Aspects of design in Iron Age and early Roman Europe

CHRISTINA UNWIN

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Abstract

This research offers design practices and processes as an approach for exploring matters of making artefacts, with particular reference to the Iron Age and early Roman period in Europe (*c.* 500 BC to *c.* AD 200). The concept of design links individuals and groups who creatively engage with materials, offering a means of thinking about artefacts in interconnected ways beyond the framing of material culture through typologies and chronologies. Designing artefacts involves networking people with other objects conceived, made and recreated in different media and within conditions of socio-cultural affordances and constraints ranging from the household to the inter-regional.

Ways of seeing (and not seeing) have fundamentally informed past research directions and continue to do so. Beyond the visual experience of artefacts, spoken and written terminologies have framed and categorized how artefacts have been perceived and how ideas about them have been transmitted, frequently preserving particular ways of seeing. The idea of an 'art object' remains at the core of many approaches to material culture studies. A review of existing literature on 'Celtic art' demonstrates that the dichotomy between 'art' and 'technology', combined with persistent terminologies, remain influential. Design theory applied in fields other than archaeology, such as architecture, shows that such divisions are redundant for the understanding of creative processes and practices.

In this thesis, design is offered as a potentially more useful approach in its constituency of social process with all aspects and associations of constructed objects; portable and fixed artefacts, buildings and landscapes. This approach has been constructed from archaeological theory, design theory and art criticism, combined with ideas from both personal experience of design practice and from discussions with designer-makers within their own creative spaces. Aspects of design of Iron Age and early Roman artefacts are explored through four case studies in order to assess the visibilities, invisibilities and transmissions of the concepts of their socio-cultural associative networks.

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Contents

Figures

11 Embodying the weaver in textile making – a design in ceramic with incised surface treatment from Sopron in Hungary. (Grömer 2013, fig. 3.3)

12 At the edge and in-between – the angled meander featuring in designs in wool, ceramic and copper alloy.
a Tablet-woven border of a fine wool garment from Hohmichele in south Germany. (© Textile Research Centre, Leiden)
b Ceramic vessel from Prunay in Marne, France. (© Trustees of the British Museum)
c Copper-alloy belt-plate from Hettingen, south Germany. (Huth and Kondziella 2017, fig. 2.2)

13 The colour pattern for weaving HallTex123. (Christina Unwin)

14 Montafoner Steinschaf sheep. (Photograph © Markus Stadelmann)

15 Spinning with a hand whorl-weighted spindle. (Christina Unwin)

16 Tablet-weaving HallTex123. (Christina Unwin)

17 Contemporary designs by Anna Moser.
a Necklace with a woven binding ribbon of silver thread.
b Extending the design of HallTex123 – a tablet-woven band in silk thread, displayed interlaced with a silver brooch.
(Photograph © Anna Moser and Margarete Neundlinger)

18 Locations referred to in the ceramic case study. (Christina Unwin)

19 The 'Prunay vase'. (© Trustees of the British Museum)

20 The Prunay vessel and other pots designed and made at the same workshop. (Christina Unwin)

21 Vessels designed and made for burials at Beine-Nauroy (Marne). (Christina Unwin)

22 The sequence of painting the surface design of the Prunay vessel. (Christina Unwin)

23 Remaking the Prunay vessel – shaping the form, showing the attachment of the pedestal foot to the body. (Photographs © Lyn Grant)

24 X-ray image of the Prunay vessel, showing the varying thickness of the fabric and the thin walls of the body and the point of attachment with the hollow pedestal foot. (Asset number 1241792001. © Trustees of the British Museum)

25 Remaking the Prunay vessel – painting the surface design. (Photographs © Lyn Grant)

26 The body pattern of the Prunay vessel in two dimensions. (Image Christina Unwin. After British Museum online catalogue Asset number 793309001, © Trustees of the British Museum)

27 Reconstruction of an Iron Age pottery kiln excavated at Alcalá de Júcar in Valencia, Spain. (© Cardona Colell *et al*. 2014)

28 The Prunay vessel on display in the present at the British Museum, London. (Photograph Christina Unwin. © Trustees of the British Museum)

29 The pot remade from the Prunay vessel design, by Gerry Grant of Fangfoss Pottery. (Photograph © Lyn Grant)

30 Locations referred to in the gold alloy case study. (Christina Unwin)

31 Orense torc 1. (Photograph Christina Unwin, image © Trustees of the British Museum)

32 Orense torc 2. (Photograph Christina Unwin, image © Trustees of the British Museum)

33 Statue from Sanfins (Porto, Portugal). (Drawings González-Ruibal 2004, fig. 4 [after Silva 1986]; photograph © Museu Arqueológico da Citânia de Sanfins; reconstruction Christina Unwin)

34 Statue from Briteiros (Minho, Portugal). (Drawing González-Ruibal 2004, fig. 9; reconstruction Christina Unwin)

35 Female deity with hands posed in a comparable way to the Briteiros statue (*see* **34**). (Photograph National Museum of Denmark)

36 The 'axe' from Cariño in Galicia, Spain. (Photographs © Armada and García Vuelta; reconstruction Christina Unwin)

37 Copper-alloy processional image. (Photographs Armada and García Vuelta, © Instituto Valencia de Don Juan)

38 Moñes I (upper) and II (lower) belt plates. (Photographs from top: © Alamy [upper image] with additions; © Armada and García Vuelta; © Museo Arqueologico de Asturias)

39 Antlered deity, wearing a torc and raising another in the right hand, on the Gundestrup cauldron. (Photograph National Museum of Denmark)

40 The melting mass and ingots from Recouso in Galicia, Spain. (Photographs © Armada and García Vuelta)

41 Assembling the parts – torc 1. (Christina Unwin)

42 Assembling the parts – torc 2. (Christina Unwin)

43 Shaping the double-scotia elements of the torc terminals over the point of a mandrel. (Christina Unwin)

44 The armlet from Lebuçâo, Vila Real, Portugal. (Photograph © Sociedade Martins Sarmento)

45 The sequence of punchwork on the end plates of torc 1. (Christina Unwin)

46 The sequence of granulation on the end plates of torc 1. (Christina Unwin)

47 The terminal of the torc from Vilas Boas in Bragança, Portugal. (Photograph © Museu Nacional de Arqueologia, Portugal)

48 The hoop end plates of torc 1 (upper) and torc 2 (lower), showing the insertion points of the hoops. (Photographs Christina Unwin, © Trustees of the British Museum)

49 The tombstone of Cnaeus Musius, standard-bearer of Legio XIV Gemina, dated to the first century AD. (© Mittelrheinishes Museum, Mainz)

50 On display in the present – torcs 1 and 2 at the British Museum, London. (Photograph Christina Unwin, © Trustees of the British Museum)

51 Locations referred to in the shale case study. (Christina Unwin. After Sharples 2010, fig. 2.23; Gallois 2004, fig. 1; Gallois 2010 fig. 1)

52 Henry Dryden's illustration of the shale vessels 'from near Quint's Hill at Warden' (upper part), dated 8th June 1843 (© Northamptonshire Libraries and Information Service DR/01/119)**3** Old Warden 1. (Photograph Christina Unwin, image © Trustees of the British Museum)

53 Old Warden 1. (Photograph © Museum of Archaeology and Anthropology, Cambridge)

54 Old Warden 2. (Photograph Christina Unwin. © Trustees of the British Museum)

55 Embodied designs turned in shale. (Christina Unwin)

56 Designs in ceramic from Bedfordshire, Hertfordshire and Essex. (Christina Unwin. After Thompson 1965)

57 Cross-Channel designs in ceramic from Swarling and Montépreux. (Christina Unwin. After Birchall 1965)

58 Reconstructions of the Old Warden shale vessels. (Christina Unwin)

59 The Old Warden shale vessels disassembled. (Christina Unwin)

60 The outcrop just east of Clavell's Hard, on the east side of Kimmeridge Bay, is around 60 centimetres thick. The joints within the rock are white, giving the Blackstone a greyish appearance. The stratum overhangs at the base, from which fragments fall and become eroded into rounded cobbles on the shore. (Photograph © Ian West)

61 Visualizing the making of a vessel to be designed in sections by grading shale cobbles by size. (Photograph © Pointer and Riseborough)

62 The pole lathe and its constituent parts. (Christina Unwin)

63 The shaping of the pedestal-foot section of Old Warden vessel 2. (Christina Unwin)

64 How the sections of the Old Warden shale vessels were designed to conjoin with double rabbet joints. (Christina Unwin)

65 The high gloss produced on an artefact designed from Kimmeridge Blackstone shale. (Photograph © Pointer and Riseborough)

66 Associated objects of design in wood, copper alloy, iron and clay, assembled in a cremation grave at Aylesford in Kent, dated to around 50–75 BC (Evans 1890, fig. 1).

67 The present display of Old Warden vessel 2 at the British Museum, London. (Photograph Christina Unwin. © Trustees of the British Museum)

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Alison Castle *tablet-weaver*
Gerry and Lyn Grant *potters*
Rupert McBain *furniture designer*
Gareth Riseborough and Sally Pointer *shaleturners*
Cynthia Sebolt *tablet-weaver*

This

thesis

is dedicated

to

Michael Shanks

for

design

conversations

1 Introduction to a design approach to the study of material culture

The aims of the thesis

This thesis offers an approach for exploring material culture through the idea of 'design', dissolving constructed dualities such as 'art' and 'technology' that continue to pervade archaeological research, with particular reference to studies of Iron Age and early Roman artefacts. In this thesis the study of making things has drawn on insights from contemporary creative practitioners to help envisage the connections between aspects of design that have generally been separated in archaeological studies.

The concept of design offers a means of exploring artefacts independently of the framing of material culture through typologies based on media types, assumed function, technologies and chronologies, and of connecting the past with the ongoing present through a particular made object. Design constitutes networks of associations between people and artefacts of different media, operating within varying conditions of social and material affordances and constraints, that range from the household to the inter-regional. The processes and practices of design are therefore essentially collaborative and extrinsic, involving individuals and groups who creatively engage with materials within their own particular communities and wider society to produce the effective designed objects that their commissioners require. The nature and degree of the reception and response to a design has the potential to extend its conceptual network within a society through the transmission of ideas, techniques and technologies.

This thesis addresses the concept and discipline of design, and how people have developed, deployed and manipulated its concepts and materials within society in order to connect themselves with others and with their pasts. The aspects of communication inherent in the strategic design of material things, and the associated fields of learning and teaching, are explored as transmitters of concepts, techniques and technologies in different social and regional contexts through the case studies.

This thesis offers the idea of design as connecting all aspects and associations of material culture – portable and fixed artefacts, buildings and landscapes – although this approach is particularly explored with regard to artefacts made during the Iron Age and early Roman period in Europe. Archaeological studies have interpreted this as a period when social and cultural identities underwent significantly new changes and transitions, with rhythms of transformation differing over time and in places where existing traditions of conceptualizing and making things were being continued, evolved and changed. How the items of material culture of these regions may be conceived of as 'designed objects' is be explored in this thesis through a consideration of the concept of a strategy to produce particular effects in society and the responses to these that continued to shape the concepts and appearance of material forms.

