10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANOVA</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
<th>F crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3971.34</td>
<td>2</td>
<td>1985.67</td>
<td>482.88</td>
<td>1.49E-169</td>
<td>3.00</td>
</tr>
<tr>
<td>Within Groups</td>
<td>7628.01</td>
<td>1855</td>
<td>4.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11599.35</td>
<td>1857</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3. (Spatio-)temporal analyses

While the archaeological and osteological data gathered as detailed above can be assessed using summary statistics, the more mathematically complex information contained within radiocarbon determinations and their calibrated date ranges requires more sophisticated avenues of analysis and interpretation.
I have used radiocarbon data to address a number of different questions. Firstly, it must be determined if the radiocarbon date associated with a deposit indicates that it belongs to the period of study. The calibrated date range of determinations is often broad, particularly over the start of my study period, where there is a short plateau in the calibration curve. Older determinations also tend to be associated with large measurement errors. As a starting point I considered all dates whose 95% confidence ranges fall within the study period by at least five calibrated calendar years, with the rounding of dates following Mook (1986). I assessed the radiocarbon determinations for their reliability at this stage; if considered unreliable for any reason, I flagged them as potential candidates for re-dating and, where appropriate, excluded them from my Bayesian models (but not from my SPD or aoristic models). The main reasons for flagging a date as unreliable include:

- the determination gives a date for something other than the human remains themselves;
- the date is for a different individual within the same deposit to the one I am interested in;
- the determination is from a bulk or mixed (non-short-lived) charcoal sample;
- the determination has a large associated error (>±50); or
- the determination is suspected to have been affected by contamination, the ‘old wood’ effect (discussed above), preparation/pre-treatment errors, or marine reservoir effects.

This accounts for 42 of the dates associated with deposits in my sample. The primary aim of radiocarbon analyses, however, is to address the null hypothesis (that there was a hiatus in cremation during the Beaker period) by exploring whether (and how) the burial evidence differs over time. I initially aimed to approach this question using Bayesian phase modelling of radiocarbon dates, but realised that this method alone would not be sufficient, and have subsequently explored approaches utilising the summing of calibrated radiocarbon dates. I will initially describe the Bayesian methodology, its application and its drawbacks in the context of my study, and will then describe my preferred methodology using the summing of dates: firstly summed probability distributions, then the incorporation of an aoristic approach into these, then the application of these approaches to understanding spatial variability in my dataset.

For many of my analyses, I have added radiocarbon determinations from other sources, particularly the expanded EUROEVOL radiocarbon dataset used by Bevan et al. (Bevan,
2017; see also the earlier dataset of Manning et al., 2015). I have added dates from my own
data collection and tagged records with additional information: whether or not the date
represents a burial, and whether that burial is cremated, articulated, or disarticulated. This
allows the dataset to be manipulated and subsetted for my own work. I originally intended
to add further tags such as artefact associations and monument type, but particularly MNI,
age, and sex. Doing so would facilitate the incorporating of osteological demography into
the radiocarbon-driven population studies that have utilised this method. However, tagging
records is extremely time-consuming because it requires the reading (or at least scanning) of
the (thousands of) publications for the burials in the dataset. Any further tagging was not
possible within the time constraints of the current project, but combined with a more
extensive programme of osteological re-analysis could certainly enable interesting and more
nuanced analyses in future work.

4.3.1. Bayesian phase analysis

The first approach I have employed for the analysis of radiocarbon dates associated with
burials in my dataset is Bayesian phase modelling, carried out using OxCal v.4.3 (Bronk
Ramsey, 1995, 2009) and the IntCal13 calibration curve (Reimer et al., 2013). When using this
method, I have treated each funerary practice in my study period (cremation, inhumation,
and in some cases subdivisions of these) as a separate ‘phase’. My dataset primarily comprises
isolated examples of burials, with no stratigraphic relationships, and in many cases the burials
have no associated finds. This makes it difficult, if not impossible, to determine the
chronological relationship between most objects, hence the use of ‘phase’ rather than
‘sequence’ priors: the latter requires a known order relationship. This method allows the
chronological relationship between different burial practices to be assessed, according to
their respective modelled start and end dates (Bronk Ramsey, 2009, p. 346).

I started with relatively simple models containing few assumptions, gradually increasing the
complexity to observe how the results differ and whether the agreement of the dates with
the model, determined through the ‘Amodel’ statistic, increases or decreases with each
agreement index can be found on OxCal’s online manual, along with the developers’
justification for the 60% acceptability threshold used throughout OxCal
(http://c14.arch.ox.ac.uk/oxcalhelp/hlp_analysis_detail.html). Dividing the burials further
by artefact association, monument form, etc. can help relate them to different cultural
traditions. The models’ complexity can be increased by exploring different relationships
between phases: the basic options are contiguous, sequential, or overlapping (Bronk Ramsey,
2009, p. 349). The latter of these allows for (but does not require) an overlap between phases
and thus requires the fewest assumptions to be made about the data. The relationship between phases can also be amended by adding the possibility of one or more hiatuses (Bronk Ramsey, 2009, pp. 348–50).

These models assume a uniform distribution of dates throughout each phase unless otherwise specified: alternatives include exponential and normal distributions. The addition of ‘trapezoidal’ priors to a uniform distribution allows for the modelled activity to gradually increase, then ‘flourish’ (at a uniform rate), and finally decrease in prevalence over time (Lee and Bronk Ramsey, 2012). In line with findings by Strahm (1977) and Manning et al. (2014) that archaeological ‘cultures’ tend to follow an approximately normal distribution, either a uniform distribution with trapezoidal priors or a uniform distribution with sigma boundaries would provide a more suitable starting point than the more commonly used simple uniform distribution. In this case the trapezoidal model may be preferable, as it allows the testing of the duration of the transition between adjacent phases (Lee and Bronk Ramsey, 2012, pp. 19–20).

Phase-modelling allows for some testing of the radiocarbon data, and I will present some simple models using this approach. However, during the process of testing it became clear that this approach is fundamentally unsuitable for the type of radiocarbon analysis needed to address my research questions.

The small number of radiocarbon dates available for atypical burials means that once these are divided into groups specific enough to be archaeologically meaningful, the number of dates in each is frequently too small for successful modelling. If groups are too small, the posterior (modelled) distributions tend to have very long ‘tails’, spreading the modelled date range far beyond the period that can be supported by archaeological evidence. The software also frequently identifies the earliest and latest dates in these phases as outliers to the group, regardless of what these dates are. Conversely, there is a risk that larger phase groups, while meeting the computational requirements for model building, can obscure evidence of the very variations that would enable my null hypothesis to be rejected.

The relatively sparse nature of my dataset, and the lack of relationships between individual burials/dates, means model building using the various possibilities outlined above requires making an increasing number of largely unprovable assumptions about the nature of my data and the patterns underlying it. While some models may be more likely, based on the archaeological information, there is limited scope for testing how well each represents reality: “more often the results [of such analyses] must be seen as depending on the assumptions built into the chronological framework” (Bronk Ramsey, 2009, p. 348). If the null hypothesis
is to be disproved, it must be clear that the analysis is not simply reflecting the assumptions of the model, and unfortunately this cannot be shown with any certainty (Bayliss et al., 2007, p. 23).

A more fundamental issue with the application of this method is that Bayesian phase modelling is generally focussed on establishing probabilistic date ranges for the start, end, and duration of groups; in this case for each type of burial practice. My research is questioning whether there even are beginnings and ends of particular burial practices within the study period. The Bayesian approach can only address this concern through the modelling of the presence or absence of hiatuses between individual dates. This is an unsatisfactory test when there is no certainty of any relationship between any two given burials/dates in the phase at all. A wider issue related to this is that the approach has a limited capability for informing about the changing level of activity between any given start and end dates: even in the models which are most complex (and are therefore most likely to be wrong) the options are fairly simplistic. Running multiple models can identify the best fit out of the options available, but this approach loses most of the complexity of the shape of the individual (prior) probability distributions that comprise each phase.

These issues combined mean that while Bayesian phase modelling is a useful approach for many research projects, for my own work I have instead decided to use approaches that focus on the shape of the probability distribution of dates, and the spread rather than the start and end points of distributions, in order to examine the pattern of activity across the whole of my study period. These approaches are described in the following subsections.

### 4.3.2. Summed Probability Distribution

After exploring and largely ruling out the possibility of using Bayesian phase modelling to address my main research questions, the primary approach I have employed to assess the changing prevalence of different burial practices over time is the summing of the probability distributions of the calibrated radiocarbon dates for these burials. I use summed probability distributions (SPDs) to examine the changing intensity of radiocarbon dates for all dated burials across my study period, the changing intensity of different burial practices in relation to each other, and the relationship between burial practices and changing population levels.

The rationale behind the summing of radiocarbon determinations is that the distribution of the summed calibrated probability densities of radiocarbon dates provides a way of looking at the changing intensity or prevalence of the dated features over time. The higher the peak of the SPD plot, the more likely (or prevalent) the dated feature was at that point in time. SPDs of dates for different features can be compared, confidence intervals for the results
can be established, and several different approaches to hypothesis testing exist. This approach differs to Bayesian phase modelling in a number of important ways, but for the purposes of comparing the two methods for my own research a key difference is that whereas phases can establish a chronological range, SPDs can reveal the changing patterns of prevalence within the range (see Manning et al., 2014).

Following Rick’s (1987) exploration of the use of radiocarbon dates to reconstruct diachronic trends in the archaeological record, studies utilising SPDs as a means of analysis have become increasingly prevalent. In archaeology, SPDs have primarily been used as a proxy for assessing population dynamics, and it is this area that has seen most of the developments and refinement of the technique in recent years (see Williams, 2012, p. 578). There has been some controversy over the application of this method, with the main criticisms summarised by Williams (2012) as largely relating to concerns about sampling biases, problems of correcting for taphonomic loss, dealing with calibration effects, and the need for comparison with other proxy methods. There have also been direct criticisms of the validity of the link between summed radiocarbon probabilities and population levels – see for example Torfing (2015) and reply (Timpson et al., 2015).

I have used the work of Shennan et al. (2013) and Timpson et al. (2014) by comparing Beaker-period burial evidence to their models of contemporaneous fluctuations of population densities in Britain. However, I have adopted an approach to SPD analysis more akin to that of Stevens and Fuller (2012) in that I use SPDs of dates that relate directly to the subject of study. Stevens and Fuller (2012) looked at radiocarbon dates of domesticated cereals and other cultigens in order to assess the changing evidence for the prevalence of cultivation; I am using radiocarbon dates from burials to assess the changing prevalence of different burial practices. There have been few studies to date taking this kind of direct approach to SPDs and my work is the first to apply the method to the study of funerary practices.

The relatively short time span of my study and the more direct relationship between the dates obtained and the phenomenon being examined circumvent some of the issues raised by critics of the method. However, sampling biases are a key problem for my work, particularly in terms of the disparity between the number of dates for cremated as compared to non-cremated inhumed remains. As cremated remains are less likely to be radiocarbon-dated than inhumation burials, the absolute height of an SPD plot based on burial dates would be expected to be reduced during periods where cremation was the dominant practice, creating a pattern of changing prevalence that is reflective of sampling bias rather than genuine changes in human activity. In order to address this issue, I have used SPDs to assess the
relative as well as the absolute prevalence of different burial practices over time. There should not be a strong correlation between the age of a cremation burial and the likelihood of it being submitted for radiocarbon dating. Any variation in the relative proportion of dates for cremated remains as compared to inhumations is therefore potentially meaningful and should be examined in further detail.

A second potential problem with the application of this method is my relatively small sample size: when considering regions within Britain my analyses fall short of Williams’ (2012) recommended minimum of 500 dates. However, subsequent work by Timpson et al. (2014) demonstrated through subsetting that the method is robust even with very small sample sizes, and that small samples produce the same patterns as large ones. In order to improve the robusticity of my results, I have added my own dataset into the larger EUROEVOL dataset (Bevan, 2017). This contains a large number of radiocarbon dates on anthropogenic materials from the European Holocene and was used either in its current form or as the earlier Manning et al. (2015) for many of the SPD studies cited above. I have utilised a subset of 11,221 determinations with uncalibrated radiocarbon ages of c. 5000-2500 BP ± errors, the dates extending beyond my study period (roughly covering the whole of the Neolithic and Bronze Age). The expanded range was chosen to provide contextualisation for my results, and to ensure that any edge effects fall outside my period of interest. The chronological edges of a radiocarbon date’s probability range are not abrupt, but show a gradual change to/from 0; these edges need to be kept outside the range of analysis as any fit with a tested model is reflective of sampling rather than the shape of the data.

I have carried out SPD analyses using the rcarbon package for R (Bevan and Crema, 2016). I have chosen to use non-normalised radiocarbon dates because the process of normalisation causes the calendar years within a calibrated distribution to have different probabilities of occurrence depending on the shape of the calibration curve. This fundamentally changes the assumption underlying radiocarbon dating, namely that each calendar year has an equal likelihood of occurrence. It should be noted that normalising dates is currently the norm in radiocarbon analysis and is carried out as default by most calibration software (including OxCal). There is, however, an increasing awareness of the problems with the approach, which (along with related problems) are discussed in detail by Weninger et al. (2015). Figure 4.2 shows the effect of normalisation on the shape of the SPD of burial dates from the British Neolithic and Bronze Age.

For all plots, I have used 50-year smoothing (indicated by ‘runm=50’). This has the effect of reducing the severity of the artefactual peaks resulting from fluctuations in the shape of the
calibration curve, but at a level that is compatible with my relatively short-duration study period; the 200-year smoothing recommended by Williams (2012) is less so (Figure 4.3).

The only substantive difference between my method and that used in most of the studies mentioned above is in the use of binning dates by site. This methodological step mathematically combines and averages dates from the same site which are chronologically similar to each other, to present this ‘excess’ data as a single (averaged) date. This is intended to correct for the sampling bias caused by some sites being studied more intensely and/or receiving more funding for radiocarbon dates than others. In theory, this binning prevents inter-site differences in sampling intensity affecting the shape of the SPD curve (see Shennan et al., 2013). While most recent papers have adopted some form of binning, there is little theoretical backing to either its adoption or the selection of parameters. While Shennan and team typically use a conservative 200-year bin size (i.e. combining all determinations for a given site that are within 200 years of each other), this would be inappropriate for a study such as mine which is looking for change within a period of less than 200 years (see also the smoothing issue, above).
Figure 4.2 – Summed probability distribution plot for all burial dates, demonstrating the difference between an SPD calculated from normalised dates against non-normalised dates. I have shown the full plot here; when discussing SPDs in results I limit the x axis to 3000-1500 BC. This plot is shown with 50-year smoothing.
Figure 4.3 – SPD for all burials (non-normalised dates) with different levels of smoothing. I have adopted 50-year smoothing (runm=50) throughout the rest of this thesis. The arrow indicates one point in particular where 200-year smoothing would result in the loss of features critical to the interpretation of the plot, and would therefore be inappropriate within this chronological scale.
I have tested the impact of different bin sizes on the shape of the SPD for all dates across my study period in order to establish whether any particular bin size would be more suitable. To do this, I have plotted SPDs for the same data using different bin sizes and rescaled them to enable direct comparison. The results show that binning can have a notable impact on the shape of the SPD, but that the magnitude of this varies (Figure 4.4). Binning, or bin size, has a relatively small impact on the shape of the curve within the study period; areas showing greater divergence between bin sizes tend to be those with large multi-period sites. The results suggest overall that 50 years is the smallest bin size to correct for the inter-site sampling bias across the study period, with bins much larger than this having little additional benefit. Fifty-year binning is therefore most suitable for a short-duration study such as my own.

While 50-year binning will therefore be carried out for the full (EUROEVOL) dataset, binning is used only in those analyses utilising this larger dataset, which is used to generate a population proxy comparable to that published by previous authors (particularly Bevan et al., 2017 (100y bins); Shennan et al., 2013 (200y bins); and Timpson et al., 2014 (200y bins)). The majority of the SPD plots used in this thesis contain only the burial dates, not the full dataset of all anthropogenic radiocarbon dates. After consideration, I have decided that binning dates by site in this way would be inappropriate for the burial dataset according to its use within my study: the individuals within burials are the unit of analysis, and I am interested in the differences between them. Binning the burial dataset by individual body/person would achieve a methodological correlate to the site binning approach used in population proxies, but in practice would not be possible to apply consistently: in many cases deposits are comprised of multiple individuals and it is not always possible to determine either how many individuals were present or which of these were dated (or re-dated). Given that it is usually only possible to securely identify any duplicate dates for individuals found in single articulated (or nearly-articulated) burials, taking this approach would systematically bias the dataset and alter the shape of the SPD depending on the prevalent practices in a given period. As a result, I have chosen to avoid combining dates in this way for my dataset of burials (and clearly indicate where binning has been used).
Figure 4.4 – A SPD plot of all dates showing the impact of different bin sizes on the shape of the curve. The different binned curves diverge from the unbinned plot at several points, but each of the binned curves are very similar during the range used in this study. Plots rescaled to run 0.0-1.0.
However, the choice to bin some dates for some analyses and leave others unbinned for other analyses becomes problematic when the data from each approach are combined. This is particularly the case with permutation testing (see below), as this draws burials and non-burials from a single dataset, so either all dates are binned or none are. I have opted to show both plots, binned and unbinned, and discuss the differences between them. A second difficulty is showing burial dates as a proportion of all dates; again I have decided to display multiple plots and discuss the difference. This approach highlights that the choice of binning is largely subjective, exposing the impact of different data management choices on the results, which I believe to be a more useful approach than presenting any one option as the ‘correct’ one.

An alternative approach to binning is that, rather than combining excess dates, they could more simply be discarded after n dates per site have been reached. In order to test the effects of this approach, I first examined the distribution of the number of dates per site. For the full dataset, most sites had one date, with the 3rd quartile being four dates, and the maximum 297. I therefore decided to set five as the cut-off number of dates per site and repeated the exercise with a cut-off of n=10 for comparison. I have referred to this as trimming. During the course of writing, *rcarbon* released two similar alternative methods, referred to as thinning: one where n dates are selected randomly from each site, and one where a given proportion of the desired n dates is filled by dates with the lowest errors, and the remaining proportion selected randomly. The results of the trimming and thinning approaches are compared to binning in Figure 4.5. Each has a clear impact on the shape of the plot at 2450 BC, the start of the Beaker phenomenon, though crucially this effect is not seen when looking at burial dates only (Figure 4.6).
Figure 4.5 – A SPD plot of all dates comparing the effect of discarding any dates over the nth date per site using three different methods, compared to the use of binning.
Figure 4.6 – SPD plot of all burial dates, showing the effects of binning, trimming, and thinning.
In order to assess changing burial practices using SPDs, I have calculated the proportion of all burial dates that different burial types represent. For example, dividing the SPD for cremation dates by the SPD for all burial dates reveals the changing proportion of cremation burials over time. I have also carried out hypothesis testing, comparing plots using the different methods available within CARBON.

The first hypothesis-testing approach is comparing each empirical SPD to a series of null models, using the Monte-Carlo simulation method proposed by Shennan et al. (2013) and refined by Timpson et al. (2014). I have also tested empirical SPDs against null models of exponential and linear change over time. A confidence interval of 95% is established around the given null model and the empirical data compared to this. In all cases 1000 simulations were run of each model. While there are no clear guidelines for the (chronological) limits of these analyses, following discussion with Andy Bevan I opted to run each model for the period 5000-2500 BP, which is just inside the limits of my dataset. On the figures produced from these tests (see Results 1), periods where the SPD falls above the 95% envelope are shaded red and periods where it falls below are blue. A global p-value for the goodness of fit of the model can then be produced. I have tested my burials dataset and subsets of this. I have also tested all radiocarbon dates for the period, in order to produce a population proxy that is comparable to the findings of (particularly) Bevan et al. (2017).

The second method used is permutation testing, following Crema et al. (2016). This approach, which uses Markov Chain Monte-Carlo (MCMC) simulation, enables comparison of the shape of two empirical SPDs: the labels of the two groups are randomly reassigned times, again 1000 simulations each, establishing a null model with a 95% confidence envelope representing the shape of an SPD of the given dataset if the groups were randomly assigned. Deviation of the empirical SPD plot above or below the null model indicates that the result (and the difference between the two compared plots) is unlikely to have occurred by chance.

4.3.3 Kernel Density Estimation

4.3.3.1 OxCal method

The Bayesian phase modelling and SPD methods have different strengths and weaknesses, but entail entirely different approaches to the assessment of multiple radiocarbon dates. There has tended to be a conflict in the literature between those advocating each of the two methods (see for example Buchanan et al., 2008 and responses). However, a recent paper by Christopher Bronk Ramsey (2017) proposes an alternative method for the summing of radiocarbon dates that is worth considering. Bronk Ramsey picks up some of the criticisms of SPD by Contreras and Meadows (2014), arguing that fluctuations in the shape of SPD...
plots are the result of random patterns resulting from the mathematical combination of errors (rather than reflecting fluctuations in the calibration curve, the effects of which are predictable). He suggests that kernel density estimation (KDE), a non-parametric method for estimating the distribution of data points, could provide a ‘third way’, especially when combined with a Bayesian approach. Bronk Ramsey argues that SPD itself is similar to KDE, but without the explicit definition of key parameters. In particular, the bandwidth (degree of smoothing) and kernel shape (shape or weighting of the curve) are undefined in SPD, potentially resulting in the use of inappropriate models (Bronk Ramsey, 2017, p. 1814). His solution is to use an explicitly KDE method, allowing for more appropriate choices for each parameter. In his method, KDE is combined with an iterative approach (Markov chain Monte Carlo), where the results of each iteration (solution to the problem) are averaged to provide a better reflection of all the possible solutions to combining radiocarbon dates. He argues that this approach will reduce the spurious peaks and high-frequency noise of SPD, which gives a single ‘solution’ to each problem.

Bronk Ramsey’s method is not ideal as it retains several of the features of SPD that he deems to be most problematic, such as the excessive spread of summed ranges and the ‘smearing’ of genuine signals. Further, it can only be run in OxCal, which has severe limitations in the size of dataset it can handle: I have only tested the case study areas as the program was unable to cope with the full dataset. An additional issue comes from OxCal’s weaknesses in exporting and plotting results, which makes it difficult to compare results accurately to those of non-OxCal methods. However, a key strength of the method lies in its iterative approach: for this reason it is worth considering the results of the SPD and KDE approaches alongside each other. I have used the KDE_Plot command to summarise the burial dates for each case study area, and used the KDE_Model command in place of the Phase command to look at each burial type. I have used OxCal’s default parameters for the kernel shape and bandwidth throughout (explained in text of Bronk Ramsey, 2017).

4.3.3.2. *McLaughlin method*

More recently, Rowan McLaughlin has published an alternative KDE method for combining radiocarbon dates in R (McLaughlin, 2019; code can be found in the supplementary information). McLaughlin uses a Monte Carlo approach to estimate the uncertainty around the KDE result, with one calendar year being sampled from each calibrated determination, repeated n times. The resulting kernel density is a range covering the total outcomes for each calibrated year, effectively giving a band of probability rather than a single result (as in SPD). McLaughlin’s method allows for permutation testing, which can be used to check the extent to which subsets of the data produce different results. He suggests this can be used to address
the possibility that the structure of summed radiocarbon results is caused by biases in the input data (McLaughlin, 2019). I have tested this approach but not used it in my work because I am exploring subsets of the data by region and discussing the possible interpretations of each regional subset. I have kept the method’s default settings: Gaussian kernels; a 30-year bandwidth; and a 512 points density calculation (giving a point every ~3 years over the ~1500 year testing period). I have set the iterations as n=1000. As this method is simpler than the OxCal KDE approach (above), it runs much quicker and is more suitable for larger datasets. Therefore I have used this approach for showing KDE against SPD results for the whole of Britain, and the OxCal method for the case study regions only.

The visualisations of each method differ, but the results produced by the two are closely comparable. I tested this by trimming the ‘all dates’ dataset to a maximum of three determinations per site and then running a random sample of 10% of this in both methods:

```r
Trim3 <- All_ukdates %>% arrange(SiteID) %>% group_by(SiteID) %>% slice(1:3)

Sample10 <- Trim3[sample(1:nrow(Trim3), round(0.1*nrow(Trim3))),]
```

4.3.4 An aoristic approach

While the SPD and KDE methods discussed above have provided fruitful means of analysing the changing pattern of burial practices over time, they cannot incorporate burials in my dataset which have not been radiocarbon-dated. Many graves are dated only by artefactual associations, or through stratigraphic relationships with other dated contexts. In order to include the burials without direct radiocarbon dates in my analyses, it is necessary to adopt an aoristic approach.

Aoristic analysis is a method originally developed for use in forensic settings to determine the probability that an event that happened at an unknown time fits into a given temporal window (Ratcliffe, 2000). It works by dividing the possible range of time an event could belong to into a number of bins, and calculating the probability that the event falls into each of these (Crema et al., 2010, pp. 1120–1). Repeating this for multiple events generates combined probabilities for each bin that can then be compared for a diachronic analysis (Figure 4.7). I have assigned to undated burials my own assessment of the probability that they fall into each of the following equally-sized intervals: Late Neolithic (2700-2450 BC), period 1 (2450-2200 BC), period 2 (2200-1950 BC), period 3 (1950-1700 BC).
Figure 4.7 – Aoristic addition of the probabilities of burials occurring within different time-slices.

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Crema has adapted and refined the aoristic method with a simulation-based approach that enables the inclusion of information from radiocarbon dates alongside the traditional ‘time span’ information for which it was initially developed (Crema, 2012; Crema et al., 2010, pp. 1124–5). Palmisano et al. (2017) compare the results of these different methods. Given the relatively small size of my undated dataset, I have chosen to take a fairly minimal approach to aoristic analysis, using it to incorporate undated burials into the analysis of burial trends. I have assigned dated burials to time-slices using a for loop summing the matrix of p-values for each calibrated determination within each time-slice.

4.3.5 Density and relative risk mapping

In order to explore burial practices across Britain, I have also introduced a spatial dimension into my analysis of the chronological patterns. I have adopted two main approaches to this: spatial permutation mapping using the rcarbon package and spatial intensity mapping using the spatstat package (Baddeley et al., 2018), both coded in R.

The spatial permutation approach was developed by Crema et al. (2017). The method can be used to determine if there are any statistically significant positive or negative deviations in the density of spatial points in particular locations at different points in time. These relative ‘hot spots’ (positive deviations) and ‘cold spots’ (negative deviations) of changing activity between periods indicate a significant deviation from the null model, which is the global rate of growth, i.e. the overall pattern of change across all locations. Using dated sites, it is possible to identify any locations that receive a particularly marked change in the density of burials in
a given period, with early hotspots potentially being a focus of Beaker-associated migratory activity.

Rather than allowing a continuous analysis, this method compares contiguous blocks of time to each other. The spatial permutation results indicate the shift in burial locations across Britain between one block and the next, with greater or lesser shifts than the norm for each transition being highlighted as hot or cold spots. The ‘permutation’ aspect is how the method determines if results are relatively hot or cold: the site locations of the burial dates in the SPD are randomly reassigned n times (in this case n=100), to create a simulated model of the level of change that could be expected by random chance. The empirical results can then be compared to this. The method incorporates q-values – the risk of false positive results, when the null hypothesis is falsely rejected (see Crema et al., 2017, p. 3). For each spatial permutation plot I have displayed the corresponding plot of p-values and q-values alongside it. P-values indicate the risk of false positives among all results, whereas q-values indicate the risk of false positives only within the significant results. A q-value of 0.05 means that 5% of the statistically significant results (indicated by p< 0.05) could be false positives.

The spatial permutation method can indicate the sites and regions experiencing the greatest change in burial density over the study period, along with an indication of the magnitude of this change (growth rate) and whether it is statistically significant. For this method, binning the burial dates by site is necessary, so I have chosen a short 10-year bin. After testing the effects of changing the kernel density estimate (KDE) band-width, I have set this at 25 km. The mean Euclidian distance between nearest-neighbour sites in the dataset is ~37 km, so a bandwidth much larger than this causes regional differences to be obscured. As the authors of the method make clear, it should be used for exploration of the data only, and cannot be used to draw any firm conclusions. Risks they highlight include type II errors, uncertainties around the free selection of site bins and bandwidth values, and the impact of temporal and geographical scope selection on the analysis results (Crema et al., 2017, p. 7). I have chosen to compare the transitions between broad chronological time-slices of 200 years in order to give a general indication of the shifts between longer periods, rather than attempting to assess local changes between more closely refined time slices.

The second approach I have adopted is similarly unsuitable for detailed analysis, but helps to reveal any changes in the locations that saw particularly dense concentrations of burials across the study period. The spatial intensity approach is used to produce calculated kernel density estimate maps of burial practices. These can be displayed as density alone, or the values for two kernel maps can be divided by each other to provide a proportional intensity
(relative risk) map. I have calculated the spatial intensity and proportional intensity of different burial types over the study period as a whole (all the burials, dated and undated) and also within different time slices across the period. In order to do the latter I have combined the density mapping approach with the aoristic binning method described above and calculated density for each aoristic bin, each burial point being weighted by the probability that it falls into the given bin. I have used 100-year bins for the dated burials, to create a fine-grained image of change over time. I have also carried out a coarser analysis of the full dataset, with the density for dated and undated burials together being compared over the four broader bins (Late Neolithic and periods 1, 2, and 3).

As the bins are created probabilistically, each burial is likely to have some probability of presence in more than one bin. This means that when maps for the different time slices are compared, the same burial will appear (at varying intensity) across multiple images: the plots are intended to indicate general, regional, changes in density only. I have scaled the colours for each plot (reflecting density level) to the highest density time-slice. This ensures that all plots are displayed on the same scale, to facilitate comparability between time-slices. The alternative, scaling each plot separately, allows for the patterns within each time slice to be observed more easily, but reduces the ease of comparison between them. Collard et al. (2010) used a similar time-slice density mapping approach to show the changing spatial density of radiocarbon dates across the British Neolithic in 100-year intervals. Bevan et al. (2017) also use this method (see their Figure 1, parts A and B). The code I have used was adapted from the supplementary information of their paper.

I selected my case study regions for the project (Wessex, Yorkshire Wolds, and Eastern Scotland) on the basis of them showing a high level of intensity across datasets using these two spatio-temporal approaches. I carried out (non-spatial) permutation tests, as described above, on these geographical subsets to test if particular regions saw significantly different trajectories in changing burial practices. The empirical SPDs for different regions can then be compared to the overall pattern and to each other.
Did funerary diversity persist throughout the British Beaker Period?

Following the process of data collection, as described in the previous chapter, I have identified 272 deposits, from 197 different sites, which meet my selection criteria as atypical Beaker-period burials. Several of the sites represented also contain burials from other periods, and some also contain typical Beaker burials from the same period; these will be mentioned where relevant. This chapter is the first of three presenting the results of my analyses of the burial evidence, with each chapter dealing with different types of evidence and analysis.

This first results chapter addresses the question of the continuity of different burial practices using a variety of methods following a ‘big data’ approach. This approach is necessarily broad-brush and groups the burials into categories in order to facilitate comparison across large areas and broad time-scales. The research focuses on the Beaker period, but most results are contextualised with reference to the wider period 3000-1500 BC (the whole of the Late Neolithic and Early Bronze Age). In order to facilitate this, my own research is supplemented by other datasets, especially the EUROEVOL radiocarbon dataset. The primary aim of this section is to examine the temporality of different burial practices in order to address the question of whether funerary diversity continued throughout the Beaker period, though the question of regionality (which can also be conceptualised as spatial continuity) is also touched on. I present results covering the whole of Britain, and carry out further analyses for three case study regions – Eastern Scotland, the Yorkshire Wolds, and Wessex – in order to demonstrate the variability of results across Britain.

The second results chapter, Chapter 6, details the nature of funerary diversity in this period and covers archaeological description of the different practices and an assessment of the variation in these. The final results chapter, Chapter 7, covers the osteological findings for the atypical Beaker-period burials, comparing this to the findings of the Beaker People Project. Discussion and cross-comparison of the results of my analyses can be found throughout these three chapters, with key points raised to be discussed further in Chapter 8.
5. The Spatio-temporal evidence

5.1. Bayesian analysis of radiocarbon dates

Following the issues with Bayesian modelling raised in the methodology chapter, I have taken a minimal approach to Bayesian analysis, focusing on the case study regions.

It is possible to evaluate the likely spread of dated evidence from different burial types across the Chalcolithic by directly comparing the (unmodelled) calibrated spread of dates for each. Figure 5.1 shows the calibrated radiocarbon dates for cremated remains, and Figure 5.2 shows the calibrated radiocarbon dates for disarticulated remains; dates are on bone only for both, and only determinations with errors <80 years are included. Determinations fall immediately before and after the extent shown; it has been limited to the current range for presentation purposes only. There is no obvious hiatus in the spread of dates for either burial type, with both appearing to span the whole Chalcolithic.

It is possible to insert these dates into Bayesian models of different practices. The BPP, for example, has modelled determinations for Beaker-associated inhumation burials to give probable start and end dates for Beaker use across Britain (see Jay et al., 2018). As many of my burials are without artefacts, it would perhaps be most appropriate to assign determinations to ‘phases’ on the basis of burial type: one for cremations, one for articulated inhumations, one for disarticulated inhumations. However, the ‘start’ and ‘end’ of each of these would simply reflect the limits of my data collection efforts. In order to model the start or end of anything, there needs to be a definable break or boundary of some description from which to begin the discussion. Using period boundaries such as the start of the Chalcolithic would be circular, as this is already based on the modelled start of Beaker burials.

I would argue, instead, that the spread of dates should not be separated into phases or periods, as is traditionally done, but viewed as informative data in their own right. This allows the possibility that the distribution of the dated examples has captured a genuine continuity of practices from the Late Neolithic to the Early Bronze Age.
Figure 5.1 – Radiocarbon dates for cremated remains, focusing on the period c.2600-2100 BC
Figure 5.2 – Radiocarbon dates for disarticulated burials, focusing on the period c.2600-2200 BC
However, the question then raised is what is - or what can be - meant by ‘continuity’ when looking at a sample such as this. While there is no clear hiatus in the radiocarbon record – the probability distributions of sequential dates all overlap – each determination actually represents a single point in time (in theory, the death of the organism). Each of the calibrated distributions, however, spans an extended period of time, reflecting machine error and the varying shape of the calibration curve as well as the age of the sample. The resulting image of overlap is therefore potentially misleading.

It must be accepted that only a small proportion of people alive at any given point in time received a formal burial, that only a small proportion of these will be excavated, and that a smaller proportion will be radiocarbon-dated. But it is debatable whether a handful of individuals dispersed over hundreds of years can (or should) be taken to indicate continuity of the burial practice they represent. Assuming a generational span of 25 years (and an MNI of one for each cremation), there are enough data points to argue that at least one individual was cremated every generation, somewhere in Britain, across the study period. However, these are dispersed from the south-west of England to Orkney; if continuity per generation in any given locale is sought, the data are insufficient to demonstrate it.

However, the Beaker People Project surely suffers from the same problem. The small number of dates in the Chalcolithic is not enough to indicate a viable community of individuals, and in the absence of clear settlement evidence it is difficult to access any other proxy for the scale of the early Beaker groups (though population levels will be discussed at the end of this chapter). Yet the typological link of the associated Beaker vessels is seen as forming supporting evidence that allows the burials to be recognised as ‘belonging’ to the same group as each other. This cannot be done with unaccompanied cremated remains, separate from any monument form, in any way other than grouping by burial practice, as I have done here. The resulting fuzzy, sparse, uncertain image of continuity in cremation practices could be divided by period boundary but I would argue against doing so for the simple reason that period boundaries are better understood not as absolute breaks in the archaeological sequence, but as processes of transition.

I will present simple two-phase models comparing the BPP dates with those for cremated remains across the same period for each of the case study regions (Eastern Scotland, Yorkshire Wolds, and Wessex), using the ‘overlapping’ model and uniform priors. I will then compare the results for Summed Probability Distribution analysis of the same datasets. In the SPD section (later in the chapter) I will explore the dates for different burial types without these artefactual and periodisation constraints.
5.1.1. Bayesian models: case study regions

Across the three case study regions, the modelled start and end dates of ‘phases’ comprising the BPP dates for each area and the dates for cremated remains from the atypical cremation burials can be compared. Each model has two phases, created using the ‘overlapping’ model, and uses uniform priors (to match the BPP method). I have chosen to collapse the phase for the BPP evidence, showing just the modelled start and end in order to aid presentation of these plots.

Figure 5.3 shows the model for the Eastern Scotland case study area. The first thing to note is the difference between the shape of the modelled start and end of the two phases: the BPP phase, comprising 60 determinations, has short and clear distributions, whereas the cremation model, utilising just seven determinations, produces boundaries with long ‘tails’.

Figure 5.3 – A two-phase model for Beaker-period Eastern Scotland, showing the BPP inhumation date start and end, and the atypical cremation phase in full.
The second feature of the plot to note is the difference between the unmodelled (light grey) and posterior (dark grey) probability distributions for each date. Inserting the determinations into a phase together results in the age of each determination being used to inform the others. While the original determinations extend over a broader period, the posterior modelled distributions are more constrained in range, fitting more neatly into the area of the plot just to the left of the ‘2000 BC’ vertical line. The determinations included in each model affect the way each posterior distribution is manipulated; for this reason my dates for the BPP are slightly different to those included in their own publications – my case study areas do not accord closely with theirs, and the choice to include or exclude certain dates based on their geographic location changes the model output. This is one of the reasons why the case study areas in the current study should be treated as demonstrations of variation rather than indications of any locally specific timings/temporalities of the traditions and transitions under discussion.

Moving onto the specifics of Figure 5.3, the start of the BPP-dated inhumation practice in this area is modelled as 2390-2280 cal BC (at 95%); slightly later than the BPP’s own estimate of a start of 2415–2315 cal BC for Beaker use in Scotland (Jay et al., 2018, p. 75). The earliest date (for a Beaker burial at Pitdrichie) is identified as an outlier in this model (A=47.7), though its unmodelled range of 2480-2290 cal BC at 95% is within the range of Beaker-use for Britain. Modelling dates by region and excluding outliers such as this one has the potential effect of missing the earliest recorded Beaker migrants (or adopters) in new areas. Modifying the phases to have sigma boundaries allows the phase to be modelled as following a normal (rather than uniform) distribution (method from Bronk Ramsey, 2009; and rationale following Manning et al., 2014). Doing so shifts the start date later (to 2330-2210 cal BC) but also prevents the Pitdrichie date from being identified as an outlier (A=88.6) and improves the overall model fit, from an Amodel statistic of 97.01 to 115.85. It could be argued that using sigma boundaries would have been more appropriate for the BPP but as they decided against using them I have displayed the boundaries as they appear under a uniform distribution for closer comparability.

The dated atypical Beaker-period cremated remains start at 2250-2020 cal BC (95%), in the Early Bronze Age. Two of these burials, from Old Rayne and Dalladies, were with Beakers, but as both probably fit within period 2, neither would have much effect on the modelled range of Beaker use in the region if included in the BPP’s models. The modelled end of the BPP inhumations accords well with the BPP’s own findings: 1880-1790 cal BC (95%) to their result of 1900–1740 cal BC (Jay et al., 2018, pp. 75–6). The modelled end of the atypical
Beaker-period cremations in Scotland is 2130-1910 cal BC (95%), reflecting my data collection range (to 1950 BC).

Figure 5.4 compares these results (uniform distribution models only) to the plot produced by summing the probability distribution of the radiocarbon dates included in each of the two phases. The solid start and end probability distributions are the modelled boundaries themselves (taken from the raw data in OxCal) and the shaded area their 95% ranges, as quoted above.

![Figure 5.4: Plots for the Eastern Scotland case study area, comparing the modelled start and end ranges of BPP burials and atypical Beaker-period cremation burials to the shape of the SPD of each.](image)

The two plots demonstrate the reduction in chronological range produced by phase modelling, with the beginning and end of each probability distribution lying outside the shaded areas representing the phase modelled start and end of each. When attempting to assess the possible range of a practice, rather than its core period, this ignored area of the distribution could arguably be the most important. This method serves to highlight the difference in results produced by these two different approaches to radiocarbon analysis; whether either answer is more ‘correct’ is a matter of (ongoing) debate.
The top plot indicates that the SPD of Beaker burial in eastern Scotland starts just after 2500 BC, corresponding with the earliest dates in England, and the modelled start actually largely captures the steepest period of increase in the practice rather than the beginning of it. The end range similarly excludes the end of the SPD. The lower plot illustrates the limited interpretive utility of the start and end dates for the cremated remains: each covers more than half of the range of the practice, and they overlap for c.100 years in the middle, from the two highest peaks in the probability of the boundaries. Despite the small number of dates, the SPD plot shows a clearly-defined practice falling into Needham’s period 2, the start reflecting an absence of relevant dates in the Chalcolithic and the end reflecting the data collection limit.