Ways of seeing

There is a widespread practice in archaeological research of framing 'art', 'technology' and 'science' as separate disciplines within which detailed studies and specialisms are situated. Artefacts continue to be subjected to the dichotomy between 'art' and 'technology' and are generally not envisaged as being within an interconnected and socially binding creative process. Much emphasis has been placed on the social context, uses and consumption of material culture that exclude concepts of making, and therefore of design. The processes and practices of making things are not generally considered in archaeological research, although this thesis demonstrates that they have great potential for informing it. This thesis explores the idea that 'design' interconnects the content of separate fields of study as a socially constitutive phenomenon, and explores the degree to which the idea of design is beginning to be approached as a creative process in archaeological research.

John Berger and the constitutive gaze

In his collaborative work, *Ways of Seeing*, the artist, photographer and art critic, John Berger, interrogated the layers of learned assumptions that people engage with

when they look at things that have been called 'works of art', and explored how their perception is affected by their experiences, knowledge and belief (Berger 1972). He described how viewing an artefact 'always constitutes the relation between a past and its present' (*ibid*. 11). He considered that the viewer is always seeking relations between themselves and the object of their perception, with the effect of adjusting and rebuilding their own experiences and knowledge.

Berger stated that images significantly embody the appearances of absent things, and that experiencing an artefact involves perceiving what is visually or conceptually both present and absent within its design; presence and absence, visibilities and invisibilities, are all embodied in the design of its materiality and form. A portable artefact has the effect of extenuating these things as it is moved through different social contexts – a universal aspect of design. Berger also argued that images constitute ways of thinking about past societies in more precise and more complex ways than written texts and that 'the more imaginative the work, the more profoundly it allows us to share the artist's experience of the visible' (*ibid*., 10).

This reading of images is particularly useful for connecting Iron Age and early Roman artefacts with the people who made them in ways that are independent of the terminology used in archaeological studies. The knowledge, experience, skill and imagination brought into play by practitioners in the conceptual and technological processes of making artefacts were all embodied with the social context of design.

Seeing 'Celtic art' objects

In order to offer the concept, process and practice of design as an approach to the study of Iron Age and early Roman material culture, this thesis reviews a range of published research on the artefacts of this period that have generally been categorized as 'Celtic art'. This 'way of seeing' these artefacts has involved a particular terminology that has frequently been drawn from a traditional art-historical approach. Ways of seeing (and not seeing) have fundamentally informed the directions of both past and current research.

The interpretation of images as faces, for example, or pareidolia (Bednarik 2017) – the capability for processing shapes into forms that may be recognized from stored knowledge – is ubiquitous in studies of late Iron Age and early Roman artefacts. Jacobsthal commented on the 'masks' he saw in the Iron Age 'La Tène style' as 'fleeting' and evanescent … the mechanism of dreams' (1941,10). He wryly suggested that this might be called the 'Cheshire Style', alluding to the slow vanishing of Lewis Carroll's Cheshire cat (Carroll 1865, 63). This remark has inspired descriptors such as 'Disney-like' abstraction, 'pseudo-faces' and 'visual puning' (Megaw 1962, as cited in Waddell 2009, 341).

Beyond the visual experience of artefacts, spoken and written terminologies have framed and categorized how artefacts have been perceived and how ideas about them have been transmitted, frequently preserving and continuing particular ways of seeing. The idea of an 'art object' has remained at the core of many approaches to material cultural through the construction of categories and hierarchies of things, and the consideration of whether an artefact constitutes a 'work of art' has continued to be influential. A review of existing literature on 'Celtic art' explores how particular art-historical attitudes have generally continued to deeply inform archaeological studies of Iron Age and Roman artefacts. Research into design theory in fields outside archaeology, such as commercial design and architecture, have shown that such divisions are redundant for the understanding of constructing material things through creative processes and practices.

Artefacts as designed objects

In this thesis 'artefact' is defined as a thing that is made by people, whether portable or fixed, a designed object to be carried, moved or built into the landscape. People design and make things as part of and to express all aspects of their social being, to mark identities and to enhance how they interact with natural and cultural environments, both their own and those of others. This concept is fundamental for the approach taken here, that artefacts as 'designed objects', rather than 'art objects', constituting networks of associations between people and things. Such associations

are expressed at many levels by designers and makers though their application of skill to technologies and their manipulation of materials. These associative networks may operate at many levels; local, regional and inter-regional.

The idea that technology is operated as part of the continuous cognitive process by which designers and makers bring their ideas into physical form has challenged the separation of tools and techniques for study as discrete categories (for example: Polanyi 1966; Schön 1987; Foucault 1970; Bourdieu 1977; Latour 1987). Through this concept of designing through the manipulation of materials, artefacts may be explored beyond the analysis of their material properties and the mechanical techniques used to shape them (Bender Jørgensen 2013, 91). Thinking of material culture as statements of concepts and knowledge networked together through the creation of material forms allows many aspects of design, such as cultural associations, to be explored in more complex ways.

A design approach to the study of material culture

This thesis has been particularly inspired by the work of Michael Shanks, notably his conceptualization of an artefact as an assemblage of attributes that may be explored through external affiliations, and the inter-relation of the past and the present (Shanks 1999 and 2012). 'Rather than begin with the question of what an artifact is, it is better to ask what it does, inquire of the social work of an artifact' (Shanks 1999, 32).

The design approach of this thesis has been constructed from art criticism, archaeological theory and design theory, with particular reference to concepts of chorography, embodiment, entanglement, dividualism and enchainment. This approach has also been informed by concepts developed by the media critic John Berger in *Ways of seeing* (1972) in which he explored the nature of images beyond the surface of their visibility. The philosophy of Vilém Flusser has also been drawn on; he has demonstrated that an artefact constitutes a form where many ideas and people are represented in a network of cultural and social associations (Flusser 1999). Design may therefore be perceived as embodying an 'admixture of the past … and the

present' (Henry 2007), an articulation of information formulated and expressed by creative practitioners through their expertise and their mindfulness of future possibilities and capabilities of the material outcome of their work. This thesis effectively critiques the concept of *chaîne opértatoire* by extending the aspects of an artefact's design beyond its deposition and into the present by revealing the potential for both its current and future reception.

The case studies

The four case studies in this thesis explore the design of portable artefacts that have been dated to between *c*. 300–50 BC (*see* **6**). Designed in different regions of Europe and made in different media, these artefacts have been selected to demonstrate the ubiquity of design, irrespective of materials used, time, place and social context. In the context of exploring the cultural networks of association for the artefacts under close consideration in this thesis, the processes of making is set out with information drawn from technological analyses of the different materials used in their construction. This allows ideas about the strategies and cognitive processes of the practitioners who designed and made these artefacts to emerge from the materials and techniques they used.

The artefacts selected for case study in this thesis comprise a textile from Hallstatt (Salzburg, Austria) in the archival collection of the Naturhistorisches Museum Vienna; and a ceramic vessel from Prunay (Marne, France), two gold-alloy 'torcs' from near Orense (Galicia, Spain), and two shale vessels from Old Warden (Bedfordshire, England), on permanent display in the British Museum in London. Exploring these artefacts as designed objects through their making is not dependent on information such as known archaeological context, and may be a more useful approach where this is absent, as in the case of the ceramic vessel and the torcs.

Aspects of the design of these artefacts are deduced from 'what remains .. what [has become] of what was' (Shanks 2012, 17). Each case study considers the social environment for design at the time of their making, use and deposition. Other objects made in the same or different media are drawn into the discussion as associated

designs in social context, showing how aspects of design may link artefacts in ways that are independent of conventional archaeological categories such as material, form and elaboration. The conceptualizing and making of each designed object are explored through the sourcing of its materials, the techniques involved, the socio-geographical context of its production, and its final deposition. Following retrieval and conservation, how the conceptual design of each artefact is continued through present-day display, remaking and redesign is explored.

In the sections that follow, the nature and theory of design and its relation to some theoretical concepts that have been drawn on in this thesis will be discussed. The application of the idea of design to Iron Age and early Roman societies is followed by the case studies, which explore the inter-relational socio-cultural aspects of design.

2 A critical review of approaches to 'Celtic art'

'Art so conceals its own art'

Ovid *Metamorphoses* 10.252 (*c.* AD 8)

Introduction

Archaeological research always reflects how what remains of the past is viewed from the present. This has been fundamental in the long tradition of ordering the surviving material culture of past societies into chronologies and categories that have come to constitute frameworks for study. The typologies and terminologies that have been developed within these frameworks remain deeply embedded in the ways archaeologists think and write about artefacts and the societies which produced and used them. A review of studies concerned with artefacts that have been designated as 'Celtic art' demonstrates that framing Iron Age and early Roman artefacts in this way has both constrained and predetermined how they have been perceived within their socio-cultural context.

Chronologies, classifications and frameworks

As archaeology began to develop as a discipline during the nineteenth and early twentieth centuries, the chronologies for the first millennium BC which had been predicated on written accounts of classical authors were reassessed using material culture studies (Thomsen 1836; Tischler 1885; Reinecke 1902–11; Déchelette 1908–14). The classifications established by this work continue to be reflected in European archaeological frameworks, such as in the allocation of particular artefacts as key chronological indicators.

By the 1930s a tripartite phasing of the British Iron Age had been developed from changes observed in the forms of material culture and settlements (Hawkes 1931;

Hawkes 1959). These changes were seen as a response to invasions or migrations from continental Europe by distinct cultural groups, the terms for which – 'Hallstatt', 'Marnian' and 'Belgic' – became a chronological framework for material culture studies. Further divisive frameworks of European cultural divisions were continued by the use of terminologies developed for the periods named 'Hallstatt' and 'La Tène', and by the merging of these chronological and cultural terms. Consequently there was an increasing separation of studies, based on the perception of how societies changed their material culture from a Bronze Age to an Iron Age, and from an Iron Age to a Roman period. Such chronological frameworks have been complicit in perpetuating a concept of change that has excluded differing technological and social regionality and rates of transmission and development. Typological studies have often been linked to a dominant art-historical approach to the study of material culture with its construction of 'styles' and their influences (Jacobsthal 1944; Megaw 1970). This has generated the idea of artefacts as 'art' with the accompanying inference that they are to some degree separate from social processes.

Jacobsthal wrote *Early Celtic Art* (1944) from the perspective of a classical archaeologist. He perceived that the early 'La Tène style', developed north of the Alps after around 450 BC, was transmitted from 'the East, Italy and Hallstatt' (*ibid*., 155), although he considered that this constituted 'an art with no genesis' (*ibid*., 157) as it could not be explained by any large-scale movement of incoming populations or by any notable new technological developments. Based on his study of classical Greek painting on ceramics and his identification of individual painters, Jacobsthal's art-historical approach assumed that elaborate artefacts of the later first millennium BC were made by highly-skilled itinerant individuals who were commissioned by a warrior elite. He also defined the principal style categories of 'La Tène' metalwork of 'Early', 'Waldalgesheim', 'Sword' and 'Plastic', and their regional variants, that constituted the framework for later studies (for example: Megaw 1972; Harding 2007).

The continued use of the concept of 'Celtic art' has maintained the separation of particular artefacts from the networks of people and material culture that may be observed in the wider archaeological record. Historically, this had been due to the

recovery of such artefacts mainly from hoards or watery contexts with a lack of context, with very few from settlement sites (Garrow *et al*., 1). The excavation of Glastonbury lake village in 1892–1907, however, uncovered a large number of well-preserved artefacts from a settlement context. They had been made in different media, including ceramics, glass, wood, bone and antler, many with elaborated surfaces (Bulleid and Gray 1911, 1917). Although these surface designs, especially those in pottery which has been termed 'Glastonbury ware' (Peacock 1969), have been compared with those on metalwork termed 'Celtic art', they have not been included within this category, despite the acknowledgement of the expertise required to make them. Grimes' comment that pottery, although 'an expressive craft … takes second place to metal and (where it exists) glass' and that usually 'pottery is the borrower both of form and ornament' (1952, 160) represents both the dualism of 'art' and 'craft' into which artefacts have been categorized. This also exemplifies how pottery and the expertise involved in their design and making have been viewed differently to those of metalwork. Archaeological studies have generally focused on the materials and making of metalwork, especially in the context of framing artefacts as 'art', at the expense of other materials (Chittock 2016, 44).

The term 'Celtic' had been increasingly applied to later first-millennium BC material culture during the nineteenth century. Archaeological material from different regions of Europe was connected together within a 'Celtic' culture with the diffusionist perspective that it had been developed from the direction of central Europe. The trajectory of this perceived cultural unity was extended by Piggott (1970), who named it 'Early Celtic art' to distinguish it from the later integration of some of its components into artefacts made in the early medieval period. During the late 1960s and 1970s distributions of artefacts were generally still being interpreted by historical and economic approaches as passive indicators of the presence of people. Research was still dominated by typologies and art-historical approaches to the material (for example: Megaw 1970; Jope 2000), although from the 1970s technological studies began to demonstrate how artefacts were produced, providing the information for new enquiries into networks of exchange. Earlier approaches such as Jacobsthal's have been developed by Vincent and Ruth Megaw, who reinforced the

concept of a comparative framework across Europe using a 'construction of decoration' and a 'possible reception of styles' (Gosden *et al*. 2014, 1). Jope drew attention to indications of distinct new regional styles on artefacts in *Early Celtic Art in the British Isles* (published posthumously in 2000). He also considered principles of metalworking style, techniques and imagery, considered in this thesis as aspects of design integrated with social context.

Transforming research approaches through social theory

A significant conceptual change in research took place during the early 1980s as new approaches were introduced from anthropology. Observations of contemporary agricultural and pastoral societies indicated that people and artefacts interrelated in structured transformative ways (Hodder 1982a; Hodder 1982b). Artefacts embodying symbolic and ideological meanings were used to negotiate ethnicity, status, age, gender and relationships. The implication of this for archaeological material was that societies selected particular artefacts for deposition in culturally structured ways, although this was slow to impact on studies of 'Celtic art'.

People living in the later first millennium BC could now be conceived of as living diverse and integrated social, economic and spiritual everyday lives within materially structured landscapes with distinct cultural differences between regions. Archaeologists drew on ethnographic analogies from different cultural and temporal contexts to reconceptualize the lifestyles of past societies and their articulation of materials. The interrelationships of people and artefacts was further developed by the application of the concepts of structuration theory and agency (Giddens 1984; Barrett 1989). By producing and working on material culture people are able to negotiate and reproduce the structures and form the practices of social relations. Inter-relationally, artefacts, buildings and landscapes constitute the material surroundings that influence further social action and cultural development.

As archaeological theory became equated with social theory, sociological frameworks such as structuralism, Marxism, post-structuralism, critical theory, hermeneutics and phenomenology began to be developed. The processualism or 'new

archaeology, developed in the 1960s and 70s, disregarded imagery as 'art' and its relevance for understanding social structures (for example, Binford and Binford 1968). In *Social theory and archaeology* (1987a) and *Re-constructing archaeology* (1987b), Shanks and Tilley challenged the redefinition of archaeology as behavioural science, arguing that structural functionalism and positivist approaches were continuing to shape archaeological research and practice due to the inadequate application of social theory. This presentation of archaeology as a critically self-aware and political practice marked a deeply fundamental point of change in archaeological thought. The research and teaching of the discipline underwent a long infiltration of social theory before its implications could be understood and eventually used to radically change the whole debate during the 1990s. In addition to their proposal of a social world of meaning in which the past and the present were interconnected, Shanks and Tilley considered how surviving material culture, as part of that world, was displayed. They demonstrated that, removed from continuity with the past by the perceived moment of 'discovery', artefacts consequently become preserved in the present as commodified objects (1987b, 64–99).

Reconstructing Iron Age Societies (Gwilt and Haselgrove 1997) explored new research in the light of the increasing dissolution of the divisions between economic, social and spiritual aspects of the later first millennium BC. The inter-relationships of the social and ideological construction of spaces in the landscape were explored and everyday processes of agriculture and making discussed. DeRoche (*ibid*., 19–25) argued that production should be approached as an integrated range of processes, from the acquisition of the raw material sources to the use of artefacts, in order to more fully recognise regional variations, comprehend why particular technological choices were made during production, and identify why the organization of these processes differed. This model considers how materials and techniques may be inter-related so that a finished artefact may be perceived of as the 'raw material' for another, aspects of the strategic planning considered as fundamental for design in this thesis. Social spaces for production were also explored, from the household to the village, including workshops of full-time practitioners from different households who invested to a greater degree in their equipment and made wider contacts through

sourcing the materials and clients they required (*ibid*., 20). Following the research of Shanks and Tilley, this re-evaluation of Iron Age societies through landscape and settlement studies appeared to have occurred apart from the study of 'Celtic art'.

Developing ideas of making and agency

The Archaeology of Celtic Art (Harding 2007) explored perceived stylistic developments of artefacts from the late Bronze Age to the early medieval period. The technologies and tools used by makers based in workshops, operating under patronage or in a wider market network, were considered, with an analysis of social, symbolic and ritual aspects of the artefacts they produced for their clients. The connections and influences were drawn out between different regional archaeological sequences that have been defined as central European Urnfield, Hallstatt, La Tène and Atlantic Europe, with La Tène defined as one aspect of a broad Iron Age European culture. The conventional archaeological focus on defining styles as La Tène was critiqued as deriving from an equation of 'art' with artefacts of complex technical accomplishment made for particular high status individuals or groups in society. Importantly for the exploration of social imagery, aspects of such metalwork styles were also expressed on artefacts such as wooden vessels, clothing and furnishing textiles, ceramics, bone and skin, and the painted plaster of buildings may have been painted with comparable motifs and patterns. Despite this critique of the prominence given to elaborated artefacts in Iron Age and early Roman studies, the concept of material culture as a socially-integrated phenomenon was not developed.

Rethinking Celtic Art (Garrow *et al*. 2008) explored how communities in Britain and Ireland participated in the material practices that were regionally developed throughout Europe during the later first millennium BC. This study was largely influenced by the work of the anthropologist Alfred Gell (1992; 1998). Gell argued that 'art' is a form of 'technology' through which inert materials were transformed by the investment of skill to imbue artefacts with the ability to dazzle, affecting people by engaging their attention through a 'technology of enchantment'; 'rather than analyse what objects mean, … [Gell] considers *what they do*' (Bradley 2009, 34).

Consequently the study of elaborated Iron Age artefacts has shifted its focus from seeking potential meanings towards describing their sensory effects on people and how they affect social relationships. Artefacts are considered to be 'crucial patterns in an unstable world' (Garrow *et al* 2008, 3), embodying multiple meanings that could be negotiated and renegotiated in changing contexts. Much of the material deposited between around AD 50–200 has been perceived as reflecting the creation of 'hybrid cultures of resistance and acceptance' (*ibid*.) and changing identities to remain connected to the past while responding to Roman culture. This thesis critiques the concept of hybridity in material culture through an exploration of the transmission of aspects of design between creative practitioners working in different media and in different regions. Gosden and Hill 'argued against a notion of art, which can be more helpfully replaced with a notion of aesthetics' (2008, 12); Giles suggested that the articulation of performance and power through artefacts involved an 'embodied' aesthetics of vision and sound that facilitated encounters between people (2008, 69–72).

The problematics of 'aesthetics'

It has been suggested that 'the idea of aesthetics can be freed from notions of refinement and beauty to look at the sensory appeal that objects have and through the senses the emotional impacts they are likely to create' (Gosden and Hill 2008, 9). Aesthetics has been constructed to explain how encountering an object may result in different kinds of experiences within a given cultural context. These may range from positive experiences of the object's intrinsic or extrinsic value to negative experiences of aspects that are considered problematic, challenging or not valued (Young 2004, 12–13). This has given rise to the concept of the 'aesthetic object' that has been intentionally incorporated with properties that affect particular experiences. The aesthetics approach has previously contributed to the privileging of elaborated metalwork in the study of Iron Age and early Roman artefacts (for example: Leeds 1933; Fox 1958; Garrow *et al*. 2009), although this has been acknowledged (for example, Garrow and Gosden 2012, 46–7).

The field of 'aesthetics', the study of perception that has come to focus on concepts of beauty and taste, follows late modern ideas of 'enframing' the subject under consideration, principally through the use of technologies that obscure how artefacts inform and remind societies of the things to which they attach value (Heidegger 1977). As 'aesthetics' is a culturally-framed phenomenon, defining the 'aesthetic value' of artefacts in the past will necessarily be a culturally-loaded exercise in the present. While this approach emphasises the effects of artefacts and so draws attention to the intentions of designers and makers, it continues to frame made things in a way that is culturally determined by the viewer. Ethnographical research has shown that apparently 'aesthetic' artefacts may have been designed and made with other intensions entirely (for example, Gell 1992, 44–9). The apparent 'aesthetic effect', termed 'the halo effect of technical difficulty' (*ibid*., 46–9), occurs when how this effect was created cannot be technologically understood due to the application of skills that are beyond the viewer's frame of knowledge. 'Aesthetics' is therefore essentially socio-culturally-dependent, like the idea of 'art'. As a system constructed according to present-day precepts, 'aesthetics' constitutes a problematic concept for the study of Iron Age and early Roman artefacts.

Late Iron Age elaborated artefacts from Europe categorized as 'Early Celtic Art' are mainly those made from gold- or copper-alloy. In 'Fancy objects in the British Iron Age: why decorate?'(Joy 2011) it was proposed that the 'decoration' of an artefact should be a criterion for considering an artefact as 'Celtic art', extending the category beyond metalwork. Although acknowledging that 'form is just as important as decoration as a means of artistic expression', this study suggested that 'decorated' artefacts made in other media such as bone, antler and ceramic, conventionally termed as non-specialist 'craft' items, should also be considered as part of this category. It was argued that the interrogation of why Iron Age artefacts were decorated, moving beyond focusing on those made in particular media and on the dichotomy between 'art' and 'craft', would provide new ways of revealing the intentions of the makers of these objects. The focus on 'art' was maintained, however, and aligned with 'decoration': 'Art … stands out from the crowd and the decision to decorate was a very clear choice which differentiated decorated form undecorated

artefacts' (*ibid*., 206). This idea of 'art' as a powerful driver of social action through objects that were elaborated in particular ways excludes most of the artefacts that were made by Iron Age communities. In order to consider the social 'effects' of artefacts made in different media, including those resulting from different decisions of surface treatment (such as those usually described as 'plain' or 'undecorated'), an approach is required that explores their associative networks of design to situate them in their social contexts of making. Applying a design approach, any surface treatment of an artefact becomes part of the practitioner's strategy of making, an extrinsic plan constructed in a particular socio-cultural context rather than a in a linear sequence of intrinsic decisions.