Figure 5.5 shows the modelled start and end of the BPP inhumations (39 dates) and the full phase (four dates) of cremated atypical Beaker-period burials in the Yorkshire Wolds case study region. Again, the results between the two vary greatly in precision, with the higher number of determinations for the BPP material resulting in tightly defined boundaries. The modelled BPP phase’s start and end for this region are 2310-2200 cal BC and 2010-1910 cal BC respectively (both at 95%), with no outliers identified. The start and end of the cremation phase are both particularly affected by long ‘tails’, showing 3520-2280 cal BC and 1880-680 cal BC respectively. This range, stretching from the Middle Neolithic to the Iron Age, is clearly not an accurate reflection of the four dates included in the phase, indicating that more data points (radiocarbon determinations for cremation burials) are required for successful Bayesian phase modelling.
Figure 5.5 – A two-phase model for Beaker-period Yorkshire Wolds, showing the BPP inhumation date start and end, and the atypical cremation phase in full.

Figure 5.6 shows the SPD of the two datasets, with the phase boundaries indicated (plot limited to 3000-1500 BC). The modelled BPP start range in this region captures the peak of the practice rather than its introduction, and the end captures a period of decline, but not the end of the practice. As with the previous case study area, the SPD plot suggests that the Beaker inhumation practice is first seen just after 2500 BC, with the inhumation rite continuing well into the Early Bronze Age. The cremation SPD reflects the finding that of the very small number of dates available, they fall into two groups of two near-contemporary dates each; the SPD plot makes clearer the distance between the two sets of probability distributions (over c. 2200-2000 BC). It can be seen in this plot that the start and end are of no interpretive value: each simply covers one of the two pairs of dates. In this region, the SPD plot shows that the atypical cremation practice was present in the Chalcolithic and in period 3, but fails to demonstrate continuity due to the hiatus over period 2.
Figure 5.6 – Plots for the Yorkshire Wolds case study area, comparing the modelled *start* and *end* dates of BPP burials and atypical Beaker-period cremation burials to the shape of the SPD of each.

Figure 5.7 shows the phase models for the Wessex case study region; as in the previous region the BPP boundaries (47 dates) are closely defined and the cremation boundaries (seven dates, but with two combined using OxCal’s R_Combine function) have extended tails. As with Eastern Scotland, the first date in the Wessex BPP phase is identified as an outlier, though this is marginal at $A=58.8$ (the threshold being 60). The final date is also identified as an outlier, at $A=21.4$, despite most of its calibrated range overlapping with that of the penultimate date. Once again, this issue is removed by the use of *sigma* boundaries with the first date shifting to $A=84.5$, the last to $A=77.8$, and the $A_{model}$ value from 75.81 to 92.22.

The boundaries of the BPP are once again neatly defined, while the cremation boundaries extend far past the range of the input data. The *start* and *end* for the BPP inhumations are 2500-2380 *cal BC* and 1880-1760 *cal BC* respectively (at 95%); the BPP argue on the basis of the early *start* (which they place at 2425-2315 *cal BC*) that Wessex probably saw the earliest Beaker use in Britain (Jay *et al.*, 2018, p. 77). Using *sigma* boundaries, the *start* and *end* change to 2430-2290 *cal BC* and 2080-1940 *cal BC*. The *start* and *end* for the atypical cremations are 3130-2470 *cal BC* and 1860-1100 *cal BC* respectively (at 95%).
In this and the previous region, the posterior distributions have not been affected as severely as in Eastern Scotland, and are largely the same as the unmodelled probability distributions. Though clearly built from a low number of determinations, the evidence for the atypical cremation practice here suggests a span throughout the Beaker period.

Figure 5.7 – A two-phase model for Beaker-period Wessex, showing the BPP inhumation date start and end, and the atypical cremation phase in full.

Figure 5.8 shows the Wessex phase models against their SPD plots. The BPP start, unlike in the other areas shown, appears to actually capture the introduction of the Beaker phenomenon in this region. The BPP end does not reach the very end of the distribution of the summed probability, but it falls in the final period of decline. The cremation boundaries once again extend beyond the range of the plot and are of limited interpretive utility. The SPD within the study period shows a ‘choppy’ pattern, reflecting the minimal overlap between each of the six radiocarbon dates included in the plot (one of these being the R_combine result). As the first spike of summed probability falls across the 2500 BC
boundary, it is unclear if these should be considered Beaker-period or Late Neolithic cremations. Of the three dates that comprise the bulk of this spike, two form late deposits into earlier Neolithic monuments (Woodhenge and Stonehenge) and the third is from Boscombe Down, unaccompanied by any artefacts but near to the famous early Beaker burials there. This suggests that there may be chronological synchronicity between Neolithic-aligned and Beaker-aligned cremation burials within the Wessex region at the Neolithic-Chalcolithic boundary. The rest of the determinations fall into periods 2 and 3 – and include further cremations at both Woodhenge and Boscombe Down.

The results from these plots demonstrate the constraining effects that phase modelling has on the range of distributions, resulting in early instances being ignored or flagged as outliers. It also demonstrates the limited utility of this method when dealing with smaller datasets, in contrast to SPD which handles both the full range and small datasets better.

The above results show that the Bayesian modelling and summed probability distribution approaches produce different results when modelling the same sets of radiocarbon dates.
The Bayesian approach tends to constrain the range of phases when there are large numbers of radiocarbon dates, resulting in early and late dates in a series being marked as outliers when they ought to be regarded as important pieces of evidence in the date range of a phenomenon. Conversely, if there are too few dates in a phase then the modelled start and end dates are inaccurately wide, often spanning for many thousands of years beyond the range of the dates included in each model. The results further show that decisions around the shape of the boundaries have the potential to alter the resulting position of these, with sigma boundaries (creating a normal rather than uniform distribution) tending to shift the boundaries slightly later but without rejecting early dates as outliers. Comparing the Bayesian phases to the summed probability distribution of the same dates reveals differences in the results produced by the two approaches, with implications for the timing assigned to events or phenomena depending on the methods utilised to analyse the radiocarbon data. The SPD approach consistently provided a wider date range than the Bayesian methods: with the visualisation of the two methods together shows that the lower levels of summed probability at the beginning and end of phases is excluded from the Bayesian phase models.

5.2. Aoristic assessment of dated and undated burials

Despite the finding of Timpson et al. (2014) that SPD methods continue to reveal the same patterns even when using small datasets, the case study results showing hiatuses between each individual radiocarbon date indicate that there is probably a threshold below which this stops being the case. The datasets compared in the above plots were intentionally small, to allow for clear visual comparison with the OxCal results for each region. However, the finding that the case study analyses are affected by small sample sizes raises the question of whether the dated atypical burials dataset should be supplemented by information from undated burials for further analysis, and whether this would affect the shape of the resulting plots.

It is possible to test such an approach by probabilistically binning both the dated and undated burials into phases. Below is a plot showing the summed probability of both the dated and undated Beaker burials across the study period (Figure 5.9). The dated burials sum is derived from assignment of the calibrated probability distribution into the four period divisions, whereas the undated burial sum is derived from an aoristic assessment of the dates. The plot demonstrates that the temporal distribution of the dated typical (BPP) and atypical Beaker-period burials form a similar shape to each other. In both, the peak of the summed probability falls into period 2. A higher level of probability occurs in period 1 than in period 3, and a small proportion of the summed probability of occurrence falls into the 250-year
block at the end of the Late Neolithic. The similarity in shape is notable given the different inclusion criteria of the two projects. My project explicitly focuses on periods 1 and 2, whereas the Beaker People Project seeks to include Beaker-associated burials regardless of time period, which therefore includes the (relatively small number of) late use/re-use examples found after c.1950, as well as Food-Vessel associated remains from the same period. This suggests that the boundary between periods 2 and 3 is relatively weakly differentiated; or perhaps just difficult to recognise in the form of atypical Beaker burials (which are largely not associated with the artefacts used by Needham (2005) to define the period).

The undated atypical burials follow roughly the same pattern, though a relatively high proportion of the probability distribution has been assigned to period 3. While it is possible that this indicates that period 3 Beaker burials are less likely to be radiocarbon dated, the pattern is probably more likely to reflect my over-cautious assignment of probabilities in the absence of dating evidence. Where possible, I have weighted the probability of undated burials falling into each period in a way that is broadly reflective of the archaeological evidence. However, in some cases there is nothing that allows a distribution more sophisticated than a flat assignment of 0.25 to each of the four blocks. As a result, I think it is unlikely that the undated burials would (if dated) form a different chronological pattern to

Figure 5.9 – Aoristic summed probability plot of the dated burials in the Beaker People Project dataset and both the dated and undated burials in the atypical dataset, by period.
the dated burials. I am therefore confident in basing further temporal analyses – intended to reflect the patterns of the full set of evidence – on the dated burials only.

5.3. **Summed Probability Distributions**

5.3.1. **Simple SPD plots**

Turning to Summed Probability Distribution method used on its own, an SPD analysis reveals several interesting patterns in the shape of the distribution of dates. Figure 5.10 below shows the summed probability of all calibrated radiocarbon dates for burials across the Late Neolithic and Early Bronze Age (3000-1500 BC). The most immediately noticeable feature of the shape of this distribution is the dramatic increase in the summed probability of burial dates just after 2500 BC, corresponding with the Bayesian modelled start date for the appearance of Beaker burials in Britain. There follows a plateau lasting around 100 years, which is probably artificial as it corresponds exactly with a plateau in the calibration curve (IntCal13). After this, the summed probability again rises sharply, peaking in the Early Bronze Age from c.2000-1800 BC, before declining again after 1800 BC.

![SPD plot of burial dates for Britain](image)

Figure 5.10 – SPD plot of all burial dates for the British Late Neolithic and Early Bronze Age

Immediately prior to the first appearance of the Beaker phenomenon, the summed probability is particularly low: at no other point in the Neolithic or Bronze Age does the burial SPD drop to such a low level. While the SPD plot indicates that a notable change occurred in the 25th century BC, the unusually sparse nature of the Late Neolithic burial context into which the first Beaker burials appeared must also be kept in consideration.
Figure 5.11 shows the same data but with the SPDs of articulated, disarticulated, and cremated burials plotted separately. 96 EUROEVOL dates for unburnt burials have been excluded from this plot as I was unable to determine if the remains were articulated or disarticulated. The shape of the distribution of disarticulated burials indicates a low but relatively stable level of occurrence of this practice throughout the period. The plotted articulated inhumation and cremated burials reveal that it is primarily fluctuations in these two practices that produce the changing shape of the overall distribution (as in Figure 5.10).

The SPD for articulated burials can be seen to increase suddenly just after 2500 BC, and then climb sharply again from c.2350-2250 BC. This does not correspond exactly with Needham’s periodisation, however, as the acceleration of growth occurs throughout period 1, rather than during a ‘fission horizon’ at the interface between periods 1 and 2 (Needham, 2005). The summed probability subsequently peaks during period 2, with a decline in stages occurring from c.2050 BC onwards. The peak for cremated burials is far higher, shows a sharper rate of increase and subsequent decrease, and occurs around 250 years later than the articulated inhumation peak. The increase in prevalence of cremation starts at around 2200 BC and peaks at c.1860-1780 BC. While the prevalence of the three rites varies over time, the SPD plots indicate that it is probable that cremation, articulated inhumation, and disarticulated inhumation burial were each practiced throughout the Beaker period.

![Figure 5.11 – SPD plot of dates for articulated, disarticulated, and cremated burials for the British Late Neolithic and Early Bronze Age](image-url)
5.3.2 Proportional SPD plots

While Figure 5.11 shows that each of the three burial practices saw a different trajectory over the study period, the reduced likelihood of cremated burials being dated means that the proportional relationship between cremation and inhumation should also be considered. Figure 5.12 shows the SPD for cremation as a proportion of all burials over the study period. As a given deposit of cremated remains can be assumed to be less likely to be dated than an otherwise equal deposit of inhumed bone, the proportion of cremation shown on the y-axis is likely to be below the true value. The plot shows that cremation formed a relatively high proportion of the total (dated) burial practice in the Late Neolithic and Early Bronze Age, and a lower proportion in the Chalcolithic. However, the start of the trends of relative increase and decrease do not closely match the established period boundaries. The relative proportion of cremation begins to decline from around 2700 BC. The drop in proportion at 2450 BC, which reflects the sudden increase in inhumation at that point, appears, rather than the start of a change in cremation prevalence, to be a continuation of an ongoing trend of proportional decline. The relative prevalence of cremation starts to climb again from around 2200 BC, corresponding with the start of Early Bronze cremation traditions. In the intermediate period the relative proportion of cremation is far lower than that seen in the preceding Late Neolithic. However, cremation does not disappear: at its lowest relative prevalence, in the century 2350-2250 BC, cremations account for 13% of the summed burial probability.

![Figure 5.12 – SPD plot showing cremation as a proportion of all burials](image)

Figure 5.12 – SPD plot showing cremation as a proportion of all burials
Figure 5.13 shows a proportional SPD plot for disarticulated burials, indicating that the relative prevalence of this practice declined over time. This is to be expected: the empirical SPD (see Figure 5.11) shows a low but relatively constant level of disarticulated burial, with no clear period of peak prevalence occurring at any point during the study period. As the other burial types peak, disarticulation becomes proportionally rarer. For completeness, Figure 5.14 shows the proportion of articulated burials, demonstrating that their relative prevalence peaked in periods 1 and 2, as might be expected. It should be noted, however, that the post-Beaker proportion of articulated inhumation is slightly higher than the pre-Beaker proportion, raising the possibility that once (re-)introduced into the funerary repertoire, rites can have a continued effect on practices for an extended period of time - beyond the influence of the original context in which they were introduced.
5.3.3. Model testing – null models

In order to test whether the shape of each empirical SPD is more likely to reflect meaningful patterns or be the result of random variation, I have compared each to a series of null models. This method uses simulation to establish whether the empirical SPD deviates from the given null model by a greater amount than would be expected by chance. In each plot, the 95% envelope around the null model is shaded grey.

Figure 5.15 shows the empirical SPD for cremation burials compared to three null models: a uniform distribution, exponential change, and linear change over time. Almost the entirety of each plot is shaded, indicating that the variations in levels of cremation seen across the period are beyond the fluctuations expected under any of the null models. While it is possible to set a different, custom, null model in recarbon (such as logistic growth, as in Bevan et al. (2017)), the empirical burial SPD over this period is (based on visual inspection) not a good match for any null that would be archaeologically meaningful.

This finding is to be expected: burial practices are culturally meaningful and changes to these would not be expected to follow any standardised or over-arching pattern, aside from the long-term principle of taphonomic loss. A second issue with null testing is that the dataset tested is (by necessity) a chronological subset. The subset has been selected to be meaningful in broad archaeological terms, but as it captures neither the initial introduction of cremation nor the long-term fate of inhumation, the model is reflecting a period of time which may not neatly correspond with longer-term shifts in burial practices. It is likely that a plot examining burials from the Palaeolithic through to the modern day would show a very different pattern, but this would be far beyond the scope of the current project.

For all model tests in this study, I have included the date range of 3250-1350 cal BC in an attempt to capture (only) the data of immediate relevance to the study while leaving the edge effects of the model test outside the plotted area (3000-1500 BC). When experimenting with the method, I found that tests using wider temporal limits tended to result in all fitted model shapes converging and producing near-identical uniform (horizontal) null models. This suggests that there is no clear directionality evident in the fluctuations of burial practices across the span of the Neolithic and Bronze Age at least; any directionality evident in the models shown here is likely reflective of shorter-term trends only. The impact of parameter selection is perhaps an under-acknowledged issue in previous literature adopting this approach, and becomes relevant to my own study when comparing my findings to those of other researchers.
In Figure 5.15, the prevalence of cremation burials in the Late Neolithic is lower than would be expected under the null models, and does not become higher than expected until around 2050 BC in each. The peak in higher-than-expected levels of cremation burial can be seen to be relatively short-lived, however, with all three null models indicating that the level ceases to be significantly higher than expected by the end of the Early Bronze Age. This should be compared to Figure 5.11 and Figure 5.12, which show that the Early Bronze Age increase in the absolute level and the proportion of cremation started from around 2200 BC. From the start of its trend of increasing prevalence, cremation took around 200 years to become the dominant rite, and this is the point where it crosses the null envelope in each model.

Despite the empirical SPD for disarticulated burial showing a trend of gradual decline in absolute and relative prevalence, the models reflecting this directionality (linear and exponential decline in this case) do not fit the data any better than a uniform distribution model (Figure 5.16). The three plots each show that disarticulated burial was present at a lower level than would be expected during most of the Late Neolithic, though after this they are more variable than the three cremation models. Each agrees that there is a significantly higher than expected level in period 2, though the duration of this varies widely, ranging from 188 years under the uniform model to 657 years under the exponential model. While this would initially appear to be an unexpected finding, it should be remembered that disarticulated burials are a subset of inhumations: their prevalence will likely co-vary to some extent with changes to the prevalence of articulated inhumations.

While the plots for disarticulated burial indicate greater areas within the null envelope, the global p-value for these three models, as with the models tested for the other datasets, is p < 0.001, indicating that the null models can be rejected as explanations for the observed patterns in the empirical data (Table 5.1). The global p-value is calculated as \((r+1)/(n+1)\), where \(r\) is the number of iterations that produce a value that is greater or equal to the observed, and \(n\) is the number of iterations run (Enrico Crema, pers. comm. and radiocarbon source code). As I have run 1000 simulations for each model, when \(r = 0\) the equation becomes \(1/1001 = 0.000999001\).

**Table 5.1 – Global p-values for null models tested against empirical SPD plots**

<table>
<thead>
<tr>
<th></th>
<th>Uniform null</th>
<th>Linear null</th>
<th>Exponential null</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articulated burials</td>
<td>(p &lt; 0.001)</td>
<td>(p &lt; 0.001)</td>
<td>(p &lt; 0.001)</td>
</tr>
<tr>
<td>Disarticulated burials</td>
<td>(p &lt; 0.001)</td>
<td>(p &lt; 0.001)</td>
<td>(p &lt; 0.001)</td>
</tr>
<tr>
<td>Cremated burials</td>
<td>(p &lt; 0.001)</td>
<td>(p &lt; 0.001)</td>
<td>(p &lt; 0.001)</td>
</tr>
</tbody>
</table>
Figure 5.15 - The empirical SPD of radiocarbon dates for cremation burials compared to three null models (uniform distribution, linear change, and exponential change)
Figure 5.16 - The empirical SPD of radiocarbon dates for disarticulated burials compared to three null models (uniform distribution, linear change, and exponential change)
5.3.4. Model testing – permutation tests

The above results indicate that none of the burial practices in this period can be described as following a uniform distribution, linear change, or exponential change over time. However, this result was anticipated based on visual inspection of the empirical SPD plots. A potentially more useful approach to determine if the results differ significantly from a null model is the use of permutation testing. This approach creates a null model which reflects the shape of the underlying dataset, creating a better model from which to assess areas of deviation.

Figure 5.17 shows the results of a permutation test on the ‘cremation’ variable, i.e. comparing dated cremated burials, as a subset, to the full dated burial dataset. The results show that for most of the Late Neolithic, up to around 2570 BC, the level of the summed probability of cremation burials is within the 95% range of the null model. For this period, the level of cremation is consistent with that which would be expected if the choice to cremate occurred at random. This is unlikely to be what was actually happening in the Late Neolithic, but it suggests that cremation was a key component of a mixed funerary repertoire during this period. From c.2570 BC, the level of cremation drops below the 95% envelope, increasing in prevalence but staying below the null until it intercepts it in the decades either side of 2000 BC. The cremation prevalence is higher than expected under the permuted null from just after 2000 BC, continuing to be so until the end of the Early Bronze Age.

Figure 5.17 – A permutation test showing the empirical SPD of cremation dates against the 95% probability envelope around a null model of random assignment of cremation/non-cremation labels

These results should be compared to Figure 5.12, which shows an ongoing decline in the relative proportion of cremation from around 2700 BC; this is 130 years before the point at
which it drops below the expected prevalence under the permuted null model. While the cremation proportion starts relatively high, declines, and then rises again over the study period, the permutation plot better reflects the impact of the much lower summed probability of all burial dates in the Late Neolithic compared to later periods. The permutation testing approach reveals that, as the observed pattern of cremation in the Late Neolithic could have occurred by chance, caution should be applied when interpreting the shape of the empirical SPD in the centuries immediately prior to the Beaker period.

Figure 5.18 shows the results of a permutation test for disarticulated burials against the dated burial dataset. This appears to support the findings of the proportional analysis of disarticulated burials, which reveals a trend of declining relative prevalence over time (Figure 5.13). While, again, caution must be applied to avoid over-interpretation of the Late Neolithic data, Figure 5.18 indicates that the level of disarticulation is either within the null range or slightly above it throughout the Late Neolithic, up until c.2330 BC, from which point onwards the level of disarticulated burial is lower than expected.

![Figure 5.18](image)

**Figure 5.18** - A permutation test showing the empirical SPD of disarticulated burial dates against the 95% probability envelope around a null model of random assignment of disarticulated/non-disarticulated (cremated + articulated burial) labels

The permutation test for articulated burials shows that the Late Neolithic level of these burials is below that expected under the null model, with the empirical SPD crossing the 95% envelope to become higher than expected at c.2480 BC (Figure 5.19). It falls below that expected from around 1900 BC, corresponding fairly closely with the Bayesian phase modelled dates for the start and end of the Beaker period in Britain.
The pattern that emerges from the permutation tests, comparing each burial type to the overall burial dataset, is thus that the level of each burial type varies more than would be expected by chance across most of the study period. From 2450-1950 BC, articulated burial is more prevalent than expected and cremation burial less prevalent than expected. Disarticulated burial is as prevalent as expected until the fission horizon, when it becomes less prevalent. These tests therefore appear to be reliable at identifying the core period of prevalence of each burial practice. As with the null model approach, the global p-value for each permutation test is <0.001 (Table 5.2).

Table 5.2 - Global p-values for permuted null models tested against empirical SPDs

<table>
<thead>
<tr>
<th>Test</th>
<th>Permutated null model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articulated burials vs. all other burials</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Disarticulated burials vs. all other burials</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Cremated burials vs. all other burials</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>
5.4. SPD compared to KDE

SPD has been criticised by some authors as providing an inaccurate representation of combined radiocarbon probability, with peaks and troughs seen as being either random in nature or reflecting the shape of the radiocarbon calibration curve, rather than reflecting genuine changes in the level of the subject of analysis (Bronk Ramsey, 2017; Contreras and Meadows, 2014). In order to assess the differences between SPD and an alternative summing approach, Kernel Density Estimation (KDE), I have plotted them against each other. SPDs have been calculated using the same method as above and KDEs calculated using McLaughlin’s (2019) method. Figure 5.20 shows the paired KDE and SPD results for all dated burials, with the KDE plot indicating the range of possible solutions under 1000 iterations. The shape of the plot is very similar to the SPD result, with a narrow range of results. The main area of difference between the two is the steepness of the increase in activity after 2500 BC. While the SPD indicates a sudden jump in burial activity at c.2450 BC, the KDE suggests a gradual increase. Bronk Ramsey (2017) noted that this ‘smearing’ of signals is common in KDE methods, unless combined with a Bayesian approach.

![Figure 5.20 – SPD (top) and KDE (bottom) plots for all dated burials across the Late Neolithic and Early Bronze Age](image-url)
Figure 5.21 shows the KDE plots for each burial type (compare to Figure 5.11). As with Figure 5.20, there is some blurring of the curves, similar to that seen when the SPD plot is averaged over a longer period. The utility of this approach is to see the range of possible solutions depicted for each burial type. While the articulated burial SPD indicates very low levels of activity throughout the Late Neolithic, the KDE indicates that the level could have dropped to 0 during the period c.2750-2600 BC. The plot is otherwise similar, indicating an appearance of activity around 2500 BC, with a reduction in the rate of increase shortly afterwards, until a sharper increase occurs from c.2350 BC. The cremation KDE, as with the SPD plot, indicates a very low level of activity prior to the gradual increase from c.2300 BC. Though the level is extremely low, it does not reach 0, so there is no solution in which there is an absolute hiatus in dated cremation burials in the Chalcolithic. The disarticulated burial plot is broadly similar to the SPD result.

Figure 5.21 – KDE plots by burial type
5.4.1. **SPD and KDE: Case study regions**

Using the same case study areas as before (Eastern Scotland, Yorkshire Wolds, and Wessex), it is possible to explore regional differences in burial practices over time, and to assess whether each tells the same or a different story to that of the Britain-wide plots shown above. A rescaled SPD plot of the burials for the three regions reveals that the shape of the distribution differs for each (Figure 5.22). Particularly notable differences are, firstly, the shape of the plot for the Late Neolithic, and secondly, the timing and duration of the increased prevalence of burials during the Beaker period. The shape of the burial SPD for the Late Neolithic in the Wessex region is closely aligned to that for the whole of Britain (see Figure 5.10). However, the other two regions show extremely low or absent levels of burial from 3000-2500 BC. As has been modelled by the Beaker People Project, the increase in burial SPD associated with the Beaker phenomenon appears to occur first in Wessex, then in Eastern Scotland (particularly Aberdeenshire), with the Yorkshire Wolds region showing a much later start date, during or after the fission horizon.

![Figure 5.22 – SPD plots of the dated burials from Eastern Scotland, Yorkshire Wolds, and Wessex](image)
Figure 5.23 shows the same data but analysed using the Bayesian-adjusted KDE method. The underlying grey outline shows the SPD (though *n.b.* there is no smoothing option in OxCal so it retains more artefacts than in Figure 5.22). The blue line and translucent band...
show the mean KDE generated through Markov Chain Monte Carlo (MCMC) sampling ±1σ. There is no substantive difference in these results that would affect my interpretation of the SPD plots. The only possible difference to note is that the KDE method suggests a slower rate of decline in burial practices at the end of the Early Bronze Age in the Yorkshire Wolds than the SPD method, which suggests a sharp decrease post-2000 BC. While much lower-resolution, aoristic plots across the three regions produces a similar shape (Figure 5.24).

Figure 5.24 – Aoristic plot of the summed probability of both dated and undated burials over the study period for each of the case study areas

Figure 5.25 shows the case study results separated out by burial practice. These plots (not rescaled) show, firstly, the widely divergent number of radiocarbon dates in each of the three regions (see counts and y-axis values). Secondly, they illustrate that the relationship between different burial types over the study period is completely different in each of the three regions.

Eastern Scotland displays a relatively low level of cremation in the Late Neolithic, and has no inhumation burials represented at all until after 2500 BC. The cremation SPD drops to zero at almost the exact point that the inhumation practice appears. In this region, the radiocarbon dates therefore suggest that there was no overlap between cremation and inhumation in the Chalcolithic; articulated inhumation appears to be the only extant practice from 2500 to around 2200 BC.
From this point, cremation practices appear and quickly rise in prevalence to become the predominant rite. Only an extremely low incidence (n=3) of dated disarticulated burials can be found in this region, all occurring in period 2. Articulated inhumation continues to be practiced, though gradually declining in prevalence, throughout the Early Bronze Age. This continuation of a practice introduced with the Beaker phenomenon contrasts with the BPP finding that the latest use of Beakers in funerary contexts in Scotland ended in 1900-1745 cal. BC (Jay et al., 2018 Table 2.5). Beaker ceramics are replaced by Food Vessels (and Food Vessel Urns) by this point, which are primarily (though not always) associated with cremated remains (Curtis and Wilkin, 2018, pp. 234–6).
Figure 5.26 shows the results of KDE models for the same data for Eastern Scotland. As with the McLaughlin method, the results are broadly similar to the SPD plots, although the plot for articulated burials smooths the initial ‘step’ in the articulated burials seen in the KDE plots.

The Yorkshire Wolds SPD plot shows a virtual absence of Late Neolithic burial of any type. There is a low probability of articulated inhumation occurring from around 2500 BC, but there is not a clear increase in the practice until just after 2300 BC. As well as being a late introduction into the Yorkshire Wolds, the articulated inhumation practice also appears to have been relatively short-lived in this region, with the SPD dropping almost to zero probability before the start of period 3 and with only minimal evidence for a continuation of the practice into the Early Bronze Age. There are very low numbers of dates for cremated and disarticulated burials in this region (ten and eight, respectively). The cremation dates cluster around 1800 BC, but there is an absence of any convincing sign of the Early Bronze Age cremation peak seen in the Britain-wide dataset: the Early Bronze Age looks almost as empty as the Late Neolithic. I suspect that the shape of the plot has been affected by the relatively low level of research and funding in this region in comparison to Wessex and Eastern Scotland. The Beaker People Project has targeted the region for articulated inhumation dates but there is not a suitable comparative dataset of dates for other burial types to compare against; this is despite the fact that there are many undated burials in the region, as can be seen from my ‘atypical’ dataset.
The KDE results (Figure 5.27) support a later start of the articulated inhumation practice the Yorkshire Wolds, suggesting that the low early probability is an artefact in this region too. The results are otherwise broadly the same as the SPD findings.

![Figure 5.27 – A composite plot of the KDE models for cremation, articulated inhumation, and disarticulated inhumation for the Yorkshire Wolds case study region.](image)

The Wessex region has a Late Neolithic profile most similar to that of the total burial dataset, seeing a sudden and dramatic introduction of articulated inhumation at the same point as in the plot of Britain as a whole. This region is the only one out of the three where the SPD results appear to show any continuity of cremation (or disarticulated burial) from the Late Neolithic into the Chalcolithic. This is likely the result of sampling biases between regions: there are more than 30 radiocarbon dates for the Late Neolithic cremated remains at Stonehenge, but no more than a dozen dates for Late Neolithic cremations across the rest of Britain combined. While many likely undated Late Neolithic cremation burials exist, their absence from the radiocarbon record means continuity cannot be supported by the dated evidence in most regions. Interestingly, there is no major Early Bronze Age cremation peak in this region: the famous ‘Wessex culture’ cremation burials that should be reflected here are almost entirely undated, with the human remains long overlooked in favour of the more remarkable grave goods that accompanied them (Needham et al., 2010b).

The KDE results (Figure 5.28) diverge more in appearance from the SPD results than in the other two case study regions, particularly in that the level of cremation appears to fluctuate...
more, whereas the fluctuations in the disarticulated level are smoothed out. The modelled fluctuations in the cremation are such that a peak is suggested at the start of the Chalcolithic but there is the possibility of the disappearance of cremation for a period at the end of the Chalcolithic (though the ±1σ range is almost entirely >0 at this point so the probability of a complete hiatus here is low). As with other regions, a sharp increase in the summed probability of articulated burials is smoothed out in the KDE plot; as in all regions this has the potential to affect the modelled timing of the introduction of Beaker-associated inhumation rites, but has limited impact on the proportional relationship between burial types at any point in time.

Figure 5.28 – A composite plot of the KDE models for cremation, articulated inhumation, and disarticulated inhumation for the Wessex case study region.

Despite the Wessex and Eastern Scotland radiocarbon datasets being similar in size (218 and 249 dates respectively), there is a clear difference in the breakdown of this by burial type, which lends support to the suggestion of regionally diverse burial trends over time. A permutation test comparing the overall dated burial SPD between regions to that of the total dataset reveals that each case study area deviates significantly from the British evidence as a whole, at p<0.001 (Figure 5.29). Wessex has a significantly higher level of dated Late Neolithic burials than does Britain as a whole. In the other two case study regions, the burial SPD accords with the null model for most of the Late Neolithic, with the exception of a small window in the 25th century BC when the Eastern Scotland SPD level drops slightly lower. This indicates that the Yorkshire Wolds, with virtually no dated Late Neolithic burial evidence at all, is in line with the global picture.
Wessex is unusual in having a relatively high level of dated burials in the Neolithic. Unaccompanied cremations are under-represented in the total dataset, but the Wessex examples are primarily from Stonehenge, which has resulted in a level of research interest that they may not otherwise have received. Wessex is also unusually well represented in the Chalcolithic: it is the only area with a higher-than-expected SPD prior to c.2300 BC. The other regions are within the expected distribution until 2300 BC, when they become higher than expected compared to the global pattern; this is to be expected in these areas, all of which contain concentrations of BPP dates. However, after this point the regions diverge once again. Eastern Scotland has a significantly higher-than-expected burial SPD until c.1550 BC. From c.1950 BC, the Yorkshire Wolds SPD is either within or below the expected range. Wessex is below the expected SPD level from c.2020 BC onwards.

The results indicate that each of these three regions is different to the other, and each diverges from the global burial SPD. While it is clear that some of the patterns should be explained by research biases, the divergence between regions suggests that local and regional variability require further exploration. The SPD method is only suitable for the investigation of areas with concentrations of dated burials, but other approaches are suitable for an overview of wider patterns in Britain.
Figure 5.29 – A permutation test comparing the burial SPD for each of the three case study regions (black line) against the 95% probability envelope around a null model with location permuted.

5.5. Spatial Permutation

I have adopted a spatial permutation-based approach to assess broad spatial differences in the burial SPD patterns across Britain without dividing the data into separate regions. Given the difficulties with interpreting these plots I have opted to display the results for all burials (rather than burial type subsets) and to use broad 200-year blocks for analysis. Figure 5.30 shows the growth rate across the study period – note that the points of comparison are the plotted points on the boundaries between contiguous blocks, showing the difference between the 200-year blocks before and after each point. The third point on the plot, the
highest, compares the 200-year period before and after 2450 BC, and it is this boundary that best indicates the change in burial practices seen with the arrival of the Beaker phenomenon. The plot indicates an increasing geometric growth rate of burials until this ‘Beaker’ transition and after this a decreasing – but still positive – geometric growth rate in the summed probability of burials.

Figure 5.30 – A plot showing the geometric growth rate in SPD for burials between contiguous 200-year blocks across the study period.

Figure 5.31 shows the modelled growth rate of burial dates across the period 3050-1850 BC by displaying the change between contiguous 200-year blocks (as in Figure 5.30). Focusing on the third (‘Beaker’) transition plot, the results suggest that the advent of the Beaker phenomenon resulted in a growth in burial practices across most of Britain. The main exceptions to this - where the results show a post-Beaker decline in burials - are Orkney, Shetland, and the Western Isles of Scotland, areas of central and northern Wales, and northwest England and the eastern part of East Anglia. Most of these areas were already in decline at the previous boundary 200 years earlier.
Figure 5.31 – Spatial permutation growth rate (25km bandwidth) for each transition between 200-year blocks across the period 3050-1850 BC
The spatial permutation test results suggest that most of the observed areas of growth at the Beaker-period boundary are not significant at p=0.05. Exceptions to this are eastern Scotland (along the stretch of coast between Dundee and Aberdeen) and a small number of more localised clusters of sites (see Figure 5.32 plot 3, orange points). Most of the areas of decline highlighted in the previous map are identified as significant; again this is mostly Orkney, the Western Isles, and Wales. However in no case is significant p-value supported by a significant q-value, indicating that these results may be false positives; this is the case for all transitions displayed, not just the ‘Beaker’ transition under discussion.

While this method has the potential to reveal spatial patterns in the radiocarbon data, the high risk of false positives reduces its interpretive potential. The main conclusion to draw from the plots is that the Chalcolithic saw an increase in burial activity in almost all areas of Britain, with the pattern of growth continuing into the subsequent 200-year period at the start of the Early Bronze Age. Exceptions to this – regions showing a decline over this period – are primarily areas which had already been declining in prevalence for several centuries: central Wales, and the islands of Orkney, Shetland, and Lewis in Scotland.

Areas where long-term trends are reversed have the potential to indicate a change in the significance of different locales, or perhaps their intensity of occupation. The only area to show a decline at boundary 3 when there had previously been growth is northwest England. While most of the identified areas of growth at boundary 3 continued a trend from the previous transition, there are several areas that show growth where there had previously been decline. The regions showing this pattern most strongly are south-eastern Scotland (the area around the Firth of Forth), the Yorkshire Wolds, the south-east of England, and central Wales. Of these areas, however, there are none where both the decline and the subsequent growth are significant at p<0.05.
Figure 5.32 – Spatial permutation test results (25km bandwidth) for each transition between 200-year blocks across the period 3050-1850 BC.
5.6. Spatio-temporal Density and Relative Risk Mapping

The spatial permutation plots above suggest that broad-scale changes to spatial density of burials over time may be significant, but are inconclusive. However, it is possible that differences in spatial intensity between burial types may still be archaeologically meaningful. Given the inherent uncertainties with spatial permutation testing, it may be preferable to explore any variations using Kernel Density Estimate (KDE) mapping. A density mapping approach simply shows the areas of higher and lower density within a given period, allowing the visual assessment of similarities and differences between plots. This approach is arguably easier to interpret than spatial permutation and may therefore be more useful for understanding the patterning of the data, although it is not associated with any measures of probability or significance.

Prior to deciding which data should be incorporated into the temporal density maps, I carried out exploratory assessments of each dataset. Figure 5.33 shows the density plots for the dated and undated deposits in my atypical Beaker burials dataset. The plots suggest that there are some areas of difference between the two, for example in north Wales, where a strong concentration of burials visible in the ‘undated’ plot is absent from the dated material. This area showed decline in the spatial permutation plot; possibly as a result of undated concentration of burials being effectively missing from the permuted data.

Figure 5.33 – Density maps of the atypical Beaker burial dataset, dated and undated plotted separately, scaled the same.
Though the differences between the two plots are not dramatic, the known lower likelihood of cremation burials being radiocarbon dated raises the possibility that excluding undated burials from the density analysis (in order to allow a higher-precision temporal breakdown) would have a disproportionate impact on the distribution of cremations in the plots. Cremation burials can survive in regions where inhumations are not usually preserved, so their distribution could be expected to differ from that of inhumations, potentially highlighting separate ‘hotspots’ of activity. The relative prevalence of cremation and inhumation burials also varies across the period (see the proportional SPD plots). This means that a disproportionate reduction of cremation density, caused by the exclusion of undated sites, is likely to have a greater impact on the spatial distribution of burials in some periods than in others, complicating direct diachronic comparison.

Figure 5.34 shows the density of inhumation compared to cremation burials, both dated and undated, over the period c.2700-1700 BC. This range covers the 250-year aoristic bins for periods 1 and 2, plus an equally-sized bin before and after. Comparison to the previous plot suggests that the hotspot of undated burials in Wales is indeed composed of cremations, as is much of the increased density in the undated plot around both the Firth of Forth and Aberdeenshire in Scotland. While there are areas, such as the Yorkshire Wolds, where an undated hotspot represents inhumations, these tend to correspond spatially with dated hotspots. This contrasts with the undated cremation hotspots, which are more likely to form densities in regions that are not already well represented by the dated burials; thus affecting the overall spatial distribution.

To examine how this might affect the apparent distribution of burials over time, it is therefore necessary to consider the changing proportion of burials in each area, as demonstrated for three regions in the case study SPD plots. Chronologically, cremation has the highest relative prevalence in the Early Bronze Age, and spatially it has the highest relative prevalence in the west of Britain. This raises the possibility, to take one example of a potential area of spatio-temporal bias, that any shift in burial density from east to west over the Beaker period would be under-reported. The eastern areas of density would have an increasingly inflated relative importance in later periods simply because inhumations are more likely to be preserved in these regions, and cremations (extending into areas of poorer preservation) are less likely to be dated.
Figure 5.34 – Density plots for Late Neolithic and Early Bronze Age burials (c.2700-1700 BC to incorporate the aoristic blocks for undated burials). Left to right are the density of inhumation burials (articulated and disarticulated), the density of cremation burials (nb plotted on a different scale), and a proportional density (relative risk) plot showing cremation as a proportion of the total burials dataset; plots include the undated atypical burials as well as the dated burials.
However, a comparison of the density plots for different datasets of Beaker pottery and Beaker-period burials reveals areas of correspondence that point to genuine concentrations of Beaker activity, beyond the patterning that could be expected for the preservation of the (primarily) inhumation Beaker burials (Figure 5.35).

Figure 5.35 – Density plots of different ‘Beaker’ distributions over the Beaker period. All are scaled differently, to the highest density within each dataset, to account for the different size of each.
The four datasets each reflect different biases but together they provide the clearest possible image of potential hotspots of Beaker-associated funerary and settlement activity across Britain. The Clarke Beaker corpus is primarily from funerary sites and should have low in-built research and preservation bias as it is dependent on the survival of pottery rather than bone. The BPP dataset is heavily biased, explicitly targeting areas with good preservation and high densities of burials. My atypical dataset contains only burials with surviving bone, so will reflect some preservation bias. Gibson’s dataset of Beaker domestic pottery should have low preservation bias, though perhaps a higher research bias due to the ephemeral nature of much of the domestic evidence. Note that the ‘blurriness’ of the Gibson density is the combined result of his map-making and my digitisation: he used very large points to mark site locations and I had to take the centre point of each.

Despite these differences, clear commonalities emerge from the plots, suggesting that there are clear and consistent Beaker hotspots, independent of burial type or preservation. Beaker burial evidence is primarily concentrated in Wessex, Oxfordshire, Cambridgeshire, the Peak District, the Yorkshire Wolds, and along the northeast coast of Britain from northeast England in the south to Inverness in the north (possibly continuously). Of these areas, those which correspond to BPP research regions will be over-represented in dated-only distributions. The Beaker domestic evidence is present in only some of the dense regions, which cannot be explained by survival alone: Gibson’s dataset should be no more dependent on preservation than Clarke’s.

It would, in theory, be possible to go through Clarke’s catalogue and reclassify his Beakers using the Needham typochronology, allowing this dataset to be incorporated into the aoristic chronology of Beaker burial density. However, I have found that, having little experience of ceramic identifications, my own attempts at re-classification involved too much guesswork to make this a reliable exercise. This is something that could perhaps be done in future, along with the incorporation of a greater number of undated burials from across the period. As a result of the potential issue of fluctuating levels of spatial bias, I have chosen to present the higher-accuracy but lower-precision aoristic plots, which incorporate the dated and undated burials in 250-year blocks (Figure 5.36). The higher-precision plots (100-year blocks), containing dated burials only, produce very similar results.
Figure 5.36 – Density plots for dated and undated burials c.2700-1700 BC. The top row shows these plots scaled the same to allow diachronic comparison of intensity, whereas the bottom row shows the same data without rescaling, to better allow the assessment of intensity within each period given the differing level of burial activity over time.
The plots indicate that the low level of burial density found in the Late Neolithic is concentrated in Wessex, as was suggested by the case study region SPD plots. The unscaled plot (bottom row) also highlights Orkney and Oxfordshire. The main concentrations of burial practices in the Chalcolithic (period 1) are again in Wessex and Oxfordshire, but Orkney is no longer marked; the new areas of apparent significance are the Yorkshire Wolds and Aberdeenshire. Both had low levels of burial activity in the previous period, but Yorkshire has an intensity of activity equalling Wessex in period 1; as we saw from the case study SPD plots, this is not captured by the radiocarbon data alone. These areas account for several of the Beaker-activity hotspots highlighted in the previous plot, but it is not until period 2 that Cambridgeshire, the Peak District, and the north east coast of Britain become important loci for burial activity. It is in this period too that the first hotspot appears in Wales. In period 3, the hotspot locations are much the same as period 2, but they have shifted in relative intensity: Wessex no longer appears to be the region of greatest intensity, though the Wessex ‘culture’ burials that should start in this period have not been radiocarbon-dated (and fall outside my archaeological data collection range).

Breaking the density down by burial type can reveal the changing areas of spatial intensity of different practices. Figure 5.38 shows the changing intensity of articulated inhumation (typical Beaker burials) over the same aoristic bins as Figure 5.36. The rescaled plots (top row) indicate that there were no focal areas of this practice prior to the start of the Beaker period, but that in period 1 (the Chalcolithic), several hotspots of activity can be identified: Wessex, the Yorkshire Wolds, and Eastern Scotland being the three main focal areas. In period two, these regions are joined by several more areas of intensity, with the typical Beaker burial practice evidently spreading across a wider area as it reaches its *floruit*. In period 3, the practice is in decline, with a reduction in overall levels of articulated inhumation burial as well as a reduction in the number of regions showing a higher intensity of the practice. The bottom row, in which the plots are each scaled to the level of intensity within each period, more clearly show the shifting foci of articulated inhumation activity across Britain. In particular, the first plot shows that while articulated inhumation levels were very low in the Late Neolithic (an order of magnitude lower than in period 2), it is possible to determine that it was practiced at a low level in Wessex, in the Yorkshire Wolds, and in north-west England; a region which contains very few surviving burials of any period.
Figure 5.37 — Density plots of articulated inhumation burials, dated and undated, by aoristic bin. The top row shows these plots rescaled to allow diachronic comparison of intensity, whereas the bottom row shows the same data without rescaling, better allowing the assessment of the areas of intensity within each period.
Figure 5.38 provides intensity plots for cremation burials only. The rescaled plots (top row) suggest that there were very low levels of density of this practice before period 2. The first areas that reach a higher intensity are Wessex, central Wales, and the Firth of Forth. Wessex is a hotspot for all burial types in this period, but Wales only appears in the atypical cremation dataset. The Firth of Forth is interesting, as the Clarke and Gibson datasets show hotspots of Beaker funerary and settlement activity, largely at the same time as the cremation activity, though with a slight spatial separation: the Beakers are closer to the coast, whereas the atypical burials are further inland. The differently-scaled plots show that Wessex (Stonehenge) was the most active cremation burial site in the Late Neolithic. This shifts in the Chalcolithic, with a wider range of loci indicating local hotspots of cremation activity. These are, in all cases but Wessex and Oxfordshire, separate from the early Beaker hotspots seen in Figure 5.36. In period 2, the areas of intensity shift again, corresponding partly with Clarke’s Beaker plot. Hotspots also appear in the west of Scotland and in Orkney, areas which are not indicated on any of the other plots, suggesting that in some cases the non-Beaker-associated Early Bronze Age cremation burials occur in focal areas that are spatially distinct (and even marginal) to the previous practices.
Figure 5.38 – Density plots of cremation burials, dated and undated, by aoristic bin. The top row shows these plots rescaled to allow diachronic comparison of intensity, whereas the bottom row shows the same data without rescaling, better allowing the assessment of the areas of intensity within each period.
5.7. SPDs: The role of population size

Most previous studies involving the analysis of the SPD of radiocarbon dates in Europe have focused on the reconstruction of population fluctuations over time and space. The majority have investigated the start of the Neolithic in Europe, and plots included in many of the resulting publications extend to cover at least some of the current study period. These plots typically indicate that a significant increase in population occurred at the start of the study period, though this result rarely receives much discussion in the text (Collard et al., 2010, fig. 1; Shennan et al., 2013, fig. 3; Timpson et al., 2014, fig. 3). This is largely because it falls outside the area of interest of most of the authors, though see Bevan et al. (2017), who do mention it briefly.

In order to assess the spatial relationship between dated burials and the population proxy (all anthropogenic radiocarbon dates), I have plotted the burials, the non-burials, and then burials as a proportion of all dates (Figure 5.39). The proportional intensity plot makes it easier to detect geographic areas which deviate from the typical pattern of burial activity as a proportion of all dated activity. The burial density is consistently below 50% of the total density of anthropogenic dates for the period (the midpoint on the colour scale). Aberdeenshire stands out as an area with a high level of dated activity (both burial and non-burial) which also shows a higher-than-usual proportional intensity of burial activity. Most other areas that deviate strongly in density from the general pattern have either a low overall level of dated activity, or have particularly poor preservation. While the pattern of density is variable across Britain, the evidence of each type is dispersed broadly and in the absence of any clear geographic regionality in the data, it seems reasonable to include the total evidence for Britain when assessing the relationship between burial dates and the population proxy.
Figure 5.39 – Density plots for the Late Neolithic and Early Bronze Age (c.3000-1500 BC) showing the density of burials (including undated burials from the atypical and the BPP datasets), the density of non-burial dates (nb scaled differently), and a proportional density (relative risk) plot of the two, showing the proportion of local density (primarily from radiocarbon date locations) that is comprised of burials (dated and undated). The Isle of Man is at 0 density because it is not included in the study.
My own re-analysis of the population-proxy radiocarbon data (all anthropogenic radiocarbon dates) covers a much shorter time scale than the studies mentioned above. The length of the period being studied affects which data are included in the model and therefore affects the model's output. However, despite the differences in input and methodology between my test and the previously published reports, the results for each of the three models do still show that the population proxy is significantly higher than expected during the Beaker period, from about 2300 BC (Figure 5.40). This holds true, and the pattern is virtually identical, regardless of the binning/thinning/trimming approach taken to reduce the effect of 'excess' dates in some sites, or if no reduction is made. The results could therefore be taken to indicate that the increase in the burial SPD over the Beaker period reflects an increase in the population of Britain at this point.

In order to assess the relationship between burial activity and population level, I have compared the SPD for dated burials to the total 'population proxy'. As indicated when plotting these results spatially, the burials generally equate to around half of the density across Britain for the period as a whole. Results indicating a uniform relationship over time between the burial and population SPDs would suggest a close relationship between population level and the level of burial activity found in this period. This would lend support to the suggestion that the Beaker-period increase in burial activity was the result of a population increase (though Figure 5.40 suggests this only became significant 150 years after the first Beaker burials). A fluctuating relationship between burial dates and population proxy, on the other hand, would indicate that an alternative explanation should be sought for the changing level of burial activity over the period.

As discussed in the methodology, the issue of binning dates by site becomes problematic when comparing the population proxy SPD to my burial dataset, for which I have chosen not to use any site-based data reduction. I have therefore decided to show (alongside a straightforward proportional plot of the two datasets) a range of these date-reduction methods together: 10-, 50-, and 100-year bins; 5-date and 10-date thinning using random selection of dates within each site; and 5-date and 10-date thinning using the 'split' method, where a proportion of the thinned number of dates are selected from those with the lowest error and the rest selected randomly.
Figure 5.40 – All anthropogenic radiocarbon dates (population proxy) tested against three null models of growth. 50-year site bins have been used in this model.
Figure 5.41 plots the resulting proportional relationship between burials and population proxy using the range of reduction methods. Though the amplitude of each varies, the shape of the plot is much the same for each. The plot shows that burial dates probably comprise somewhere between 25-50% of the anthropogenic radiocarbon dates at 3000 BC, dropping to around 10-20% by 2800 BC and slowly declining over the Late Neolithic, to a low of around 10% at 2500 BC. There is a sharp jump at 2450 BC, to 20-40%, and the burial proportion then climbs gradually, peaking in the Early Bronze Age at between 50-90% of the total.

The shape of this proportional plot is similar to that of the SPD plot for burials alone. This indicates that, while the increase in burials over the Beaker period is not solely reflective of an increase in the population proxy, there is a close relationship between the two. This is as expected: the population proxy contains burial dates. Another way of demonstrating the changing relationship between burials and population proxy is to separate the population proxy into burial dates and non-burial dates. Figure 5.42 shows the different reduction treatments of each dataset plotted against the total unaltered SPD, extended a further 500y in each direction for a wider chronological perspective. It illustrates the different shape of the burial and non-burial SPDs over time. A Spearman’s rank correlation test shows that there is no year-by-year correlation between the summed probability of burial dates and the summed probability of non-burial dates, at r=-0.1 (p<0.01).
Figure 5.42 suggests that the increase in anthropogenic radiocarbon dates during the Beaker period is comprised almost entirely of an increase in burial dates. Even in the most heavily reduced datasets the non-burial dates follow a gradual and stable change over time; it is only the burial dates that illustrate a marked increase during the Beaker period.

It could be argued that this disparity between the two datasets reflects the relatively low level of Beaker settlement evidence: most of our understanding of the period is based on evidence from funerary and ceremonial sites. However, while the choice of excess date reduction will affect the exact relationship, in most scenarios the SPD for non-burial dates is actually higher than that for burial dates. As such, the results cannot simply be dismissed as resulting from a lack of non-funerary evidence. In the long term, the variable proportions of different types of evidence could be considered to roughly equal out; this is a key principle behind many of the larger population-proxy SPD studies (Rick, 1987). However, it must also be considered that the strong influence of changing burial practices on the population proxy during the Beaker period is problematic for the comparison of burials to supposed fluctuations in population size. I would argue, therefore, that this method is currently unable to conclusively answer the question of population level over this period.

Alternative methods of constructing population proxies are available: land cover, food production, settlement size, and climatic fluctuations have all been used. Previous studies that have applied these methods to the Beaker period produce inconsistent results, but in most cases do not support the suggestion of a population increase. In terms of subsistence evidence, Stevens and Fuller (2012) show the Beaker period as being part of a Late Neolithic cereal decline, in which cereal cultivation drops to very low levels; it does not start to increase again until after c.2300 BC. They argue that throughout the Late Neolithic and Early Bronze Age people instead relied on pastoralism and the gathering of wild foods. Bevan et al. (2017), however, show marked declines in all plant and animal food sources, wild and cultivated, across the Beaker period – hazlenuts, wheat, legumes, oats, and animal remains. The single exception is barley (*Hordeum vulgare*), which shows a sharp increase from 2500 BC; this alone cannot provide strong evidence for a population increase. The absence of evidence for an increase in subsistence practices in the radiocarbon data is matched by the archaeological evidence (Parker Pearson, 2018). Similarly, this period shows no major climatic fluctuations, there are few settlements of any size, and most areas of land clearance are relatively minor (Bevan et al., 2017; Parker Pearson, 2018). While it is possible that there was a population increase, this is not well reflected in any other dataset, strengthening the suggestion that the SPD is unduly affected by shifting cultural practices.
Figure 5.42 – An SPD plot showing burial and non-burial dates against the full dataset (population proxy), expanded to show 3500 – 1000 BC for wider context, under the range of binning/trimming/thinning conditions discussed above.
Chapter Five: What is the nature of the funerary diversity in the British Beaker Period?

6. The archaeological evidence

The previous chapter demonstrated and discussed the nature of chronological change and continuity in burial rites (as well as human activity more broadly) across the Beaker period. In order to carry out these analyses, I grouped the burial evidence for the period into three mutually exclusive groups (cremation burial, articulated inhumation, and disarticulated inhumation). As might be expected, however, the burials observed are far more variable than is suggested by this categorisation.

The concept of the ‘typical’ Beaker burial is based on the recognition of similarities between burials: most are crouched or flexed, articulated, inhumed, and associated with artefacts and monuments characteristic for the period. However, in practice, the ‘typical’ burials are in fact variable; both in terms of the differences between individual burials and in regional patterns of the burial evidence across Britain. Some ‘typical’ burials contain two crouched articulated inhumations, for example; and the orientation of burials differs between the north and south of England (Shepherd, 2012). The atypical burials are far more variable than the typical burials as a group, with a high level of diversity within this top-level category. For the purposes of data collection, I assigned the atypical burials to nine broad groups on the basis of treatment of the body, but discuss the differences within them.

Table 6.1 gives a summary of the different burial types present among the typical and atypical burials; the variation within these will be explained and discussed in more detail throughout this chapter.
Table 6.1 – Typical and atypical deposits by treatments of the body. Combined types refer to deposits with multiple individuals receiving different rites.

<table>
<thead>
<tr>
<th>Deposit type</th>
<th>Atypical (Deposits)</th>
<th>Atypical %</th>
<th>BPP (Individuals)</th>
<th>BPP %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical</td>
<td>0</td>
<td>-</td>
<td>263</td>
<td>78.5%</td>
</tr>
<tr>
<td>Typical - double burial</td>
<td>0</td>
<td>-</td>
<td>11</td>
<td>3.3%</td>
</tr>
<tr>
<td>Typical but tightly flexed/?bound</td>
<td>1</td>
<td>0.4%</td>
<td>11</td>
<td>3.3%</td>
</tr>
<tr>
<td>Articulated but in an unusual position</td>
<td>2</td>
<td>0.7%</td>
<td>4</td>
<td>1.2%</td>
</tr>
<tr>
<td>Articulated with charring</td>
<td>2</td>
<td>0.7%</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>?Mummified</td>
<td>4</td>
<td>1.5%</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Disarticulated</td>
<td>77</td>
<td>28.3%</td>
<td>14</td>
<td>4.2%</td>
</tr>
<tr>
<td>Disartic scatter or isolated cranium</td>
<td>21</td>
<td>7.7%</td>
<td>5</td>
<td>1.5%</td>
</tr>
<tr>
<td>Disarticulated with articulated</td>
<td>8</td>
<td>2.9%</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Cremated</td>
<td>136</td>
<td>50.0%</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Cremated with disarticulated</td>
<td>10</td>
<td>3.7%</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Cremated with articulated</td>
<td>9</td>
<td>3.3%</td>
<td>2</td>
<td>0.6%</td>
</tr>
<tr>
<td>Articulated, disartic, and cremated</td>
<td>2</td>
<td>0.7%</td>
<td>3</td>
<td>0.9%</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>-</td>
<td>19</td>
<td>5.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>272</strong></td>
<td><strong>100%</strong></td>
<td><strong>335</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

In terms of the prevalence of typical and atypical rites, the 272 atypical burials I have identified compare to the Beaker People Project’s 335 burials (2500-1500 BC). As highlighted in the previous chapter (see Figure 5.3.5) the BPP dataset is concentrated spatially into a few small regions that show a high density of burial activity. The atypical burial dataset is, however, more broadly distributed and reflects more closely the underlying pattern of Beaker burial activity. The different distributions of the BPP, Clarke, and atypical datasets can be seen more clearly in Figure 6.1. As may be noted from the distribution of the atypical dataset, the case study regions I have selected capture only a small and somewhat arbitrary selection of the burials; some of the most interesting burials were found outside these regions. For this reason, I will continue to compare the case study regions as indicators of variability, but will discuss the burial evidence, and the extent of variability within this, from across the whole of Britain.
Figure 6.1 – Left: the distribution of the 272 atypical deposits; Right: the distribution of the BPP burials and Clarke's (1970) Beaker corpus
6.1. **Treatment of the body**

Behind the broad burial groupings, there is a wide range of variability between the atypical burials. Following the main groupings (as in Results 1), it is possible to illustrate a selection of this diversity.

### 6.1.1. Articulated inhumation burial

Articulated inhumation burials are perhaps deceptively familiar to modern excavators: their form is immediately recognisable and seen as normative with reference to the Christian tradition of extended articulated inhumation burial. As a result, they are often presumed to be the result of relatively straightforward processes, with variability of funerary treatments within the articulated group rarely being considered. However, the assumption of these burials being the result of less complex funerary treatments would be an oversimplification. Contrasting with the ‘natural’ appearance of foetal-position-like crouched burial, several Beaker burials are placed in a flexed position (with legs at <90° from the torso). Skeleton 15 at Eynsham flat cemetery, for example, must have been bound into its tightly flexed position (Leeds, 1938, see plate 2C). Other bodies were placed in less common positions that similarly would require the corpse to be bound or intentionally posed: at Parsley Hey, the burial was apparently found in a seated position, shown in Figure 6.2 (Bateman, 1861, pp. 22–4). Though the illustration of this burial is schematic other (rare) examples of this type have been recorded in more recent excavations, for example the Early Bronze Age seated burial [7813] at Eye Quarry, Peterborough (Patten, 2009), and are well-attested in other prehistoric contexts (Rottier, 2016; Schulting et al., 2010). Alongside the evidence for carefully posed bodies, there is evidence for burials that appear not to have been presented in a carefully managed way: at the Hamel, Oxford, a child's skeleton is described as having been ‘thrown’ into a pit (Palmer, 1980).

### 6.1.1. Mummification

In some cases, a (bound) flexed position has been used as supporting evidence to suggest the remains had been mummified: at Snailwell in Cambridgeshire a tightly flexed burial with possible charring to the bones was suggested to be a smoked mummy (Lethbridge, 1950, p. 36). However, most putative cases of mummification from this period have been suggested on the basis of histological assessments indicating that the process of their decay was arrested shortly after death (Booth et al., 2015). Those individuals displaying histological signs of arrested decay are not always macroscopically distinguishable from other burials: cases of mummification, and composite bodies of mummified individuals, most often appear
superficially normative. They could, and probably have been, easily missed, among articulated and disarticulated remains. It is possible that some mummified bodies were also cremated at the end of their ‘lifespan’ but no examples of this have yet been identified. Examples of histologically-identified mummified remains from this period are Canada Farm skeleton F1, in the south west of England, and Ingleby Barwick skeleton 2, in the north east of England (Anderson, 1998; Bailey et al., 2013; Booth et al., 2015; Green and Rollo-Smith, 1984; Tees Archaeology, 1997). At Langwell Farm, in Sutherland in the Scottish Highlands, the evidence for arrested decay was equivocal and could have resulted from waterlogging rather than active management of the corpse (Lelong, 2014).

Figure 6.2 – The seated burial from Parsley Hey, as depicted by Bateman (1861, p. 23)

6.1.2. Charred inhumations

Blackening/charring has been noted on other articulated inhumations in this period, but alone is not usually suggested as indicating smoking of the corpse (which could be used as a form of preservation/mummification: see Beckett and Nelson, 2015). Greenwell (1877, p. 29) noted that charcoal occurs in many, if not most, Beaker-period inhumation graves. The appearance of this charcoal is described in more detail by Leeds (1938, p. 25): At Eynsham
cemetery, all burials apart from skeleton 15 (mentioned above) had ash ‘completely surrounding’ the skeleton, but never on or beneath the bones. Leeds suggested that brushwood had been piled around the walls of the grave and fired after the deposition of the body. Despite charcoal and evidence for burning within the grave being relatively common, few skeletons show evidence of charring. Body fat burns well, but other ‘wet’ soft tissues do not, and a fire in a deep grave may have been starved of oxygen (DeHaan, 2012). If a fire was relatively short-lived, it could be expected that incomplete combustion of the remains would occur, primarily affecting the superior surface of the body in areas with less soft-tissue coverage.

Examples in the atypical dataset of articulated inhumations where bones show possible charring (aside from Snailwell) include individuals from Old Kelloe (Wake and Wright, 1951) and Brandon, where there were ‘some signs of fire in the interior and also at the top of the grave. Some of the bones also appear to have been partly calcined’ (Trechmann, 1914, p. 132). At Reaverhill (Jobey et al., 1965), Hexham Golf Course (Cocks, 1921), and Aldwincle (Jackson, 1976), disarticulated bones were found with evidence of charring. Chris Fowler has noted other similar examples dating to the post-Beaker Early Bronze Age, in the north east of England (Fowler, 2013; Gamble and Fowler, 2013).

The bones affected are not always specified by the excavators; at Snailwell it is implied that the whole skeleton appeared ‘smoked’ (I interpret this as charred; Lethbridge, 1950). At Hexham and Reaverhill, the disarticulated remains showed only small areas of blackening, described as localised charring, with a recent osteological assessment suggesting that the remains may have been burned in the grave after they were skeletonised (Gamble and Fowler, 2013). These reanalyses, however, fail to demonstrate conclusively that the observed blackening is the result of heat exposure; FTIR would be useful in this regard (Thompson et al., 2009). At Aldwincle site 2 barrow 2, the primary burial was fragmentary and disarticulated, with the remains showing extensive charring to one side only. The osteologist was unable to determine if the remains were burnt before or after skeletonisation, but the lack of burning to the burial context indicates that the remains were exposed to fire prior to their deposition (Denston in Jackson, 1976, p. 68). This individual could thus represent a ‘partial’ or incomplete cremation (Noy, 2000; Rebay-Salisbury, 2015). The primary burial in pit 32 at Baily’s Hill was initially described as a partial cremation from the Beaker period, with commingled burned and unburned remains (Greatorex, 2001). However, my reanalysis showed repeated skeletal elements between the burned and unburned portions, indicating that a minimum of two individuals were present, one showing each funerary treatment. A radiocarbon determination commissioned as part of this study (OxA-36699, 3318±30)
produced a result outside the 95% range of the initial published determination (OxA-8981, 3820±45), and places this burial at the end of the Early Bronze Age (1690-1510 cal BC).

Most of the other burnt remains would probably fall short of being partial cremations, with only minimal heat exposure evidenced. However, it should be noted that some looser definitions of cremation, e.g. ‘the combination of fire and the body’, would incorporate all burials with signs of heat exposure (Quinn et al., 2014, p. 5). Given the relative infrequency of charred skeletal remains, in comparison to the more common presence of charcoal within inhumation graves, it is possible that the use of fire in inhumation rites was not primarily aimed at burning the body, and instead served a different purpose: rites involving the disintegration of the body are discussed as a group in Chapter 8.

6.1.3. Cremation
The remains identified as cremated in the dataset, comprising more than half of the deposits, are generally more easily differentiated from non-cremated material as they tend to comprise deposits of highly fragmentary bone showing signs of having been burned at high temperatures (Figure 6.3). While most of the deposits of cremated bone were fully calcined (primarily white or light grey in colour), it is notable that there are also many deposits containing fragments of darker-coloured bone, suggestive of less efficient cremation (Shipman et al., 1984; Walker et al., 2008). Seven of the 29 cremation deposits with available colour information were primarily black, dark grey, or brown. While the sample is small, this suggests a higher proportion of low-temperature cremations compared to the Early Bronze Age rite, in which most cremations were efficient, with most bone fragments being white and fully oxidised (McKinley, 2006, p. 84; all her examples of less-efficient cremations are Roman or Anglo-Saxon). A study of Roman northern frontier cremations found that incomplete oxidation was the norm among the military communities carrying out the practice; incomplete oxidation in the Neolithic/Bronze Age context is, however, unusual (Thompson et al., 2016). Given the low instance of cremation in the Chalcolithic and the low level of evidence available for most cremation deposits in the dataset, it is not possible to assess the chronological dimension to cremation efficiency in any greater detail.
The quantity of bone present in cremation burials was highly variable, with some deposits comprising less than 1g of bone and others being several kilograms, suggesting a more variable deposition practice than for most other cremating periods (McKinley, 1997, p. 139). I have not categorised any deposits as ‘token’: the arbitrary nature of the classification results in it having a low interpretative value (McKinley, 2006, p. 86). I have included all instances of cremated bone that is likely to be human (if not verified as such) in an aim to incorporate all visible burial practices. Among burials where the presence of different skeletal elements is recorded, there is no clear pattern in the elements selected for burial. Burials have variable presence of cranial, dental, axial, and limb fragments and the lower-weight deposits do not differ from the heavier ones in this regard. Some low-weight burials will have some evidence for patterning: the Davidstow Moor site III(8) deposit is 36g and the osteologist mentions only teeth and long bone fragments, with the cranial vault being absent (Christie, 1988, p. 67). Deposit 2060 from Ferry Fryston, in contrast, is 94g but all major skeletal elements were represented in the deposit.

McKinley (1993) recorded the weight of cremations from modern British crematoria. As most people are cremated in coffins, it is necessary to exclude the weight of the <2mm sieve...
fraction as this will primarily be wood ash. The modern material >2mm had a mean weight of 1625.9g per person, with a range of 1001.5g to 2422.5g.

The atypical cremations have a lower mean weight of 631.7g, with a range of 0.5g to 2742.7g. While several burials reached the expected total weight of a cremated individual, most burials were considerably lighter than this. All cremation deposits had an MNI of either 1 or 2. This should be treated with caution as the fragmentary and incomplete nature of cremation deposits makes it difficult to identify the presence of multiple individuals. However, there is a clear difference in the weight of deposits by their MNI, with deposits of MNI 1 and 2 having mean weights of 493.0g and 1483.2g respectively (Figure 6.4). A t-test indicates that the difference between the means of these two groups is significant at p<0.05.

![Figure 6.4](image)

Figure 6.4 – Boxplot of the weight of cremation deposits from the atypical dataset grouped by MNI

There is no significant difference in the weight of cremation burials according to the age of individuals (adult or subadult). There is, however, a significant difference at p<0.05 between the weight of male and female burials where the MNI is 1. Cremation deposits of single male adults (N=7) and single female adults (N=4) have mean weights of 1702.7g and 793.8g
respectively (Figure 6.5). McKinley (1993) similarly found significant differences in the weight of modern cremations of male and female adults, with (>2mm) means of 1863.9g and 1271.9g respectively. The mean male weight in the atypical sample is therefore close to the mean male weight for modern cremations. Few cremations in the dataset have associated age and sex information, with the large and well-preserved deposits being most likely to have the information needed to make these assessments: the unknown sex group primarily comprises low-weight deposits. However, the results from these deposits indicate that, while in some cases a tiny quantity of bone was deposited, in others the burial may represent a complete skeleton; and further suggests that this may have been more common for adult males than females. However, the small sample size means this suggestion is tentative and requires testing against a larger dataset of burial weights.

![Boxplot of the weight of cremation deposits where MNI is 1, by sex estimation](image)

**Figure 6.5** – Boxplot of the weight of cremation deposits where MNI is 1, by sex estimation

### 6.1.4 Disarticulated remains

The disarticulated remains in the dataset are particularly variable in appearance, ranging from near-articulated formal burials to isolated bone fragments (which I have listed as ‘scattered
disarticulation'). The means by which the remains became disarticulated also appears to be highly variable. In some cases it appears likely that the body was buried intact, but was disturbed shortly afterwards. At Babraham Road, Cambridgeshire, the remains of a young adult male were incomplete, and possibly decapitated (Figure 6.6). The body appears to have been revisited and rearranged during its decomposition, with articulating groups of skeletal elements found intact but separated from the rest of the remains (Hinman, 1999, 2001). An adult male in grave 950 at Barrow Hills, Oxfordshire, similarly showed signs of disturbance during the process of decomposition: the remains, once disarticulated, were returned to the grave in a fragmentary state, placed in two deposits with some remains scattered around them (Barclay and Halpin, 1998, pp. 59–63). In both these cases, the grouping of elements in anatomical position indicate that they were partially fleshed at the time of their dismemberment, with the grouping of remains and the presence of cut-marks indicating that this was carried out actively and intentionally.

Figure 6.6 – Partially articulated remains of a young adult male at Babraham, Cambridgeshire; photograph kindly provided by Cambridgeshire HER

Other bodies show evidence for active dismemberment in the form of cut-marks, but without the preservation of articulations between elements. This suggests that the body was dismembered at a later stage in the process of decay, and indicates that the revisiting of remains could occur after a lengthy hiatus, as well as after a short interval. This is the case at both Brymbo (Duhig, 2007; Savory, 1959) and Charterhouse Warren Farm Swallet (Levitan
et al., 1988). Most disarticulated burials do not have any recorded evidence for cut-marks, with the preservation of articulated groups of bones being a more frequent form of (secondary) evidence for active dismemberment. Stanton Harcourt XV inhumation 1 shows partially articulated groups of bone, spread across different levels of a pit, though no cut-marks were reported (Hamlin and Case, 1963). At Porton Down, likewise, the body was revisited after burial and the skull removed – that it had been present originally is indicated by the loose teeth found in the grave (Andrews and Thompson, 2016). At Easton Down, the burial of a skull must have occurred while the remains were still partly fleshed because the first and second cervical vertebrae were still in articulation (Stone, 1934). However, given that the dimensions of this grave are suitable for an intact inhumation, it is possible that it is everything but the head that was removed in this instance. Other bodies with large portions absent include the torso in Fargo A1 (Stone, 1938) and the lower body at Chleamny (Gourlay, 1984). In each of these cases, some or many skeletal elements were missing from the body, indicating that their removal may have been part of the reason for disarticulation.

In this context, it must be considered that the ‘disarticulated scatter’ burials – isolated bones or small groups of elements – could represent these removed parts of burials, subsequently deposited into another context. At An Corran, a single ulna dating to the Beaker period could represent such an element (Saville et al., 2012). More commonly, these small deposits of bone occur alongside another individual: this is the case with the fragmentary infant accompanying a neonate in Barrow Hills flat grave 919 (Barclay and Halpin, 1998). Examples of other burials similar to this are: the incomplete scattered bones of a child in Marsden’s cist 2 at Bee Low (Marsden, 1970); the disarticulated remains in burial 6033, Boscombe Down grave 6012 (Fitzpatrick, 2011); the extra mandible in South Dumpton Down pit F200 (Jay, 1992; Perkins, no date). However, the burials showing signs of post-depositional revisiting are almost always adult males, whereas the fragmentary deposits of bone accompanying other inhumations are more often subadults. Given the relative lack of subadult single burials, this suggests that the fragmentary subadult remains received a different trajectory of rites prior to their final deposition, but it is not clear what these initial stages involved or how the bodies were disarticulated.

Alongside the dismemberment of bodies there is evidence for disarticulation via other means; all the cremated remains could be placed into this category. Alongside the action of fire, there is limited evidence for disarticulation by water: at Langford Quarry, disarticulated, articulated, and partially articulated bodies were piled against a log jam in an old river channel; the excavators suggest the bodies were partially decayed at the time of their deposition into the river, which may have been intended to complete the process (Garton et al., 1997b, 1997a).
There is also limited evidence for ‘passive’ disarticulation, achieved through exposure or excarnation. At several sites, this is in the form of ‘weathering’ to the bone only: Guiting Power site 1 primary burial was analysed by McKinley, who suggested the ‘worn’ appearance of the fragmentary bones of this incomplete individual indicated exposure prior to deposition (Marshall, 2004). At Wilsford Down G1 burial 1515, also analysed by McKinley, longitudinal cracks to the surface of the bones were seen as indicating weathering or exposure (Leivers and Moore, 2008). Exposure was also suggested for the disarticulated remains at Corston Lime Kilns Quarry, but this appears to be on the basis of the absence of small skeletal elements, such as bones of the hands and feet: there are no cut marks, signs of gnawing, erosion, or weathering to otherwise support this (1930s) assessment (Taylor, 1933). Remains with evidence of (canid) gnaw marks can provide secondary evidence of the exposure of remains: gnaw marks were found on an isolated infant femur in the cairn material at Hindlow phase II burial VIII (Ashbee and Ashbee, 1981; Walsh, 2013). This individual was presumably left exposed prior to their partial final deposition; it may be that this was a practice applied more widely to subadult individuals. At Charterhouse Warren Farm Swallet, the dismembered individual also displayed canid gnaw marks, as did the disarticulated remains within Carsington Pasture Cave (Chamberlain, 1999; Levitan et al., 1988). Given the cave location of these deposits, it is possible that the animal activity occurred after deposition, rather than before. Finally, a burial on Bredon Hill, Worcestershire, has some of the most interesting evidence for excarnation in the dataset: bones from the pellet of a bird of prey, the shells of carnivorous snails, and the individual’s own hand phalanx were found inside their cranial vault (Thomas, 1965). Unfortunately the human remains from this burial have since been lost, so further examination is not possible.

Overall, the remains showing evidence for the means of disarticulation indicate that a wide variety of practices were carried out during the Beaker period to break up bodies: dismemberment prior to burial, after burial, burning, placement in water, and exposure to the elements. It is likely that a range of means of disarticulation were commonly practiced throughout the period.
6.2. **Archaeological Overview**

Moving to the archaeological contexts in which these burials are found, it is possible to explore patterns in the burial practices beyond the treatment of the human remains.

6.2.1. **Excavation and discovery**

The 272 atypical deposits come from a total of 197 different archaeological sites, giving a mean of 1.4 atypical deposits for each site where atypical Beaker period remains are represented. However, the definition of ‘site’ is variable: I have largely followed the excavators’ lead on this, though this results in some sites comprising single cists, and others being extensive ceremonial landscapes. For example, Barrow Hills, Radley (in Oxfordshire) is listed as one site, but its six atypical Beaker-period deposits each came from different features spread across a kilometre-long ceremonial landscape (Barclay and Halpin, 1998, p. 1). Other deposits categorised as belonging to different sites are closer to each other than this: the two Dryburn Bridge cists and the two Skateraw cists, discovered in three separate excavations, are all within around 750m of each other, for example (Close-Brooks, 1979; Dunwell, 2007; Ritchie, 1958). The question of how better to define a single site for comparative purposes is difficult. This is partly due to the question of how best to divide up extended areas such as Barrow Hills, and partly because smaller excavations could have missed neighbouring deposits, as can be seen at Skateraw. Figure 6.7 illustrates that the separation between the number of sites and the number of deposits excavated occurred primarily from the 1960s onwards, when professionalisation of the discipline led to new approaches to excavation including the investigation of larger areas in advance of construction.

The quality of information available for these excavations understandably varies over time. The earliest excavation is an antiquarian find published by Cordiner (1788, no pagination). The report details a Beaker, containing cremated bone and ash, found intact within a cist under a cairn near Findlater Castle, within the Eastern Scotland case study area. The Beaker is illustrated clearly and is depicted in an inverted position, which would be very unusual for this period, but no other evidence is provided about the remains. Finds such as this should be viewed with caution: the circumstances of discovery are unclear, the human remains are not described, the vessel itself is lost, and there is no indication that the illustrator observed the excavation (their depiction of the Beaker in an inverted position could easily be a stylistic choice). Some of the more recent excavations are associated with extensive high-quality information, including modern osteological reports, isotopic analysis, genomic analysis, and detailed reports on any accompanying artefacts. However, conversely, some of the most
recent excavations are described only by a brief note of discovery in a local journal; the delay between excavation and publication can be seen through the drop in the number of sites in my database that were excavated in the most recent decade.

![Graph showing number of deposits and sites excavated over decades from 1800 to 2000.]

**Figure 6.7** – A plot showing the number of deposits and the number of sites containing atypical Beaker-period burials excavated during each decade from the 1780s to the present

### 6.3. Sites and monuments

The different deposits in the atypical dataset are associated with a wide variety of above-ground monuments, with the proportion of each type varying by date of excavation. The atypical burials were most commonly found under round barrows (83; 30.5%), with a further 50 (18.4%) found under or within cairns (Figure 6.8). Other deposits were associated with a variety of other ‘monument’ types: earthworks, such as henges, with and without stone and post circles; others were placed in caves; domestic contexts; and others may have been deposited into rivers or streams. While some of the more unusual burial locations occur only in very small numbers in my dataset, the examples found should be taken as indicative that burials were possible in these spaces during the Beaker period.
The second-largest group of burials in the dataset, roughly equalling the barrows in number with 81 examples (29.8%) were those found with no associated monument or structure. Evidence for continued or repeated access to these so-called flat graves suggests, however, that in some cases their location was originally marked in some way. Temporary markers which have since completely eroded could have been utilised, though it is also possible that some excavations have missed evidence for upstanding monuments or markers. The ‘memorial stele’ post hole at Tallington is a possible example of what one might look like archaeologically. At this site, near to the marker, multiple Beaker-period burials were disturbed by subsequent inhumations that appear to have occurred when the earlier individuals were still partly fleshed (Simpson, 1976). I have recorded ring-ditches as earthworks, though it is possible that some or all of these represent the ploughed-out or eroded remains of round barrows; ditchless barrows could easily be lost altogether.

There is a clear difference in the types of monument form uncovered by excavations in different decades, with the current figures for each inevitably reflecting in part the history of excavation strategies. I have categorised burials into those that are from sites that were visible versus those that were not (Figure 6.7). ‘Visible’ sites in this sense refer to those that were visually detectable to archaeologists prior to the start of excavation. They include sites with structures or monuments visible from the ground or air, either as upstanding monuments or
cropmarks, but not sites that were only detected through remote sensing or after topsoil stripping.