Technologies of Enchantment? Exploring Celtic Art: 400 BC to AD 100 (Garrow and Gosden 2012) was based on a database of late Iron Age metal artefacts from Britain, dated to around 450 BC until the second century AD, and categorized as 'Celtic art' (ECAIC; Garrow *et al*. 2009). The artefacts were selected based on the criterion that they 'share decorative features with art found throughout Western Europe and further afield' (Joy 2011, 205). This study considered 'Celtic art' to be a 'usefully ambiguous concept' (Garrow 2008, 18) for exploring these artefacts, and that they were elaborated in complex and ambiguous ways to enable people to negotiate their relations under unstable social conditions, for example, in redefining their identities with the approach of Roman influence. This positioning of perceived ambiguity as presently unfathomable though differing in its effects under negotiable social circumstances in the past, may be rethought through the idea of design strategy. This approach offers that all aspects of making an artefact are conceived and directed towards the communication through material effects within particular temporal and socio-cultural contexts.

Situating 'Celtic art'

Celts: art and identity (Farley and Hunter 2015) was published with the exhibition held jointly by the British Museum and National Museums Scotland that explored 'Early Celtic Art' from the perspective of the effects of artefacts and the people who

were associated with them. This study suggested an overall concept of 'Celtic arts' for referring to artefacts dating from the fifth century BC to modern expressions of 'Celtic' design and identity (Hunter *et al*. 2015, 277). Intending to 'tell different stories for different times and places': different Celtic arts' (*ibid*., 278), this nevertheless continued to situate Iron Age and early Roman artefacts as 'art' objects within the broadly conceived category of postmodern universal and spiritual 'Celticity' (Dietler 2006, 239).

Although archaeological studies of late Iron Age artefacts have acknowledged the separation of 'art' and 'craft' and have attempted to construct new approaches that seek to reintroduce 'Celtic art' into a wider archaeological context (for example: Garrow *et al*. 2008; Joy 2011), this dichotomy has not yet been resolved. The effects of the 'decoration' of artefacts made in media other than metalwork have been discussed in the context of antler and bone weaving combs from the Iron Age lake village at Glastonbury (Somerset, England) (Chittock 2014). This study has drawn on the idea that a maker's conscious decision to 'decorate' an artefact had imbued it with social significance (Joy 2011; Chittock 2014, 315). Although this study has discussed the surface treatment of an artefact and its application as a moment of choice by the maker, rather than as an aspect of the strategy of design explored in this thesis, it has resituated these combs as socially significant beyond being 'craft objects' and as comparable with other surface-elaborated objects made in other media (*ibid*., 324).

It has also been proposed that the perceived dichotomy between 'art' and 'craft' artefacts may be removed by the 'decision to decorate an object, regardless of what that object is' by recategorizing artefacts as 'decorated' and 'undecorated' (Chittock 2016, 59. In 'Pattern and purpose in Iron Age East Yorkshire' (Chittock 2016), elaborated surface effects of artefacts were reconsidered in relation to their social intentions and contextual functions. This study discussed how, in Fox's *Pattern and purpose: a survey of Celtic art in Britain* (1958), motifs and patterns had been separated from the surfaces of artefacts and reduced to two dimensional representations as a 'Grammar of Celtic Ornament (*ibid*., 147–8). Fox considered that artefacts had purposes such as display, but that the elaboration of their surfaces had a secondary purpose. In Chittock's study the term 'pattern' has been used to separate

the surface aspects of a design from its form, although it was acknowledged that 'the boundary between them is extremely fluid and context-dependent' (*ibid*., 64). Chittock reintegrated surface elaboration and use, considering 'the possibility that pattern was part of an object's primary function' and that the purposes of such artefacts must be explored 'holistically' (Chittock 2016, 67). Although this study focused on the visual effects of the artefacts, rather than on their elaboration within an intentional strategy of design, 'the materials in which patterns are made, the objects they form and the ways people have used and deposited them' were contextually explored (*ibid*.). The approach explored in this thesis offers that all artefacts are socially-situated designed objects, regardless of any surface treatment.

Art in the Eurasian Iron Age. Context, connections and scale (Nimura *et al*. 2020) was an outcome of the European Art in Context (ECAIC) project (2015–18) that geographically extended the 'Technologies of enchantment' database project (Garrow *et al*. 2009) into mainland Europe and northern Eurasia (Gosden *et al*. 2016). In contrast to previous studies associated with the database project, (Garrow *et al*. 2008; Garrow and Gosden 2012), the term 'Celtic Art' was used deliberately and consistently, though 'with caution, emphasising its combined identity as an academic construct by capitalising both "Celtic" and "Art" and acknowledging that, as a label, it has meant many things to many people over the past 200 years' (Gosden *et al*. 2020, 1). Defined according to particular artefacts selected by scholars in the nineteenth century, this category has since become firmly established in archaeological studies (*ibid*.). While acknowledging the deconstruction of the category through the interrogation of whether artefacts were 'Celtic' or 'Art' (for example, Gosden and Hill 2008), this approach to Iron Age and early Roman material culture remains deeply informed by historically-constructed and self-referential terminology.

The University of Oxford project 'European Celtic Art in Context' (ECAIC) has located artefacts from excavations and museum collections conventionally described as 'Celtic' in order to explore the relationships between the 'central European Celts' and the nomadic Eurasian societies who inhabited the western grassland steppe extending through central Asia to China, a significant route for east–west cultural exchange. The researchers compiled resources for a database of 'Celtic art' in Europe

and of artefacts with styles considered to be broadly connected in Asia, focusing on those beyond what has been conventionally thought of as the 'Celtic' world. The European styles that developed around 500 BC and the imagery of Mediterranean traditions were perceived as 'intellectually realistic and naturalistic representation' respectively, identified as 'two streams of art and sensibility' in contact with each other and sharing 'motifs or forms … incorporated into a style with a different logic of construction and appreciation' (Gosden *et al*. 2020, 2–3). This study set out to analyse 'Celtic Art' as belonging to the northern stream, defined as being concerned with 'ambiguity, play and transformation, with a changing balance between geometric and figurative forms', flowing from the eastern steppe to the Atlantic. The southern stream was defined as being 'partly concerned with a more conventionally realistic portrayal of people and scare beings', flowing from the Middle East to Italy (*ibid*., 3).

This study's objective of positioning 'Celtic Art', within 'a broader Eurasian Universe of form and decoration' (*ibid*., 3), has continued to be informed by the duality of material form and surface effect, and the categorization of 'key motifs', artefact types, materials and contexts. In a more integrated way, this study focuses on the connections between people and things, facilitated by the artefacts they produced, which enabled creative ideas and practices to be transmitted over long distances.

While this study sought to connect creative concepts between the Far East and northwest Europe, the perception of imagery from the Iron Age and early Roman period as either 'intellectually realistic' or 'naturalistic' continued to frame the study of artefacts in divisive ways. The concept of naturalism has been understood to be a general cultural phenomenon in which similar natural affordances of forms are drawn on to design images and iconographies within specific cultural circumstances (Tanner 2017, 24–5). Different regional traditions of visual materialities are created by informing materials with concepts in culturally constructed ways, according to differing 'ways of seeing' and through differing strategies of design. As creative practitioners constantly engage with the visual world around them, these concepts may emerge from observing the effects of different types of artefacts made in different media. In conceptualizing the visual world through design, a practitioner can

transcend the attributes, applications and associated techniques of specific media, places and time in order to formulate ideas for making artefacts within their own socio-cultural environment.

Designs from the Iron Age and early Roman period have frequently been attributed with ambiguity (for example, Armit and Grant 2008, 420). This property has been regarded as 'crucial to many decorations' (Gosden 2020, 15), underlining the perception of surface designs as non-strategic and creatively unstructured, and reflecting the conventional approach of categorizing the elements of their forms. Seeing these apparently undefinable designs differently, they may have been intended to be asynchronous, communicating through a particular social network independently of the context in which the designed object was deployed. For example, a radical visual reworking of surface designs familiar to a community, kin or peer group from their ancestral past that have not survived in the archaeological record would seem 'ambiguous' in the present. As an object of design, the accumulated materiality of an artefact becomes 'unambiguous' in its strategy of layered and integrated making, including the decisions behind surface pattern-making and how they were deployed.

Most studies of 'Celtic art' have drawn on external art-historical approaches set out in earlier works, although it has also been approached 'from inside, as a technology of visualisation' (Olivier 2020, 95). From the premise that creative practitioners and the people who received the artefacts they had made participated within a shared view of reality, and therefore how it may be materially represented, it has been proposed that images were assembled according to particular rules or 'visual constraints' and that these continued to inform their transformation (*ibid*., 97). This was manifested as an 'analogical ontology' of fragmentary and composite human and non-human beings that were materialized throughout the Eurasian continent that connected China, the Scythian nomadic communities of the Steppes and western Europe (*ibid*., 104). This argument has been used to separate these images from the 'naturalist representations' of the Mediterranean region, where creative practitioners 'drew on what seemed to be useful in pursuing the exploration of form'. The 'visual

realism' expressed as 'objectal' images was contrasted with the 'intellectual realism' of the 'relational' representations of more northern and western regions (*ibid*., 106).

This dichotomous approach has been informed by Ernst Gombrich's deeply influential account of naturalism in western art, *Art and illusion* (Gombrich 1960). This proposed that making images entails a process of matching them to 'reality' by creating a visual formula that was progressively transformed according to continual testing against perceptions of reality. The assumptions constructed from logic in this account have been notably critiqued by Norman Bryson in *Vision and painting: the logic of the gaze* (1983), in which it is argued that creative practitioners and the viewers of artefacts do not access 'reality' directly but through a culturally-mediated experience constructed from the traditions of representation in their own lives. In this way, an image is felt to be acceptable through codes of recognition that link it to the experienced world. Robert Witkin has also dissolved the dualism between 'abstraction' and 'naturalism' by arguing that 'styles of art' are constructed as ways of organizing experiences of social relations, and that the 'perceptual realism' of naturalism operates at a particularly constrained level of 'abstraction' (Witkin 1995). The natural affordances of bodily shapes were appropriated as a central component in constructing classical artefacts and their iconography, enabling Mediterranean societies to articulate a wide range of social practices and cultural discourses and to shape the identities of viewers according to particular social conventions (Tanner 2017, 199–200). This transdisciplinary approach may be used to construe a more integrated positioning of image-making by Iron Age and early Roman communities with that of the peoples of the Mediterranean region in the creation, display and negotiation of their social inter-relations.

The potential of design theory and making for archaeological study

Some archaeological studies have begun to reconnect artefacts with the people who made them by exploring their materials and applied techniques. Detailed technical analyses of artefacts have provided a large quantity of information about the sources and nature of material forms, including conclusions drawn from microscopic data

about the technological processes and practices of making (for example: Rigby *et al*. 1989; Armada and García Vuelta 2018). A consideration of the conceptual and practical aspects of making, constructed through the interplay of the eye and the hands as materials were worked into artefacts, constitutes a new direction in archaeological studies of Age and early Roman material culture. This is explored further through the case studies in this thesis.