Figure 6.9 – A plot showing the number of excavated deposits found with and without any form of above-ground marker or monument in each decade from 1790 to the present

All of the burials found without visible associated monument were excavated in the 20th century, with more than three quarters having been excavated since 1960 (Figure 6.9). This compares to around half of the round barrows having been excavated post-1960; many deposits in round barrows were found much earlier as the result of targeted antiquarian activity. Bradley et al. (2016, p. 32) see a marked shift towards the excavation of sites without visible upstanding structures following the widespread adoption of strip-and-record methods with the post-2001 boom in commercial archaeology. These most recently-excavated sites are not yet fully represented in my dataset, but can be taken to indicate that increasing numbers of sites being excavated, greater numbers of deposits per site, and a higher proportion of sites being found without visible monuments are all trends that can be expected to continue into the current decade.
6.3.1. Round barrows, cairns, and other mounds

While I categorised earthen round barrows and stone cairns separately during data collection, it may be more accurate to consider them as a group, which together accounts for the monuments of half of the deposits in the atypical dataset. Several burial mounds show structures that are intermediate between the two categories, with some elements of their structure being earthen and others stone. At Pitnacree, for example, I have recorded the monument as a barrow because the outer turf layer dates to the period of the Beaker deposition; but the mound is a complex structure that could as easily be described as a cairn based on its internal stone features (Coles and Simpson, 1965). Additionally, older round mound excavations frequently fail to distinguish between the two categories. I have classed several mounds in the Peak District as barrows, following Bateman’s nomenclature, but the re-excavation of Bee Low provides a section drawing revealing this ‘barrow’ to be a stone cairn (Marsden, 1970). It is possible, even likely, that others would show the same if re-excavated: Barratt and Collis note in their survey of Peak District ‘barrows’ that it is impossible to tell from surface inspection whether a monument is built of earth or stone (1996, p. 27). Their suggestion that alternating layers of different materials may have been the norm for construction in this region, based on the notes of Bateman and other early excavators, is supported by the recent re-excavation of the Longstone Edge barrows, which showed exactly that (Last, 2014).

A map showing the locations of the cairns and barrows in the atypical dataset, despite the issues with my current classification, indicates regional differences to the distribution of each (Figure 6.10). The disparity is particularly marked in Scotland and Wales, where almost all of the burial mounds represented are stone cairns, with the distribution of each supporting the suggestion of Ashbee (1960, p. 41) that the choice of building material was largely conditioned by local availability of materials/regional geology.

I have avoided classifying barrows into subtypes (bowl, bell, saucer, etc.) because the final form of the monument may have been reached long after the Beaker period had ended (e.g. Garrow et al., 2014, p. 217). I am more interested in Beaker-period activity than subsequent elaborations to Beaker-period burials and structures, though this is of interest as a separate avenue of research. However, it is worth noting that in most cases where a Beaker burial is associated with a mound, it is in a primary position to it, i.e. the mound construction began at a time subsequent to the burial, rather than the burial having been associated with a pre-existing monument.
This means that in most mound-associated Beaker burials, the initial stage of monument construction effectively curtailed access to the primary burial deposit(s) (Last, 2007). Where there is evidence for multiple depositions in a grave, or subsequent revisiting and interaction with Beaker deposits, this tends to occur in a phase of interaction prior to the monument creation - there is usually no evidence that the mound was cut into to re-gain access, though most antiquarian excavators would not have been able to identify any signs of this process. It is unclear in most cases in the dataset whether construction of the mound had begun around the time of burial or after a longer delay. Early Bronze Age mounds should not be considered as the product of single events, however: as indicated by the multiple layers found in mounds like those at Longstone Edge, these monuments often have a complex history of construction and an extended temporality of their own (Garwood, 2007a; Last, 2014).

Few burials in the atypical dataset should be considered as secondary or subsequent inclusions after the monument had been constructed. However, it appears that in cases where Beaker-period burials are placed in secondary positions within barrows and cairns, they are at least as likely to be inserted into earlier Neolithic monuments as they are into earlier Beaker period monuments. The difficulties of interpreting early excavations make it hard to quantify this precisely, but in the atypical dataset there are probably ten and possibly 13 sites where atypical burials were placed in a position secondary to a Beaker-period mound, and probably 15 and possibly 19 sites where they were placed secondary to a Neolithic mound. Though Garwood found that the primary mound could ‘belong to virtually any time in the forth and third millennia BC,’ the ratio of Neolithic to Bronze Age primary phases in my dataset is higher than his (Garwood, 2007a p.32 and fig. 4.1) The association of Beaker burials with Neolithic monuments (including but not limited to barrows/cairns) will be addressed in more detail below, and I will return to the implications of cross-period relational associations between burials in the discussion.

The practice of adding secondary burials into an existing mound appears to be relatively rare in the Chalcolithic, but increases in prevalence later in the Early Bronze Age, particularly for urned cremation burials; Garwood argues that most secondary activity within barrows occurred in the time range c.2100-1750 BC (2007a, p. 34). However, the idea of these burials having been ‘dug into’ a mound appears to primarily stem from antiquarian reports where the structure of the mound itself was often of little interest. Modern excavations, revealing multi-layer structures with multiple phases of expansion and elaboration, often demonstrate that secondary burials are associated with an enlargement of the mound and thus involve a form of mound-building, rather than simply utilising an existing monument as is. Arguably, then, it is the secondary burials at barrow sites, rather than the primary ones, that are most
closely associated with monumental construction events, the latter often being associated with only small simple structures.

Figure 6.10 – The distribution of atypical burials in earthen round barrows and stone cairns
Though unusual, burials in a secondary position have been identified in the atypical dataset, with some atypical Beaker deposits associated with burials that were monumentalised earlier on in the Beaker period. However, the limitations of early excavations do reduce the likelihood of identifying these cases. At Long Crichel barrow 5, for instance, Frances Lynch and Hilary White, the authors of the posthumous report of Charles Green’s 1960 excavation, disagree with Green’s earlier interpretation of the stratigraphic sequence of burials. They suggest, following a careful consideration of the available site documentation, that the atypical Beaker-period burial 6 belongs to the primary pre-mound phase of the monument – challenging the excavator’s assumption that its disarticulated state must indicate that it belonged to a later phase and had been subsequently disturbed. They argue, in the unusual step of allowing this disarticulated burial to belong to the Beaker period, that “the idea that single inhumations are simply placed in the grave and rapidly and decently covered is one that has been losing ground of late as more and more excavations suggest that the details of these Beaker burials may be as complex as any of the earlier multiple rites” (Green et al., 1982, p. 53). However, with the existing stratigraphic information it is impossible to resolve the relationship between burials with certainty.

Atypical burials in the dataset that are more clearly secondary additions to Beaker mounds are found at sites including Tallington, Lincolnshire, where the partial articulation of intercut burials has been used to argue for a short interval between successive depositions (Simpson, 1976). At Low Hauxley cairn 1 in Northumberland, Beaker-associated cist burials (cremations and inhumations) were found in a primary position within the cairn, while further cremated remains with a fragmentary Beaker were found in the mound material (Waddington, 2010). At Barnack in Cambridgeshire, the primary typical Beaker burial was followed by an intensive series of additional deposits and structural alterations of the mound (Figure 6.11), with burial 71 being a candidate for a Beaker-period cremation burial at this site (Donaldson, 1977).

For most sites in the dataset (and throughout the Chalcolithic and Early Bronze Age more widely), there are few radiocarbon determinations for successive burials within a single barrow. This means that the chronological relationship between successive interments can usually only be established through taphonomic or typological clues (skeletal articulation, slumping following coffin decay; ceramic style, sequence of copper to copper alloy artefacts, etc.). This results in a coarse and unevenly-applied understanding of intra-site chronology (see Garwood, 2007a for discussion).
The barrow cemetery at Over in Cambridgeshire is not featured in either the atypical or BPP dataset, but a series of 43 radiocarbon dates has allowed detailed Bayesian modelling of the chronology of burial and construction events across the site (Garrow et al., 2014). There was a variable temporality to the burial activity at different monuments within this site. An extended phase of Beaker-associated inhumations, with long intervals between each deposition and activity potentially spanning several centuries, occurred prior to monument construction. The subsequent monumental activity, including multiple phases of activity, expansion, and elaboration, and the deposition of large numbers of secondary cremation
burials at each barrow, was likely confined to no more than one or two generations each. The different paces of pre-monumental and monumental burial activity at each barrow suggests that the relationships between adjacent burials would also have differed widely: some adjacent inhumations were separated by centuries, whereas multiple cremation burials were deposited within a few decades; a difference between deep time and living memory. These cremation and inhumation phases, with their vastly different paces, were occurring contemporaneously at different barrows within the same cemetery, indicating that this difference is not just reflecting changing practices over time (Garrow et al., 2014, pp. 221–6).

At Waterhall Farm in Cambridgeshire, several intercutting burials were cut through barrow 2, including a disarticulated Beaker burial. However, in this case the excavation revealed the ‘barrow’ to be a natural chalk mound, which must therefore have pre-dated all interments (Martin, 1976). I have classed this monument as a barrow because it was treated as such by those burying the dead there. Though unusual, it is not an isolated case: other examples in the atypical dataset can be found where natural mounds have been utilised, such as at Cheviot Walk Wood in Northumbria (Stopford et al., 1985). Burials such as this may indicate that in some cases it was the presence of the mound, rather than the details of the construction or any memory of its contents, that was important to those interring the dead here. However, the process of mound creation and elaboration appears to have been more widely associated with a range of other non-funerary concerns: Garwood argues that in some cases it “may have been an end in itself” (Garwood, 2007a, p. 46).

6.3.2. ‘Domestic’ burials

With a relative lack of settlement evidence for this period, it is difficult to establish the extent to which we should conceptually separate funerary and ceremonial sites from domestic or settlement locations (see Brück, 1999). In practical terms, Alex Gibson also recognised the difficulty of separating out domestic/ritual/funerary assemblages of Beaker material due to the extent of similarities between them; the existence of the Beaker domestic assemblage as a concept is a hypothesis rather than a certainty (1982, p. 66). In his study of Beaker domestic sites, Gibson excluded any material found with a burial, a term presumably intended to indicate a formal or typical burial (1982, p. 2). However, his domestic sites include long barrows, henges, ring ditches, round barrows, caves, and pits, and some deposits are claimed by both his ‘domestic’ and my ‘atypical burial’ categories (Gibson, 1982, pp. 27–41). Though there are few cases of ‘domestic’ material culture deposited in formal burial contexts, there are several examples of human remains deposited alongside contemporary domestic refuse. These deposits indicate that, while most funerary sites of the period show no evidence for contemporary ‘domestic’ activity nearby, there was not a necessity of separation between
funerary and domestic spaces or remains – *i.e.* human remains did not always belong to a circumscribed funerary sphere and could be incorporated into other areas of activity in some situations.

While there is variation within the group of burials I have categorised as having ‘domestic’ associations, they differ substantially from the category of waste-associated burials, typified by the barrows at Irthlingborough and Gayhurst Quarry. At both sites, huge quantities of cattle bone were found incorporated into the structure of a round barrow, in the mound and the ditch respectively (Towers *et al.*, 2010). At these sites, the cattle bone is within the monument but separate from the burial context, and it is unclear whether the human or the cattle bone is the focus of monumentalisation. The deposits I have grouped as ‘domestic’ instead tend to comprise mixed deposits of broadly ‘domestic’ material culture that also contain human remains; this generally being either single individuals or small quantities of cremated or disarticulated human bone.

One example of an atypical domestic burial is the small quantity of cremated human bone found in pit 1374 at Beechbrook Wood, Kent, which was found mixed in with a large quantity of Beaker sherds, worked flints, charcoal, a possible stone pestle, and a possible clay children’s toy. The contents of the pit were interpreted by the excavators as re-deposited midden material (Booth and Smith, 2011). Similarly, cremated remains of a young or middle adult male were found in a pit at Chew Park, Somerset, mixed with worked flints, domestic Beaker sherds, pebbles, a polished stone axe, and a quern rubber (Figure 6.12) (Rahtz and Greenfield, 1978, pp. 29–30). At Fifty Farm, Mildenhall, near the boundary between Cambridgeshire and Suffolk, a human mandible (unburned) was found in a pit with what the excavator described as domestic rubbish. This material included sherds of Beakers and other vessels, animal bone and antlers, pot-boilers, and flint flakes and cores (Leaf, 1935).

These assemblages are notable for the wide variety of material included (in each); there are a broader range of material associations than normally found in even the most well-furnished ‘typical’ Beaker burials. Also notable is the diversity of objects that archaeologists have incorporated into the ‘domestic’ label at these sites: the deposits frequently include potentially highly-symbolic artefacts, which are subsumed into the domestic category as a result of their associations - although the human remains themselves are not usually considered to be part of this classification. Though there are clearly similarities in the material included in each, I would hesitate to draw too many conclusions from this given the lack of any organic preservation at these sites. A burial that falls short of my atypical definition which is nevertheless similar in form to these three previous examples is the contents of pit 62015...
from Boscombe Down. Here, the remains of a girl aged 9-11 years were buried in a crouched articulated position within a pit containing a variety of burnt domestic materials including flint, daub, charred grains, worked bone, broken Beakers, and a quern stone (Olalde et al., 2018 supplementary information p.108).

Figure 6.12 – Chew Park deposit of cremated human bone with mixed ‘domestic’ material in a pit (Rahtz and Greenfield, 1978, fig. 15)

While there are many possible interpretations of the association between bodies and ‘waste’ found in the domestic pit burials of the Beaker period, their similarity to structured deposits (in the sense of ‘odd’ deposits, following Garrow, 2012) is noticeable. Rather than representing ‘burials with midden material’, it could instead be argued that the human remains are just one of many types of object incorporated into these contexts; it is not at all
clear that the human remains are focal in any way. The consideration of human remains as being somehow ‘different’ to the other material present transforms the interpretation of these contexts from structured deposit to burial in a way that is not clearly supportable.

However, it should also be noted that, in addition to the ‘structured deposition’ contexts, human remains can be found inserted directly into middens, meaning the association between bodies and ‘waste’ material cannot be characterised simply and evidently was expressed in multiple forms. The insertion of remains into midden material does not necessarily indicate that they were considered as middenable ‘waste’. At Sorisdale, Coll, a disarticulated Beaker inhumation was found in a cist that had been cut into a contemporary midden (Ritchie and Crawford, 1980). The remains were separated from the midden material by the cist walls, but nevertheless inserted into (and spatially associated with) the domestic refuse material. At An Corran on Skye, a human ulna dating to the Chalcolithic had been inserted into a Mesolithic shell midden, though the radiocarbon date for the bone does not necessarily date the event (Saville et al., 2012). At Low Hauxley, cairn 1 was constructed over Mesolithic material that has been tentatively identified as a midden, indicating that the presence of midden material at a minimum did not preclude the creation of a burial space (Waddington, 2010, pp. 22–3). While these types of context are unusual, they reinforce the suggestion that Beaker period burials can be found in all site types, and that what is interpreted as a ‘domestic’ association is both variable and highly subjective. It is likely that burials that could belong to this broad grouping are under-recognised in the period due to their general absence of the defining or identifying features of ‘typical’ Beaker burials.

6.3.3 Neolithic connections

Some of the deposits in the atypical dataset appear to have had an extended temporality within the Beaker period, with evidence for multiple successive deposition events, repeated interaction with and rearrangement of bones. While these activities sometimes occurred over prolonged periods of time, it appears that in most cases the contexts that were the focus of repeated activity were created and accessed entirely within the Beaker period. However, there exists a sizeable group of atypical deposits, around 20-25% of the dataset, which were placed within earlier Neolithic contexts. These include monuments such as henges, stone circles, wooden post monuments, and Neolithic round barrows and long barrows. They also include cave sites that were previously used for Neolithic burial activity. The sites with Neolithic activity are broadly distributed across Britain, with examples in England, Scotland and Wales. However, the sites are not evenly distributed, with apparently higher levels of Neolithic association in the south of England and in Scotland, and a notable lack of such sites in northern England (Figure 6.13). Given the heterogeneous nature of these possible Neolithic
associations it is difficult to establish whether this regional pattern is meaningful, though this question will be addressed in Chapter 8.

In a small number of cases there is a suggestion that Beaker period activity in these ‘Neolithic’ locations represents a continuity of burial activity across the period boundary. For example, at Stonehenge, while the majority of the cremation evidence appears to be firmly Late Neolithic, the date of 2570-2350 cal. BC (at 95%, OxA-17958; 3961±29) for the latest-dated cremation in the ditch indicates this individual died around the time of the modelled arrival of the Beaker phenomenon (Parker Pearson et al., 2009; Willis et al., 2016). Stonehenge is unusual in having a large number of radiocarbon dates for a single site, though I suspect that the monument complex at Dorchester-on-Thames would similarly show cremation activity continuing right up to the advent of the Chalcolithic if dated more thoroughly (Bradley and Chambers, 1988; Whittle et al., 1992). I had initially thought that Meldon Bridge might also display evidence for local continuity of a cremation rite—specifically at post-pit circles inside the main enclosure (Burgess, 1976; Speak and Burgess, 1999). However, the radiocarbon determination commissioned as part of this study returned a range of 2880-2630 cal. BC, suggesting that this is not the case and that the site’s usage ended within the Late Neolithic (SUERC-73285; 4153±29; Sheridan et al., 2017). It should also be considered that the different timings of first appearance of Beaker material culture in different regions means that in some areas burial activity occurred in a local ‘Late Neolithic’ context, while other regions simultaneously displayed Chalcolithic practices. This could arguably be the case with the cremation at the centre of Ferrybridge timber circle, dated to the Chalcolithic but before the earliest dated typical Beaker burials in the Yorkshire Wolds region (Roberts, 2005). For most of the Neolithic sites represented in my dataset, however, the Beaker period burials appear to follow a lengthy hiatus in depositional activity. They suggest that while engagement with Neolithic places was relatively common in the Beaker period, this was typically through re-use rather than a direct chronological continuity; the implications of this will be considered in the discussion.

At a small number of re-used sites, the earlier Neolithic evidence was non-monumental in nature. At Dryburn Bridge, two Beaker-period cists were located alongside earlier pits containing (unusually northerly instances of) Middle Neolithic Impressed Ware sherds (Ard and Darvill, 2015; Dunwell, 2007, p. 28). At Winterbourne Stoke barrow 44, the ground surface under the barrow had been stripped of turf and topsoil prior to barrow construction, with the mound material containing Grooved Ware sherds indicative of previous Late Neolithic activity on the site (Green and Rollo-Smith, 1984, p. 287). Evidence like this has elsewhere been argued to indicate long-term engagement with mytho-historically significant
places (Gillings et al., 2019). As the non-monumental evidence is more ephemeral, it should also be considered that some Beaker-period burial places may have been sited at locations known or believed to have pre-existing significance, but which have no identified/surviving Neolithic material evidence. The question of Neolithic referencing will be returned to in the discussion.

In reused Neolithic monuments, it was common for modifications to be made; both to accommodate the new Beaker-period deposit and in several cases to block off the entrance to the monument. At Dalladies a secondary cist was built into the mound structure (Piggott, 1974; Wilkin, 2016); and at Achnacreebeag the entrance was blocked with material including cremated bone and Beaker sherds added among the stones (Ritchie, 1973). At Pitnacree, the Beaker remains were placed in the base of a newly-created hole in the mound material of the barrow and surmounted by a standing stone (Coles and Simpson, 1965). Cases such as these raise the question of whether there should be any distinction between foundational deposits, token deposits, and burials in this period.

In only a small number of cases were the chambers of earlier long-barrows re-used, such as at Embo, where a second layer of burials was added to Chamber I of the tomb, on top of the previous Neolithic layer (Henshall and Wallace, 1965). However, these remains date to around the same time as the creation of a secondary cist with a Food Vessel burial, with other structural alterations to the monument probably dating to the same period. In the chamber, the two layers of disarticulated bone were noted to be separated by a layer of silt, but many long barrows and cairns were emptied by antiquarians with little regard to stratigraphy, meaning evidence such as this is unlikely to have been recorded. In these instances, different periods of deposition can only be identified through radiocarbon-dating of the remains, which are liable to have been mixed since their excavation. At Cuween chambered cairn, disarticulated bone from the entrance passage has been dated to the Beaker period (Charleson, 1902; Sheridan, 2005).
Figure 6.13 – Atypical Beaker burials, with those associated with Neolithic activity highlighted.

There are a small number of well-known examples of typical Beaker burials that have been deposited into earlier monuments, such as into the ditches of Neolithic barrows or earthwork monuments. The ‘Stonehenge Archer’, for example, was placed in a crouched articulated position in the ditch at Stonehenge (and subsequently disturbed by burrowing animals; Evans, 1984). Recent excavations at Wilsford Henge in the nearby Vale of Pewsey have uncovered a crouched, articulated Beaker-associated burial of a child in the henge ditch.
Deposition within Neolithic monument ditches and other pre-existing features has also been reported for atypical Beaker burials at Neolithic sites. However, ditch depositions in the Chalcolithic and Early Bronze Age seem to be a minority practice regardless of treatment of the body, and are very rare within the atypical dataset (n=3). In her survey of Cornish Bronze Age round barrows, Nowakowski (2007) records a variety of depositional activity into monument ditches, at various phases of their construction and silting, but notes that in most cases the ditches have not been fully excavated. This likewise appears to be the case for earlier monument forms, and it is likely that ditch-based depositional activity at Neolithic sites (burial and non-burial) will have been overlooked.

At Forteviot, a complete All-Over-Corded Beaker (with no associated human remains) was deposited into the ditch of a Neolithic henge, though the Beaker-period burials are all within the centre of the henge enclosure, and are associated with significant structural alterations to the monument (Brophy and Noble, 2010, 2011; Noble and Brophy, 2011). Differential forms of engagement utilising material culture should therefore also be considered when discussing Beaker-period engagement with earlier remains. With regard to other Neolithic monuments, Stonehenge and Woodhenge are both unusual in having multiple Beaker-period burials within earlier contexts, including in their respective ditches (Cunnington, 1929, pp. 52–60; Parker Pearson et al., 2009, pp. 23–4; Pollard, 1995; Willis et al., 2016, p. 352). At neither of these sites has the ditch been fully excavated (Cunnington, 1929, p. 6; Parker Pearson et al., 2009, p. 23).

In some cases, Beaker period burials were inserted into Neolithic round mounds. In most cases, these remains were excavated before the systematic recording of stratigraphy became common, which can make the interpretation of these burial forms difficult. At Bee Low in Derbyshire, for example, Bateman illustrates the excavated barrow in plan view, with burials now known to be Neolithic and Bronze Age in date displayed side-by-side (Bateman, 1848, p. 35, 1861, pp. 71–74). The report of the later excavations of the same barrow by Marsden (1970) sheds some light on the structure of the monument, which was revealed to be a stone cairn, rather than a barrow, as had been implied by Bateman. Marsden, however, believed that all the burials were Beaker period or later, and as such believed the cairn mound must have been constructed in this period. Knowing that some of the burials are in fact Middle Neolithic in date would instead seem to imply that the mound material of this Neolithic cairn would have been partially dismantled and reconstructed each time a Beaker-period cist was created within it. Many of the earlier barrow excavations represented in my dataset targeted only the centre of the mound (though practices did vary between antiquarian excavators). As some of these have since been identified as being earlier Neolithic constructions, it is possible
that Late Neolithic or Chalcolithic burials have been missed in more peripheral areas of these structures.

6.3.4. ‘Natural’ places

Atypical burials were also deposited within potentially symbolic natural places, such as into shafts within cave systems and into rivers. In many cases, the caves selected for atypical Beaker-period burials had been used for the same or similar purposes earlier in the Neolithic: the 4th millennium BC was the period of peak depositional activity within caves (Chamberlain, 2012, fig. 5.2). Given the (often large) chronological distance between depositional phases in caves, and the frequent lack of any physical indicators of previous activity, it cannot be assumed that there is any direct connection between these. Cave burials do seem, however, to be a broadly prehistoric phenomenon, with later traces of human activity tending to be non-funerary in nature (Chamberlain, 2012 and the Cave Gazetteer: caveburial.ubss.org.uk).

Cave burials are unusual in their use of apparently ‘natural’ places for deposition, though Chamberlain (2012, pp. 84–5) raises the question of whether cave sites were selected for deposition on the basis of their special (liminal, transformative) characteristics, or whether they are simply the only ‘natural’ places that provide sufficient protection for remains to survive intact enough to be uncovered by archaeologists. If caves were selected on the basis of their particular qualities, the variability of the types of location selected perhaps indicates that these reasons varied. At some cave sites, bodies were deposited into deep shafts or swallow holes (Figure 6.14): Charterhouse Warren Farm Swallet (Levitan et al., 1988); Twll Carw Coch (Aldhouse-Green et al., 1996). In others, bodies were deposited in rock-shelters or relatively close to the entrance on the ground surface: Carsington Pasture Cave (Chamberlain, 1999); Wolf Cave (Aldhouse-Green and Peterson, 2013). In some sites bodies were deposited outside the entrance to caves and rock-shelters: Kent’s Cavern (Hedges et al., 1989, p. 209; Silvester, 1986); An Corran (Saville et al., 2012). Interestingly, several cave sites used for burial were modified in the same way as the reused earlier monuments (with cists, blocking, etc.), indicating that these ‘natural’ sites are not without human-made elements (Barnatt and Edmonds, 2002, p. 117).
It could be argued that the category of ‘natural places’ is the result of a conceptual separation of the natural and human-made sites in the minds of modern excavators, which may not be valid when applied to prehistory (Bradley, 2000a). Disused flint mine shafts were used for deposition in a similar way to caves. Though there is only one example of an atypical burial within a flint mine in my dataset, there is evidence for wider (non-funerary) depositional activity occurring in mines during the Beaker period, as is the case with cave sites. Though not ‘natural’ places by modern definitions, mines have many parallels with caves: both can involve extensive subterranean structures and could be seen as liminal places, potentially with a symbolic significance that could be equated with the power of more traditionally ‘ceremonial’ sites (Barber, 2005, pp. 95–6; Barnatt and Edmonds, 2002; Bradley, 2000a, pp. 40–1). The flint mine deposition (Church Hill in Findon, Sussex) also has parallels with the deposition of remains in chambered tomb blocking material: cremated bone inside an inverted Beaker that was placed inside a partially infilled mine shaft (see Russell, 2001, describing John Pull’s 1930s excavation). Disarticulated human remains appear to be a
common feature within the material deposited into mine shafts in the Neolithic, but any deposits that can be securely dated to later periods, regardless of funerary treatment, are rare (Barber, 2005). It is not clear that those reusing much earlier mine shafts would have known them to be human-made rather than natural; a point that could equally be made for the reuse of earlier Neolithic monuments (Bradley, 2000a, pp. 34–5). The use of natural barrow-like mounds for burials, mentioned above, would lend weight to this suggestion: the location was seemingly selected on the basis of external form, rather than knowledge of the interior.

Depositions in rivers and streams are difficult to classify alongside any of the monument forms in the dataset. While it may be possible to frame deposition in rivers and streams as engagement with active and provocative (natural) places, in a similar sense to cave deposition, the evidence for deposition within water is not as strong as that for the cave sites in this study (Prijatelj and Skeates, 2019, pp. 20–21). At Syon Reach (on the River Thames) and at Alexandra Dock, Cardiff, isolated calvaria were recovered that date to the Beaker period (Bell, 2000; Schulting and Bradley, 2013). However, it is possible that both of these could have been washed out of eroding formal burial contexts, rather than deposited into the water (see discussion in Edwards et al., 2009). The evidence from Langford Quarry in Nottinghamshire lends stronger support to the idea of intentional water deposition in the Beaker period. The remains of several individuals, with some skeletal elements still in articulation, were found in a former river course resting against a log jam; the remains (through radiocarbon dating) and the logs (through dendrochronology) both dated to the Beaker period (Garton et al., 1997a, 1997b; Garton and Kinsley, 1996). However, as an isolated case, it can only serve to indicate that water deposition was possible in this period.

6.4. Treatment of the body by burial context

The spatial results presented in Chapter 5 indicate that there are regional variations in burial practices, which may relate to the differential survival of unburnt bone. Comparison of burial practices by context reveals variations in rites associated with each monument type (Figure 6.15). The fifteen atypical deposits found in caves are all disarticulated, suggesting a link between cave contexts and disarticulation. However, I have categorised most of the deposits in this group as being in the more dispersed ‘disarticulated scatter’ group of burial rites (see section 6.1.5). Almost all of the disarticulated remains from caves were found on the ground surface or in an unknown stratigraphic location within the cave, rather than having been placed in a pit or cist that would have afforded some protection from disturbance. This is also the case for cave burials from earlier periods, with Neolithic deposits similarly seeming to have been placed either on the ground surface or into natural fissures and crevices
(Schulting, 2007, p. 7). However, many cave sites containing archaeological remains were discovered by non-archaeologists, so it is possible that in some cases evidence for the placement (and displacement) of human remains has been missed during their recovery (Chamberlain, 2012, p. 81). As an example, Kent’s Cavern was cleared by workmen, who sorted the excavated material outside the cave entrance, thus losing any stratigraphic or other contextual associations between finds (Silvester, 1986, pp. 21–2).

Many of the cave environments have been subject to variable taphonomic processes including periodic flooding, reducing the likelihood of survival of any cremated remains that were not contained within a secure burial context. For the same reason, bodies are also less likely to remain articulated unless they are placed in well-protected contexts, so few typical Beaker burials are likely to be identified in these locations either (Büster et al., 2019, p. 2; Soltysiak and Fetner, 2017). The unequal representation of burial rites within caves is therefore likely to reflect a combination of preservation and recovery biases. However, caves do represent a minority burial location that was selected for deposition relatively frequently within the Beaker period. As is common with cave depositions from other periods, these Beaker-period remains were not usually associated with any pottery sherds or other grave goods. In only a small number of cases were Beaker-period finds located anywhere within the cave environment, and in most cases the material was found alongside remains dating to other periods. As a result, Beaker-period cave burial is likely under-recognised.

Turning to the cairns and round barrows - the forms of burial monument most closely associated with this period – the two forms appear to be associated with different burial practices in the Beaker period. There are roughly equal numbers of cremated and disarticulated remains in round barrows, but most atypical deposits in cairns (85.1%) contain cremated remains. The differential distribution of the respective monument forms (see Figure 6.10, above) suggests that this is likely the result of variable preservation, with geological variation being the common factor between choice of building material and survival of bone. The Invisible Dead Project highlights the fact that the preservation of inhumed bone can be mapped to soil acidity (Jay and Scarre, 2017, p. 19), and the BPP evidence is clearly concentrated on specific geologies. The connection with preservation (rather than a preference of siting on the part of Beaker period individuals) is supported by a spatial assessment of the dataset of 2580 radiocarbon dates for burials used in Chapter 5. The cremated burials survive in areas where no inhumations do, though the distinction is less strongly marked with this larger dataset than in the Invisible Dead Project.
The highly acidic soils in Wales have resulted in the Welsh material being severely underrepresented by the Beaker People Project, which required good preservation due to its focus on isotopic analysis: just seven burials are included from four sites, all of which are located in the Vale of Glamorgan. There is a wide range of funerary evidence from Wales, but a focus on the typical Beaker burial evidence means that the country appears virtually empty in the Beaker period (Tellier, 2015). This is, however, not the case: Beakers without (surviving) inhumed bone are found across the lowland regions and valleys of Wales, with the atypical Beaker-period burial evidence usually being close to other Beaker period sites and finds. The pattern across the Neolithic and Bronze Age is that cremated bone survives across a wider range of environments; the lack of inhumed Beaker burials is typical and should not be taken to indicate absence of contemporary activity (Figure 6.16).
Finally, there appears to be an association between atypical deposits containing cremated remains and earthwork monuments, with or without post or stone features. Twenty-seven of the 30 burials across these three categories (90%) contain cremated bone only. However, these categories include a diverse range of sites, many of which lie on the boundary of different classifications. For example, ring-ditches are categorised as earthwork monuments, though they might be more suitably classified as round barrows. Similarly, I have recorded post-circles separately, but they can also be found underneath round barrows. The categories followed here (and similar categorisations found across the literature relating to the period)
are therefore not necessarily separate forms: they may represent different stages in monument construction and elaboration.

Of the ten atypical deposits associated with henge monuments across Britain, all are cremated, suggesting that there may be some association between these sites and cremation. Henges are under-represented in traditional discussions of Beaker-period burial activity, and despite the burial evidence from Stonehenge are often discussed as ceremonial (rather than strictly funerary) sites (Willis et al., 2016). Of the henges included in this study, several also featured typical Beaker burials, as well as burials dating to other periods; the atypical remains form only one aspect of the usage of these locations.

The overall impression, then, is that while there are some differences in burial type by monument form, most of these are the result of taphonomic factors resulting in differential survival of remains. The cremated and disarticulated burials do, however, survive in a much broader range of sites than do the typical Beaker burials, and as such can be used to highlight gaps in our understanding of the period when relying on the typical information only.

6.5. Monuments by case study region

The difference between monument associations across the three case study regions is shown in Figure 6.17. Round barrows predominate in Wessex and the Yorkshire Wolds, but are virtually absent in Eastern Scotland; the only example of a barrow in this region is the intermediate monument at Pitnacree. A search on the Canmore database (canmore.org.uk) found just eight monuments tagged as round barrows (belonging to any period) in the Eastern Scotland region, and only one of these (Scoonie) has been verified through excavation (Gooder, 2017). The persistent absence of these monuments in this region indicates that this is likely the result of geological variation, rather than reflecting a differential depositional practice specific to my study period. Relatively few examples of other monument types are present in the case study areas. Despite flat graves being common within the dataset as a whole, they are absent in the Yorkshire Wolds region. The Eastern Scotland region, however, contains more flat graves than mounds.
These results are broadly as expected, given the results for Britain given above, but are interesting in comparison with the BPP’s findings for each region. Utilising just the portion of the dataset that meets the same chronological criteria as my own, the BPP finds a greater level of homogeneity in monument form does my dataset. In Eastern Scotland, all but one of their 50 individuals were buried in a flat (cist) grave, with the remaining individual buried in a cist covered by a cairn. Therefore it is only atypical burials that were associated with earthworks, with or without stone or post features, in this region during the Beaker period. Likewise, in the Yorkshire Wolds, all 34 BPP individuals were buried in graves covered by barrows (with only one in a wooden chamber). The earthwork burials in this region are therefore also only found in the atypical dataset. In Wessex, however, the BPP dataset contains 43 individuals buried in a wide range of different contexts: barrows, cairns, flat graves, within long barrows, ring ditches, and at wooden and stone circles, echoing the locations found in the atypical dataset for this region. It is possible that the monument associations varied between case study regions, affecting particularly earthwork monuments; however, I suspect that the difference is the result of the longstanding higher level of research interest in Wessex resulting in a wider range of sites being dated. There is no chronological difference between the different monument forms, and the atypical deposits show that these sites were used throughout the Beaker period across Britain.
6.6. Containment

In terms of the below-ground structure (or container, in a broad sense) of burials, around half of the atypical deposits (128; 47.1%) were placed in a pit, with the next largest group being those deposited in a stone cist (63; 23.2%). Seventeen deposits (6.3%) had evidence suggesting the presence of a wooden chamber, though this is probably an under-estimate due to these structures being less likely to be preserved and recognised. Smaller numbers of deposits were placed into the ditch of monuments, laid directly on the ground surface underneath barrows, or appear to have been deposited directly into water. Seven deposits were found in the fill of other graves, though this group is quite variable in terms of evidence for the stratigraphic and temporal relationship between the different burials within the same grave structure.

There are some relationships between the choice of above- and below-ground structure, illustrated in Figure 6.18. In some cases these are the functional result of my categorisation choices (water deposition is not combined with any monument form, for example), though in others there is a pattern that may be meaningful. Burials in pits were more likely to be subsequently covered by a barrow than any other structure (or no structure, i.e. to be left as a flat grave). However, burials placed in stone cists were usually left as (apparently) flat graves; when they were associated with an archaeologically-visible monument this was most commonly a stone cairn. The association between cairns and cists was noted by Ashbee, who suggested that the use of stone simply reflected local geological conditions, with cists (which survive more frequently) functioning as counterparts to wooden coffins in a different environment (Ashbee, 1960, p. 70). However, most of the cists and wooden coffins or chambers in my dataset were excavated after Ashbee was writing, and while the wooden chambers are primarily found on chalk, a closer examination suggests that stone and wooden burial containers in this period were typically used in different ways to each other.
6.6.1 Wooden coffins and chambers

The Boscombe Bowmen burial, contained within a wooden chamber, is very unusual for the period, with its high MNI of 9 (McKinley in Fitzpatrick, 2011, pp. 19–20). However, wooden chambers, where found, often include multiple individuals. Remains in wooden chambers also frequently display evidence of the bodies having been re-visited after their initial deposition. The evidence from the atypical and BPP deposits suggests that wooden chambers could be viewed as a burial form designed to facilitate continued interaction and engagement with remains.

Within 12km of the Boscombe Bowmen grave, there are two further burials of atypical remains in wooden chambers from the same period, one on Porton Down (Figure 6.19) and the other on Wilsford Down. Both show signs of having been re-visited after their initial deposition (Andrews and Thompson, 2016; Leivers and Moore, 2008). However, (probably) unlike the Boscombe Down grave, these two other chambers were covered by round barrows after the period of interaction had ended; this is the case for around half of the wooden chamber burials in the atypical dataset. The Boscombe Bowmen burial has been unusually well dated, the multiple determinations on the remains enabling chronological modelling of the duration of use of the chamber. Radiocarbon analysis suggests that the period when the
chamber was accessible and received depositions lasted for 30-310 years at 95% probability (Barclay, Marshall, and Higham in Fitzpatrick, 2011, p. 175). Whether the usage of the chamber lasted decades or centuries, the chronological data indicate that prolonged series of processes could be involved in the creation of final burial and monument forms in this period; the raising of mounds above the burials could potentially occur many decades or even centuries after the first deposition in the ‘primary’ burial at a site.

Figure 6.19 – The disarticulated bones of an adult woman buried in a wooden chamber on Porton Down, Wiltshire (centre; cranium and upper body in bottom left of image are in a later grave) (Andrews and Thompson, 2016 Plate I)

Of the 17 wooden chamber burials in the atypical dataset, four contained cremated bone (two of these deposits being cremation-only), and 13 contained disarticulated remains. A further disarticulated wooden chamber burial, KHF F6 from Knowle Hill Farm in Dorset, was published too late to be included in my dataset but meets the criteria for inclusion (Delbarre et al., 2019). I have tried to avoid deposits where displacement of the bones could have occurred as the result of the collapse of the chamber during its decay, as the excavators have suggested for the primary burial in Barrow 2 at Gayhurst Quarry, Buckinghamshire, for example (Chapman, 2007). Prior to the dislocation of their remains, this individual appears to have been buried in an extended supine position, which is extremely unusual during the Chalcolithic and Early Bronze Age; this burial could therefore be considered a member of the group that falls between my ‘typical’ and ‘atypical’ categories. I have tried to focus on the
Disarticulated burials in wooden chambers that show some evidence of the disarticulation having occurred as the result of active manipulation. One example of this within the atypical dataset can be seen at Chilbolton: the excavators’ preferred interpretation of the two individuals in the wooden chamber at this site is that the first body was articulated when buried, but disturbed at the time of the deposition of the second individual (Russel, 1990). The absolute chronological interval between the two depositions in this grave is unclear because the radiocarbon determination on the secondary burial has a large error margin, with its calibrated date at 95% probability spanning the whole of the Beaker period. The resulting probable duration of activity in the chamber is 0-203 years at 68% probability or 0-382 years at 95% probability (using the BPP date OxA-V-2271-35: 3935±32 for the primary burial and OxA-1073: 3780±80 for the secondary). Given that the primary burial retained some articulation, the disturbance to it probably occurred at the lower end of these time spans, when the body was still at least partly fleshed (Russel, 1990, pp. 156–7).

The Chilbolton burial is one of the relatively small number of atypical deposits studied by the BPP. However, a large proportion of the BPP’s individuals buried in wooden chambers are (disarticulated) atypical burials. Nineteen BPP individuals were buried in wooden chambers, with only one of these falling later than my study period. Of these burials, five, or around a quarter, were disarticulated and are therefore also included in the atypical dataset. Thus, half of the identified wooden chamber burials in this period are disarticulated (13 of each), and more than half are atypical, suggesting an association between this burial form and a continued interaction with remains. Disarticulated wooden chamber burials are found from the start of the Chalcolithic in both datasets and continue into period 2. A phase model including the dates from the BPP, the atypical dataset, and those listed in the Boscombe Bowmen publication’s review of comparative material (Fitzpatrick, 2011, pp. 199–202) gives a modelled start of 2500-2330 cal BC and an end of 2200-2020 cal BC for their use (both at 95%).

6.6.2. Stone cists

Cist burials dating to the Beaker period are recovered in far greater numbers than wooden chambers, and a majority of these cists contain typical articulated inhumation burials. There are 63 cist deposits in the atypical dataset compared to 133 individuals in cists in the BPP, 91 of which meet the same (typo-)chronological criteria as my dataset. Only 12 of the BPP individuals are atypical deposits and therefore feature in both datasets. This leaves more than 40% of the Beaker cist burials in this period featuring atypical remains (63 to 79, with all typologically EBA burials excluded). This suggests that there may have been a weaker association between stone cists and interaction/revisiting of remains than for wooden
containers in the Beaker period, but cist burials should not be considered a form closely associated with typical Beaker burial. Cist burials continued to be used into the Early Bronze Age, and are often associated with Food Vessels and other EBA material culture, but those EBA-associated deposits (and those dating to later periods) are not included in this analysis of the material.

Most of the atypical cist burials appear to have been the result of a single deposition event, and most contain cremated remains only (35 of 63). A small number appear similar to the accessible wooden chamber burials, with evidence for rearranged and disturbed bodies. One example is Dryburn Bridge, where two adjacent cists each contained an articulated individual with the disarticulated remains of a second individual placed overlying them; see Figure 6.20 (Dunwell, 2007). With overlapping radiocarbon date ranges, it is unclear which burial in each grave is older. The disarticulated remains could represent the disturbed original burials within each cist, or they could comprise disarticulated remains transported from elsewhere to be deposited with the articulated individuals; the osteological evidence supports the latter interpretation (Dunwell, 2007, pp. 28–9).

Disarticulated and incomplete single inhumations were found in cists at Brymbo (Savory, 1959), Hexham Golf Course (Cocks, 1921), and Skateraw (Ritchie, 1958). However, in each of these cases it is unclear whether the burials were disarticulated prior to deposition or if they were altered subsequently. While cists appear to be closed in the sense that they are lidded (often with very large stone slabs), the presence of a lid does not necessarily indicate that a burial context was seen as inaccessible, either in terms of practicality or acceptability. The cist at Mill Road Industrial Estate, Linlithgow, for example, may have been constructed with accessibility and re-opening in mind, and the remains within appear to have been deposited and rearranged periodically (Cook, 2000). However, this burial is unusual, and most cists have no clear evidence of later reopening.
I have grouped together — for the most part — all the earth-cut pits that have no evidence for a wooden chamber or stone cist into one category. Between the categories of cist and pit lie a small number of burials deposited into rock-cut graves (a term usually referring to rectangular graves cut into non-chalk bedrock), which I have grouped with cists as they are similarly labour-intensive to create, requiring stone working. Pits that are ‘lined’ with stones (typically an irregular single course of unworked or lightly-worked stone, which may not extend to all sides) can also be found in small numbers, and I have grouped them with pits.
The rock-cut pits/cists must have been particularly laborious to excavate; that they were dug suggests that there may have been a motivation to site these burials in their particular locations, as easier ground to prepare could have been selected instead. I have categorised three particularly deep pits separately as shaft graves - in each instance they are deeper than is required for the deposition of the body and they are suggestive of a different attitude to containment, perhaps more akin to deposition within mine shafts. The two published shaft grave sites, Octon Wold barrow 1 and Long Crichel barrow 7, both covered shafts containing the disarticulated remains of multiple individuals, and were reported as being c.1.8m and 2 metres deep respectively (Armstrong, 1984 (notes on an unpublished T.C.M. Brewster excavation); Green et al., 1982). Burton Hastings site 2 (Wolvey 6008) is not yet fully published, but contained the remains of an unaccompanied Beaker period individual deposited in a shaft under a barrow; it is unclear whether the shaft was primary or cut through the mound (Garwood, 2007b and pers. comm. 2017). The other pits in the dataset are variable in size and shape, but are generally cut to the around the right size for their interment – none are as far beyond the necessary dimensions as the shaft graves. I have not systematically recorded the dimensions of features, but they appear to be similar to those reported in Fowler’s north-east England dataset (Fowler, 2012, downloadable from ADS). In a small number of cases, a suitable pit (of broadly the right dimensions) has been reused, as at Long Crichel 5, where interment 6 may have been deposited into a recut tree throw (Green et al., 1982). While pits or graves may have been a valid containing structure for bodies on their own, it is likely that poor organic preservation has resulted in the loss of evidence for shrouding or wrapping materials from some sites, which could form a primary layer around the body or bodies.

6.6.4. Ceramic and organic containers: bags, boxes, and urns

Containment within ceramic vessels or organic containers can be combined with any of the other forms of structure, with examples of containers such as these found within containing cists, pits, and other features. Twelve of the atypical deposits in my dataset were reportedly found contained within Beakers. In all but one of these cases, the remains were cremated; the twelfth, from Barrow Hills flat grave 919, contained the mixed cremated and disarticulated bone of two infants (Barclay and Halpin, 1998, pp. 55–59). Several of these instances of Beakers as containers come, however, from unclear antiquarian reports that should be viewed with caution, such as the Findlater Castle example described earlier. I have encountered several other instances of Beakers as containers that I have been unable to verify for inclusion. To take one example: I noticed a sign at Devizes Museum (Wiltshire) noting that the Beaker on display (from Figheldean barrow 25) had originally contained “shells,
bone, and a tooth.” However, I could find no source for this information (despite two separate excavations of the barrow having been published). After investigation, the museum curator advised me that the information had been transferred from an older sign, but that there was no record of the contents ever having been accessioned (Lisa Brown pers. comm. 2016). It is probable that the information on the Beaker’s contents was provided orally at the time of its presentation to the museum, but I decided against listing it as a known example in my database. In some cases the rejected reports are derived from earlier surveys of Beakers, and it is possible likewise that information known to the compilers has since been lost (e.g. in Manby, 1969).

Only one of the burials contained in a Beaker has been dated: the disarticulated bones in Barrow Hills 919 Beaker P25 date broadly to the Chalcolithic (OxA-1875, 3990±80). The sequence for this grave proposed by the excavators is that this Beaker and its contents represent a secondary deposition into the grave of the primary burial, a 4-5 year old child who was also accompanied by a small Beaker. They suggest that it is this later disturbance that resulted in the absence and dislocation of several of this individual’s skeletal elements. However, on the basis of the radiocarbon dates, the remains contained within in the Beaker are probably older than the ‘primary’ inhumation, at 72.1% probability (OxA-1874, 3930±80). The interval between the deaths of these two individuals could be anywhere between 0-436 years at 95% probability. As there is no stratigraphic evidence of disturbance, two further possible sequences should be considered: 1) that Beaker B25 is indeed secondary, but contains older (curated?) remains, or 2) the inhumation was itself disarticulated at the time of deposition, and the three children were buried together at the same time. The individuals in this burial are all infants and young children; demographic associations within burials will be returned to in Chapter 7.

Evidence for organic containers is similarly rare among the atypical dataset. There are a small number of possible examples of both bags and small wooden boxes being used to contain remains, both cremated and inhumed. At Cossington, Lincolnshire, a deposit of cremated bone was found packed tightly into a shallow rectangular shape (50 x 30cm across and 6cm deep) that was then further contained by a packing of pebbles (Thomas, 2007). This burial contained two sherds from two different Beakers and dated to 2140-1930 cal. BC at 95% probability (SUERC-11277, 3660±35). At Burton Hastings/Wolvey, the ‘complete’ cremation of a mature adult male was probably deposited within a bag at the base of the shaft grave (Garwood, 2007b and pers. comm. 2017). Several deposits in this period appear to be so tightly flexed that they may have been bound into position. At Crichel Down, Dorset, the central burial in barrow 5 is suggested to have been both tightly bound and placed in a
bag: several skeletal elements were displaced but kept within the closely flexed outline of the burial (Piggott and Piggott, 1944, pp. 68–9).

At Langwell Farm, in the Scottish Highlands, good organic preservation revealed that the body had been wrapped in cattle hide and covered with a woven material; this type of wrapping could be seen as providing an additional layer of protection around the body (after clothes, as evidenced by occasional finds of buttons and bone or copper/copper alloy pins) that would be lost in most contexts (Lelong, 2014). In this case the histological analysis of the remains was inconclusive as to whether the individual had been mummified prior to deposition or whether their arrested decay resulted from the periodic flooding of the context that had resulted in the preservation of the (other) organic materials (Thomas Booth in Lelong, 2014, pp. 82–7).

6.7. Containers by case study region

As with the above-ground monuments, the below-ground burial contexts seen in the atypical dataset for the Yorkshire Wolds and Eastern Scotland regions are far more variable than those seen in the BPP (Figure 6.21). In Eastern Scotland, all 50 BPP individuals were buried in cists, whereas the atypical burials are frequently found in pits, in some cases with wooden chambers. In the Yorkshire Wolds, all but one of the BPP individuals were buried in a pit; the remaining one was found in a wooden coffin. Among the atypical dataset, most (14, 64%) of the deposits were placed in pits, but a range of other burial contexts were represented with one or two instances each. Of the three case study regions, it is only in Wessex that the BPP dataset reflects a similar range of burial contexts to the atypical dataset: there, most individuals were placed in pits, but wooden chambers, cists, and ditch burials are also present in low numbers.
6.8. Artefactual associations

I have recorded the artefactual associations for all deposits in the atypical dataset, including ceramic vessels and sherds, grave and pyre goods, and any other artefacts or ecofacts in the burial context that may have been deposited intentionally. I have taken a broad definition of ‘artefacts’ (see Table 2.1 in the Background chapter) because standard typologies, as with those applying to burial types, risk overlooking a broader range of non-conforming evidence. I am generally only looking at presence, absence, and combinations of artefacts rather than considering the objects themselves in any detail. *Ritual in Early Bronze Age Grave Goods* by Woodward and Hunter (2015) includes detailed analyses of the composition, context, and use-wear of many of the artefact types I list. My own scoring of types is based on the BPP’s expanded version of Woodward and Hunter’s artefact list, which includes materials they had not considered: their study did not include flint artefacts, for example. With regard to material type, I have separated out alloyed and unalloyed copper versions of the same broad artefact type, but where there is uncertainty I have generally recorded it as copper alloy.

I have added two further categories of artefact in order to capture recurring objects that the BPP has not considered: charcoal and (other) pyre waste, and other organic remains. I have not included these latter object types in my count of presence/absence of grave goods,
simply because most other authors do not consider them to be grave goods, so they would artificially inflate the proportion of my burials with artefacts in comparison to other datasets. However, I would argue that they should be considered as grave goods (or, rather, pyre goods) because in most cases it is clear that they have been intentionally deposited in the burial context. The presence of charcoal is not limited to cremation burials, and inclusion in large quantities in inhumation burials is even harder to ascribe to chance. Both Mortimer (1905, p. xi) and Greenwell (1877, pp. 28–9) report that almost all of the inhumations they excavated, which can be assumed to be primarily Neolithic and Bronze Age in date, were found associated with charcoal. Greenwell notes that charcoal is present ‘in every instance since my attention was directed to the fact’ and that ‘the frequency of its occurrence and the close contact between it and the body make it very improbable that its presence is accidental’ (Greenwell, 1877, p. 29). For this reason I have taken care to consider any inclusion in the grave that may have been intentional.

6.8.1. Grave and pyre goods

Fewer than half of the deposits were associated with any surviving grave goods: 122 (44.9%) contained one or more artefacts other than pottery. Seventy-six deposits (27.9% of the atypical burials) were not accompanied by either a vessel or any other artefact type. It is possible that for some of these deposits evidence of organic objects has been lost; there are few cases where preservation is good enough to assess this possibility. In deposits with particularly good preservation, however, there can be preserved textiles, wooden planks or logs, wicker basketry, and plants or flowers alongside those items traditionally considered to be part of the ‘Beaker package’ (e.g. Langwell Farm; Lelong, 2014). There is no difference in the proportion of deposits with grave goods between cremated and disarticulated remains, however deposits including articulated remains were slightly more likely to have associated grave goods (though the numbers of these are low).

Figure 6.22 shows the number of deposits where each artefact type is present. Given the low numbers for each, it should be immediately clear that most of the atypical deposits were not furnished with a ‘high-status’ assemblage of multiple Beaker package artefacts. The most common artefact type is flint tools/flakes (primarily flakes and a small number of thumbnail scrapers), with these being found in just under a third of deposits (84; 30.8%). In 30 of these deposits, flint flakes/tools were the only artefact type present, but in other cases they formed part of an extensive and varied assemblage of grave goods. Deposits with a large number of different artefacts types are rare: graves with one or more objects present had a mean of 2.2 artefact types each.
Figure 6.22 – Artefacts (other than ceramic vessels and sherds) associated with atypical Beaker-period deposits
Three of the four burials with the largest MNI counts (nine, 12, and 20 individuals) each had either three or four different types of (non-ceramic) grave goods present, representing some of the most variable assemblages in the atypical dataset. If these particularly unusual deposits are excluded and only those with MNI of six or less are considered, there is a mean of 1.1 artefact types per deposit. Among these deposits, there is no relationship between MNI and quantity of grave goods. As variable deposits with large MNIs are very rare, a relationship between unusually high MNIs and unusually variable artefact assemblages cannot be identified with any confidence. Some of the most variable assemblages in fact contain only small quantities of bone likely to be from one person.

These relatively sparse assemblages - when artefacts are present at all - contrast with the popular image of richly-furnished typical Beaker burials. However, the Beaker package is very rarely found in its entirety in any one assemblage, with most typical burials also containing few artefacts. A key difference between the typical and atypical datasets, however, is that most ‘typical’ Beaker burials – crouched articulated inhumations – have historically only been identified as such if found with diagnostic artefacts, whether these be the Beaker itself or other items from the ‘package’. As a result, it seems likely that burials among the ‘typical’ group will have a higher level of grave good representation, though this may result more from modern typological categorisations and data collection strategies than prehistoric practice. Clarke’s analysis of grave good associations with his different Beaker types reveals some very highly-furnished burials, though he lists only 245 funerary Beakers as having a direct association with other artefacts (Clarke, 1970, pp. 438–47). The BPP has included burials with no associated vessel or artefacts, with a view to establishing whether these burials differ in any way from those with artefacts. Around a quarter of their individuals have no grave goods, with approximately 70 individuals (around 20% of the dataset) being entirely unaccompanied (according to the BBP’s own interpretations of the stratigraphic and contextual information for deposits).

Across both the typical and atypical datasets there are relatively few burials that contained metal artefacts of any kind. The locations of all burials including any metal artefacts are plotted in Figure 6.23, indicating that the distribution of these burials is not equal across Britain. The western third of Britain (covering in Cornwall, Wales, and Western Scotland) lacks any burials containing gold, copper, or copper alloy in either the typical or the atypical dataset. The greatest concentrations of burials with metals occur in Wessex and the Peak District, with atypical burials that contain metal appearing to have a broader distribution across Britain than the typical burials that do.
Most of the artefact types found with Beaker-period burials, whether typical or atypical, are represented by a single instance in each deposit: atypical deposits featuring daggers only ever have one dagger present, for example. However, some artefact types, particularly flint flakes and arrowheads, tend to be found in greater (though variable) quantities when they are present. I have scored each artefact type as present or absent in order to produce a matrix indicating the frequency of co-occurrences between artefact types; the results are plotted in Figure 6.24. My approach falls between those of Clarke (1970, p. 448) and Needham (2005,
the former considered all artefact associations, but arranged them by (now largely defunct) Beaker types, whereas the latter considered the artefact associations on their own terms, but chose to exclude the most common Beaker-period grave goods from the analysis (as they were perceived by the author to be low-value). As a result of these analytical choices, it is difficult to directly compare the grave good associations of the typical and atypical burials.

Figure 6.24 - Co-presence plot indicating the frequency of association between different categories of artefact within atypical burial deposits

An additional issue comes with the limited artefactual associations of most atypical graves: the small number of deposits with multiple grave goods are not representative of the dataset as a whole and will produced skewed results. To illustrate this issue, the strongest positive association between any two artefact types is that between copper ornaments and ‘other’ ornaments (at 0.63, p<0.01); there are only two instances of copper ornaments in the dataset and in both cases they were found with other uncategorised ornament types. Charcoal is not significantly associated with any (other) grave good.
Recurring associations between objects are generally rare throughout the dataset due to the low counts of each type, but flint knives/daggers stand out as a type with significant positive correlations with multiple artefact types. In order to avoid the bias of types with few instances, it is possible to focus on those only where the associated artefacts are each present in several deposits (n>3) and where the correlation is significant at p<0.05. The flint knife/dagger associations meeting these restrictions are in descending order of strength: buttons (mostly jet or shale); stone blocks (‘cushion stones’/‘sponge-fingers’/whets); flint barbed-and-tanged arrowheads; bone points; bone dress pins; and bone or jet rings (belt/pulley/ribbed). The common feature of these is perhaps that they are everyday ‘practical’ items and dress-fittings: compare, for example, with Ötzi’s clothing and toolkit (Wierer et al., 2018). The artefact relationships can be seen more clearly when plotting the Jaccard distance between artefacts (Figure 6.25).

Figure 6.25 – Matrix of Jaccard similarity between artefact types based on their co-occurrence
These Jaccard distances can be plotted as a network, to produce a visualisation of ‘packages’ of artefacts (Figure 6.26). Flint daggers are the node with the strongest and most numerous connections to other artefacts, as was identified by Needham for the typical burials (2005, fig. 11). Many of the best-connected artefacts here fit into Clarke’s ‘basic’ Beaker association range, being those most commonly found among the typical burials as well (1970, p. 448). The objects that are best connected to other types cover all categories (tools, weapons, ornaments, and other), and include all material types. However, it is possible to discern two main branches of the clusters of strongest associations: Copper daggers are associated with a range of other metal artefacts (gold, copper and copper alloy), whereas flint daggers are not associated with metal artefacts and are instead linked into metal-free assemblages.

It is notable that, among the artefacts found across the atypical dataset, the vast majority are standard Beaker-package objects. There are few truly unusual artefacts for the period, and little evidence among the atypical deposits for any continuity of use/deposition of Neolithic artefact types. Most Neolithic artefact associations in the dataset come from sites where Beaker-period remains have been deposited into older contexts, as at Clachaig on Arran, where Chalcolithic remains were deposited into an earlier Clyde cairn that contained finds including Neolithic bowls and a polished stone axe (Bryce, 1902). There are few clear cases of Late Neolithic-type artefacts being retained and/or manufactured in the Beaker period and deposited in atypical burials.
Figure 6.26 – Network plot of degree of Jaccard similarity between artefact types. Unconnected nodes are artefacts that are only found alone.
In order to examine potential discrepancies in the grave goods provided to different individuals, I have followed Clarke’s division of burials into male and female graves: he found that Beaker-associated women had relatively sparsely furnished burials and that many artefact types are only found with men (Clarke, 1970, pp. 448–9). In order to make the datasets more directly comparable, I have looked at atypical burials with MNI=1, where that (adult) individual has been sexed as either male or female. Twenty-three of the 42 male single burials (54.8%) were associated with at least one (non-ceramic) grave good, whereas five of the 16 female single burials (31.3%) were. From this, the discrepancy appears to be less severe than that noted by Clarke. However, in the atypical dataset, these female individuals were found with flint tools/flakes, animal bone, and other organic material only. None of their associated artefacts are period-specific or period-diagnostic. The only example with diagnostic artefacts is a deposit of cremated bone from Grandtully, which was found with a flint dagger and arrowheads; this individual has been sexed as female on the basis of their small size, however, which is not a reliable method (Simpson and Coles, 1990). The male individuals were found with a much wider range of artefacts, including tools, weapons and artefacts made of flint, bone, antler, copper, and copper alloy: essentially the recognisable Beaker-period artefacts. The single burials of subadults are notable in that five out six were accompanied by artefacts, with all but one of these having multiple types present. The types present lie between the male and female results: there is a preponderance of organic and animal remains, but some contain Beaker-package artefacts, including a bronze dagger and a necklace. In no case in the dataset is there a ‘complete’ Beaker package. The presence of elements of the Beaker material cultural package could instead be considered as references to the ‘full’ repertoire - omissions are meaningful if the range of acceptable artefacts for burial contexts is both limited and known.

6.8.2 Ceramic vessels

I have recorded the ceramic associations of each deposit separately from the other artefacts and used slightly different criteria for identifying an association. The other artefacts are, with the possible exception of the structured/domestic deposits, grave goods contained within the same cut feature as the bone. The ceramic associations are often looser and I have captured the variable security of the Beaker association of each deposit in a broad sense by categorising the remains as being ‘with’ a Beaker, ‘in’ a Beaker, or having a ‘Beaker association’. This latter group typically have a looser or less clear spatial or contextual relationship with Beakers that was nevertheless worth capturing; around half of these are with complete Beakers and half with sherds. Figure 6.27 shows the vessel types present in the atypical dataset, along with the breakdown of whether deposits with each had any other
grave goods or not. Many of the deposits (188; 43.4%) were not associated with any ceramic vessels or sherds. Most of this group (76; 64.4%) were not associated with any grave goods at all. Representing more than a quarter of the atypical burials (27.9%), the entirely unaccompanied deposits of human bone are variable as a group, but indicate that a focus on burials associated with Beakers (and the Beaker material cultural package) is not necessarily representative of the rites of this period. Burials with a Beaker were more likely to have other grave goods as well: 50.7% of Beaker-associated burials had (other) grave goods, against 35.6% of those with no pottery. Seventy-eight deposits were found directly alongside Beakers, and 12 were found inside a Beaker (this includes those covered by inverted vessels). If all of the 46 cases of possible Beaker association are accepted then burials with some Beaker connection comprise exactly half (50.0%) of the dataset. However, some of this category’s Beaker associations are tenuous and the true figure is likely to be lower than this.

The ten deposits associated with sherds of an unknown vessel type are mostly from recent excavations where the finds analysis has not yet been published, though others have inconclusive reports or are old excavations with insufficient description and no illustration of the sherds. Of the three Food Vessel deposits, one at Barns Farm is a hybrid vessel, and I have only included this deposit because Gibson (2004, 2007) did in his ‘Beaker veneer’ papers (the site is primarily Early Bronze Age in terms of material cultural associations; Watkins, 1983). In the other two cases, at Fargo Plantation and South Dumpton Down, it was unclear if the Food Vessel was associated with the individual I have included as an atypical burial or with another adjacent burial; in both cases several burials were placed in intercutting pits (Jay, 1992; Stone, 1938). Of the three Grooved Ware deposits, one was in a pit with mixed Late Neolithic and Early Bronze Age material (Dinn and Evans, 1990). The other two are deposits of cremated bone from pits dating to the secondary phase of use at Stoneyfield Clava cairn (Simpson, 1996); the site is currently being re-dated (Mike Copper 2017 pers. comm.). The final two deposits, categorised as ‘other’, are both deposits of cremated bone from Orkney, found with steatite urns; though this vessel type may be more of an Early Bronze Age tradition, both deposits have been directly dated to the Beaker period (Grant, 1937; Hedges, 1981; Sheridan, 2007). The relative lack of deposits with a non-Beaker ceramic association reflects my data collection method rather than an archaeological pattern.
While I have not explored the Beaker typology in any detail, I have recorded the description given in each site publication, and supplemented this with my own assessment, where possible, of where they fall in Needham’s (2005) typology. Most of the Beaker types present are, as expected, the more numerous forms belonging to the *floruit* of the phenomenon in Britain: Long necked, short-necked, and S-profile forms were all present. Only three deposits were accompanied by securely-identified low-carinated vessels, with a further three being possible weak-carinated forms; the styles Needham has dated to the pre-fission horizon Chalcolithic. These typologically early Beakers are found in wooden chambers at Chilbolton and Boscombe, with a disarticulated burial in a cist at Sorisdale, Coll, a bound/possibly mummified individual from the Foxley Farm flat cemetery, and potentially deposits of cremated bone from Dalladies and Dilston Park (Fitzpatrick, 2011; Gibson, 1906; Leeds, 1938; Piggott, 1974; Ritchie and Crawford, 1980; Russel, 1990). These Beakers were all complete, rather than being represented by sherds, and the dates of the burials, where available, match the early typology of the vessels. This suggests that, as well as fitting
chronologically into the earliest phases of the British Beaker period, atypical burial forms were also associated with the earliest recorded Beaker presence in Britain. In the case of cremated bone, where the dates of unaccompanied deposits could be argued to have been affected by the ‘old wood’ effect, the typological associations lend additional support to the evidence that they were carried out during the Beaker period and were part of the Beaker phenomenon.

Figure 6.28 – Beakers from Chilbolton: 1. Low-carinated vessel with the primary burial, and 2. Low-bellied S-profile vessel with the secondary burial (Russel, 1990, fig. 5)

Due to the perceived rarity of Beaker-cremation associations it is worth considering the Beaker types found with cremation burials. Up to 67 of the burials represent deposits of cremated bone (only) with a Beaker association; of these 11 were deposits of cremated bone inside a Beaker and 32 were securely ‘with’ a Beaker, the remainder being looser associations. Further deposits contain both cremated and inhumed bone, but it is possible that the Beakers found in these were intended to accompany the inhumed remains (as appears to be the case in the Boscombe Bowmen grave, on the basis of stratigraphy and radiocarbon determinations for the remains). None of the Beakers securely associated with cremations are likely to be early styles. There are vessel forms present that may date to the fission horizon (potentially as early as c.2300 BC), but most are later period 2 or period 2-3 styles; this is not unexpected though, as these forms are the most numerous. Only three securely Beaker-associated cremation deposits have been radiocarbon dated, with the results matching those expected from the typology of each vessel: in all three cases the calibrated dates fall into periods 2 or 3 (Figure 6.29).
6.8.4. **Beaker sherds**

Many of the deposits accompanied by Beakers, particularly those which I have listed as having a Beaker ‘association’, were accompanied by sherds that do not form a complete vessel. Across the atypical deposits with some level of Beaker relationship, around two thirds (89; 64.4%) were with one or more complete vessels, or vessels that probably had been complete at deposition. The remaining third (49; 36.0%) of Beakers were represented by sherds. These are generally few in number, with many deposits containing only a single Beaker sherd, but in some cases a large quantity of sherds representing multiple vessels was found. The greatest quantity in a single deposit is probably that found in pit 1374 at Beechbrook Wood, Kent, the ‘domestic’ deposit mentioned above: among the other finds, 1616g of Beaker sherds from a variety of vessels (mostly S-profile) were present (Booth and Smith, 2011). Though no weight is given, a deposit of cremated bone at Ardnaree, West Lothian, contained 43 Beaker sherds from up to 24 different vessels (Moore and Kirby, 2010).

The frequent finding of sherds, rather than complete vessels, deviates from the idea of Beakers as individual drinking vessels furnishing a grave. Given that the small quantities of bone sometimes found in burials of this period are often described as ‘token’ deposits, the small quantities of partial Beakers could perhaps also be considered as token representations of the complete vessel (or the values signified by it). While Clarke (1970, pp. 2–3) refers to the ‘very great quantity’ of known Beaker sherd material, he states that this ‘represents the domestic background of the otherwise funerary vessels’. However, he frequently describes single sherds found in apparently funerary contexts as ‘domestic’ in nature (there is a subheading for the ‘domestic assemblage’ within each of his Beaker types); vessel
completeness seemingly taking precedence over find location in the distinction between categories.

The atypical deposits with sherds include individual sherds placed in traditional burial contexts, but also small quantities of human bone placed in primarily non-funerary deposits that include pot sherds among other materials. Regardless of the label applied to each (or sites falling on the specturm between these), both complete and incomplete bodies can be seen to be intentionally incorporated into assemblages containing both complete and incomplete Beaker vessels. While it is not currently possible to quantify the relationship precisely, there are relatively few examples of Beaker sherds with typical burials, so sherd material is probably more frequently found with atypical deposits of disarticulated or cremated bone than with articulated burials.

6.9. Funerary treatment and artefacts

While there is variety in the presence and absence of artefactual associations, and the number and type of artefacts found with burials in the atypical dataset, the differences between burials displaying different funerary treatments is minimal. Figure 6.30 shows that for each vessel type and association, there is a roughly equal proportion associated with cremated and disarticulated deposits. The exception to this is the group of burials found within a Beaker – all but one were cremations only, the example with both cremated and disarticulated bone being the infant and neonate in Barrow Hills flat grave 919 (Barclay and Halpin, 1998).

Similarly, the proportion of each burial type with and without grave goods is roughly equal (Figure 6.31). 40% of cremation-only burials have grave goods, compared to 45% of disarticulated-only (‘disarticulated’ and ‘disarticulated scatter’ categories). There is broad overlap in the types of grave goods found with cremated and disarticulated remains, with a similar range in each of objects classified as weapons, ornaments, tools, and miscellaneous. There is, however, a clear disparity in the presence of artefacts made of copper and gold: there are no gold artefacts with cremated remains, and the single instance of a copper artefact (an awl) was almost certainly intended to accompany an inhumation burial rather than the cremated remains in the grave fill (Stone and Hill, 1940). There is no such disparity with copper alloy artefacts, however, suggesting that the artefactual associations with cremations may have changed over time, with Early Bronze Age cremation deposits being better-furnished than their Chalcolithic counterparts.
Figure 6.30 – Vessel associations among the atypical deposits by funerary treatment

Figure 6.31 – Presence and absence of grave goods by burial type
Among the 55 cremated burials with associated artefacts, just over a third (19; 34.5%) contained pyre goods – objects that have passed through the fire. These were most commonly flint artefacts, though this is likely due to the combination of their ability to survive high temperatures and the characteristic spalling that enables this to be identified. In several cases, burials with burnt artefacts also included grave goods – objects buried but not cremated alongside the body. Figure 6.32 shows some of the artefacts found with cremation F34 at Broomhouses, Lockerbie. Burnt flints as well as a fully calcined antler pin were mixed with the cremation deposit, and an unburnt wristguard/bracer placed on top (Kirby, 2011, p. 29). The wristguard, often considered as a ‘personal ornament’, was evidently not with the body when it was cremated, though the burnt dress pin suggests that the body was clothed as it went onto the pyre. Burnt remains suggestive of food offerings are also frequently found in cremation deposits: animal bone, acorns, and charred plant remains are all found. As most artefacts placed on the pyre will have been lost to combustion, the loss of evidence is greater in cremation than inhumation deposits; it is likely that cremation burials were more frequently and more fully furnished than they appear. As most cremation deposits are incomplete in terms of the quantity of bone present, it seems likely that not all pyre goods that survived the fire would have been buried. However, it is not possible to determine how this – combined with the addition of new artefacts at the burial stage – would affect the composition of each assemblage.

Figure 6.32 – Some of the grave goods with Broomhouses cremation F34 (from Kirby, 2011 Illus 15)
With this in mind, it is possible to compare the artefact associations of cremated and disarticulated remains (the two most common categories) in the atypical dataset. Figure 6.33 shows the co-presence of artefacts in the two grave types (as in Figure 6.24). While the proportion of burials of each type that have grave goods is roughly equal, the co-presence plots illustrate that there are far more instances of the co-presence of artefacts among the disarticulated burials, indicating that these burials are more likely to have multiple (surviving) artefact types among their grave goods. The disarticulated burials plot shows co-presence between some of the artefacts that were well-connected nodes in Figure 6.26, whereas the cremation plot does not: this suggests that most of the ‘packages’ visible in this period will be seen among the non-cremated burials only.

From this, the Jaccard networks of the two types can be plotted (Figure 6.34 and Figure 6.35). Figure 6.34, showing the network for cremation burials, indicates two main separate groups of connected artefacts. The cluster at the top left of the image contains most of the ‘personal ornaments’, whereas the cluster at the bottom of the image contains a range of tools, weapons, and miscellaneous artefacts. Unlike in the overall network plot, the artefacts with the highest degree of similarity to other types are stone blocks (‘cushion stones’, ‘sponge-fingers’ and whets) and ‘miscellaneous’ objects, which are also mostly made of stone. Figure 6.35 shows the network for disarticulated burials and indicates one small group between ornaments (at the right of the image). The main group of artefacts includes almost all of the other grave goods, indicating that most artefact types occur in combination with other types. The artefacts with the highest co-presence are antler objects, flint arrowheads and knives/daggers, and other tools, with charcoal also frequently present and found alongside grave goods. No clear groupings emerge from the plot, with artefacts of different materials and suggested functions co-occurring: the pattern in these burials is that where grave goods are present, multiple Beaker-package artefacts are found together. These include ‘high-status’ objects like gold ornaments, which are found alongside other ornaments, tools, and weapons, and more common objects such as flint flakes, which are found alongside many artefact types.
Figure 6.33 – Co-presentation plots for artefacts found with cremation burials and disarticulated burials
Figure 6.34 – Jaccard network of artefacts with cremation burials
Figure 6.35 – Jaccard network of artefacts with disarticulated burials
6.10. **Grave goods by case study region**

There is some variation in grave good and vessel associations between the three case study regions. A simple plot of presence and absence indicates that the Yorkshire Wolds region is particularly poor in terms of artefactual associations (Figure 6.36). The difference in the combination of vessels and grave goods also points to other regional traditions. In Wessex, the majority of burials without pottery have no grave goods either, and are entirely unaccompanied; the same is seen in the Yorkshire Wolds region. However, in Eastern Scotland, the reverse is the case, and the majority of burials that have grave goods are actually aceramic.

![Figure 6.36 – Vessel type and grave good presence and absence by case study region](image_url)

The sparse nature of the grave goods in each of the case study regions can be seen in Figure 6.37. It illustrates that Wessex had both the greatest number of grave goods and the widest variety of objects, made from a variety of materials; though interestingly very few burials contained charcoal. In the Yorkshire Wolds, by contrast, only seven types of artefact were present (plus charcoal), and all but one of these were represented by a single example only; further, all were made of bone, stone, or organic materials. Eastern Scotland is intermediate between the two other regions. It is clear that the majority of ‘Beaker package artefacts’ are entirely absent from atypical burials in some regions.
Figure 6.37 – Grave good types by deposit in the three case study regions
Chapter Six: Who was buried in the British Beaker Period?

7. The osteological evidence

Alongside the evidence for funerary practices, presented in the previous chapter, the demographic profile of the individuals buried in this period should be considered. This is particularly relevant in light of the long-standing belief that Beaker burials were primarily given to adult males; an assessment that has in turn coloured interpretations of the burials themselves and the period more widely. The evidence from the atypical burials presented so far has indicated, firstly, that the shift to individual inhumation burial was by no means universal in this period. Secondly, most of the atypical burials are not associated with the Beaker-package artefacts that have led to Beaker burials being interpreted as high status.

In order to examine the demographic profile of the atypical burials, individuals in the atypical and BPP datasets have, where possible, been classified into age and sex categories. Of the 175 deposits with some level of available demographic information (64.3% of the dataset), I have classed 80 as having ‘modern’ analyses, meaning they were carried out by an osteologist who was following some form of guidelines; these comprise 29.4% of the deposits in the dataset. The other osteological reports mostly comprise brief and non-specific descriptions of the material (e.g. ‘a man in the prime of life’ or ‘the bones of a young child’), with no evidence of any method behind these assessments. The methodology for analysing inhumed and cremated remains developed at slightly different times. The earliest ‘modern’ report for inhumed remains in my sample is a detailed pathology study from the 1960s (Cule and Evans, 1968). The first full osteological reports for inhumed remains then appear from the 1970s and (particularly) the 1980s onwards. The earliest ‘modern’ cremation report in my sample, however, dates to the late 1980s (Barnetson in Mercer and Rideout, 1987), with all others being from the 1990s or later. As might be expected from this, a higher proportion of the inhumed burials have modern reports than do the cremated ones: 50 of the inhumation-only burials (43.5%) have a modern report, as opposed to just 24 (17.6%) of the cremation-only deposits.

Attempts to trace the burials that lack modern analyses to museum collections, in order for me to carry out these analyses, were largely unsuccessful: many have been lost, either before or after museum accessioning, or were otherwise inaccessible. Because of the consequent low level of data, I have chosen to incorporate the evidence from non-modern analyses into the demographic profile of the dataset, but have taken care to exclude information that is likely to be erroneous; for example, I have removed attempted sex estimations from subadult...
individuals. Where descriptions are vague ('prime of life'), I have spread the probability of the individual’s age equally across the relevant age categories (in this case 0.5 of an individual in the young adult and 0.5 in the middle adult categories). This results in the totals for some age categories being fractional numbers, but produces the most complete results possible given the nature of the available information. I have followed the same process when converting the BPP’s age estimates into standard age categories to ensure the results for the typical and atypical datasets are comparable. In all cases, I have coded all tentative sex estimations as either Male or Female, except in cases where multiple modern estimations for an individual disagree with each other, in which case they are coded as ‘Unknown’ sex.

The section on pathology uses only the data from the 80 modern osteological analyses; while pathological conditions are often noted in the non-modern analyses, the absence of any pathological changes is rarely stated, which means it would not be possible to establish prevalence rates for different conditions if the results from these studies were included in counts.

7.1. Age and sex profile

Across the 175 analysed deposits, there are a minimum of 341 individuals present. If the remaining 97 unanalysed deposits each contained a single individual, this would result in a minimum of 438 individuals in atypical Beaker-period burials; greater than the number of typical burials in the Beaker People Project.

The BPP age and sex profile is as expected following the longstanding image of the ‘typical Beaker burial’: the results show a preponderance of adult male individuals (Figure 7.1). Most of the BPP adults were between the ages of 20-35 years at death, with the second largest category being those aged 35-50 years. There are relatively few old adult and subadult individuals present. Almost all of these individuals were re-examined by one or more of the BPP’s osteologists and consequently there are few that are uncategorised or indeterminate. These results will reflect in part the BPP’s decision to preferentially include individuals with intact enamel on their permanent second molars. It can be expected that among the adult individuals this decision will have disproportionately affected old adults, a higher proportion of whom lack the relevant teeth due to ante-mortem tooth loss or extensive occlusal wear (Cave and Oxenham, 2016; Mays, 2014). The sampling strategy may further have affected the inclusion of young children, in whom the relevant tooth has not yet formed (Moorrees et al., 1963). However, the BPP dataset also includes the Beakers & Bodies Project, which had no such sampling restrictions. The BPP further includes a sub-study on juvenile stress markers, meaning individuals from younger age categories have been included in the study.
As a result, it is difficult to determine the true extent to which the BPP age profile has been affected by their sampling strategy. While it is possible that the effects are substantial it should be noted that the BPP contains an estimated 50% of the known Beaker burials with surviving bone in Britain (Parker Pearson et al., 2018c, p. 29). Mike Parker Pearson (pers. comm.) has further advised that, while subadults were less likely to be sampled for isotopic analysis, the project actually encountered few subadult individuals during data collection, so it is likely that the age profile given here broadly approximates the ‘true’ profile of typical Beaker burials.

Figure 7.1 – Demographic profile of the BPP burials (compiled from Parker Pearson et al., 2018c Appendix 4)

In terms of the estimated sex of individuals, there are just over twice as many male (or possible male) adults as there are female (or possible female) adults (166.5 and 80 respectively). The proportion of female adults is highest in the young adult category, with 40.5% of this group (where a sex estimation is present) being female; the proportion drops to 27.8% in the middle adult category and 18.2% in the old adult category. It is possible that this trend of a decreasing proportion of female adults with increasing age is partly the result of the sex estimation methods: in many cases only the cranium was available for re-analysis, and it is a well-established phenomenon that the cranial morphology of adult females
becomes increasingly ‘masculine’ (i.e. robust) with advanced age (Meindl et al., 1985). However, this alone is unlikely to account for the observed trend: many BPP individuals were complete and received multivariate sex assessments. The under-representation of female individuals in the typical Beaker burials therefore appears to be genuine and age-dependent.

The demographic profile of the 175 analysed atypical deposits differs notably in several regards (Figure 7.2). Firstly, the age profile of the population differs from the typical Beaker burials. While subadults are severely underrepresented in the BPP material, comprising only 13.6% of the individuals, they comprise 37.5% of the atypical individuals. These figures can be further compared to the results of a multi-period pathology survey that included 291 Bronze Age inhumations (2500-800 BC), which found 25.8% of inhumed individuals were subadults (Roberts and Cox, 2003, p. 75). There are a large number of children (ages 3-12 years) present, with the younger age categories of infant and neonate also being well-represented. The ‘neonate’ category, intended to capture individuals who died around the time of birth, includes several possible pre-term or foetal remains.