Approaches to material culture through the concept of 'design' as creative process and practice, rather than through the idea of 'art', have begun to be developed by drawing on design theory drawn from other disciplines. In 'The line, the void and the current: Iron Age art from a design theory perspective', Romankiewicz (2017) offered an approach based on architectural analysis combined with archaeological, social anthropological and art theory for exploring notions of creativity in the design of particular Iron Age artefacts. The architect Fonatti's *Auffindungsprinzip* ('discovery principle') was discussed as a framework for identifying underlying design concepts of the 'design matrix' in portable artefacts that have been conventionally termed 'Early Celtic Art' (Fonatti 1995, 19). This is based on the assumption that a design is deliberately made to 'speak' to its cultural and social domains. It was proposed that the principle that the intentions of the creative practitioner who constructed a design matrix may be identifiable within the material form of an artefact (*cf*. Fonatti 1995, 18) may also be applied to prehistoric artefacts.

Conventionally, Iron Age and early Roman artefacts with 'applied decoration' seen as constituting 'Early Celtic Art' have been considered in terms of their elaborated surfaces. Importantly, and parallel with this thesis, Romankiewicz has emphasized that the design of the surface of an artefact is integral with its overall form and that it embodies complex layers of emulation and innovation. From the standpoint of architectural design, she has contended that Iron Age artefacts were planned and made as designed entities of form and function, and that their inter-related shape and decoration were integrated with their materiality (Romankiewicz 2017, 46). This shows that the design process and the artefact produced are integrated and inseparable. Romankiewicz has used the idea of design to try to identify and analyse key concepts of recurring notions of creativity, the implications for the thinking

involved in Iron Age design processes, and the agency that informed them. She has acknowledged the validity of a semiotic approach to reading motifs and patterns, although this should acknowledge 'agency, intention, causation, result and transformation' (Gell 1998, 6). This thesis extends these concepts of the transmission of design through exploring the collaborative nature of its practice and process, such as teaching and learning in a workshop environment, and through a discussion of associative design in different media.

One particular contribution to *Art in the Eurasian Iron Age* (Nimura *et al*. 2020) has been derived from conversations with contemporary designers and makers of artefacts in gold, silver and other media (Machling and Williamson 2020). Exploring the making process of gold-alloy 'torus torcs' in conversation with experienced goldsmiths working in different traditions and with varying techniques has provided insights into the complexity of their design and the expertise required to assemble them. Generating new information that could not be acquired through the more usual procedures of archaeological analysis, this approach shifted the focus of research to the practitioner and their making of the artefact (*ibid*., 179 and 194). It was surmised from the collaborative conversations between the contributors to this project that Iron Age goldsmiths probably also gathered to compare approaches or techniques, resulting in certain similarities between the artefacts they produced. That knowledge of making things are taught and learned is acknowledged, and that skills are developed from knowledge through experience (*ibid*., 181). The ability to realize a new idea emerges from 'building skill through practice' through a creative practitioner's routine of sustained focus on their materials and techniques (Sennett 2008, 38). The processes and practices of making, both in the past and the present, constitute the mechanisms for materializing the socially integrated strategies of design. Conversations with contemporary designers and makers therefore has great potential for informing a design approach to the study of Iron Age and early Roman artefacts.

This thesis has been developed in parallel to that of Romankiewicz, with a view to relating the concept of design to wider aspects of materialized social constructs. All materials and the processes and practices affecting them are subject to design

concepts. Further to the idea of integrated entities of design, there are implications for changing, for example, the surface design of an artefact; that alterations would redeploy the perception and reception of the whole designed object as effectively as changes in its underlying form. This repositions the idea of the surface treatment of an artefact from one of visual 'decoration' or 'ornament' to one of a conceptually elaborated design, moving the artefact to a different network of cultural associations formulated through the strategy of design.

Conclusion

Archaeological approaches to material culture have long been deeply informed by more traditional art-historicist principles. Artefacts have been compartmentalized effectively as 'art' and 'non-art', from which categories and frameworks have been generated to build concepts throughout the discipline of archaeology. Designs in metalwork have been the subject of most studies of Iron Age and early Roman 'art', often to the exclusion of artefacts in other media (for example, Jope 2000). The idea of 'art' continues to inform how studies that have attempted to reintegrate it into wider studies of archaeological evidence are framed; for example, it has been stated that 'Understanding art is not possible without also examining the artefact and the archaeological evidence' (Joy 2011, 205–6). The idea of an 'art object' has been central to many approaches to the study of material culture, and whether an artefact constitutes a 'work of art' has continued to underpin research into Iron Age and early Roman material (for example: Spratling 2008; Gosden *et al*. 2014; Olivier 2014; Hunter *et al*. 2015). Studies that attempt to critique this terminology nevertheless continue to make use of it in their ensuing discussions (for example: Gell 1998, 5–7; Garrow *et al*. 2008, 8–13).

3 Towards a working definition of design

'To design is to decide.'
Hugh Casson, 'Design talk: constructing the object in studio conversations' (1979)

'Everything depends on Design.'
Vilém Flusser, *The shape of things: a philosophy of design* (1999, 21)

Introduction

There are many ways to model concepts and processes of 'design', and there have been countless attempts to describe it, both in print and online. The approach taken in this thesis has been partly influenced by the work of Gilles Deleuze and Félix Guattari (Deleuze and Guattari 1987), combined with an emphasis on the integrated practices of design and making. That a creative practitioner embodies a designed and made object with 'aspects of design' that continually emanate from it has been informed by the concept of 'lines of flight' through which things are continuously affecting, being affected by, and changing people and events encountered along these pathways (*ibid*., 508–9). This has particular significance for exploring the role of design in Iron Age and early Roman societies in this thesis, dissolving archaeological divisions based on media and areas of production and use and connecting people through networks of associative design. This concept also allows for the interconnection of the pasts, presents and futures of artefacts, as conceived at different points during their making, use and circulation, and also after their recovery from the ground.

In this section the etymology of design is explored as a basis for critiquing the terminology generally used in material culture studies. The development of design as a discipline into one with contemporary notions of reflective practice reveals how it has been continually driven by and has responded to social requirements and context. The discussion of conceptual and material aspects of design and making in this thesis have been informed by Vilém Flusser's proposal that 'material' and 'immaterial'

forms both contend with visibilities, invisibilities and transmissions in the networks of association that accrue within the design of an artefact (Flusser 1999, 22–9). This conflates the ideas of designing and making with how creative practitioners bring about their objects of design, by 'in-forming' materials with their concepts of how things should come into being through their techniques and technologies. Fundamentally for this thesis, designers construct strategies for articulating materials towards the object of design within their own social contexts. The collaborative encounters that take place within the process and practice of design, the conversations and transmission of design through teaching and learning, are discussed.

Design ideas – process and practice

The generation of ideas is central to design. Within the design process this channels subsequent creativity, the interpreting of ideas and the materialization of the designed object. These are all subject to modification and change according to the requirements of the cultural, social and economic contexts within which the design process operates and which are interlinked. Trial and experiment are important aspects of the design process, of physical prototyping a natural outcome.

The design field has been described as the articulation of awareness, skills, thinking and research (Moggridge 2007). Design awareness involves the selection and design of artefacts that promote an individual's or group's identity. Design skills can be significantly developed within the environment of a group practice. Design thinking is a strategy constructed to explore issues and problems while innovating within the process. Design research explores past and contemporary creative processes. Design has therefore now become identified as a fundamental mechanism within the life of a society, the practice through which innovation, agency and change are brought about. This positions design as a new core concept for approaching the study of material culture.

Design has also been described as conceptually located at the nexus of theory and practice, 'art' and 'science', integrating information from knowledge and actions in a way that connects the influences of the past with ideas of new future possibilities

(Wahl 2016). Actions are nevertheless always fundamentally informed by the current social system of values and perspectives within which they are carried out, and so designed objects may be constituted to connect the past with future aspirations in the context of the present. For exploring material culture, the idea of design may therefore be used to connect past, present and future, while encompassing aspects of cultural variation, complexity and difference in the designed object.

Vilém Flusser and the communication of design

Through his philosophy of linguistics, combined with empirical observation, the media philosopher Vilém Flusser was able to deconstruct and reconstruct design in a different way from traditional art-historical approaches to form. He viewed design as a process that 'makes its discursive, apparently wasteful way … towards the perfect reconciliation of needs with resources. … Words and the languages in which they are packaged became the means whereby … design proliferates and cross-fertilises' (Flusser 1999, 8).

Flusser's essays on the design of everyday things, *The shape of things: a philosophy of design* (1999), are based on a philosophy that is specifically about form – the design and constituted shape of things – and how it relates to other disciplines within the 'arts' and 'sciences'. In an essay on pots, Flusser wrote that 'A pot is a vessel, a tool to be grasped and held' (*ibid.*, 99). A pot filled at a water fountain affects both the container and the contained; the shape given to the water ends its formless flowing. Through this notion of the 'hollowness' of the pot Flusser demonstrated how an artefact constitutes an intersection of the many ideas and people attributed to and associated with it, such as pottery design, the act of fetching water, enclosure, and serving and pouring water into other vessels. This conceptualization of made things offers another 'way of seeing' that goes far beyond the linearity of some biographical approaches and emphasises the multi-directional transmission of ideas and actions that are materially embodied by design.

Flusser's concept extends beyond thinking about what is known about an artefact, and how this is known, into an exploration of the nature of its attributes; the network

of people and things associated with an artefact, in the past and through to the present, are embodied within its design. He contended that an artefact constitutes the results of a process of observation and experimentation, an embodied empirical form of knowledge that is always waiting to be 'filled', interacted with or completed by other associations and attributes; 'What is at issue is the concept of in-formation. In other words, imposing forms on materials' (*ibid.*, 28). A designed object therefore comprises a materialized form that has been continually shaped and refined through subsequent experiences and interactions.

Flusser equated making with learning, the production and passing on of information. He suggested that people can be identified through the study of their 'factories', the design spaces of workshops and the creative and organizational tensions that took place within them (*ibid.*, 43). He defined the making of artefacts as 'turning what is available in the environment to one's own advantage, turning it into something manufactured, turning it over to use and thus turning it to account' (*ibid.*, 44). He imagined how the turning movements of a maker's hands were extended by tools to 'enlarge the pool of inherited information by means of acquired, cultural information' (*ibid.*). The introduction of new technologies into an environment of making things constituted a 'new form of human existence' (*ibid.*, 45), where changing raw materials into cultural artefacts is connected to the natural environment from which they were sourced.

In his essay, 'Form and material', Flusser described the material world as an illusory amorphous state that only acquires a physical presence as 'stuff' once it has filled, or 'in-formed' a conceptual, immaterial form. Designers and makers impose 'immaterial forms' (concepts) and techniques on materials to bring them into the materialized world through their strategy of design (*ibid.*, 22–9). The creative practitioner perceives the raw material in the form of an artefact and embarks on a strategy to bring it into being. The perceived dichotomy between 'material' and 'immaterial' things becomes dissolved within the practices and processes of making of designing and making. The creative practitioner engages in both 'material thinking' about representations or images and 'formal thinking' about how immaterial forms may be brought into effect through their designed appearance.