![Figure 7.2 - Demographic profile of the 175 atypical deposits for which some osteological information is available](image-url)
Among the adult individuals the proportion assigned to each age category (young, middle, old adult) is consistent across the two datasets, with the majority of the adults that have an age estimate falling into the 20-35 years category, and a declining proportion across the older categories. This pattern, consistent across datasets, is strong evidence for the selection of particular individuals for inclusion in burials of this period, as the age profile of the adults goes against that expected under an attritional mortality regime (in which more old adults would be expected). The atypical dataset has a large number of adults with no detailed age assessment but there is no reason to believe that these individuals would have a different age profile from those with an assessment. As with the BPP dataset, there are almost exactly twice as many male as female adults. In the atypical dataset there are also proportionally fewer female adults in the older age categories: 38.2% of the young adults with a sex estimate were female, as opposed to 9.8% and 19.0% of the middle and old adults respectively. This supports the suggestion that male adults were preferentially selected for burial – whether typical or atypical – in the Beaker period.

7.2. Burial types by age and sex

Comparing the demographic profile of individuals to funerary treatment indicates differences in the individuals that were given different rites. Figure 7.3 shows that adult individuals heavily outnumber subadult individuals (including adolescents) in deposits of cremated bone and deposits of disarticulated bone. However, among the ‘disarticulated scatter’ category, where isolated fragments of bone are more commonly found, the subadults outnumber the adults. There are no identified mummified remains of subadult individuals in the dataset, but due to the low number of identified instances overall it is difficult to establish if this is a genuine pattern. All other burial types have a roughly equal number of adult and subadult individuals.

Across the dataset, 66.9% of individuals with a sex estimation are male, with Figure 7.4 indicating that male adults are present in equal or greater numbers than female adults across all burial types. The male-to-female ratio varies somewhat across burial types: in the two largest categories, cremated and disarticulated burials, the percentage of males is 71.4% and 61.4% respectively. Males were around twice as likely to receive a formal burial within this period and were more common than females across all burial types, with differences in the sex ratios of different burial types not being strongly marked.
Figure 7.3 – Atypical funerary treatment by age of the individual where an assessment as either adult or subadult is present

Figure 7.4 – Atypical funerary treatment by sex of adult individuals where an assessment is present

7.3. Case study regions

Figure 7.5 shows the demographic profile of individuals, using the same age and sex categories as above, across the different case study regions. The low number of analysed
individuals in each region means care must be taken not to over-interpret results. The finding that is most prominent, however, is the substantial over-representation of young adult males in Wessex. As the region where typical burials have received the most focus, it is interesting to note that the stereotypical demographic profile of Beaker burials is continued into the atypical burials. This pattern is in itself atypical, however, and is not replicated in the atypical burials of other regions, or in the pattern of atypical burials across Britain as a whole.

![Figure 7.5 – Demographic profile of atypical burials by case study region](image)

### 7.4. MNI

Despite the evidence from typical Beaker burials suggesting that single burial became prevalent in the Beaker period, there is evidence among the atypical dataset (and also infrequently in the BPP dataset) of burials containing two or more individuals that were placed either simultaneously or within a relatively short space of time. As has already been indicated in the previous chapter, some deposits of cremated bone have an MNI of two, but none have been identified as having an MNI higher than that: 50 have an MNI of one and seven have an MNI of two. Among the disarticulated burials and the mixed-rite burials, however, there are some cases where MNIs are much higher than this. Figure 7.6 shows boxplots of the MNI counts for the 175 analysed atypical deposits by funerary treatment. The burials with the highest MNI tend to be deposits of disarticulated bone.
As the stereotypical single burial in this period is of an adult male, I have also tested to see if burial MNI varies by the demographic profile of the individuals contained within them. I have categorised burials into single (MNI = 1), double (MNI = 2), and multiple (MNI > 2) for ease of analysis. While there are few burials in the dataset in the latter category, the very large MNI of some of these means that a large number of individuals are represented in this group.

Figure 7.7 shows the demographic profile of analysed individuals by MNI group. The results indicate that the individuals found in atypical single burials display a demographic profile strikingly similar to that of the BPP’s typical burials (see Figure 7.1). These single burials, as with the BPP, are dominated by young adult males, with a declining level of individuals (and a declining proportion of females) in older age categories. Subadults are under-represented, with slightly more adolescents than children, and very few infants and no neonates, as seen for the typical burials.

The clear deviation from the typical burial profile occurs in the demographic profile of the individuals found in double and multiple burials. The young adult peak is virtually absent from these two groups, suggesting that young adults in this period were most commonly buried alone. There are also very few individuals in the middle and older adult categories,
indicating that these individuals were overall less likely to receive formal burial in the Beaker period but were still most commonly found in single burials. The double burials have a relatively flat demographic profile, with near-equal numbers of male and female adults, and no clear peak for any age category. Subadults are present in larger numbers, with double burials commonly containing an adult (male or female) with a subadult, though adult-adult and subadult-subadult double burials can also be found.

Among the multiple burials, there is a stronger deviation from the pattern of typical burials, with the majority of the individuals in this group being subadults (82 subadults to 73 adults). Most of the subadults in the dataset are found in this group. As with the double burials, there are slightly more male than female adults, but there is an absence of the marked sex disparity seen in the single burials.

![Figure 7.7 – Demographic profile of atypical burials for each grouped MNI category](image)

The overall demographic pattern, then, is that single burial was primarily given to adult males, regardless of the funerary treatments utilised. Adult females can be found across all burial types, but occur in proportionally low numbers throughout. Subadults were rarely given single burials, but are found in large numbers in multiple burials. Figure 7.6 indicates that burials with an MNI of three or more are mostly deposits of disarticulated bone. An assessment of the subadult representation across burial types confirms that subadults are most commonly found in deposits of disarticulated bone: 62.3% of the subadults were in ‘disarticulated’ or ‘disarticulated scatter’ deposits. This further supports the suggestion that
burial categories may in part reflect choices based on the characteristics of the individuals included within them.

7.5. **Pathology and trauma**

Almost all of the 80 modern osteology reports have some information about pathological changes (or absence thereof) to the remains, relating in total to a minimum of 151 individuals. It is usually possible to relate pathological indicators to a particular identified individual within each deposit. Just over half of these deposits have no individuals with any visible pathological changes to their remains, with the remaining 38 deposits (47.5%) containing at least one individual with at least one visible indicator of pathological change.

The Beaker People Project did not conduct an analysis of pathological and traumatic changes to skeletal and dental remains beyond a sub-study of stress markers on 12 juvenile individuals (Parker Pearson *et al.*, 2018c, p. 431). They refer the reader to Roberts and Cox’s (2003) multi-period study of health and disease in Britain, which records the pathological changes observed to 291 individuals from across the Chalcolithic and Bronze Age and a further 772 from the Neolithic (inhumations only were included across all periods). Roberts and Cox compile reports on remains with various reported pathological and traumatic lesions, and provide an indication of the prevalence rates of diseases based on this (Roberts and Cox, 2003, pp. 74–89). In some cases they give the crude prevalence rate (CPR), the percentage of individuals affected by a given condition. This can be calculated for the atypically-buried individuals (using only those with a modern analysis) when the MNI of 151 is treated as the actual number of individuals. As the true number of individuals is likely to be higher than the MNI, the calculated prevalence rates may be lower than they would be if the skeletal remains were more intact (and thus easier to assess the true number of individuals). Roberts and Cox have also in some cases calculated the true prevalence rate (TPR, the percentage of skeletal elements affected), which accounts for the presence in the sample of incomplete individuals for whom the relevant skeletal elements for each condition are absent. This is clearly an issue in my dataset, but most burials are reported in insufficient detail to allow TPRs to be routinely calculated for this material. I have decided to use the CPR of conditions to compare to their figures for the Neolithic and Bronze Age: the levels of skeletal fragmentation and completeness will vary within and between these assemblages and can be assumed to be roughly comparable across periods.

7.5.1. **Dental pathology**

Twenty-three deposits contain at least one individual displaying pathological changes to the dentition. The most common finding was dental calculus, which was usually scored as mild
to moderate in severity. It was found to affect 17 individuals, all of whom were adults, among the minimum of 151 individuals with a modern osteological analysis: a crude prevalence of 11.3%. Roberts and Cox (2003, Tables 2.7 and 2.29) found the crude prevalence rate across the Bronze Age to be 37.5% compared to 11.0% in the Neolithic.

Carious lesions were rare, with only three individuals (2.0%) displaying any. Wider evidence of poor dental health was found in the form of periodontal disease (four individuals, 2.6%), periapical abscesses (five individuals, 3.3%), and ante-mortem tooth loss (two individuals, 1.3%). The CPR for most of these conditions falls between those given by Roberts and Cox (2003) for the Neolithic and Bronze Age (Figure 7.8).

![Figure 7.8 – Dental pathology crude prevalence rates for the 151 atypical burials that have been osteologically analysed to modern standards, compared to the Neolithic and Bronze Age prevalence following Roberts and Cox (2003).](image-url)

Although most individuals with abscesses showed no other dental or oral pathological changes, one individual with a periapical abscess also had ante-mortem tooth loss and another showed calculus deposits and periodontal disease (Figure 7.9). Similarly, few individuals with either periodontal disease or carious lesions had any other dental conditions. Few individuals had signs of severe, pervasive, dental health issues: the most notable case is of Dryburn Bridge skeleton 10, an articulated individual buried in a cist with disarticulated remains, who displayed six severe molar periapical abscesses and the ante-mortem loss of
seven teeth, alongside a range of skeletal pathological changes (Dunwell, 2007, p. 21). The evidence suggests overall that dental health problems were present at both a low level and at low severity among the adults in the atypical Beaker burial sample. Of the individuals displaying pathological changes affecting the dentition only two were subadults: one child with three teeth showing carious lesions, and one with periodontal infection.

![Figure 7.9 – Portion of the right maxilla of an adult male individual from Pyecombe, West Sussex, showing dental calculus, periodontal infection, and periapical alveolar bone resorption (to the first molar). Author’s own image.](image)

Scored separately is linear enamel hypoplasia (LEH); marks caused by disruption to enamel formation, which can be the result of stress to the individual (Hillson, 2005, pp. 169–176). Six individuals displayed evidence of LEH, with two of the affected individuals being subadults. One of these, the Gelligaer child, died at around six years of age and displayed porotic hyperostosis (Figure 7.10). The authors suggest this condition may have been caused by iron-deficiency anaemia, either due to dietary insufficiency or repeated infection (Cule and Evans, 1968). At Mill Road, the fragmentary and commingled remains of several children included at least two with LEH, with one individual in the cist showing active infection through ‘slight but extensive’ pitting to their parietals; however it is not possible to determine if this was the same individual as any of those displaying LEH (Cook, 2000, pp. 84–5). The other individuals showing signs of childhood stress in their dentition all survived into adulthood, with none of these four displaying any substantive active pathological changes.
The BPP stress study looked at the first molars of 12 juvenile skeletons, all of whom had survived to at least three years of age, to explore the evidence for stress-related enamel defects. They found that the greatest prevalence of stress markers occurred in the ninth and tenth post-natal months, which they ascribe to the weaning process (Deter et al., 2018, p. 261).

In all cases except for ante-mortem tooth loss, which remained stable from the level seen in the Neolithic, the Beaker period values lie between the Neolithic and the Bronze Age values. For most conditions, the Atypical Beaker levels are closer to the Neolithic than the Bronze Age values, which tend to show a sharp increase in prevalence. This evidence suggests that the prevalence of most dental conditions occurred gradually between the Neolithic and Early Bronze Age, with the Middle and Later Bronze Age probably seeing a large increase in prevalence for many dental conditions. Roberts and Cox (2003, pp. 100–1) report that this high Bronze Age prevalence is short-lived, however, with the Iron Age values being closer to those seen in the Neolithic.
7.5.2. Skeletal pathology

A wide range of different pathological changes can be found among the skeletal remains in the atypical deposits. Some of the changes observed can be categorised as belonging to a particular group of potential diagnoses; however, many of the conditions seen are present in a single instance only and are therefore difficult to assess in terms of prevalence, severity, or expression among the population. Roberts and Cox’s (2003) comparative material gives broad groups of pathological changes, which I have followed where possible.

7.5.2.1. Disease

Roberts and Cox note low levels of non-specific infection among both the Neolithic and Bronze Age groups, which they suggest is due to population density still being low in this period (Roberts and Cox, 2003, p. 87). The evidence for non-specific infection is greater among the atypical dataset, but with only seven individuals (4.6%) affected, the prevalence is still low. I have not included dental/oral infection in this count, following Roberts and Cox. In most of the atypical cases, as with the comparative data, the ‘non-specific’ indicator of infection is the presence of periosteal new bone (PNB). PNB formation is an inflammatory reaction of the periosteum that can also be caused by a very wide variety of factors other than infection; unequivocal evidence for infectious disease among these skeletal collections is minimal (Waldron, 2009, pp. 115–6). However, recent findings of Yersinia pestis DNA in human remains from the Late Neolithic and Bronze Age across Europe indicate that plague had a potential role as a driver of the population movement seen in this period (Andrades Valtueña et al., 2017; Rascovan et al., 2019). Population density may therefore have been relatively low in this period, but it was evidently not low enough to curtail the spread of disease across Eurasia, and it is entirely possible that other infectious diseases were prevalent among the population of Beaker-period Britain. The genetic evidence for the presence of plague highlights the need to be aware that absence of skeletal indicators of disease does not indicate that no disease was present (Wood et al., 1992).

One individual, a child from cist 2 at Dryburn Bridge, displayed a number of pathological skeletal changes which are likely to have been caused by infectious disease. This individual displayed rhino-maxillary lesions that are pathognomonic of leprosy (Figure 7.11), though this would be the earliest case in Britain by more than 2000 years (Dunwell, 2007, pp. 22–3). Mycobacterium leprae DNA could not be found in the affected bone but another mycobacterium, M. tuberculosis was: it is thus more probable that this individual suffered from chronic tuberculosis. This latter condition often affects the facial bones of children in a way that mimics the effects of leprosy (Dunwell, 2007, p. 23; Ortner, 2007, pp. 164–5). The evidence from this individual reveals that TB was present among the population in the
Beaker period, though no other lesions indicative of the disease were identified among the atypical Beaker burials.

Figure 7.11 – The nasal and maxillary regions of individual 11 from Dryburn Bridge, showing widening and remodelling of the nasal aperture and resorption of the alveolar process of the maxilla (Dunwell, 2007, fig. 15)

Evidence for congenital disease is similarly rare, with the only examples in the modern-analysis dataset being an infant with Klippel-Feil syndrome (mentioned below) and one individual displaying bathrocephaly, a congenital bulging of the occipital bone (Cook, 2000, p. 84). Roberts and Cox include some potentially non-pathological variations in this category which were also found in the atypical sample, such as an individual with (unilateral) L5 sacralisation from Fordington Farm (Bellamy, 1992, pp. 119–20). One individual, an adult male from Frampton in Dorset, had (bilaterally) elongated styloid processes of the temporal (Figure 7.12). Though the variation is not pathological in itself, it can result in Eagle syndrome, a condition in which the extended styloid process can cause painful and potentially fatal impingement of the nerves and blood vessels of the neck (Raina et al., 2009). There are no examples in the modern-analysis atypical sample of neoplastic disease, though Brymbo Man had a button osteoma to the frontal (Duhig, 2007).
The most prevalent group of skeletal changes in the Bronze Age collections compiled by Roberts and Cox is changes to the joints (including those of the spine), which they categorise as joint disease. In this group, they include osteoarthritis, Schmorl’s nodes, Scheuermann’s disease, temporo-mandibular joint disease, and DISH, among other conditions: it is a very broad category including all conditions that affect any joints. Among the atypical Beaker evidence, there are 19 individuals with some signs of joint disease: most commonly this is osteoarthritis or Schmorl’s nodes, but there are also cases of intervertebral disc disease, osteochondritis dissecans, and non-specific indications of joint disease (such as one observation of ‘age-related wear and tear to joints’). Most of the individuals affected by joint disease are adults, the single exception being an individual who died around one month after birth, who was identified as having Klippel-Feil syndrome, characterised by the complete fusion of two or more of the cervical vertebrae (Waldron, 2009, p. 218). Among the adults, individuals of all ages are affected by joint disease, as might be expected given such a broad category of conditions with variable aetiologies. The severity of changes also varies widely. Widespread but slight evidence of osteoarthritic change is seen to the joints of the Aldwincle individual (Jackson, 1976, p. 68). Others appear to have suffered more severely: a young to
middle adult female from Porton Down had multiple Schmorl's nodes, osteoarthritis to the ribs, vertebrae, and left distal humerus, a cyst to a carpal bone (the trapezium), and multiple fractures to the cervical, thoracic and lumbar spine as well as to the right ulna; the joint disease may relate to her injuries, which could have been caused by falling from height (Andrews and Thompson, 2016, pp. 66–7)

7.5.2.2. Trauma
As with Roberts and Cox’s sample, there were several cases like the Porton Down individual where joint disease and signs of traumatic injury were both present, with the conditions possibly being inter-related.

Fractures were the most common form of traumatic injury, with nine individuals (6.0%) being affected; in some cases individuals had several fractures in different stages of healing. All regions of the body were affected, but there is only one instance of a lower body fracture (femoral, healed) and one instance of cranial fracture (to the nasal bone, healed). Five individuals had upper-body fractures and six had fractures to the axial skeleton. Some were suggestive of accidental injury, for example an individual with vertebral compression fractures, and another with clavicle and ulna fractures, both of which could have been caused by falls. However, others were more suggestive of interpersonal violence: the fractured nasal bone and ribs of Dryburn Bridge Sk10, or the ‘parry’ fractures to the left ulna of the individual from Pyecombe (Figure 7.13) and to the right ulna of the Chilbolton primary burial, for example (Dunwell, 2007; Russell, 1990). All of the individuals affected by fractures in this sample were adults, and in most cases the fractures were well healed at the time of death. As mentioned above, however, the affected individuals appear in some cases to have suffered from secondary joint disease as a consequence of their injuries.

Figure 7.13 – Healed fracture to the distal left ulna of an adult male individual from Pyecombe, West Sussex (Butler, 1991). Author’s own image.
There is also evidence for inter-personal violence from other forms of traumatic injury among the sample: sharp force, blunt force, and projectile trauma are all visible. Two of the three atypical individuals that display sharp force trauma (cut marks) may have received these injuries during post-mortem dismemberment, as discussed in the previous chapter. The Brymbo Man remains have cut marks to the distal femur and proximal tibia, which could have been caused by the intentional dismemberment of the knee joint (Duhig, 2007). However, the other individual with potential signs of dismemberment, the young adult male from flat grave 950 at Barrow Hills, had cut marks to the medial clavicle, which seems an unlikely incision to make for dismembering a body, particularly when no other cut marks were identified. The osteologist suggested, as an alternative explanation, that the bone was damaged when the grave was re-opened, but possible ante-mortem causes were not discussed (Barclay and Halpin, 1998, pp. 172–3).

The only clear example in the dataset of sharp force trauma that is likely to have occurred ante-mortem are the v-shaped cuts to the right petrous temporal of a young adult male at Babraham; he was likely decapitated (Hinman, 1999, pp. 64–5). The disarticulated individual from Knowle Hill Farm, which was published too late to be included in my dataset, is however another example of an atypical Beaker burial with ante-mortem sharp force trauma: the osteologist argues a deep incision to the left femur reflects a stab-wound that would have (fatally) severed the femoral artery (Delbarre et al., 2019). A fourth individual in the dataset, an adult male from Frampton, may show healing sharp force trauma to their left frontal. However, the marks are smooth-sided flat-bottomed impressions that end suddenly, and I think they are more likely to be vascular impressions than healed or healing injuries (see Schunk and Maruyama, 1960). There are no cases of trepanation among the sample, though it is known to have been practiced in this period (Parker Pearson et al., 2018a, p. 432).

With only one clear case in the sample, there is very little evidence for (ante-mortem) sharp force trauma among the atypical individuals. Brymbo Man does, however, have a well-healed lesion to the frontal, which has been interpreted as a possible arrow wound (Duhig, 2007). This is the only osteological evidence for projectile trauma in the sample, though there is some secondary evidence for sharp force trauma. At Sarn-y-bryn Caled, a deposit containing the cremated remains of two adult individuals included burnt arrowheads. Two of these had impact fractures, indicating they had previously struck a target, and although they had been cremated they had not spalled from the heat. The excavator suggested this may be because they were protected from direct exposure to the fire by being inside the body of one of the individuals, rather than having been placed alongside them as pyre goods (Gibson, 1994, p. 155). Clearer examples of projectile trauma can be found in the typical Beaker burials, notably
the ‘Stonehenge Archer'; an adult male with multiple arrow wounds who was buried in the ditch at Stonehenge (Evans, 1984). In all cases mentioned here, the arrows in question were Chalcolithic/Early Bronze Age barbed-and-tanged forms, rather than Late Neolithic styles.

Blunt force trauma is no more common among the dataset, with only two possible candidates. The first individual, an adult female with healed depressions to the parietals, is known only from the cranium, which was found as a ‘Thames skull’ at Syon Reach (Edwards et al., 2009; Schulting and Bradley, 2013). With the rest of the body missing, it cannot be determined if the cranial trauma was isolated or related to other injuries. The second, a mummified young adult male from Canada Farm, was found to have partly-healed cranial injuries (Bailey et al., 2013).

If the two equivocal cut-mark cases are excluded, then 8.6% of atypical individuals show signs of trauma (fracture, sharp force, blunt force, projectile); the same prevalence as in the Bronze Age comparative sample, and considerably higher than the prevalence of 2.2% reported by Roberts and Cox for the Neolithic (2003, p. 73; my calculation from their text description, contra their calculation of 1.7% given on p.80, which reflects fractures only).

Other studies have, however, suggested a higher rate of trauma for the Neolithic: Schulting and Wysocki (2005), for example, found a 5-7% incidence of cranial trauma alone for British Neolithic burials, suggesting the total trauma rate is likely to be higher and potentially in line with the atypical Beaker incidence. The examples of traumatic injury listed by the Beaker People Project are mostly fractures, as in the atypical dataset. The BPP does highlight some further cases of weapon-related trauma, including apparent axe-wounds, though they note that these are only rarely found among Beaker burials (Parker Pearson et al., 2018c, pp. 432–3).

The chronological patterns of skeletal disease prevalence are more variable than for dental diseases (Figure 7.14). The atypical Beaker sample has a prevalence of joint disease roughly equal to that seen in the Neolithic, a trauma prevalence equal to that seen in the Bronze Age, and greater osteological evidence for infection than either comparative period. Across the whole dataset, most individuals have no recorded pathological information. Among the sample of (the minimum of) 151 individuals from the 80 deposits with modern osteological analyses, however, more than a quarter (41; 27.2%) display one or more pathological change to the bones or teeth. The nature of this evidence is highly variable, and individuals with pathological changes can be found in single or multiple burials, with or without grave goods, and in a wide variety of burial contexts. It does not appear that the pathological status of an individual (as determined through the skeletal evidence) affected their funerary treatment.
Figure 7.14 – Skeletal pathology crude prevalence rates for the 151 atypical burials that have been osteologically analysed to modern standards, compared to the Neolithic and Bronze Age prevalence following Roberts and Cox (2003).
Chapter Seven: Discussion

8. Interpretations of the results

The following sections contain discussion of the radiocarbon, archaeological, and osteological results that were presented in chapters 5, 6, and 7 respectively. I firstly cover my interpretations of the evidence for the nature of Beaker-period funerary practices, focusing particularly on treatment of the body, material culture, and demography. I consider how the evidence can be used to reconsider the nature of the Beaker phenomenon in Britain, both in terms of its variability and in terms of how social and cultural identity were expressed in this period. Following this, I address the topic of how these new understandings can be used to reconsider the nature of the Beaker transition in Britain, particularly in re-evaluating the extent of Neolithic continuity throughout the period. The evidence for the nature of the Beaker transition is considered in terms of continuity and change in practices, places, and peoples.

8.1. The nature of Beaker period funerary diversity

In this section, I will cover some of the key themes that arose from the results presented in chapters 5, 6, and 7. In these chapters, I provided widespread evidence for British Beaker period burial practices that do not conform to the narrow definition of the ‘typical’ crouched articulated inhumation burial that is traditionally associated with the Beaker phenomenon in Britain. I have identified 272 burials, containing a minimum of 438 individuals, that could be considered period-atypical. The atypical group are themselves variable and diverse, with a wide range of practices being displayed. It is possible, however, to draw out patterns and indicate a number of conclusions that can be drawn from these.

8.1.1. The chronology of practices

The chronological evidence for different burial practices across the Beaker period, primarily presented in Chapter 5, indicates that the Beaker transition did not occur at the same time, or at the same pace, across Britain. Further, the evidence indicates that the Beaker phenomenon arrived into different local contexts in different regions. I have demonstrated that it is possible to model the radiocarbon evidence for the timing of the Beaker phenomenon using a number of different methods, with each approach having different strengths and weaknesses. My modelling of the Beaker People Project dates for the ‘typical’ articulated inhumation practice shows that different results can be obtained by the selection of different modelling parameters, but that broadly my Bayesian modelling results correspond with those obtained by the BPP using the same approach (see Jay et al., 2018).
My Bayesian phase modelling results support their analysis that Beaker inhumations first appeared in Britain in the 25th or 24th century BC, with Wessex likely having the earliest dated Beaker burials. The other case study regions examined, Eastern Scotland and the Yorkshire Wolds, both displayed a slightly later modelled start for the phenomenon, with both falling around a hundred years later than for Wessex.

Analysis of the same radiocarbon data using the non-Bayesian methods of Summed Probability Distribution (SPD) and Kernel Density Estimation (KDE) both suggest a slightly earlier initial arrival of Beaker-associated inhumation burial practices into Wessex, and a less severe delay between the appearance of burials in other regions. The Bayesian phase modelling approach can be shown to have a tendency to under-value the earliest dates in each phase, when these are arguably the most important when looking for the initial ‘pioneering’ evidence of new practices at the start of the ‘visibility phase’ of an archaeological innovation (see Background Figure 2.4). As a result, I am inclined to favour the earlier dates indicated by the summing methods, and would argue that the true timing of the arrival of the Beaker phenomenon in Britain is likely to be in the decades immediately before 2500 BC, with the very earliest burials appearing roughly simultaneously across regions. However, there does appear to be a difference in the timing of the delay between the first burial in a given region and the Beaker practice becoming a numerous and highly visible rite. Beaker burial practices appear to have rapidly proliferated in Wessex, whereas the other case study regions see a much slower increase in prevalence of the typical burial rite; it is this delay before reaching a critical mass that gives the appearance of a later development of rites in some regions. The shape of the distribution of activity, revealing differences in the prevalence of practices over time, can only be revealed through the summing methods demonstrated in chapter 5, rather than phase modelling approaches.

The changing prevalence of other, atypical, burial practices varies greatly, and this is best indicated by SPD and KDE methods rather than Bayesian modelling. The overall pattern for Britain is that low levels of both cremation and disarticulated burial practices continued throughout the period, with continuity from the Late Neolithic through to the Early Bronze Age being supported. The evidence from Wessex corresponds closely with the picture for Britain, and it appears from each of the chronological modelling methods that there is a low level of continuity of cremation from the Neolithic across the Chalcolithic in this region. However, this is not the case for the Yorkshire Wolds or Eastern Scotland case study areas; both of which show that there is no continuity of cremation from the Neolithic into the Chalcolithic. In these regions it appears that the Early Bronze Age tradition of cremation, when it appears at around 2200 BC, is a novel development.
As the case study regions were chosen in part due to their relatively high density of burial activity, it should be noted that the appearance of an overall pattern of continuity in cremation in Britain is largely the result of sparsely distributed, relatively spatially isolated, cremation burials, rather than locally-specific practices at a higher intensity. At its lowest level of prevalence, during the 24th to 23rd centuries BC, cremation burials formed 13% of the total summed probability of burial activity across Britain. As this is likely to be an under-estimate, the evidence indicates a broadly dispersed but widely practiced minority rite during the Chalcolithic. Cremation is a complex multi-stage rite, which requires a high level of technical knowledge as well as, presumably, a cultural and/or religious motivation to carry out these processes (Quinn et al., 2014). It is not necessarily the case that all communities practiced cremation, with groups carrying out burials in the Yorkshire Wolds region in particular showing a clear preference for inhumation rites from the Neolithic through to the Early Bronze Age. Each instance of cremation burial in the Chalcolithic, however, points to the existence of a community who had the knowledge, skills, and desire to cremate the dead, at least in some circumstances. As a result, I think the broad spatial distribution of Beaker-period cremation burials across Britain is indicative of the survival of a practice within communities, of which only a hint is surviving archaeologically.

The chronology of disarticulated burial is harder to adequately describe: disarticulation is harder to identify than cremation, in many cases requiring a close reading of the archaeological evidence, and consequently evidence for it has historically been overlooked. However, the chronology of disarticulated burial appears similar to that for cremation: the overall pattern in Britain is one of continuity, but this picture is comprised of spatially disparate burials dotted across Britain. When looking at case study regions, there is strong evidence for continuity from the Neolithic through the Chalcolithic in Wessex, but the other two case study regions have virtually no dated evidence for Late Neolithic inhumation practices, of which disarticulation is a subset. This is despite ample evidence for undated articulated and disarticulated Late Neolithic inhumation burials in the Yorkshire Wolds in particular. The evidence indicates, as with cremation, that disarticulated burial was not a locally-specific practice, but instead occurred as a low-level minority practice within communities across Britain.

8.1.2 Regionality and Wessex exceptionalism
That the burial practices of the British Beaker period were regionally variable is clear from the radiocarbon evidence alone: Chapter 5 demonstrates that cremation, articulated inhumation, and disarticulated inhumation, the three broadest categories of burial rite, can each be seen to follow different trajectories in the three case study regions across England.
and Scotland. When initially reviewing this evidence for regional variability I had considered the possibility that burial practices might be ‘mobile’ across regions in the Chalcolithic: when articulated Beaker inhumations appeared in a given region, perhaps cremation practices could be seen to shift geographically into an area where the Beaker phenomenon had yet to arrive, for example. This possibility was prompted by the lack of evidence for substantial settlements over much of Britain in the Late Neolithic and Early Bronze Age, combined with the BPP’s isotopic data indicating a high level of inter- and intra-regional mobility among Beaker-period communities. However, the spatio-temporal evidence does not support this suggestion. Almost all regions of Britain see an increase in burial activity during the Beaker period, and most areas with atypical burials also have evidence for other forms of Beaker-associated activity; the distribution of Clarke’s (1970) dataset of funerary Beakers provides a close match and is less dependent on preservational biases than the BPP’s inhumations. An issue with this form of analysis is the very low level of dated Late Neolithic activity across Britain. Wessex and Orkney were key centres of activity in the Late Neolithic, but outside these regions the evidence is sparsely distributed and difficult to analyse diachronically in order to assess any spatial shifts that could occur with the advent of Beaker-associated activity in the Chalcolithic.

The spatio-temporal evidence primarily indicates that there were clear hot-spots of Beaker-period activity which crossed evidence types and burial types: some regions of Britain saw more archaeologically-visible activity in this period – of all types – than did others. Wessex, Oxfordshire, the Yorkshire Wolds, and Aberdeenshire were all key centres of activity in the Chalcolithic, with Cambridgeshire, the Peak District, and the east coast of northern England and Scotland joining them in period 2, alongside a broader distribution of lower-intensity activity. In the Late Neolithic, burial activity is concentrated in Wessex, Oxfordshire, and Orkney, with Orkney being the only region that experienced a marked decline in activity during the Beaker transition.

Broad regional variations can also be seen within the typical Beaker burials, most notably in terms of the orientation of the body: the north and the south of England have different traditions regarding the orientation of male and female individuals in the grave (Shepherd, 2012). There are finer-grained regional variations in the Beakers themselves, with Clarke (1970), Lanting and van der Waals (1972), and Boast (1995) each recognising regional variability in Beaker shape and/or decoration. Less commonly recognised, however, are the regional variations in grave good associations seen among typical burials (see Parker Pearson et al., 2018b). The atypical burial evidence indicates that traditions of grave good provision varied markedly between different regions: some, such as the Yorkshire Wolds, utilised a
smaller range of artefacts and materials than others, with differing rates of unaccompanied burials occurring in each.

When looking at the atypical evidence, the region that appears to deviate the most from the pattern for Britain as a whole is Wessex. Although it contains an unusually high intensity of burials, the broad pattern of changing rites closely matches that seen for the wider dataset. However, the nature of these practices differs from those seen elsewhere. There are unusually high numbers of burials accompanied by grave goods, with an unusually high level of variation and diversity in the artefact assemblages. The evidence suggests either that communities living in the Wessex region had access to a greater selection of ‘Beaker package’ artefacts, and in greater numbers, than did communities living elsewhere in Britain, or that these groups had differing attitudes to which artefacts and assemblages should be included in burials. While the richness of Wessex burials as a group is unusual, the most distinctive feature of the atypical burial evidence from this region is the demographic profile of the individuals selected for burial. Within the Wessex region there appears to have been a strong bias in favour of the burial of young adult males, in both the typical and atypical datasets, at the expense of other age and sex categories. The evidence seen here, for well-furnished burials of young adult males (overwhelmingly in pits under barrows) conforms closely to the expectations set by the typical Beaker burial stereotype, and matches the findings of the BPP. However, in this regard Wessex is the area that deviates the most from the atypical burial evidence from across the rest of Britain. Nowhere else is this demographic profile seen, with other regions tending to have a more even distribution of age categories. The implication is that the image of the typical Beaker burial – the well-furnished burial of a young adult male – may have been disproportionately affected by the evidence from Wessex, a region which more than most should not be seen as representative for Britain as a whole.

Evidence from continental Europe suggests that the regional variability of the Beaker phenomenon can in some cases be mapped onto pre-Beaker Neolithic cultural variability and exchange networks (Lemercier, 2012). In Britain, the Grooved Ware Late Neolithic was relatively homogeneous, providing limited evidence for the kind of within-Britain patterns that could provide a precursor to Beaker period variability (Bradley et al., 2016). Some examples may exist, however: in the Yorkshire Wolds the relative prevalence of different rites deviates from the expected pattern seen across Britain as a whole. Here there is almost no dated burial evidence from the Late Neolithic, and little evidence for a cremation practice occurring in the Late Neolithic or during the Chalcolithic. This region has, instead, archaeological evidence for a strong local tradition of inhumation burial in the Late Neolithic, though there are very few radiocarbon determinations to reflect this (Lucas, 1996; Petersen,
1972). It appears likely that in this region the absence of dated cremation burials in the Late Neolithic and Chalcolithic reflects a regionally variable trend in burial practices: the undated burials of this region are also inhumations, and there are not large numbers of undated cremation burials here as there are in some other regions. Interestingly, in this region the dated burial evidence also suggests that there was a subsequent failure of cremation to see the huge increase in prevalence that occurs elsewhere in the Early Bronze Age. There is a possibility, therefore, that the character of the Early Bronze Age burial practices in the Yorkshire Wolds reflects the Late Neolithic inhumation rites of the region, with the Beaker phenomenon of the intervening period potentially incorporating and carrying forward local burial traditions (Lucas, 1996).

However, few regions have a high enough level of recorded activity in both the Late Neolithic and the Beaker period to point to clear evidence for continuing regional trends. It is likely, particularly when considering that the Late Neolithic was dominated by the cross-Britain Grooved Ware styles of material culture, that much of the regional variability seen within the Beaker period arose within the Beaker period. One possible explanation for ‘new’ regional differences is that migrants into Britain during this period were travelling from a variety of different source regions across continental Europe. This is supported by stable isotope analysis of long-distance migrants: the Amesbury Archer may have originated in the Alps, and some of the Boscombe Bowmen may have come from Ireland, Brittany, central France, Portugal, or south-west Germany (Fitzpatrick, 2011). Given that the Beaker phenomenon was expressed differently in different regions across Europe, it stands to reason that individuals migrating from different places would bring with them different cultural understandings of appropriate funerary practices. This has been argued in a number of different cases. Alison Sheridan, for example, has argued for a Scottish-Dutch connection on the basis of morphological similarities between both Beakers and burial styles (Sheridan, 2008). The Boscombe Bowman monograph further contains a detailed consideration of the possible continental origins of the collective burial rite displayed, as it is recognised as being unusual within Britain, with no local precursors (Fitzpatrick, 2011). If different migration streams existed, linking certain places on the continent with different areas within Britain, these migration patterns could be reflected in regional traditions within Britain during the Beaker period. This idea influenced Clarke’s (1970) Beaker typology: he identified stylistic influences from the middle and northern Rhine regions among British Beakers and associated these stylistic variations, brought to Britain by migrants from each region, with differences in Beakers, other grave goods, and rules for the orientation of burials.
However, evidence from stable isotope analysis warns against equating regional variability in Britain directly with variable migrant homelands (even in cases where there is good chronological control of variability in artefact forms; an issue now known to affect all Beaker typologies proposed prior to that of Needham (2005)). Burials containing multiple individuals provide evidence suggesting that long-distance migrants from different source locations lived together within communities, alongside both those born locally and those who had travelled shorter distances within Britain during their lifetimes. Among the people buried together in the Boscombe Bowmen grave, for example, the adults were all long distance migrants whereas the children’s isotopic signatures were consistent with being raised in Britain, but not within the immediate Stonehenge (chalk geology) area (Evans et al., 2006; Fitzpatrick, 2011). It seems possible, however, that incomers bringing knowledge of a broad range of associated cultural traditions would increase the range of practices available to a mixed-origin community within Britain. Regional variation in cultural norms, and diversity of available rites within communities, could be explained by differential participation in the processes of adaptation and acculturation leading to the creation of new, uniquely British, cultural norms (Binford, 1965).

8.1.3. Beakerless burials?

While several of the burials among the atypical dataset were accompanied by diagnostic Beaker package artefacts, including items that have traditionally been referred to as ‘high status’, the results of Chapter 6 indicate that the majority of the atypical burials are not found with the rich material culture that is often associated (conceptually, if not physically) with typical Beaker burials. Even among those burials that do have grave goods, the majority of artefacts appear to be functional and are made primarily from readily-available materials; flint tools and flakes are the most common, with bone tools and unworked animal bone (suggestive of food offerings) also being frequently found. The assemblages are relatively sparse and rarely contain more than two different (surviving) types of artefact.

The data collection process for compiling this dataset required some evidence for a Beaker-period date (see Methodology section 4.1), which could be expected to artificially inflate the proportion of burials associated with period-specific artefacts. Despite this effect, a large proportion (43%) of the atypical burials identified were aceramic, more than half (55%) were without any non-ceramic grave goods, and 28% lacked either, having no associated material culture. The number of unaccompanied burials among this dataset must be regarded as an underestimate of the true level, given the difficulty of identifying unaccompanied burials as belonging to this (or any other) period. This invites a consideration of which types of burial—and which types of person (see Fowler, 2004)—were provided with grave goods in this
period, what form these assemblages took, and how the role of grave goods might be re-evaluated if interpretations surrounding the ‘rich’ Beaker package of artefacts are recognised as being inapplicable to many burials in this period.

There are no clear differences between the proportion of different types of atypical burial (cremated, disarticulated, etc.) that received grave goods or Beaker associations. However, networks of association, correlation, and Jaccard distances between artefacts found with different burial types (see section 6.9) suggest that when disarticulated burials are furnished they tend to have a greater variety of different grave goods than do cremated burials. While difficult to compare precisely, it appears that typical Beaker burials were slightly more likely than atypical burials to be accompanied by vessels and other grave goods. Of the BPP burials, 39% were aceramic, and 34% were without any non-ceramic grave goods; 27% of BPP burials were entirely unaccompanied, being with neither. The levels of aceramic and entirely unaccompanied burials are therefore close to those seen among the atypical evidence, but a greater proportion of typical Beaker burials were accompanied by grave goods other than vessels. When typical burials do have grave goods, these are more likely to form more complex assemblages containing multiple types of artefact. Many do still contain simple deposits of flint flakes and tools, as is often seen among the atypical burials, however.

The co-presence and Jaccard similarity between artefact types reveals that while flint flakes and tools are the most common artefacts found in atypical graves, they are not strongly or commonly associated with any other artefacts, and thus do not form part of an ‘atypical Beaker package’. Flint daggers, while rarer, appear to be used more often as core components of a package of related grave goods. Among disarticulated burials with grave goods, they are found alongside a wide variety of artefacts made of a range of materials, including some that are rare in the period such as gold, copper, and jet. The network of artefact associations for cremated remains is smaller, and metal artefacts are not well-connected, indicating they were not used as part of a package but were more commonly placed as single items. The evidence therefore suggests that disarticulated burials, while less frequently furnished with grave goods than typical burials, and typically containing fewer different types of artefact, showed the same ‘packages’ of artefacts as suggested by Clarke (1970) and Needham (2005) for typical Beaker burials. Cremation burials occasionally included Beaker package artefacts, but assemblages tend to be sparser still and consequently do not show the same network of interrelated artefact types as do the inhumations.