This thesis considers that the socially-integrative process of learning is a fundamental part of making within design practice. Making things involves a process of articulating inherited information and increasing acquired or learned information. Acquiring, absorbing and articulating this information means that makers become transformed (in Flusser's terms, more 'artificial'), inter-relating with their tools and media as they convert and assemble materials into artefacts. The practices and processes of making continually deepens their experience, generating new types of makers, as well as artefacts, with specialized knowledge and abilities with the potential to change design and therefore aspects of social practice.

The ways in which an artefact from the past is affected after its recovery in the present – through conservation, display, conversations, remaking and redesign – generates further aspects of its design. A 'designed environment' therefore comprises an 'admixture of the past … and the present' (Henry 2007) within a continually socially-constituted process.

Visibilities and invisibilities

The visible aspects of an artefact have been considered by many archaeological studies to 'represent' the results of a visual design process and, by extension, this has excluded other aspects of making. The distance from which an artefact was viewed has been considered as 'crucial to aesthetic experience' (Spratling 2008, 191) and the velocity at which the artefact is moved a test for its visibility (for example: Giles 2008, 59; Spratling 2008, 191–4). Concepts such as the aesthetic framing of artefacts and the significance attributed to assessing one aspect of a designed object's visibility have disconnected the material object from the people and practices involved in its making from their networks of association.

This pronounced emphasis on the visible aspects of an artefact's material presence has generally been associated with the 'invisible' aspects of a designed object being approached from the point of view of semiotics and codification (for example, Olivier 2014). The oppositional states of presence and absence, applied to materialities and

how the past has been translated to the present, have been fundamental to studies of material culture.

Domanska has challenged this paradigm of representation by adapting Greimas' graphic model of a semiotic square, itself based on the logical 'square of opposition' of Aristotle, in order to explore encounters with what remains of the past (Domanska 2006; Greimas 1983) (**figure 2**). To the model's first-level terms of 'presence' and 'absence', selected on the basis that each implies the other, Domanska has refined them logically by applying the second-level compounds 'non-absence' (an imprint, rather than a material trace, of the past in the present) and 'non-presence' (something that had never been in existence, such as a *simulacrum* (copy of an imagined original) (Baudrillard 1981). Both of these compound terms evoke presence and absence in which the past and the present are conflated in an 'anachronic' way (Knappett 2013a, 38–9). This model admits the idea that 'distinctions or contrasts are more-or-less; … differences or contradictions are either:or' (Shanks 2012, 136), dissolving the categories that have been applied to material culture and how it has been discussed and displayed since its recovery. Domanska has used the semiotic square model to construct a temporality of the past in the present.

This conceptualization of the material past operates within the design process, as practices of making entail the opening up of possibilities through both logical and imaginative connections that may be invisible in the resulting artefact. As the semantic square model is further developed with compound terms, contradictory aspects and implications emerge that are reflected in the trajectories of design. For example, the cognitive practices of making involve dealing with such issues that arise from particular design requirements or choices that must be resolved in order to produce the final designed object.

Domanska's adaptation of the semiotic square model is also useful for exploring the reception and display of the past in the present time. Designed objects incorporate materials and their associations that have undergone many types of transformations, dematerialized and disassembled to be rematerialized and introduced in their new forms into current networks of associations (González Ruibal 2018). These may be networks of curation, collection or display, both in the past and the present, that

connect through to contemporary concepts of exhibition. Archaeologists reveal the 'materiality of the invisible' (Shanks 2017), things that have been hidden or unobserved, building narratives loaded with meanings that shape how past material and people are perceived in the present. The environment staged for the display of a past or contemporary designed object, how it is 'performed' in the present, determines how it is visually accessed and viewed, fundamentally affecting how it is perceived and therefore changing its design.

Thinking creatively

Archaeologists have generally observed and described the similarities and differences of material culture through constructed categories such as elements of surface patterns, 'traditions', 'influences', 'styles' and typologies. From the viewpoint of design process and practice, these categories and frameworks serve to focus only on particular aspects of design and to disconnect the associations that have been integrated by practitioners within the social design of things. Breaking down the material expressions of highly integrated and fluid associative processes of making into similarities and differences into archaeological categories appears to be based on the assumption that people have designed and made things at particular creative moments of time (Molander 2018, 9). This implies that there are also 'uncreative' phases, when there are no changes in design or that they are too subtle to observe, and that the continuous process of learning through acquiring knowledge is a discontinuous process. This is to disregard how practitioners are necessarily continuously creative in designing and making things in their social practice. In studies of Iron Age and early Roman material culture this approach to research has created an established tradition of focusing on the detail of elaborated artefacts.

In considering that the material and materiality of an artefacts are integrated with its form and surface treatment, Romankiewicz has suggested that they 'generate the object's essence' in a comparable way to the architectural design of a building (Romankiewicz 2017, 46). This study drew on the concept of a 'design matrix'; although invisible, this may be identified by analysing the morphology of an artefact

to trace the design process in reverse (*cf.* Ingold 2013, 7–8). This assumption that there is an in-built mechanism that controls the effects of a designed object has also been drawn from art-historical approaches, and positions creativity as an intrinsic process of 'action without agency … not done by an authorial agent with a design in mind' (Ingold 2014, 136–8). This view of creativity as an intrinsic process has separated the cognitive process from the idea of design as a strategy, and also its practitioners from their societies. This thesis, however, offers that design is an extrinsic, collaborative phenomenon, both driven and responded to by conversations between creative practitioners and their communities through time. Continually emerging towards the point when an artefact is materialized, design is a process though which society may reassess how it relates to its past, and one which continues to be revisited through time.

Collaborations and encounters

Among present-day designers and makers, it has long been realized that excellence is acquired through the experience of making things, 'a process amplified by personal reflection and social engagement' (Henry 2010), integrated with learning and sharing knowledge and experience with others that reshapes wider socio-cultural forms. These collaborative aspects of design extend creative work beyond the making of single artefacts into assemblages of people and artefacts in networks of broader socio-cultural association. In order to envisage the relationships and creative spaces of Iron Age and early Roman workshops, where materials and ideas were formulated into designed objects, some aspects of the collaborative process are explored.

The transmission of knowledge and the techniques through which an individual's skills develop through instruction and learning require the availability of experienced practitioners, appropriate spaces, access to tools and resources, and time. The performance of design involves phases of physical inactivity as well as activity, the processing of information into creatively networked ideas as well as applying tools to the materials to transform them towards the object of design. A workshop environment constructed for making particular artefacts allows designers to articulate

their concepts of theory and practice, perform their design strategies in their transformation of materials towards designed objects, and to develop their spaces for design as their creative projects emerge. By assembling tools, materials and other equipment in a scene appropriate for creative work, designers and makers set up an environment where they can explore the relationships between the design and use of artefacts and potential artefacts. This environment facilitates and encourages instruction and learning, and the transmission and maintenance of hard-won experience and knowledge over time, a creative space where innovative and controversial things may be showcased.

Conversations

The concept of 'design' is essentially a collaborative process linking creativity with innovation by which abstract thoughts and inspirations are transformed into tangible form. The design process may be described as a social strategy – the identification of a requirement that is then defined and refined by trial procedures and in conversation with others (for example, in a workshop environment), developed through ideas reviewed through cultural thinking and design, and then delivered and deployed within society. Such 'conversations' are fundamental to the practice of design.

In his discussion of the 'dialectical image', Walter Benjamin proposed that artefacts, as socially constructed material forms, became conversation pieces though which the people who came into association with them communicated and arbitrated with each other (Benjamin 1999, 462). Designed and made artefacts, from articles of everyday utility to commissions for particular circumstances, were constituted as connective devices to be viewed, handled and conversed about by individuals and groups.

Using this analogy of language, artefacts may be viewed as 'statements' in the 'conversations' of design, networks of associated ideas embodied in physical form, with conceptual points of departure for further discussion, decision-making and action. This discourse between people and materials fundamentally informs the design of an artefact, from first concepts to its making for a particular socio-cultural

context, and also its reception, remaking (either conceptual or material) and display in later quite different cultural and social contexts. These interactions continually transform and draw people and materials together in both differing and new ways.

Workshop spaces for design

Envisaging the workshop as a place where creative practitioners enquire into materials and forms as new ways of modifying social behaviour, appearance or identity, directs study towards design as a process rather than on particular makers or artefacts. Through the design process a practitioner is able to develop new concepts that may be regarded as controversial or challenging within their own society, or to formulate a reaction to the arrival of a new culture. Commissioners and others associated with the resulting designed objects are drawn together by its effects and reception in new ways, as these artefacts emerge as 'ready for unexpected use and opening up new ways of thinking and behaving' (Friedman and Stolterman 2011).

The cultural background and experience of a designer or maker also influences how they conceptualize an artefact, and therefore affects their working practice and the design process in which they engage. The ability to collaborate with others is also a crucial issue for the successful outcome of a design project. Research into engineering design and methodology has concluded that different culturally-affected approaches may be used within one design process, and that there may be large differences of approach among designers within one culture (Gautam and Blessing 2007). The dynamics of design and making in workshop spaces, within their particular socio-cultural and regional contexts, are considered further through the case studies in this thesis.

Associative artefacts

Artefacts, through the processes and practices of making, embody aspects of design within networks of associations with other people and things. Conventionally they have been disassembled by analyses in order to subject them to categorization and to

create frameworks as bases for both conceptualizing and further categorization. Such frameworks break down the networks between the aspects and associations that are fundamental to the design of an artefact. This thesis seeks to reconnect these in order to show how artefacts may be explored through aspects of their design and making. Through considering the 'spaces between' the immaterial and material aspects of an artefact, where design is situated, it may be possible to derive new ideas about the social associations with which it had been informed.

An artefact may be thought of as being related to its various attributes by 'lines of flight' (Deleuze and Guattari 1987, 508–9). These connections are made, altered and developed when the artefact is processed by its maker through experimentation and innovation and when it is exchanged, consumed, displayed, deposited, recovered and processed further. These associations are continually being accrued, but also being brought to an end, as they are formulated and remade as expressions of memory and forgetting. This process operates through the changing knowledge and experience of people who engage with the artefacts, from the time they are designed and made, through to their deposition; and, if they are recovered, by means of their display and further reception and remaking in the present and into the future. This concept operates beyond the idea of a 'biography', as the design process of perception and remaking, material or conceptual, of the artefact as a 'deep map' (McLucas 2000) of socio-cultural experience is continually transformed by both observers, users and researchers through time.

Conclusion

Central to this design approach is the practice and process of making things, the applying knowledge and expertise to materials. Design is a concept on which all matters of making depend. This approach affords an opportunity to explore the contemporary practice of some designer-makers within their own creative spaces, in order to determine insights into aspects of the design of Iron Age and early Roman artefacts. The design process links all aspects and associations of constructed objects – artefacts, buildings and landscapes. This process encompasses individual portable

or fixed objects, networks of similar or different objects, and all objects within society – design is a social construct and process. Design operating between social groups within their encounters facilitates the transference of aspects of design by mechanisms such as exchange, population movement, invasion, diplomacy and gifts, all of which are bound up in travel – the geo-chronological shifts of people and objects together.

A fundamental premise of this thesis is that design constitutes networks of artefacts made in all media as expressions of social relations, and that display and viewing – present 'ways of seeing' – constitute part of their ongoing design. From the point of their recovery, the conceptualization and construction of objects from the past is extended into the present through conserving their materials and stabilizing their physical decay, and through their display in continually changing social contexts. The design of an artefact may also be continued, and extended, by learning and interacting with its constituent materials and techniques though the actions and process of remaking; this is explored through the textile and ceramic case studies (*see* **6.1** and **6.2**).

4 Design related to some theoretical concepts

Introduction

The development of the design approach set out in this thesis has been partly informed by the concepts of chorography, embodiment, assemblage, entanglement, dividualism and enchainment. This approach applies these concepts to artefacts to situate them as connected networks of design associations within local, regional and inter-regional societies. These concepts have therefore been drawn on to apply the idea of design to the study of Iron Age and early Roman artefacts.

Chorography

The concept that constructed things have 'social lives' has been widely used in studies of portable artefacts, buildings and landscapes (following Kopytoff 1986). This approach deals with things at different phases of their physical existence, as they pass through different social contexts and acquire differing evaluations and significances though changing perceptions of their design (Hahn and Weiss 2013, 3). An artefact that was designed and made for a particular social occasion, for example, may then become reused for other purposes or curated as a memory-piece, integrated into networks of the living and the dead.

In the study of material things, the term 'biography' by definition describes a 'lifespan', the unfolding of making and use that ends with the removal of its physical presence from the world of the living. This has also been conceived of as the *châine operatoire* ('operational sequence') that closely associated technical processes with social and bodily actions and significance, promoting the social analysis of artefacts (Leroi-Gourhan and Brézillon, 1966). Both of these concepts describe mechanisms that are brought to an end when the artefact is destroyed or deposited. These ways of seeing need to be extended in order to accommodate aspects of design that operate beyond this end point, such as the effects of conservation on a recovered object

intended for archive or display, the remaking of the object, or the creation of new objects that refer to them. The idea of networks of people and things that become associated with each other through mechanisms such as making, travel and exchanges between places and across spaces and time is more appropriate for articulating such multi-dimensional activities and the mutual interactions and transmissions that take place.

The older term 'chorography' is a concept concerned with the description and representation of a particular place that allows expressions of social experience to be drawn into the performance of place-making. This concept of characterizing a place was derived from the writings of such classical cosmographers as Mela (*De chorographia*, first century AD) and Ptolemy (*Geographia*, second century AD). During the seventeenth and eighteenth centuries antiquaries inspired by these classical commentaries on place wrote chorographies comprising information on topographies, local histories, communities, memories and stories of a district or region.

This sense of place may be articulated and expressed through a 'design of place' – making artefacts, creating architectural traditions, and planning local and regional landscapes. The continuing chorographical development of an area necessarily involves a sense of time as well as a sense of place, as both artefacts and oral tales become vehicles for remembering and forgetting within the multidimensional network of community associations. Chorography may be extended to include artefacts that operate as part of these spatial and temporal environments. As networks of inter-related associations, artefacts may therefore be conceived of as being chorographies of things and also as intra-chorographies of continually evolving design processes that link the past with the ever-changing present.

Designed embodied objects

The concept of 'embodiment' has been used to review how people relate with objects in their surroundings and with which they come into contact. It holds that, in the designing of artefacts, elements of human and animal body forms may be combined

with other aspects of the process, such as the intended purpose of the finished piece, 'which invites interaction with other bodies' and environments (Gaifman and Platt 2018, 404). Choices are made, therefore, at the beginning of the design process with the objective of attracting use to the designed object, according to its intended purpose. It follows that later alterations to the finished object are formulated and applied to make a change in its intended use. The form or material of an artefact may also be altered, reconceptualizing its design so that it must be redeployed within or removed from its former network of associations. Designed objects that are both unchanged and altered may be further redeployed by being fragmented, and are only finally removed from their associative networks when they are deposited in the ground or hidden permanently from the view of the living community.

The embodiment approach perceives people as being within complex reciprocal associations with the artefacts they make or receive, engage with and are affected by, rather than as subjects who act on inert material objects. People's social associations and their artefacts therefore constantly emerge and change in a complex process of socio-cultural design. There is significant potential for conceptualizing artefacts as 'embodied objects' within their context of use, rather than conventionally perceiving them as passive things distinct from their active users. Hodder has set out how human culture may be fundamentally defined by a dynamic entanglement of people and things that links them together in networks (or associations) as a way of understanding social and technological change (Hodder 2012).

Assemblage and entanglement

Assemblage thinking and actor-network theory have been widely used to challenge the focus on representation and semiotics in the study of material culture. The idea of an 'assemblage' of people and things has been derived from Deleuze's concept of *agencement*, in which things have been designed or arranged in particular ways in order to make specific connections (Deleuze and Guattari 1987). This may be clearly perceived in the case of artefacts designed to be closely related to the human body as they are worn or handled, a relationship in which they become 'charged' (Gaifman

and Platt 2018, 404, 408) and also emit associations that are beyond their materials or symbolic representation (for example, in the case of amuletic devices).

Actor-network theory also relates people ('actors') to their technologies and other non-human things ('actants') (Latour 2005) as 'a continuously generated effect of the webs of relations within which they are located. … Its studies explore and characterise the webs and the practices that carry them' (Law 2009, 141). This theory rejects oppositions between culture and nature, while people and things are considered to possess equal agency as 'nodes' within 'actor-networks' of association. This theory of 'symmetrical archaeology' is useful for not only conceptualizing how artefacts are brought into being through design processes and practices but also why decisions are made to discard or alter elements during these operations, or when the creative practitioner judges the designed object to be ready for its intended purpose.

The concept of assemblage and actor-network theory both connect people with artefacts and other things in associative networks that other studies have treated as conventionally separated. Both hold that these 'socio-material' relations depend on the concept of 'emergence', of work in progress that becomes enlarged as associations are accumulated. Assemblage often reflects on the construction of strong associations that would sustain the design process of an event (or an artefact) if a change of direction was required due to unforeseen circumstances; actor-network theory emphasises the fluidity of associations in design. Both approaches place an emphasis on analysing how particular individuals or societies produce artefacts to display and perpetuate their attitudes, wishes and intentions within networks on associations.

The concept of 'entanglement' has been developed to focus more on the ways people and material things 'entrap' each other in their connected associations (Hodder 2012), and that they interact in unexpected ways in the 'spaces between'. This also occurs during the design process; for example, decisions may be made for practical or conceptual reasons of design, such as the availability of material components or the perceived intentions of clients or potential users. The deposition of an artefact constitutes a truncation in its design process to break its entanglement, when it is deliberately removed from its socio-cultural context.

Dividualism and enchainment

The ways in which people connect in their societies have been conceived as 'individual' and 'dividual' networks of inter-relations. An individual person becomes dividual by becoming defined through their connections with certain other people and things, so that they are subject to developing reciprocal and lasting relationships of 'enchainment' (Chapman and Gaydarska 2007). On a wider scale, the relationships between people, designed objects (portable and non-portable artefacts, the forms of buildings and settlements they live in), and the natural and altered environments they worked in and moved through, transform their ideas of personal identity (Jones 2005; Chapman, in progress). The process of the accumulative enchainment of ideas that people make between themselves, objects and places operate continually throughout society. This behaviour of networked dividual practice ranges from making everyday artefacts for the household to acquiring materials, technologies and expertise for creating particular or innovative designed objects.

These concepts have significant implications for envisaging the new technical and creative skills that were developed at times of cultural change in the Iron Age and early Roman period. In forming new social relationships through cultural change, people may therefore have become both individual and dividual in the households and work places in their communities and within their wider social connections (Chapman, in progress).

reception into new socio-cultural contexts, to increase their effectiveness and connecting them into familiar deep-rooted iconographies. The Greek tradition of curating particular artefacts for long periods (*keimêlia*) as redesigned objects entangled with the past transformed them into talismans and memory devices (Reiterman 2015). These artefacts could be used to articulate an individual or group identity through their redesign that connected those who possessed and displayed them with people from different periods of time, places and cultural traditions, implying that the redesigned artefacts were used to structure personal histories and how the past related to the Iron Age present.

Conclusion

The social, cultural and economic transformations in Europe during the third and second centuries BC involved expanding populations who changed their landscapes, intensified their agricultural production and produced new types of artefacts to articulate their social interactions. These interconnected agrarian societies devoted resources and time to constructing and displaying their local and regional group identities as new conceptual and material resources for artefact design were exchanged between communities. By the first century BC communities in new settlement networks that included the larger developments at *oppida* expressed their new inter-relationships across Europe through redesigning familiar forms of artefacts and making new designed objects by using their regional technologies and techniques. The transmission of design concepts through contact and exchange networks was essential to the particular constructions of changing social identities that took place from eastern Europe and the Mediterranean to the Atlantic coastal regions. Through the redesign and new design of material things, communities continued to maintain links with their past while expressing new concepts of materiality in order to affect their future encounters with others.

by either creating artefacts of their own design or by modifying the forms and surface designs of those previously made by others. Design novelty therefore references new social developments as an 'embodiment of the social' (*ibid.*, 4). Societies transform their environments by redesigning portable artefacts, buildings and landscapes to make them more complex and technologically altered (or, 'artificial' in Flusser's terms). As perception and behaviour are directly connected, aspects of design can be used by creative practitioners and their clients to change how things are perceived and, therefore, the response to designed objects.

This realignment of designed objects, brought into a different regional social context from that in which they were produced, is exemplified by the two Greek cups (*kylikes*) buried at Kleinaspergle as part of an assemblage drinking gear (**figure 4**). Made around 450 BC, the two-handled cups had been painted black, one in the red figure tradition, the other without motifs or patterns, and both had probably been used and stored for a long period. The cups had been subsequently overlaid with gold foils in the shapes of plant elements, finely hammered in relief, by a goldsmith who may have been attached to the wealthy household in the area of the Hohenasperg (Böhr 1988, 176 ff; Schaaf 1988, 191–5). The concept for the redesign of the cups may have been informed by the treatment of elements of other artefacts in the assemblage, such as in the elaborated handle mount of the bronze flagon and the small openwork mount applied with gold-alloy foil (**figure 5**). These cups have been redesigned to socially resituate them from a context of Greek wine drinking into a reception as far-traded exotic artefacts to be redeployed in the drinking set of a new owner in central Europe.

Transforming design may also be represented by the assemblage of feasting gear from a wealthy burial at Lavau (Aube, France) that included a Greek wine-pouring vessel (*oinochoe*), placed inside a cauldron. A gold-alloy crimped band had been applied to the rim, and the foot replaced with a composite form in tooled gold alloy and silver alloy or tin (Dubuis *et al.* 2015). The person who acquired these cups in central Europe may have commissioned their redesign in order to socially resituate them from the traditions of Greek wine drinking into their own. Changing the design of artefacts acquired from other regions may have been a necessary part of their

thrown within their creative strategies in varying ways, extending their knowledge and expertise and, consequently, their access to a wider range of commissions, including those for novel designs. This implies that the Aylesford-Swarling 'tradition' of ceramic design and making was varied by potters working in collaboration with their commissioners to produce what was continually required.