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2 Those with vessels include burials with Beakers, Food Vessels, hybrid forms, and other or uncategorised types, as recorded by the BPP for their ‘core’ period of 2500-1500 BC.
Such a difference in the grave goods associated with different burial types might traditionally have been argued to reflect status differences: the extensive and diverse exchange networks required to procure specialist artefacts or exotic materials for grave goods has been argued to reflect power, both political (Renfrew, 1974; Shennan, 1982) and cosmological (Needham, 2000). Individuals with more prestigious grave goods would be seen as being higher-status or more powerful within society. Consequently, the different association networks of artefacts between cremation and inhumation burials, as demonstrated here, could be taken to indicate that funerary rites differed based on the status of the individuals being buried: the greater range of artefacts associated with typical burials indicating that the articulated inhumation rite was applied to higher-status individuals than were cremation rites. However, there is no reason why differences in burial assemblages should be indicative of prestige or status differences: the assemblages we see archaeologically, particularly in cremated and disarticulated burials, are the result of dynamic processes of addition and removal, over multiple stages of burial rituals, on the part of a community of people (Mizoguchi, 1993).

It is possible that the difference in the proportion of typical and atypical burials that are accompanied by non-vessel grave goods could be explained by differences in the pre- and post-depositional processes to which each of the burials have been subjected. Atypical burials show more evidence for extended post-mortem interaction and post-depositional revisiting than do the typical Beaker burials. The finding that only one third of the cremations with grave goods included objects that had passed through the fire suggests that the grave goods we find archaeologically were primarily placed with the body at the time of the final deposition of the body (or later), rather than earlier in the funerary treatments. This does not necessarily mean that there was not an earlier phase in which artefacts were placed with or displayed alongside the body, however; the third of cremations with pyre goods attest to artefacts being present alongside the body in earlier phases of the funerary process. It is possible that bodies with evidence for weathering, excarnation, and revisitation had previously been associated with artefacts which have experienced the same processes of degradation, attrition, and selective removal as the bones (as suggested by Brück, 2004, pp. 310–11).

The finding that a third of Beaker associations with atypical burials are in the form of sherds, rather than complete vessels, also fits the possibility that grave goods may have been affected by processes of fragmentation and manipulation. Very few of the typical (complete) articulated inhumations were buried with sherds of vessels; the association between incomplete vessels and incomplete bodies is interesting. The concept of ‘token’ burial is often used to discuss the deposition of small quantities of human bone, particularly when cremated,
as a representation of the whole body. The posited reasons for token deposition are varied, but it is clear that the burial of partial remains allows for the remainder of the body to be located elsewhere; potentially in other burial contexts and potentially in circulation. The deposition of Beaker sherds with incomplete bodies could also be considered in the same way, with fragments of the vessels being retained for circulation or for deposition in other burials in order to create or sustain relationships between individuals in life and in death. Partible or fragmentable bodies are thus more likely to be paired with fragmentary vessels (Brück, 2004; 2006). It is also possible that previously complete bodies and artefacts were fragmented as part of the same acts: the reopening of the grave of the Amesbury Archer, for example, could have facilitated both the removal of a rib and the removal of fragments of the three Beakers (of five present) that were found to be incomplete on excavation (or alternatively, the incomplete Beakers could have been added at the time that the body was altered). The similarities in treatment between bodies and Beakers may indicate that they were viewed as analogous to each other (Brück, 2019, pp. 111–14). This contrasts with the finding of Rebay-Salisbury (2010) that vessels were used as bounded spaces that provided ‘an inversion of fragmentation and dispersion’ for cremated burials across Bronze and Iron Age Europe. This suggests that while pots and bodies continued to have a conceptual connection, the nature of this – the role and meaning of the vessel, particularly in relation to cremated remains – changed during the course of the Bronze Age.

However, the analogy between fragmentary bodies and objects only holds up for vessels: there is no apparent difference in the state of fragmentation of the non-ceramic artefact types between typical and atypical burials. Both datasets provide examples of intact and fragmentary weapons, tools, and ornaments. It is likely that other, or additional, factors lay behind the choice to provide grave goods, what state these should be in, and how they should be combined. Though there are overlaps between each category, the evidence that assemblages of grave goods differed between burial types, with articulated inhumations having a wider range of artefacts than cremated remains, suggests that there may have been some relationship between burial form and which artefacts were deemed suitable for deposition as grave goods. Given that artefacts could be (and were) added to cremation burials at a stage after the process of burning, the difference in artefact associations between cremated and inhumed atypical burials cannot solely be explained as a function of the different taphonomic processes involved in each.

The evidence presented here suggests that burials in this period do not represent fixed assemblages, and neither do the bodies or combinations thereof in each funerary context. The treatment of the body, including whether it is cremated or dismembered, at what site in
the landscape it is placed, and what artefacts, if any, should be associated with it at each stage represent a complex series of processes which could change over the ‘life course’ of each corpse, even after its deposition.

8.1.4. Rites of disintegration and interaction

Chapters 6 and 7 present evidence that articulated inhumation was far from being the only funerary rite in Beaker-period Britain: though the burials are less numerous, the MNI for each indicates that rites which deviated from the typical Beaker inhumation practice may have been applied to as many people as those that conformed to the stereotype. Among the atypical burials identified during this research there is evidence for cremation, dismemberment, excarnation, the burning of inhumed remains, mummification, the revisiting and rearranging of burials, and the curation of skeletal elements. Human remains, partial and whole, were deposited into the full range of funerary, ceremonial, domestic, and natural places known in this period. In some cases the atypical burials are with Beakers or other Beaker-package artefacts, though in many cases they lack any grave goods or other associations with surviving material culture at all. The broad categories of cremation, articulated inhumation, and disarticulated burial, used for diachronic analyses of burial trends, are not discrete categories and are not the only way of grouping the visible practices, but do provide a useful indication of the temporality of variability.

In many cases the burial types are represented by a small number of examples, often located in disparate regions of Britain. The extent to which each practice can be considered typical of the period is limited by the sparse nature of the evidence, with it being likely that further examples of each burial type existed but have not been recognised (by excavators, previous researchers, or myself). A list of more than 150 burials that were considered for inclusion in the project, but which were ultimately rejected, is included in Appendix III as an indication of the limits of data collection for this project.

Though the evidence suggests the existence of flexible attitudes to the treatment of the body, with a range of options available within contemporary communities, it is noticeable that most of the atypical practices considered here would have accelerated processes of bodily disintegration when compared to simple inhumation of the body. That this was an intentional result of the funerary rites is suggested by the diverse ways in which the end result was achieved. Cremation would have been a particularly dramatic (and effective) means of dis-integrating the remains, but excarnation, dismemberment and decapitation, as well as the excision of body parts, all serve to reduce bodily integrity. The application of fire to an inhumation burial (as in section 6.1.3) would similarly have damaged the flesh of the
individual and accelerated the processes of disintegration. These burials break down the distinction between Neolithic and Beaker-period rites argued for by Thomas (1991) among others.

While cremation is often conceptualised as being in opposition to inhumation, and frequently theorised as serving a different purpose, I would argue that the finding of cremated and inhumed remains mixed together in burial contexts — and minimal distinctions in the way cremations and inhumations are treated — indicates that such a structural opposition was not upheld during the Beaker period. It could instead be argued that cremation was one of many approaches available to communities to break apart the body of the deceased during funerary rituals (see Larsson and Nilsson Stutz, 2014; Rebay-Salisbury, 2015). It is also worth considering that cremation could have been carried out subsequent to other processes of disarticulation: there is often an assumption that a low burial weight for cremated remains indicates that these body parts were selected from the pyre for burial. However, it is also possible that incomplete bodies were cremated and buried (see Duffy and MacGregor, 2008, p. 75). Articulated inhumation burial also results in the disintegration of the body but at a slower pace; it is interesting to note that several of the disarticulated burials of this period appear to have been initially buried in an articulated position until they were revisited and body parts removed or rearranged.

There does not appear to be any pattern to the body parts that were removed from burials, or those which were chosen for deposition into burial contexts. In some cases specific bones were removed: the individual from Radley barrow 950 was found to be missing their right humerus and scapula and first cervical vertebra (Barclay and Halpin, 1998, pp. 59–63). In others, isolated bones are found: at Borrowstone cist 5 only the right femur, the cranial vault, and some teeth (all well-preserved) were present (Shepherd, 1984, 1986). In other burials the remains are suggestive of a removed body, as at Embo chamber I where ‘a preponderance of bones from the hands, feet, and wrists’ were found (Henshall and Wallace, 1965). And at some the remains look more like they were moved from elsewhere: the Corston Lime Kilns Quarry individual was missing many ‘small’ bones; from the hands, feet, vertebrae, and ribs (Taylor, 1933). In other burials groups of articulated elements were removed from the grave: the individual from Chealamy was missing all elements above L5 as well as the feet, with the legs remaining in articulation (Gourlay, 1984). In others, grouped articulated elements were apparently disarticulated but then rearranged within the grave, as at Skateraw where the arms of the inhumed individual were apparently ‘severed from the trunk and placed separately on the wrong sides of the body’ (Ritchie, 1958). In cremated remains, in which identification is not always possible to the level of the skeletal element, the regions of the body included in
each burial nevertheless indicate that the body parts selected for deposition (and/or cremation) are similarly highly variable between burials. This supports the suggestion that it was the process of disintegration that was important, rather than any particular body part (compare to Iron Age practices focusing on the skull: Armit, 2012).

It is interesting to compare the prevalence of practices resulting in disintegration of the body to the rare evidence for mummification in this period; a process by which decomposition of the body was actively impeded. That maintaining the integrity of the corpse was one of the purposes of mummification is indicated by the evidence for additional efforts to retain bodily cohesion among these burials. This can be seen, albeit later in the Early Bronze Age, at Canada Farm F3, the burial of a mummified adolescent placed in a satellite position to the mummified F1 Chalcolithic burial which is included in this study. The body of individual F3 appears to have been held together past the limits allowed by the mummification process by a system of dowel-like pegs at the long bone articulations (Smith et al., 2016). The Middle Bronze Age mummies of Cladh Hallan indicate an alternative strategy for retaining the appearance of bodily integrity: creating composite bodies to provide the illusion of intact remains after the mummified bodies had apparently fallen apart (Booth et al., 2015; Parker Pearson et al., 2005). In light of the finding by Booth et al. (2015) that almost half of their sample of Bronze Age inhumation burials displayed evidence for arrested decay, it is likely that there are many more Beaker-period mummified burials than those which have been recognised to date. A possible avenue to explore further in this regard would be whether the many putatively bound or bundled individuals in this period, both articulated and disarticulated, could represent attempts to retain the integrity of mummified bodies at the end of their ‘lifespan’.

An additional theme that emerges from the diverse atypical burial practices is the extent of evidence for extended interactions with the dead. This can occur viscerally, seen through cut-marks on bones indicating active defleshing and dismemberment of bodies. It can also be seen through multiple burials, where relationships between bodies (or parts thereof) were curated. It can further be inferred through signs of weathering and gnaw marks on bones, which can indicate that remains were kept exposed prior to a delayed burial. That mummified remains were retained to the point of requiring conservation treatment by the burial community also suggests that at least some bodies had extended post-mortem lifespans. In some cases, as with the Boscombe Bowmen, secure chronological control reveals extended usage of a burial context – and interaction with the remains within – over a period spanning between 30 and 310 years (at 95% probability, or between 100-250 years at 68%; Fitzpatrick, 2011, p. 175). In most cases the period of interaction appears to have been shorter than this,
with a high likelihood that the timescale of engagement would allow for individuals who had
known each other in life to continuing to interact past the death of one (or both).

The nature of the atypical dataset, containing diverse deposits of human bone, potentially
provides insights into multiple stages of these processes of interaction and curation. In
addition to complete (or near-complete) bodies in formal burials, it is possible to find
examples of single, potentially curated, bones, potentially capturing the final stage in the
(prehistoric) journey of remains that had been removed from burials within this period.
Compare, for example, the missing first rib of the Amesbury Archer to the isolated humerus
deposited in a midden at An Corran on Skye (Fitzpatrick, 2011; Saville et al., 2012). While
these are clearly not parts of the same individual, they indicate the different archaeological
evidence for deposition that can be seen for remains at different stages in processes of
circulation or curation. Recent work presented by Tom Booth (Booth and Brück, 2018) has
indicated that in the Bronze Age the length of the phase of interaction with remains (their
curation) tended to be relatively short, in the region of decades rather than centuries. It seems
probable from the atypical Beaker-period evidence that processes of curation and
manipulation in the Bronze Age were a continuation of those seen in the Chalcolithic.

In some cases the lived relationships being created (or recreated) in burials are accessible to
us. At Trumpington Meadows, for example, two second-degree relatives were buried toe to
toe. Both had evidence for weathering of the bones, and at least one of the individuals (burial
2) was partially disarticulated, suggesting that the remains had either been retained above-
ground or moved from a different burial place to allow for the relationship between the two
individuals to be displayed in the grave in this way (Evans et al., 2018; Olalde et al., 2018
supplementary information). At Dryburn Bridge, only one individual from each of the two
cists has been genetically analysed so far, but burials such as these have the potential to reveal
further curated relationships between individuals with (genetic) kinship affinity; the work of
Knipper et al. (2017) and Mittnik et al. (2019) indicates the interpretive possibilities when a
greater proportion of adjacent burials are subject to aDNA analysis.

8.1.5. The roles of women and children

The historical focus on typical Beaker burials, the majority of which contained adult males,
has tended to lead to androcentric narratives of the period, with few authors considering the
roles of other people within Beaker-period social groups. In light of this the atypical burial
evidence may help to provide different perspectives on the treatments and roles of men,
women, and children in the period, in particular through the combinations of bodies that
occur in the multiple burials that are so prevalent within this dataset.
The atypical dataset contains the same proportion of adult females as does the typical dataset, with males being twice as common as females across both datasets among the adult remains which have a sex assessment. Women are therefore under-represented to exactly the same degree in each dataset. Interestingly, the two datasets also share the same age-related patterning across male and female adults: younger adults are found far more frequently than middle adults, which are in turn more common than older adults. This is unlikely to mean that the demographic profile of burials reflects the mortality profile of the underlying population: the rate of non-adult burials diverges widely between datasets (see below), and in both the level of infant burial is far lower than might be expected in a non-modern society. The evidence suggests, rather, that both age and gender were taken into account in the provision of funerary rites during this period, with older adults – and particularly older women – apparently receiving rites that have yet to be detected archaeologically.

There is some variation in the adult sex ratio for different burial types, though interestingly the findings here disagree with those of previous studies. Brück (2009; 2014) found that women were more prevalent in cremation burials than in inhumation burials during the Bronze Age, in which she includes the Chalcolithic. She argues against the common assertion that the prevalence of men in inhumation burials, often in primary positions, means that they held a higher status in Bronze Age society than did women (Brück, 2014, p. 120). She suggests instead that women may have been cremated more often as a means of facilitating the fragmentation of their remains: this allows the retention and circulation of fragments of bone, a process which reflects women’s role in creating and maintaining inter-group relationships. Brück argues that the lower weight of female cremations (which is replicated in the current study, see Figure 6.5) indicates that when fragmented by cremation, parts of female bodies were more often retained for dispersal and circulation, rather than the entirety of the remains being placed in a primary burial location. She argues that the fragmentability of female bodies – and the retention and circulation of these fragments – points to there being an understanding of female identity as relational, with women being partible individuals.

Among the atypical Beaker period burials, however, women were more commonly found disarticulated than cremated. Cremations are relatively rare across this period, so this might be expected. However, the proportion of women is also higher in disarticulated burials than in cremated burials – 39% compared to 29% of the adults with sex estimations in each. It is possible that, prior to the rise of cremation in the Early Bronze Age, disarticulation held a comparable role, being used as a means of dismemberment and dispersal; allowing body parts to be circulated and retained within communities. However, the bodies selected for these processes of fragmentation in the Beaker period, whether through cremation or
disarticulation, were predominantly male, with females only being slightly more frequent in disarticulated burials than the average for the period (33%). This could therefore suggest that any gendered difference in understandings of personhood or relational identity did not develop until later in the Bronze Age.

However, the role of women in this period may also be indicated by the finding that they are most commonly located in multiple burials, rather than in single or double burials (see Chapter 7, Figure 7.7). The burials with high MNIs tend to be of disarticulated remains, with some also containing cremated bone. In this group of burials, the level of male and female adults is roughly equal, suggesting that women were more frequently placed in burials alongside other individuals than alone. This could lend support to the hypothesis that women had relational identities, with this being expressed in the burial context by the positioning together of different bodies (or parts thereof). The difference from the cremation/circulation hypothesis above is that these relational burials are likely to have contained individuals from within a community, and thus emphasise relationships within rather than between groups, and the role of women in these.

The greatest demographic differences between burial types, however, are those relating to the presence and prevalence of non-adults. While virtually absent in the BPP’s dataset, subadult individuals are well-represented among the atypical burials, with children aged 3-12 years being almost as common as young adults. Infants, aged birth to 3 years, were as common as middle adults. Adolescents were more common than old adults, and the number of neonatal infants (including foetal remains) was not much lower. The difference in the prevalence of non-adults between the two datasets is therefore striking, and suggests that the atypical burial practices of the Beaker period may have broadly been seen as being more suitable for children.

Subadults are most commonly found in disarticulated burials, particularly in the highly fragmentary and dispersed deposits that I have labelled as ‘disarticulated scatters’, but they are proportionally under-represented in cremation burials. As noted in Chapter 7 (pp.229-30), the demographic profile of the single atypical burials is remarkably similar to that of the BPP’s typical burials. The subadult individuals are, by and large, not in single atypical burials: the large majority are found (disarticulated and incomplete) in multiple burials. Non-adults in the Beaker period were therefore seen as being most suited for fragmentation and inclusion in disarticulated burials alongside others. This suggests that, more than a gendered difference, there may have been stronger age-related difference in the conceptual partibility of bodies. This ties into suggestions that children can be seen as ‘plural’ beings as they tie
together communities and embody both beliefs and predictions about the future as well as shared social understandings of the past (Mizoguchi, 1993, pp. 141–2). The remains of children were evidently treated differently in this period, apparently having mortuary norms distinct from those applied to adults.

There are few comparable studies to indicate if children received differential burial practices in other regions of Europe during the Beaker period; in many areas children are frequently perceived as being ‘invisible’ in the archaeological record or assumed to be peripheral to the important narratives of a period (see Kamp, 2001; Sofaer, 2015). A recent study by Herrero-Coral et al. (2019) has challenged this, however, by reviewing the evidence for child Beaker burials in Iberia, placing them into the wider European context. They indicate that the role of children – or the extent to which they were differentiated in burial rites – varied markedly between regions. The most common finding across Europe is that children received the same burial rites as adults (ibid., p.77). In regions where collective burial was common, children can be seen to receive these locally normative practices (Herrero-Coral et al., 2019, p. 78).

Similarly, in areas where the highly homogeneous crouched inhumation practice was predominant, the similarities can be seen to include children sharing the same patterns of gendered burial positioning and grave goods as adults (Makarowicz, 2015). In some cases, this includes the provision of ‘high-status’ grave goods to children, which has been interpreted as indicating that systems of hereditary status were used (Heyd, 2007, pp. 352–7). I would argue against assuming this interpretation to be correct, however, as the link between grave goods and status is by no means certain. Herrero-Coral et al. (2019) find that it is only from middle childhood (around six to 11 years old) that children in western European Beaker burials receive Beaker package grave goods. They argue that this indicates that it is only from this age that children gained the right to be recognised as full members of the group, with the grave goods selected reflecting this role within society. This interpretation does not fit the British evidence well given that such a high proportion of burials – belonging to adults and children alike – lack these artefactual associations.

Ancient DNA analysis has in some cases complicated suggestions that children were treated (in death, and possibly also in life) as miniature adults, with their graves being inscribed with the same gendered and status-related symbolism. A study of children at Hoštice, a Beaker cemetery in the Czech Republic, found that the chromosomal sex of children frequently disagreed with the gender expressed through their burial rites, with only 62% of assessments agreeing (Vaňharová and Drozdová, 2008). Turek (2013) notes that in this case it is mostly boys that were buried in a ‘female’ manner, rather than an equal pattern of non-concordance. He suggests that this indicates these boys had been intended to be raised as the opposite
I would argue instead that it may indicate that (adult) male status was, in this community, seen as something that had to be attained, rather than an innate characteristic. This would have the implication that it was possible to move between social identities, though the process may have been unidirectional.

Turning to the role of subadults in multiple burials, McKinley (1997, p. 142) found that Bronze Age cremation burials containing multiple individuals tended to contain adult-child combinations. While this is not the case for the Beaker-period cremations, it is the case for the multiple burials (the majority of which are disarticulated): all but one of the multiple burials containing at least one subadult also contained adult remains. This finding, that Beaker-period multiple burials containing non-adults also include adults, fits into the wider Beaker phenomenon evidence from across western Europe (Herrero-Corral et al., 2019, p. 77). This provides another indication that multiple disarticulated burials in the Beaker period prefigured the patterns that would later appear in Bronze Age cremations, perhaps suggesting that these rites were applied to the same categories of person at different points across the period.

Though cases such as the double burial at Trumpington indicate that bodies were in some situations paired on the basis of their lived relationships, this should not be assumed to be the case for all multiple burials. Heyd (2007) suggests several other examples of possible family groups buried together in Germany and Austria, though these are made on the basis of shared non-metric traits and/or body positioning, neither of which provide strong evidence. Simón et al. (2011) present a case study of a Bronze Age collective burial in Spain that had been believed to represent a ‘nuclear family’, though aDNA analysis subsequently negated this possibility. They note, however, that that the lack of immediate (first- or second-degree) genetic relationships between individuals does not exclude the possibility that they were part of a kinship group; in this case the presence of multiple different mtDNA haplogroups suggesting that this could have been based on a patrilocal marriage system.

In terms of the child-adult combinations in the atypical dataset it would be tempting to interpret these as familial groupings, whether genetic or not. This could tie into the idea that children’s identities were relational and seen as a part of the adults around them (Rebay-Salísbury, 2018). Herrero-Corral et al. (2019, p. 79) express the same concept as children not being ‘considered full members of the community, or even true individuals within the social group’, with full personhood being obtained by adolescence. There is no difference in the sex of adults found in the atypical multiple burials alongside children: the 2:1 male-to-female ratio of the wider dataset is maintained precisely among those with a sex estimate. The
evidence for potentially long delays between depositions within the same context, including evidence for weathered and dismembered remains, may indicate that bodies of children were only combined into the atypical burials of adult bodies at certain times or in particular circumstances. While the atypical burials have provided evidence for some of the ‘missing’ children of the Beaker period, highlighting a different practice, closer analysis of the remains in this category would, however, be required to determine the reasons why some were selected for this treatment.

8.2. Culture change in the post-DNA landscape

In this final section I will consider the extent to which the atypical burial rites of the British Beaker period indicate a continuity of Late Neolithic practices, cultures, or peoples across the Beaker transition, thereby addressing my final three research questions. If continuity can be demonstrated, this has implications for the nature of the Beaker transition and potentially for the origins of subsequent practices in the Early Bronze Age and beyond.

The process of culture change across the Beaker transition has been subject to marked shifts in interpretation over the history of the discipline, as outlined in Chapter 2. The two main opposing positions within British archaeology, from which other studies have led, can be characterised as Childe versus Burgess and Shennan. The Childean position can be characterised as the belief that cultural change – in this case the shift from the Late Neolithic to the Beaker period – indicates (and requires) a change in the population of the affected area. In this view, the evidence for the appearance of new burial rites from c. 2450 BC (the typical crouched inhumation), alongside the appearance of new artefacts and evidence for new technologies, indicate a change in the population of Britain from that seen in the Neolithic, which must have been brought about by large-scale migration (Childe, 1950a, 1950b). This view was largely superseded in British archaeology during the latter half of the 20th century, though remains the prevalent paradigm in many areas of continental Europe, with modern scholarship on Beaker burials in other regions reflecting this (Vander Linden and Roberts, 2011). From this perspective, the aDNA evidence indicating genomic population change across the British Beaker transition might seem like an obvious result, supporting the evidence for dramatic change already identified through the archaeological record. Diversity among the burials of this period, deviating from the image expected from the well-defined ‘typical’ Beaker burial, could under this model be taken as signs of the existence of alternative cultures existing in Britain contemporaneously with the Beaker culture/phenomenon. If the influence of this ‘other’ group or groups could be shown to reflect a continuity of Late Neolithic cultural forms into the Beaker period, this would
indicate a corresponding continuity of indigenous peoples. This could be argued to be reflected in the finding that 10% of the modelled aDNA profile of the people of the British Bronze Age is derived from the insular Late Neolithic peoples of Britain (Olalde et al., 2018).

Conversely, the Burgess and Shennan (1976) position is that cultural change primarily involved the spread and adoption of ideas, without necessarily reflecting a transition in the population of an area. Under this paradigm, the new Beaker-associated burial rites indicate the arrival and adoption of something ‘extra-cultural’; the expression of concepts which were dispersed and applied across cultural boundaries and, in this case, adopted by the indigenous peoples of Late Neolithic Britain. The nature of these extra-cultural concepts varies across different interpretations, but is generally taken to include new understandings of individualised status and social hierarchy. The shift from unaccompanied collective burial to the well-furnished single inhumations of the Beaker period reflects the adoption of not just the concept of elite roles and figures within a society but the means of expressing this. Under this paradigm, the existence of funerary diversity within the Beaker period could indicate the existence of groups of people who eschewed these new developments. However, more commonly, unaccompanied burials, disarticulated burials, and cremated remains, are all interpreted as being ‘lower-status’; diversity in rites could be seen as providing a window on hierarchy and status differentiation within Beaker-period society. The change seen in the genetic profile of the population of Britain during this period could be explained as the new Beaker-associated elite being incomers with a reproductive advantage over those who were lower-status.

Although the recent aDNA findings could be used to lend support to either position (or an intermediate one, say requiring short-distance mobility and exchange networks rather than mass migration) it has thus far primarily been taken to indicate support for migrationist hypotheses: Heyd writes, in response to the initial wave of post-DNA archaeological publications, ‘culture-history and ethnic interpretations are back on the dinner table’ (Heyd, 2017, p. 349). The same process has occurred for the study of the Neolithic transition in Britain, with the aDNA evidence for this period being taken to summarily resolve the question of acculturation versus migration in favour of the latter (Brace et al., 2019). There has been a tendency, as noted by Heyd (2017), for archaeologists writing immediately after the publication of aDNA results relevant to their field to return to explanations relying on single causative factors to explain the findings. Treating the genetic data as being more accurate than the archaeological evidence when assessing the processes of culture change risks a return to genetic essentialism in our work. No one factor, however, is likely to satisfactorily explain everything: even if the migration of a genetically-distinct group of people is deemed
to explain the entire process of culture change, both the migration and the process of transition it brings about still need to be explained (Anthony, 1997). The isotopic evidence presented by the Beaker People Project indicates more complex patterns of human mobility that do not appear to reflect a single wave of long-distance migration: the story of human mobility in this period is more complex than a single migration and replacement ‘event’.

Rather, the genetic and the archaeological evidence ought to be considered together to create a modern assessment of the nature of cultural transitions in prehistory. Long- and short-distance patterns of mobility can be incorporated into the evidence for change and continuity, with aDNA findings and population modelling feeding into our interpretations. In the following sections, I will consider different aspects of the evidence for cultural and population continuity and change, and will consider how these can be tied together to inform our understandings of the nature of the Beaker transition, and the relationship between traditions across the Neolithic, Chalcolithic, and Early Bronze Age.

8.2.1. New and old practices
One of the main arguments for the transition to the Beaker period reflecting a dramatic change in the population of Britain (caused by a migration event) is the sudden appearance of standardised Beaker burials; a fully formed burial practice that differs markedly from those seen in the British Late Neolithic, but which corresponds closely with those seen in contemporary Beaker-using regions on the near continent, particularly the Netherlands and northern Germany. These latter regions had previously seen Single Grave traditions in the Late/Final Neolithic and thus have evidence for a sequence of endogenous development that is lacking in the British material. However, previous work has indicated that the earliest-dated Beaker burials in Britain were present only in low numbers, with a gradual spread and increase in prevalence occurring from the ‘fission horizon’ of the 23rd century BC (Needham, 2005). The current study similarly shows a sudden appearance of inhumation burials around 2500 BC, with a marked increase in prevalence from this initial level occurring only after a delay of a hundred years or more. The current study has further demonstrated that a wide range of other funerary rites were carried out contemporaneously with the rise of the Beaker inhumation practice. While it seems clear that the typical Beaker inhumation practice is of continental origin, the potential sources of these other Beaker-period funerary practices also need to be considered. If any of the atypical Beaker-period practices emerge as being likely to have a continental origin, they can provide additional information about the composition and history of incoming migrant groups. If they appear to be indicative of continuity from the insular Late Neolithic, however, they could help provide information about the indigenous population of Britain. In particular, they can inform about the extent of
interaction between these groups during the Chalcolithic, when the level of Beaker activity appears to have been both relatively low and concentrated in a small number of locations within Britain.

Chapter 6 demonstrates that the British atypical burial dataset contains evidence for a wide range of inhumation practices that differ from the ‘typical’ crouched or flexed single inhumation rite. Some of these practices, such as mumification, have no known parallels in continental Europe, although this likely reflects the geographic focus of work on this topic to date rather than indicating that there are no examples outside Britain. Other practices, such as the selective removal of body parts from the grave, appear to have existed in other regions across Europe. At Nimes, in southern France, for example, an unaccompanied Beaker-period inhumation burial was found to have had its cranium removed after deposition (Tchérimissinoff et al., 2011). At Pouilly, in Moselle in north-eastern France, the disarticulated remains of an adult woman were placed in a wooden box and added to the grave of an adult whose remains had decayed in situ (Lefebvre et al., 2011). Drenth and Hogestijn (2001, p. 317) further list several examples from the Netherlands of isolated skeletal elements in Beaker-period burial contexts, either alone or accompanying the intact remains of another individual. However, the removal and/or deposition of isolated skeletal elements, which can be linked to rites of fragmentation and curation of the body, is not the majority rite in any region. As in Britain, it tends to occur at low levels and is primarily detected in inhumed bone – although ‘token’ deposits could be the equivalent for cremated remains. Determining the prevalence of disarticulation and curation across other Beaker-using regions of Europe would require a similarly systematic analysis of the burial evidence as I have carried out for Britain, and is therefore beyond the scope of this project.

Other inhumation practices that are seen among the British atypical burials are well-attested in other Beaker-using regions across Europe. For example, collective burial of the unburned remains of multiple individuals is the normative (though not exclusive) Beaker-period rite in several regions. These include parts of the Iberian peninsula (Fernández-Crespo et al., 2018; Harrison, 1977; Kunst, 2001), Mediterranean France (Lemercier, 2012, 2014), Brittany (Salanova, 2004), and the Paris basin (Chambon and Salanova, 1996; Salanova, 2001; Salanova et al., 2017).

Connections to the collective burial rites of the Atlantic façade were considered by Fitzpatrick (2011) when discussing potential origins of the Boscombe Bowmen collective burial rite, and (by extension) the individuals themselves. He notes that this grave has more in common with contemporary collective burial practices in continental Europe than with
most of the burials found nearby in Beaker-period Wessex (ibid. pp. 205-7). However, this and the other wooden chamber multiple burials identified in the atypical dataset were all either found in flat graves or had been subsequently covered by a round barrow. Flat graves and round barrows are both commonly found in Beaker-period Britain and the Netherlands (as well as both Neolithic and Bronze Age Britain), but are not commonly found in the regions practicing multiple burial in Beaker-period continental Europe (Vander Linden, 2004, pp. 39–40). The presence in Britain of collective graves covered by round barrows may suggest a merging of burial practices, with influences from multiple areas being reflected in the rites. However, the historic practice of excavating the central burials within barrows – at the expense of investigating the structure of the mound – means it is not always possible to determine if the mound was constructed at the same time as the burial was placed (Garwood, 2007a).

Most of the Beaker-phenomenon-associated traditions of collective burial across Europe are instead associated with megalithic monuments. In some regions these are new constructions: the wedge tombs of Ireland, for example (Carlin, 2018). In others, the monuments used are older constructions, but their use appears to have continued in an unbroken tradition across the Beaker transition: this is the case for several sites in Brittany (Salanova, 2004) and in south-west Iberia (Kunst, 2001). There are no unequivocal examples of this form of Neolithic continuity in Britain, with most megalithic tomb construction and use in Britain occurring earlier in the Neolithic (although some other site types may show continuity; see Chapter 6 ‘Neolithic connections’). However, in most regions of continental Europe where collective inhumation burial was practiced in the Beaker period, the communities carrying out these rites chose to reuse much earlier Neolithic monuments, with bodies being deposited at sites that had not been used for many centuries (Sommer, 2017).

The use and adoption of earlier burial sites is also found within Beaker-period Britain (see Chapter 6, section 6.3.3). There are many examples in the atypical dataset of Beaker-period burials being placed at earlier Neolithic monuments, within megalithic tombs, and at other sites representing Neolithic activity (domestic, funerary, and ceremonial): up to a quarter of the Beaker-period burials in the atypical dataset are closely associated with Neolithic evidence. This Neolithic activity includes sites and artefacts dating to the Early, Middle, and Late Neolithic; in most cases the chronology of each site indicates an extended hiatus lasting many centuries before the Beaker-period burial. Few sites with Beaker-period funerary activity have any Late Neolithic evidence dated to the decades or centuries immediately prior to the modelled first appearance of the Beaker phenomenon in Britain, though those that do
tend to be particularly notable locations, such as large ceremonial monument complexes (e.g. Stonehenge).

However, the atypical Neolithic-associated burials rarely look like those seen in the collective traditions of Beaker-period continental Europe, within or without megalithic tombs. Just seven of the atypical burials from sites with Neolithic activity are multiple burials with an MNI of three or more. Most were instead deposits of the remains of either one or two individuals, and the majority (63.7%) were cremation burials. Of the multiple burials, two were deposits of disarticulated bone found within cave sites and had no associated grave goods, and one was a possibly Beaker-associated deposit of the disarticulated remains of four individuals within the grave of an articulated primary inhumation burial under a round barrow. The remaining four did, however, have more in common with continental collective burial traditions: all include disarticulated bone, in some cases with cremated bone as well, and were placed within earlier Neolithic monuments as a secondary phase of burial activity. The earlier tombs used for funerary activity vary in style, age, and location: a Neolithic round cairn in the Peak District, a Maes Howe-type chambered cairn and an Orkney-Cromarty type round cairn, both in Orkney, and a Severn-Cotswold tomb in south Wales.

It is possible that the use of these tombs could be considered evidence of a continued importance of Neolithic burial sites to people living centuries later, thus reflecting a certain level of continuity across the period transition. However, the nature of the reuse of these earlier sites (which is also reflected across typical burial activity and non-funerary depositional activity) often includes the alteration and in some cases ‘decommissioning’ of the earlier site (Sommer, 2017). Ulrike Sommer (2017) discusses the evidence for the use of older burial sites in the Beaker period, interpreting it as evidence for an intentional system of taking control of existing places of power on the part of incoming Beaker-associated groups; ‘a deliberate attempt by a new elite to erase power-mechanisms of previous generations’ and neutralise the power of the ancestral dead of another people.

While this theory provides a plausible explanation for the Beaker-period use of Neolithic tombs and ceremonial sites, in many cases the Beaker-period atypical burials are associated with more unremarkable activity: scatters of pottery suggestive of Neolithic settlement sites on the ground surface underneath barrows; or pits containing Neolithic domestic material, the locations of which are unlikely to have been visible on the ground surface. It is possible that the Beaker-period burial communities were unaware of this material, or did not recognise it. However, the finding that such a high proportion of sites was associated with this material makes it less likely that this was due to chance alone. Ray and Thomas (2018,
pp. 57–67) point to the evidence from very similar site types, including relatively ephemeral evidence, when discussing the evidence for continuity across the Mesolithic–Neolithic transition in Britain one and a half thousand years earlier. They highlight evidence where Mesolithic sites have been returned to in the early Neolithic, in some cases after a lengthy hiatus in activity. They argue that this reflects the existence of groups with continued knowledge of ancient sites in the landscape; in some cases with evidence that they continued to follow ‘Mesolithic’ diets and mobile lifestyles in the decades during the transitional period. The frequent use of Neolithic places among the atypical burial practices of the Beaker period could similarly be interpreted as reflecting the activity of groups with some shared knowledge of Neolithic places and activities. This does not necessarily mean purely ‘indigenous’ peoples continuing with unchanged lifestyles – rather, the use of old sites to carry out new practices could instead reflect the activity of communities with mixed origins and ancestries, as is reflected by the wider archaeological and genomic evidence.

Of the funerary rites visible in the British Beaker period, cremation is, however, perhaps the most likely to reflect a direct continuation of Neolithic practices, being the most prevalent archaeologically-visible funerary practice of the British Late Neolithic. Modelling of the radiocarbon determinations for cremation burials, presented in Chapter 5, shows that cremation was practiced at a low frequency throughout the Late Neolithic and Chalcolithic, before becoming the dominant rite after 2000 BC. The fact that the practice remained at roughly the same prevalence during the Chalcolithic as it did in the Late Neolithic suggests that it could represent a continuation of the indigenous practice. The apparent prevalence of cremation was much lower than that of inhumation across this period, even at the point of the first appearance of Beaker-associated inhumation rites, when they were at their most sparsely-distributed and infrequent.

Several possible explanations for this exist. Firstly, it is possible that the disparity is due to the different level of importance placed on cremated and inhumed remains across the history of the discipline: cremation burials are less likely to be retained for study, and only recently has it been possible to date them. Alternatively, the disparity in prevalence could be genuine (if exaggerated by the above issues), and could reflect a difference in the application of rites by the communities which practiced them: perhaps cremation was an unusual practice, applied only in rare occasions for individuals significant enough to be buried at the major ceremonial monuments of the period. The new inhumation rites, however, could have been applied more frequently by the groups using this practice, with fewer (though evidently still some) restrictions surrounding its use. A further possibility is that the disparity in prevalence reflects a massive difference in the scale of the populations of Late Neolithic and Beaker-
period Britain, with there simply being more people to die and be buried. This latter suggestion, which is not incompatible with either of the previous two, is supported by SPD population proxies for the period; however, the first two suggestions would lead to an impact on the apparent population level derived through the SPD method; difficulties relating burial data to population are indicated further at the end of Chapter 5.

Rather than reflecting continuity from the Neolithic, it is also possible that cremation practice seen in the British Chalcolithic was a new arrival to Britain, imported alongside the ‘typical’ articulated inhumation burial rite. Cremation rites are found in Ireland, in the Netherlands (and north-west Germany), and in the Bell-Beaker ‘Eastern Province’ of central Europe (see Background section 2.3). Comparing the evidence from each may indicate whether the British Beaker-period cremation rites are more likely to reflect a new development or a continuity of practice; I will consider each in turn.

The Irish Beaker-period cremation tradition – as well as the expression of the Beaker phenomenon more widely – differs markedly to that seen in Britain. Most cremation burials are primary deposits in wedge tombs; megalithic monuments that were constructed in Ireland at a time when most areas of Britain did not have a megalithic construction tradition (Clava cairns, found in the Scottish Highlands, are similar but date to after 2000 BC; Bradley, 2000b). The remains are primarily found in multiple burials, and may be with Beaker sherds but are rarely found with other Beaker-package artefacts. It is not until after c. 2150 BC that a Beaker-associated single burial tradition emerged in Ireland, and it was then characterised by inhumation (Carlin, 2018). In Britain, Beaker-period cremation burials are, similarly, frequently found with Beaker sherds and more rarely with other Beaker-package artefacts. However, they are not usually placed as multiple burials, with most having an MNI of one. Most of the British cremation burials are placed within containers, such as pits or cists, which demarcate the single burial; these burial locations are for the most part similar to (though smaller in size than) those used for the typical articulated inhumations of the same period. There are few collective burials in megalithic tombs in Britain during the Beaker period, though some evidence can be found for this practice in Scotland, particularly Orkney, where both disarticulated and cremated burials are found. While these features separate the British and Irish Beaker traditions, they also separate the Late Neolithic and Beaker period cremation practices within Britain. As most British Late Neolithic cremation burials have been found deposited in large numbers at ceremonial monument complexes, they similarly do not show particularly close parallels with the Beaker-period tradition of individual cremation burial.
There is evidence for widespread connectivity between Britain and Ireland during the Late Neolithic and the Beaker period, so it is plausible that these contacts could have influenced the Beaker period cremation burial traditions on either side of the Irish Sea (Bradley et al., 2016). However, the rites seen in the British Beaker period are broadly dissimilar to those in Ireland, with the Irish evidence arguably showing stronger links to the Beaker-using groups of the Atlantic façade (Carlin, 2018). The British evidence, in contrast, reflects stronger influences from Beaker-associated groups in areas with an earlier Single Grave tradition, such as the area covering what is now the Netherlands and north-west Germany, though the practices for children, in particular, do deviate from this (Fitzpatrick, 2013).

The Beaker-phenomenon cremation burials of the Netherlands and north-west Germany are well-attested, with reviews by Lanting (2007), Beckerman (2011), and Drenth (2014) all providing multiple examples, several of which have also been radiocarbon-dated to the correct period. These burials form a relatively closely-defined group, which appears to be characteristic of the Beaker period: few examples of cremation burial are found in the preceding Final Neolithic or in the subsequent early phases of the Early Bronze Age ‘Barbed Wire Beaker’ culture (Drenth, 2014, p. 308). The burials are all associated with Bell-Beaker vessels – this is due to the process of identifying burials as belonging to a particular ‘culture’ (in this case the Bell-Beaker Culture) by association with characteristic artefacts. This presents a marked difference to the evidence I have identified in this study for the British Beaker-period cremation burials, many of which are not associated with any material culture. However, it is possible that a similar study carried out on the Dutch material would identify unaccompanied cremation burials belonging to the period but which lack clear markers of any particular cultural affiliation.

Drenth and Hogestijn (2014, p. 109) identify 24 cremation burials among the 140 Dutch Bell-Beaker graves that have been investigated to date, giving a higher proportion of cremation burials than found among the British evidence. Dutch authors separate out All-Over-Ornamented Beakers (AOO) as belonging to an earlier culture than the Bell Beakers, but as AOO Beakers are part of the British Beaker tradition I have included the evidence for those in my assessment of Dutch Bell-Beaker-period cremation practices. Lanting (2007, p. 100) found that while the three cremation burials from north-west Germany were each inside their associated Beaker, the Dutch burials were all found next to the Beaker and never inside it. Drenth’s later survey finds just one possible exception to this rule, where a Dutch Beaker may have been used as an urn (Drenth, 2014, p. 313). This corresponds well with the British evidence, in which the majority of Beakers were alongside the cremation in the burial context: only 12 cremation burials were inside the Beaker (and several of these are antiquarian finds.
which cannot be verified). Drenth (ibid.) notes that few of the Dutch Beaker-associated cremation burials have been osteologically analysed; across large areas of the Netherlands soils are not conducive to bone preservation and, while cremated bone survives better than unburned bone, it is often impossible to obtain any demographic information when the bone is poorly preserved. Twelve of the 16 analysed burials have an MNI of one, three have an MNI of two, and one was evidently indeterminate (ibid.). This again corresponds well with the British cremation evidence, in which nearly 90% of the cremation burials had an MNI of one, with few having evidence for two individuals and none providing evidence for more than this.

The majority of the Dutch cremation burials are poorly furnished, with few grave goods being present; however, Drenth (2014, p. 313) notes that this is similar to the inhumation evidence, few burials among either group having lavishly equipped graves. He points to two cremation burials accompanied by Beaker-package wrist guards, providing close parallels to four of the British cremation burials: Old Rayne (in the Eastern Scotland region), Hilton of Embo (Scottish Highlands), Broomhouses (Dumfries and Galloway), and Aldbourne (in Wessex). All Dutch Beaker-associated cremation burials have been found in either flat graves or under round barrows, with the exception of one, which was inserted into an older megalithic tomb (at Exloo). This accords fairly well with the British evidence, in which most cremation burials were either in flat graves or under cairns or barrows (depending on geology), though there are burials in other locations: at earthwork monuments, and post and stone circles, for example. The cremation burials at these other locations were less likely to be Beaker-associated and would thus not be categorised as being ‘Beaker culture’ in the Dutch or German archaeological traditions.

The overall pattern, then, is that the Dutch and north-west German Beaker-associated cremation evidence looks broadly similar to that seen in Britain, except that cremation forms a greater proportion of the overall evidence in the former regions than it does in the latter. Some of the British cremation evidence differs from this tradition, particularly in that there are more entirely unaccompanied burials, some of which are in unusual locations for the period or associated with older (Neolithic) monuments. While the British Beaker-period cremation burials represent many aspects of an incoming tradition, there are also aspects of the practice that differ from the continental evidence. These areas of difference – particularly the British examples of unaccompanied burial and deposition in graves and locations not typical for the Beaker burial tradition – could reflect a continuation of insular Late Neolithic practices. However, it must be borne in mind that the apparent absence of an unaccompanied cremation burial tradition on the continent does not necessarily indicate that it did not exist:

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it may be the case that these burials have been overlooked (or not assigned to the correct period) just as they have historically been in Britain.

The cremation practices of the Bell-Beaker Eastern Province (primarily referring to those in the Czech Republic and Hungary) are spatially separated from the British evidence and unlikely to be directly related, but may help inform understandings of continuity and change as seen through burial practices in this period. Although the Beaker cremations of this region are well known, they actually represent a small proportion of the overall burial evidence; a small number of large cremation cemeteries provide most of the burials (Turek, 2008). The cremation burials are much more variable than those seen in the Netherlands; they ‘vary in their forms almost site to site’ (ibid. p.271). The burials include cremated remains deposited unaccompanied into shallow grave pits, spread across graves the same size as those dug for inhumations, and placed into stone cists; some graves also show signs of burning. Some cremation burials were surrounded by ring-ditches, and others were inserted into inhumation graves. Around 10% of the cremation burials assigned to the Beaker-culture in Bohemia contained Bell Beakers, with most graves instead containing vessel types (Begleitkeramik) that are part of the local Beaker package – a practice that, alongside the use of large cemeteries, sets this evidence aside from that seen in Britain. In the Hungarian Csepel group, the Beaker cemeteries are also characteristically found to contain a variety of cremation practices alongside crouched inhumation burials (Endrödi, 2014, p. 259; Kalicz-Schreiber, 1976, pp. 198–202). In some cases the cremated remains are accompanied by Bell-Beakers and other Beaker-package artefacts including wristguards, but these similarly form part of a larger assemblage that also contains a variety of local Begleitkeramik forms (Endrödi, 2014, p. 262; Kalicz-Schreiber, 1976; Machnik, 1991, p. 88).

Turek (2008, p. 279) suggests that the cremation tradition in the Czech Republic was influenced by the Csepel Bell-Beaker group, the cremation traditions of which are widely believed have originated in the preceding cultural groups local to the area, particularly the Makó culture and the Somogyvár-Vinkovci culture of the Carpathian Basin (Endrödi, 2014; Heyd, 2001; Kalicz-Schreiber and Kalicz, 2001). Other authors also see strong connections between the late Csepel group burials and those of the succeeding local Nagyrév culture (Machnik, 1991); the appearance of the latter is simultaneous with the disappearance of the former (Shennan, 1976, pp. 233–4). The Csepel cremation tradition, reflecting continuity from earlier periods, existed alongside new inhumation traditions, with the material culture of graves not just including artefacts from both sources but also displaying unique traits that developed through this admixture (Endrödi, 2014, p. 267). Endrödi argues that ‘cultural

The Csepel group’s mix of inhumation and cremation practices is seen as reflecting mixed cultural influences, from incoming Bell-Beaker groups and existing local groups respectively. In north-west Europe, Bell-Beaker inhumation traditions also reflect those of the preceding Single Grave and Corded Ware cultures, but with no obvious local precursor yet identified for the rites of cremation that also exist. Across much of European archaeology, burials are routinely assigned to an archaeological culture on the basis of their accompanying artefacts. On this basis it is possible to identify burials (and entire traditions) that reflect plural cultural influences, as at Csepel, through the association of characteristic material culture with non-normative burial practices, or vice versa.

The British evidence, however, makes this process more difficult when looking at the Beaker transition: the cremation burials of the Late Neolithic were largely unaccompanied single deposits, and the atypical burials of the Beaker period similarly frequently lack diagnostic features that would facilitate the identification of different influences. Many of the British atypical Beaker-period burials I have recorded can only be identified as such on the basis of a radiocarbon date. However, financial constraints mean that routine radiocarbon dating of unaccompanied cremated and disarticulated remains is not currently possible within Britain, and is even less so in many other regions of Europe. The comparison of practices across regions is undoubtedly affected by this issue: it is possible to compare my evidence to the Beaker-accompanied burial evidence of other regions, but the possibility of culturally-unassigned burials complicates the existing picture. In some regions this is starting to change, however: Herrero-Coral (2019, pp. 65–6) notes that recent excavations in the interior of Iberia, for example, have uncovered collective burials that date to the Beaker period but which have no associated Beaker material culture. Though isolating the specific influences on each burial practice is not typically possible, the diversity of burial practices seen across Beaker-period Britain can itself be used to indicate that multiple influences were playing out in the funerary sphere. As described by Ray and Thomas (2018, p. 67) when discussing the process of the Neolithic transition in Britain ‘there were centuries in which there was experimentation, and a certain amount of diversity, based upon emergent practices and already existing cultural differences’.

8.2.2. New and old peoples

Processes of continuity and change in burial practices are closely linked to the question of who was carrying out different rites. Among the atypical burials it is possible to detect signs
of some level of continuity of Late Neolithic cremation practices, and a continued association with Neolithic places, alongside evidence for a variety of incoming cultural influences from continental Europe. The evidence from ancient DNA, particularly admixture analysis, can be used to feed into these findings to address the question of to what extent cultural continuity reflects population continuity, and to what extent exogenous practices relate to the arrival into Britain of migrant groups.

The burial evidence, as discussed in previous sections, shows a complex picture of a syncretic mix of multiple sources of influences. However, genomic analysis only allows (or has allowed to date) an analysis of two oppositional groups: Neolithic peoples of Britain (as a whole) versus the genomic data derived from individuals buried in Beaker-period type-sites in continental Europe. Olalde et al. (2018) use the genomic data from individuals buried at the Oostwoud site in the Netherlands as a ‘surrogate’ for the genetic input of continental Bell-Beaker-associated individuals into the gene pool of Britain during and after the Beaker period. No more than seven of the British Neolithic individuals in Olalde et al.’s sample could justifiably be assigned to the Late Neolithic based on their radiocarbon date, with most being Early Neolithic; the requirement of inhumed remains for genetic analysis leaving a notable gap in data across the Late Neolithic (Figure 8.1).
The largely-unknown profile of the Late Neolithic population leaves room for the process of genomic transition to have occurred more gradually than their study implies (compare to Brodie, 1994, who faced similar issues in his craniological study of the transition). The Oostwoud remains are similarly problematic as a population surrogate for Beaker-associated migrants: the Oostwoud burials were not actually Beaker-associated, and the burials at this site, from within two round barrows, span several centuries, beyond the end of the (Bell-)Beaker phenomenon in either the Netherlands or Britain (Olalde et al., 2018 supplementary information). This is not to suggest that I disagree with the broad findings of the genomic analyses; rather to emphasise that we do not currently have a good chronological control for the timing or duration of the processes of genomic change that occurred in Britain.

The chronological and archaeological evidence, presented in Chapters 5 and 6 respectively, raise the possibility that the timing and nature of the transitional period differed across Britain. In Wessex, for example, Summed Probability Distribution analysis indicates a sudden
and dramatic increase in the presence of articulated inhumation burials at around 2500 BC, whereas the other case study regions show a more gradual increase in this practice, from a later start date. Kernel Density Estimation indicates a slightly more gradual increase in inhumation for all regions, but still shows Wessex to have a faster rate of increase, starting from an earlier date, than other regions. Differences across Britain in the pace and timing of the process of transition from Neolithic to Chalcolithic practices could have been caused by variation in the local scale of inward migration, differences in the cohesion of the cultural traditions of migrant groups entering each area, or the extent of acculturation to new practices among the existing peoples within each region. Differences in the chronology of the archaeological transition presented throughout this study could help to inform a more nuanced chronology of the genomic changes that occurred across this period: it is possible that genomic transition occurred more quickly in Wessex than in other regions, for example.

The chronology of transition relates to the mechanisms by which it could have occurred, as discussed in Chapter 2. The relative size of the insular population of the British Late Neolithic, in relation to the scale of inward migration during the Beaker period, is also an important factor in understanding the processes of cultural and genomic transition. However, as discussed in Chapter 5, I have reservations about the use of SPD-derived population proxies for this particular time and place: the burial evidence, which we know to reflect changing funerary practices over this period, has too strong an impact on the resulting population model for it to be discounted as a factor that will simply equal out over time. Cassidy et al. (2016) use runs of homozygosity (ROH) analysis to estimate histories of endogamy (and inferred population size) in Irish Neolithic and Bronze Age samples, finding that the Early Bronze Age individuals in their study came from large source populations with little inbreeding. Similar analyses have yet to be carried out on the British material, but it is worth noting that the ‘source population’ of migrant individuals could be large while the number of migrants remained low; this would require migrant communities to continue marriage partner exchange with their ‘source’ communities.

The archaeological evidence indicates some variability in burial practices across Britain, with some areas having a higher intensity of Beaker-associated burial (including all three of the case study regions, by design), and others having only sparse examples (or none at all) until very late in the period. Some regional differences in burial rites can also be tentatively suggested; for example there is a notable lack of association with Neolithic sites and material culture in the north of England (see Chapter 6, Figure 6.13). However, it is not currently possible to perceive any regional differences in the genomic transition, with the genomic data
across Britain showing the same levels of admixture between incoming and pre-existing groups during the Beaker period and after (Figure 8.2).

It is possible, however, to assess differences in the level of genomic admixture for individuals who received different burial practices, as a way of assessing the relationship between cultural expression and genotype. Figure 8.3 shows the modelled admixture profiles from Olalde et al. (2018) for atypical Beaker-period inhumation burials (most of which are disarticulated), shown in chronological order with the earliest dated burials towards the top. It shows that the atypical inhumation burials have admixture profiles which are identical to those of typical inhumation burials, suggesting that there is no genetically-distinguishable difference in the ancestries of people receiving different inhumation rites during the Beaker period in Britain. All individuals show profiles indicating low levels of insular Neolithic ancestry, with no significant difference between the admixture profiles of individuals in typical and atypical burials; Figure 8.4 illustrates the similarity between the two groups. It is possible that the individuals in cremation burials differed from this picture; however, this seems unlikely given that the atypical burial practices of Beaker-period Britain appear to primarily represent a mixing of traditions, rather than evidence for the persistence of a culturally and genetically isolated community and their practices.

3 Olalde et al.’s individual codes in brackets are individuals which were buried articulated but within the same grave as individuals who were disarticulated or cremated.
Figure 8.2 – Modelled admixture between ‘Beaker’ and ‘British Neolithic’ genomic signatures among the Beaker-period individuals analysed by Olalde et al. (2018). Figure drawn from data in their Supplementary Table 1 and supplementary information Table S9; pie charts are slightly displaced from their points to reduce overlap.
The complexity that lies behind this basic admixture model can be indicated by a closer examination of the individuals in the Boscombe Bowmen burial, which is unusual as a Beaker-period multiple burial in which several individuals have been subject to genomic analysis. This burial contains some of the earliest-dated Beaker-associated individuals in
Britain, which is one of the reasons that the earlier individuals within it were seen as being potential first-generation continental migrants. The adults in the grave show isotopic signatures suggesting they spent their childhoods in the same location, which was outside the Wessex region (potentially in Wales, potentially in continental Europe). Hrnčíř and Laffoon’s recent review of the analysis of childhood mobility through strontium isotopes presents a number of possible interpretations for isotopic mobility aside from migration (Hrnčíř and Laffoon, 2019). The modelled profile of genetic admixture for the different individuals in this grave suggests that they may represent communities with more complex patterns of mobility than is traditionally assumed for this period. One adult individual (Sk25005, Olalde’s individual I2417) shows an admixture profile indicating that their ancestry was derived overwhelmingly, possibly entirely, from outside Neolithic Britain. However, another adult within the same grave (Sk2004; I2416) is an outlier among the Beaker-period dataset, with a modelled 40±5% insular Neolithic and 58±5% continental ancestry profile; they could have had an indigenous parent.

This (male) individual belonged to the R1b Y-chromosome haplogroup, which was absent in the British Neolithic but was the most common haplogroup among Beaker-associated males both within Britain and across continental Europe. This individual’s mtDNA profile, from the K1b group, however, is rare among most Beaker-associated European populations, but was found in nearly a third of the British Neolithic individuals analysed by Olalde et al. (2018; see Table S9 and Supplementary Tables 2, 3, and 4). This could indicate that the individual had maternal ancestry within Britain. However, more than 30% of the Iberian Beaker-associated burials were also found to have mtDNA from the K1 haplogroup, and it has been found among Neolithic individuals from elsewhere in north-western Europe, including Ireland (Olalde et al., 2018, Supplementary table 3, 2019, fig. S11A; Sánchez-Quinto et al., 2019). While this individual evidently had a high level of genetic input from a Neolithic British source, their mtDNA profile could have been derived from Iberia, Britain, or elsewhere. This complicates the question of whether individuals in the Boscombe burial belonged to communities with ties to regions of the Atlantic façade that practiced similar rites. Whether Sk2004 had an indigenous mother (or two indigenous grandparents) and spent their childhood in continental Europe or elsewhere in Britain, they were a member of a group with a mixed migrant-insular background, had migrated within their own lifetime, and were buried by a community choosing to use burial rites that reflected a variety of cultural influences.

The genomic evidence for the Beaker transition shows a strong male bias. While the pre-existing Y-chromosome haplogroups found within the population of Britain were almost
entirely replaced with the R1b group over the transitional period, several new mtDNA haplogroups were introduced but most pre-existing groups also persisted, thus increasing the mtDNA variability within the population (Olalde et al., 2018 supplementary tables S2, S3, and S4). In their study of the spread of Steppe-derived ancestry across Neolithic Europe (associated with the expansion of Corded Ware material culture), Goldberg et al. (2017a, 2017b) similarly found that the process was strongly male-biased; their modelling approach indicating that European Bronze Age genomes reflect the genetic contribution of between four and seven times more males than females with Steppe ancestry (in their amended analysis following comments by Lazaridis and Reich, 2017). Mittnik et al. (2019) likewise found a highly male-biased pattern of Steppe-derived ancestry among individuals in Corded-Ware-associated burials in southern Germany. However they found no such bias among the Bell-Beaker-period burials in the same region (ibid. Figure 2C). This work does not directly indicate the presence or degree of any sex bias among individuals migrating from continental Europe to Britain during the Beaker period, but does indicate that strongly male-biased migration processes – or more accurately, strongly male-biased reproductive success among migrants – were possible in prehistory.

While the traditional image of the typical Beaker burial suggests that male individuals were treated differently in this period, being given the most lavish burials at the expense of lower-status females, the atypical burial evidence does not support this. It suggests that strongly male-biased funerary rites were a feature particular to Wessex, rather than one reflected across Britain. Age differences are, instead, more closely reflected in funerary treatment, which lends support to the hypothesis that the variability in funerary rites existed within communities, rather than (only) between them in this period. Some studies, particularly those using stable isotope analysis, have shown evidence for practices of female exogamy among some Beaker-associated groups in Central Europe: women showing greater evidence of unidirectional lifetime movement than males (e.g. Knipper et al., 2017; Price et al., 1998). This corresponds with suggestions that similar practices were present among the preceding Corded Ware-associated groups of the region (Haak et al., 2008; Schroeder et al., 2019). However, this finding has not been replicated in all Beaker-using regions, and no differences have been found between male and female patterns of mobility in Beaker-period Britain (Parker Pearson et al., 2018a; Price et al., 2004). Schroeder et al. (2019), however, argue that a high diversity of mtDNA lineages found alongside a single Y-chromosome lineage, as is found in Beaker-period Britain, is consistent with patrilocal residence systems, which tend to be associated with marriage systems involving female exogamy. It is possible that some of the (mixed-sex) groups migrating into Britain had a genetic heritage reflecting a history of
female exogamy; and, if groups continued this practice on arrival into Britain, it would have helped forge relationships between groups of migrants, and potentially with existing populations (Mittnik et al., 2019; Vander Linden, 2007). My analysis found that individuals in the atypical Beaker period burials were subject to a level of traumatic injury comparable to that seen in the Neolithic and the Bronze Age (Section 7.5.2.2). Among this there are few examples of injuries that could have resulted from interpersonal violence and there is no evidence for any larger scale inter-group conflict in Britain during this period. While this lack of evidence for inter-personal hostility does not mean that all groups were engaged in peaceful exchange, it does however lend support to arguments suggesting a certain level of tolerance between groups with different origins and cultural traditions.

The archaeological evidence indicates that Beaker-phenomenon-associated practices were highly variable across Europe, as was the degree of genomic population change associated with their first appearance in each area. These differences are the result of variable degrees of migration and acculturation, and variable processes of syncretisation between new and pre-existing cultural forms in each region. The finding that the British evidence is both diverse and different from that seen elsewhere is, in fact, typical of the evidence for the Beaker phenomenon across its range. The ways in which the British evidence differs from that seen elsewhere, potentially including a greater prevalence of disarticulated burial and unaccompanied cremation burial, can be suggested to reflect the locally-specific processes of cultural interaction that occurred during the establishment of new communities and cultural practices in Britain.

As noted by Jones (1997, pp. 122–4), the limits of archaeological ‘cultures’ (as they are perceived today) do not necessarily relate to the boundaries of ethnic groups as they would have been understood by their members (and outsiders) in the past. The British archaeological and genomic evidence is usually divided into the signals of two separate groups, which are simplified as representing two homogenous blocs: incoming Beaker-associated migrants, and the pre-existing Late Neolithic peoples of Britain. There is strong evidence for interconnectivity and shared cultural understandings across Late Neolithic Britain, not only through shared material culture forms but also through collaborative construction and ceremonial events involving thousands of people travelling from locations hundreds of kilometres apart (e.g. at Durrington Walls: Craig et al., 2015; Viner et al., 2010). This could be used to indicate that the peoples of Neolithic Britain understood themselves to be related by a shared culture and/or ethnicity. However, the apparent differences in Beaker-phenomenon practices across Europe suggest that the peoples associated with these were not a single group (or ‘culture’) but instead represent diverse communities with differing
cultural practices, each reflecting influences from a range of local and external sources. It is likely, therefore, that while different Beaker-associated groups migrating into Britain would have had some shared cultural understandings, which may have differed from those held by the insular peoples they encountered, they might not have seen themselves as a coherent group in the way they are often treated archaeologically. In this context it is possible to see the diverse backgrounds of migrant groups playing a role in the nature of interactions that occurred (avoidance, acculturation, syncretisation) between groups across the transitional period (Lucy, 2005, p. 100). It is therefore necessary to include the diversity within the Beaker phenomenon as one of the many factors that played a role in the development and emergence of new, local, syncretic cultural forms in Beaker period Britain, and the regional differences in the timing, pace, and nature of this process.
Chapter Eight: Conclusions

9. Conclusions of the research

In this concluding chapter I will draw together the findings from throughout the results and discussion chapters, with reference to the research questions raised in Chapter 3. Firstly, it should be clear that funerary diversity was widespread across Beaker-period Britain, with evidence for a wide variety of funerary rites being practiced throughout the period. These atypical burial practices are in themselves highly variable, and should probably not be considered a group separate to the ‘typical’ Beaker-associated articulated inhumation rite; rather, the concept of the ‘typical’ burial in this period should be shifted to incorporate the funerary diversity evidenced here. This argument is prompted by the findings that, alongside extensive variability within the ‘atypical’ group, there is no evidence for any spatial or chronological separation between typical and atypical practices that might indicate they belonged to different groups or communities during the Beaker period. The evidence instead indicates that each group utilised a range of funerary rites, and applied these to group members at least partly on the basis of their perceived social qualities.

In answer to the research question of which burial practices were carried out during the British Beaker period, the range identified here appears to be limited only by our current abilities to locate and date their material traces. The practices identified include suggestions of excarnation, the curation of disarticulated bone, and water and cave deposition, alongside the formal burials associated with this period. Many of these practices result in dispersed and fragmentary bone that is less likely to survive and be identified archaeologically; the absence of the majority of the Beaker-period population from the burial record may be due to there having been a wider application of these rites of fragmentation and dispersal than I have identified here. The dataset demonstrates that more formal burial practices in this period included inhumation, cremation, and rites that lie between these, including charred inhumation burial and the application of fire to burial contexts. Bodies and parts thereof are found in places that can categorised as monumental, ceremonial, natural, and domestic; effectively, all locations were permissible for the deposition of human remains.

This differs to some extent from the ‘typical’ burial evidence. While most atypical burials are found in period-typical graves, such as stone cists or pits covered by round barrows, they appear in a wider variety of other, non-standard, contexts than do typical burials. The wide variety of ‘alternative’ locations selected defies a simple explanation: deposition within pits of apparent waste material and burial at large ceremonial sites are both equally unusual in
this period, yet may have had entirely different motivations and significances. It appears that there was a blurred distinction between natural and human-made sites in this period, and examples can be found where the use of a site appears to reflect its form rather than its origins: the deposition of remains into a flint mine as if it were a natural cave, and the burial of remains into a natural mound as if it were an earlier round barrow, for example. In terms of influences, the normative British Beaker-period practices of burial within flat graves and under round barrows are closely linked to the similar articulated inhumation rites seen in the Netherlands during the Beaker-period; the ‘unusual’ locations, however, are more closely aligned with places utilised for burial and ceremonial activity in the insular Neolithic.

The atypical burials are widely dispersed across Britain and, for the most part, found in the same locations as typical Beaker burials, in some cases even within the same grave. Cremation burials are an exception to this, as cremated bone survives in soils where inhumed bone does not, meaning the distribution of cremation is wider than that of the typical and atypical inhumation rites of the period. That this reflects preservation (and recovery) biases rather than a spatial separation of communities practicing different rites is indicated by the distribution of Beaker vessels, as recorded by Clarke (1970). This dataset, while now no longer complete, contains evidence for more than a thousand Beakers from funerary contexts, with a distribution that corresponds well with that of the atypical Beaker-period burial evidence.

Despite this evidence for diversity, it is possible to identify several key areas of similarity and difference across rites to help answer the questions of whether it is possible to access any meaning in the funerary variation of this period, and what we can infer about the nature of the Beaker phenomenon in Britain. Firstly, it appears that although there are many double and multiple burials in this period, single burial was the norm across all burial types. Previous research has identified the shift to individual burial in this period (perceived as contrasting with Early-Middle Neolithic multiple burial) and suggested interpretations including a changed expression of individualising status. This understanding of Beaker inhumation burials as being high status has persisted despite the fact that few burials have the grave goods that supposedly display this status.

However, the finding that the multiple burials in this period are primarily those of children suggests that the choice of which bodies to combine and which to bury separately reflected the social categories to which the deceased belonged, of which there was a shared understanding across Britain. Children prior to mid-adolescence were seemingly placed into a different social category than adults, for which different burial rites were suitable. The
finding that in some cases the bones in multiple burials are weathered, or display gnaw marks, indicates that in some cases the remains of children and adults were retained, perhaps to wait for a suitable burial context or combination to develop, this delay in burial being permissible. The reasons behind the choice to bury certain people together, or place fragments of their bodies in association with each other, is largely unclear across the British Beaker evidence; further aDNA and isotopic analysis of multiple individuals within shared burial contexts could help to shed light on this question.

Single burials are primarily those of young adult males, with individuals across other age categories increasingly disappearing from the formal burial record, particularly older female adults. Across the entirety of Beaker-period burial evidence there is a consistent 2:1 male-to-female ratio among adults, suggesting that sex, as well as age and position in the life-course, were factors in whether an individual was provided any of the burial rites that I have identified throughout this project. Sex-related differences in the rites applied to adults are not as clear among the atypical dataset as with typical burials, in which orientation is seen to differ by sex, for example. However, there is a significant difference in the weight of cremation burials of male and female adults, with a greater proportion of male remains being selected for deposition, suggesting that some differences in practices did exist, even if they are less visible in the burial context. Where evidence of pathological changes to the remains was available, the atypical Beaker period burials showed a prevalence intermediate between the Neolithic and Bronze Age rates. This indicates that the sample of individuals in atypical burials were not subject to any unusual risk of osteologically-visible illness or injury. However, it is not possible to relate this finding to health in life, and the evidence from this period indicates the presence of infectious disease including tuberculosis and, potentially, plague.

The extent of the variety of means of disarticulating and fragmenting the body points to the disintegration of the body as being a key concern during the Beaker period in Britain, contrary to the traditional image of the period as one dominated by the articulated inhumation rites familiar to modern western ideals. The means of disarticulation range from active dismemberment and defleshing of the corpse through to revisiting inhumed remains at a later date in order to add and remove bodies and their parts (and likely artefacts as well). It is possible to consider these practices together, as a conceptual group involving disintegration of the body. However, the processes involved in each would have been experienced differently by those taking part in them: dismembering a fleshed corpse would be a very different experience to leaving a body to be altered by the elements, for example. It is possible that the rites grouped together here instead had entirely different meanings and
purposes to people during the Beaker period. The fragmentation of bodies could also be linked to the fragmentation of Beakers, although further investigation is needed to address patterns of fragmentation across different artefact types in combination with different treatments of the body.

There is evidence that body parts, and even entire bodies, remained within the community, with human remains in some cases being retained and curated before their final deposition. The role of mummification, which could be seen as the inverse of process of dismemberment, though still involved in curation, is unclear in this period due to the difficulties in identifying it in skeletonised remains. I suggest that the many bound (or tightly flexed) inhumation burials in this period would be a reasonable place to begin looking for further examples.

The presence of Beaker-package artefacts among the atypical burials also point to these reflecting shared understandings of which objects were suitable for inclusion in burial contexts. There are few examples of grave goods that were unusual for the period, with most instead conforming to the same restricted range as is found in the typical burials. However, there are interesting regional differences in the provision of grave goods that point to the existence of variable traditions among different communities within Britain. Across the dataset, almost half the atypical burials are without any ceramic vessel, and more than a quarter of burials have no associated surviving material culture at all. In the Yorkshire Wolds case study area, this figure is higher, with few burials containing artefacts and none containing any metal artefacts. In Wessex, by comparison, a much greater range of artefacts was present, and in greater numbers, with a small number of atypical burials in this region containing complex grave good assemblages.

Addressing the questions of Neolithic continuity, and how Beaker-period evidence relates to that of the periods before and after, it is evident that the data present a picture of complex funerary rites representing a variety of influences. The null hypothesis, that there was a hiatus in cremation during the Chalcolithic, can be rejected when looking at the evidence from Britain as a whole; there are many examples of Beaker-period and Beaker-associated cremation burial. Assessment of continuity is affected by low levels of radiocarbon dating of cremation burials, with it being likely that many unaccompanied cremation burials have not been assigned to the correct period. The evidence identified during the course of this research likely represents just a small proportion of the cremation activity in the Beaker period. Though the number of examples is small compared to those for articulated inhumation burials, the identified cremation burials demonstrate the the persistence of cremation
traditions and technologies during this period. Through comparison of Bayesian, aoristic, Summed Probability Distribution (SPD), and Kernel Density Estimation (KDE) methods I have demonstrated that Bayesian analysis is inappropriate for answering questions of cultural prevalence and continuity, but that the latter three approaches all produce closely comparable results. In particular, non-normalised SPD analysis, carried out in R using the ‘rcarbon’ package, is a powerful method of investigating changing burial practices when used in conjunction with osteological and archaeological data.

Many of the burial rites seen across Britain during the Beaker period appear to have continental origins, though there are also practices that suggest an element of Neolithic continuity: the re-use of Neolithic places for burial, and the continuity of unaccompanied cremation burial, for example. The burial practices of the Early Bronze Age are accepted as reflecting a gradual transition: from inhumation to cremation, from Beakers to insular ceramic styles. The Beaker transition should be similarly viewed as a gradual process, with diversity flourishing as different migrant and insular groups interacted. The Early Bronze Age practices of Britain, having developed from those of the Chalcolithic, therefore represent a small but significant element of Neolithic continuity alongside a variety of exogenous influences.

The precise relationship between incoming and pre-existing groups is difficult to access due to the absence of Late Neolithic individuals from genomic analyses, as well as their severe under-representation in previous osteological and archaeological research. I have shown the existing SPD-based population proxies to be problematic for this period due to their emphasis on burial data; consequently, the relative sizes of incoming and pre-existing populations are also unclear. I would argue that the same issue may be behind other short-term fluctuations in population SPDs, and care should be taken to interrogate the archaeological data behind these models. However, the genomic and archaeological data do suggest that Late Neolithic population levels in Britain may have been very low, leaving room for these communities to have been gradually absorbed into larger incoming groups of people. That the Beaker phenomenon involved a high level of openness to inter-cultural interaction is indicated on a broad level by its extensive heterogeneity across Europe, with variations reflecting elements of local indigenous cultures in each region. This is seen partly through the burial practices, but more so through the frequent finding that settlement practices, domestic architecture, and monumental construction traditions continued across the Beaker transition in each region. Although the pre-existing groups rarely had a large genetic input, their cultural influence can be seen clearly in the syncretic Beaker-period practices. On a local level, it is possible that intermarriage between groups was an important
mechanism for this process, particularly the inclusion of indigenous women within Beaker-
phenomenon communities.

9.1. Future directions

There are a number of ways in which the research presented in this thesis could be added to
or developed in future. Firstly, with more time and resources it would be possible to carry
out wider data collection, incorporating burial evidence from period 3 and the later Early
Bronze Age as well as from the Late Neolithic in order to provide a more detailed
consideration of the role of the Beaker evidence in the development of cultural practices
across the wider transitional period. The research by necessity focused on one area of
evidence – the burial rites – whereas further resources would allow the inclusion of more
forms of evidence in this discussion. Domestic sites and ceremonial monuments are key
areas of continuity across this period and would ideally be included alongside the burial
evidence, which is traditionally seen to represent the strongest indicator of change between
the Late Neolithic and Chalcolithic/Early Bronze Age. There is currently no dataset of Early
Bronze Age burials comparable to those now available for the Beaker period (combining my
data with that of the Beaker People Project) and a detailed programme of data collection
would be necessary to further study the variability of Early Bronze Age funerary rites and
how this relates to that seen in the Beaker period.

There are also a number of questions that arose during this research which I have not been
able to address in detail. The finding that 20-25% of atypical Beaker period burials are
associated with Neolithic sites requires further investigation, in order to establish in closer
detail the nature of these sites and whether any evidence of referencing (or destruction) can
be determined at each. This would require a more detailed site-level analysis than is possible
in the broad overview I have presented here, but would provide interesting parallels to similar
work being done around the Mesolithic-Neolithic transition across Europe. Related to this,
the question of the spatial relationships within and between sites could provide insights into
the relationship between contemporary groups. I have only briefly touched on the question
of spatial distribution; a closer investigation of inter- and intra-site patterning would be
valuable.

Another question that could not be pursued within this project is the origin and significance
of charcoal in burials in this period. I chose to record charcoal alongside grave goods and
found it to be the most common object included in atypical burials in this period. This can
be seen to vary between regions, with very few burials in Wessex containing charcoal, for
example. An analysis of the composition of this material, the quantities of material and the
plant or wood species present could provide an insight into the pre-burial funerary rites in this period, and potentially an additional means of assessing variation in cultural practices between communities. Use of FTIR analysis to assess the temperature of cremation pyres, and microscopy to examine cut marks to bones, would also provide additional means of investigating the funerary treatments in this period in greater detail, and may reveal information overlooked by the macroscopic methods employed here.

A further area of interest for future research is the development of SPD and KDE analysis for addressing culture change. I have demonstrated the utility of these approaches and can see several ways in which further development would be valuable, both within the study of the Beaker period and as a method that can be applied more widely to other times, places, and research questions. It would be particularly interesting to apply the same approach to other period boundaries in order to provide a new perspective on the analysis of transitional periods and processes. For this study I have only tagged radiocarbon data with whether the date represents a burial or not and whether this burial is cremated, articulated, or disarticulated. This process is time-consuming, especially for large datasets such as those used in this project. However, tagging dates with further details would allow more nuanced analyses: which grave goods and vessels are present, or how is the burial oriented, for example, could be tied into the chronological models of culture change. I would be particularly interested in exploring the utility of this method in association with osteologically-derived demographic data: if dates were tagged with the age and sex of the individual dated this could provide a means of exploring demographic patterning alongside osteological and genomic approaches.

I have sought to incorporate genetic data into my analyses where available, and a final area which I would suggest as one for future research is in developing a closer integration of genetic and archaeological data. Unanswered questions that could form the focus of interdisciplinary research include the relative size of migrating and insular populations in Beaker-period Britain, and the composition of migrating groups, particularly in terms of their gender balance. I would also be interested in working to determine if regional differences in admixture over time can be related to the different timing and pace of the transition suggested by the radiocarbon data in Chapter 5, as well as the local cultural differences revealed in Chapter 6. A further question of interest is the relationship between individuals buried in close proximity to each other. Beaker-period flat cemetery sites such as Eynsham and Foxley Farm in Oxfordshire are very unusual for Britain, being more similar to sites seen in the Netherlands and Germany, but could provide interesting case studies for assessing the composition of communities, as seen in recent research focusing on the Lech valley in
Germany (Knipper et al., 2017; Mittnik et al., 2019). It would also be valuable to further explore the question of ethnic and cultural identity during this period, which I have only briefly mentioned here. It appears that populations were genetically and culturally mixed, and it would be interesting to investigate the relationship between ancestry and culture, as well as their role in the presence of community-level and regional cultural differences in this period.
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Appendix I: List of Atypical British Beaker-period Burials

This appendix comprises the list of atypical Beaker burials (in alphabetical order by site), identified following the criteria set out in Chapter 4. The full details of each deposit (or group of deposits, in a small number of cases) can be found in Appendix II (see CD).

<table>
<thead>
<tr>
<th>DepositID</th>
<th>Sitename</th>
<th>Grouping</th>
<th>Identifier</th>
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<td>Hemplands Farm, Methwold</td>
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<td>Fissure outside northern entrance</td>
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<td>Kilmarie, Cnocan Nan Cobhar</td>
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<td>D0244</td>
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<td>Pits</td>
<td>Features 5, 14, 44</td>
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<td>Standing Stone</td>
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<td>Barrow 5k</td>
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<td>Round barrow F298</td>
<td>Pit A burials (1, 3, 5, and 7)</td>
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<td>Round barrow F298</td>
<td>Pit C burials (4 and 6)</td>
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<td>Springhead Lane, Ely</td>
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<td>Bone with Beaker</td>
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<td>Pit 50</td>
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<td>Wooden cist</td>
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<td>Ysgwennant</td>
<td>NE of Pit 1</td>
<td>YSG1</td>
</tr>
<tr>
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<td>YSG70 (w/YSG16-18, 79)</td>
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<td>YSG71</td>
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<td>Pit 2</td>
<td>YSG103</td>
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<td>Ysgwennant</td>
<td>SE of mound</td>
<td>YSG82</td>
</tr>
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Appendices II, III, IV, and V

Please see the attached CD for Appendices II, III, IV, and V. These are:

- **II** – Access database of atypical burials. The Deposit ID field, seen in Appendix I, is the Primary Key for navigating this database.
- **III** – Sites excluded from analysis. This Excel spreadsheet lists the sites that I considered for conclusion but ultimately did not include in the database, along with a reason for this decision.
- **IV** – Sources checked. This Excel spreadsheet lists the journals and databases which were searched systematically for Beaker-period burials. It does not include monographs or other one-off sources, which were also searched.
- **V** – New osteological assessments. This Word document provides a summary of the osteological analyses carried out during the course of this research.