Turners of artefacts in shale and wood also began to use this type of mechanized technology in the form of the pole lathe. Potters and turners supplemented and extended their knowledge and skills to develop the traditions of working their particular materials by hand. This relational aspect of design between the potter's wheel and the pole lathe was materialized in artefacts that were fully formed on these machines or in hand-built artefacts that were finished using turning devices in a process of varying technological application. The concept of design may be used to reassemble aspects of creative practice that have conventionally been categorized in archaeological studies into 'handmade', 'wheelmade' and according to media.

Transforming identity through design

A collaborative project carried out by researchers in archaeology, heritage, biosciences, informatics and philosophy on the cognitive analysis of the visual environment has proposed that an observer's 'selective attention' determines how they explore and interact with their surroundings, including their visual response to artefacts designed and made in different socio-cultural contexts (Criado Boado *et al*. 2019). The project measured responses to viewing pottery types dating from the Neolithic to the Iron Age by tracking the movement of the eye. The research proposed that, as cognition continually relates the viewer with their environment, the design of material objects and the visual responses they elicit evolve together to reflect changes in social complexity and culture at all periods (*ibid*., 1–2).

Visual saliency directs the attention of the viewer to particular aspects of designed objects. Iron Age and Roman creative practitioners who had observed this phenomenon would have then had the potential to both respond to and direct cultural change through their designs. They would have been able to achieve these objectives

reasons or gender (*ibid*., 220; for example, Hill 2002). Although the installation of turn-wheel technology in potters' workshops reflected a change in their creative strategies of design, for many practitioners it represented an extension of their existing practices, rather than a fundamental technological change.

After around 25 BC potters working in southern Britain began to design ceramics with concepts transmitted from Gaul, including forms with cordons, pedestal feet and lids such as those from assemblages at Prae Wood (St Albans, Hertfordshire), Sheepen (Colchester, Essex), Baldock (Hertfordshire) and the forum-basilica at Silchester (Hampshire). This late Iron Age pottery, termed 'Aylesford-Swarling', has been reassessed as representing 'an assemblage of technical, stylistic and cultural attributes' through which the artefact may be explored in detail, particularly as regards to how the potter's wheel had been used in practice (Sutton 2020, 215). Empirical and radiographic studies have shown that many ceramics designed and made within this tradition were hand-built as 'wheel-coiled' forms and then finished on the wheel with the addition, for example, of cordons around the body (for example, Courty and Roux 1998). Parts of vessels of all sizes, such as rim-necks of larger storage jars and pedestal feet for smaller vessels, were also shaped on the wheel and then attached to the body by hand (Sutton 2020, 230–1). It has been noted that at least half of the Aylesford-Swarling vessels reassessed from Berkshire, Hampshire and Hertfordshire had been hand-built and wheel-finished (*ibid*., 227–8). Potters in these regions continued the tradition of coil-building larger vessels, while smaller pots were thrown on the wheel.

This change in the strategy of design was a response to changes being made in society as communities began to renegotiate their identities within their wider societies and commissioned artefactual forms as material statements of this process among others (Pitts 2019, 41–2), to be deployed in feasting and funerary contexts. Potters may have decided to use the newer technology of the turning-wheel to shape ceramics that had been particularly commissioned for display and for containing food and drink, where the technological method of shaping the pot, in addition to its form, was intended as a novel statement set within the older traditions of their design strategies. Potters conflated the techniques and forms of the hand-built and the wheel-

from the burial at Hochdorf (Baden-Wurttemberg, Germany) of around 530–20 BC (**figure 3**), originally designed and made in Greece around 550 BC, would have been able to control the focus of their guests' attention on their generosity and hospitality. It has been estimated that this vessel could contain up to 500 litres of mead (Joy 2014, 341–2), representing the communal effort of gathering around 184 kilograms of honey. It is possible that the last owner of this cauldron may have acquired it through their peers' social connections as a gift or item of elite exchange. The cauldron had been carried into many feasts hosted by its owners and their kin and had been skilfully repaired by Iron Age bronzesmiths.

In a comparable way to the framing of the Greek cups from Kleinaspergle made over one hundred years previously, which had been fragmented, repaired and redesigned with patterned foils in gold-alloy, the design of the Hochdorf cauldron may have been altered to redeploy it within a new regional socio-cultural context. Both fragmenting and redesigning these designed objects 'enchained' them within the regional networks of their new owners (Chapman and Gaydarska 2007, 111), with creative practitioners using familiar ways of seeing to embody new images into their societies. If the new lion mount on the rim of the Hochdorf is part of this enchainment within the redesigned object, the replaced mount was also constituted within this network through its newly-acquired mobility for other uses, perhaps becoming a token or relic strongly resonant of past relations, reincorporated into a composite artefact or removed from its enchainment to become a curated heirloom (*ibid*. 112).

New concepts of identity through handmade and turned design

The duality of 'handmade' and 'wheelmade' has been critiqued in terms of the production of pottery during the late Iron Age in southern Britain (Sutton 2020, 219–21). This 'binary logic' has been used to separate Iron Age communities of potters according to their technological practice and with inferences for the categorization of practitioners into socio-economic groups such as those based on 'household production' (Rigby and Freestone 1997, 61), increasing specialization for economic

widely, including unelaborated bar forms, such as on a vessel from Elveden (Suffolk), or forms cut with openwork or recesses and filled with red glass paste inlay, such as those from Seven Sisters (Glamorgan, Wales). The different technologies and techniques required for the design of the elaborated drinking vessels reflects a considerable investment of skill and expertise by the communities who made them. These artefacts also reflect a collaborative attitude to designing things, and may have been produced in a workshop where practitioners in woodwork, metalwork and glasswork worked together on their designs.

The design and making of artefacts for preparing, serving and consuming food at the feasting table could also be informed by concepts of social differentiation, integrated with the particular substances that they were required to pour or contain. Wine had been a significant liquid in social and spiritual ritual life at least since the use of elaborate ceramic drinking sets in the late Neolithic in continental Europe (Sherratt 1987). During the Iron Age exchange networks with the Mediterranean region provided some rulers and community leaders with the means of accessing an alcoholic drink that could be stored long-term, unlike ale or mead which would have to have been consumed within a relatively short time of its production, and that could be shared according to their own social strategies of commensality (Arnold, 1999, 74). These strategies would have been integrated with the design and making of the artefacts required to articulate them. This new type of alcoholic drink required new designs of containers that required different ways of presenting, handling and pouring into the drinking cups of those whom the host sought to bind into their social network.

Reconstituting design

The frequency of 'repairs' observed in excavated feasting artefacts may indicate attitudes to their materiality far beyond practical considerations of prolonging their use or ideas of valuing them as objects. Many of these changes were made throughout their time of use, possibly indicating the realignment of the designed object according to changing social requirements of the feasting occasion. The owner of the cauldron

it was poured at the table, embodied with the social behaviours of the feast through their material design.

Through its representation of commensal hospitality, the design concept of the cauldron could be extended to inform other media. Creative practitioners articulated this concept to design containers for collective dining in a wide range of media, in ceramic, for example, from Ardleigh (Essex, England), and in wood, for example, from Ireland (Joy 2014, 341). Designers and makers would have drawn on the social integration to materialize the social networking of the feast into designed objects. Through the integration of feasting ritual with artefact design, hosts and their communities could maintain or renegotiate their social positions independently from acquiring artefacts from distant regions such as the Mediterranean region (Diepveen-Jansen 2001, 207) or in the particular medium of elaborated metalwork. The concept of a centrepiece artefact at a feast was one that could be adopted throughout society. At other feasts the leaders of smaller rural community groups may have collaborated to contribute and arrange the preparation of the food and drink, and to supply the vessels form which they were served and consumed. Practitioners based at workshops attached to wealthier households, or living in the wider community, would therefore have regularly undertaken commissions for the ceramic, metal and wooden vessels required for these occasions.

The 'tankard' drinking vessel, for example, was a design concept used to inform its materials through complex techniques of making, and deployed to articulate 'frontier identities' during a period of wider cultural change in late Iron Age and early Roman Britain (Horn 2015). Comprising an assembly of wooden staves bound by copper-alloy, these drinking vessels were fitted with one or two opposing vertical handles made in sheet or cast copper-alloy and attached with rivets or lugs with pins. The design of the body with staves may have drawn on large wooden containers use to ferment and store ale, making them artefacts of association within the existing traditions of preparing and consuming alcoholic drink. The small size of the handles shows that the vessel lifted by encircling it with the hand (*ibid*., 2), indicating that it was designed to accommodate a particular gesture of commensal drinking, with larger containers being passed between drinkers. The design of the handles varied

Building associative design through the feast

The addition of metal vessel designs to ceramic drinking containers in wealthier burial assemblages during the fifth century BC may reflect how, in life, leading members of society sought to mark their status to differentiate themselves further form others (Dietler 1999, 145). The commissioning and display of new designs would constituted a significant statement of status, both within their own extended households and to others. The changes affected by the reception of these designs would have been developed as members of their social group began to successively emulate each other.

Designers and makers with the knowledge and technical expertise to produce these items of drinking equipment would have been much sought after, and some may have been installed in workshops attached to their commissioners' household as a mark of cultural status among community leaders. Creative practitioners in different media, networked with their resources of information and materials through the artefacts they designed, may have been sought after by influential individuals and groups who sought to socially distinguish themselves from others. Some rulers and leaders, for example, may have sought to display their influence through the commissioning of elaborate textiles with complex patterns that had associations with particularly-esteemed designs in other media whose effects they had experienced. For example, the angled meander as a border concept for the design of the wool garment from Hohmichele and the copper-alloy belt plate from Hettingen, both from burials in Baden-Württemberg, Germany.

Different groups in Iron Age and early Roman society had their own long traditions of feasting together as mechanisms for social bonding and for confirming the differences and alliances between them. The serving of alcoholic drink would have also be subject to particular rules for each occasion and dependent on who was present (Dietler 1990, 384–6). Different types or vintages of wine and different fermentations or recipes of ale and mead may have been served to guests according to their relationship with the host (Arnold 1999, 75). This would also apply to the containers in which the drink stored within the household buildings, and from which

artefacts. They may have been associated with individuals or extended families who lived at the *oppidum* for part of the year or for particular occasions. Their designs may have reflected the social interactions that operated at and from this location, for example, in ceramics for special feasting occasions and the requisite textiles for clothing and furnishings.

For Iron Age and early Roman societies in different regions of Europe, meeting to eat and drink together – apart from the everyday meals of their households – would have been integrated with collective activities such as the growing, harvesting and redistribution of foodstuffs and the processing of ales and wines. The agricultural year would have been celebrated in this way at different levels of society on particular occasions, such as after the crops had been harvested and stored in the late summer. Leaders of larger communities may have presided over a feast at which their farmland overseers were seated, where everything that was prepared and consumed was a product of their lands. Those who supplied and maintained the ploughs and their draft animals may have also been invited to attend and granted admission to the feasting hall (Camille 1998, 86). At other feasts the leaders of smaller rural community groups may have collaborated to contribute and arrange the preparation of the food and drink, and to supply the vessels form which they were served and consumed.

Designers and makers based at workshops attached to wealthier households or in the wider community, would therefore have regularly undertaken both private and community commissions for the ceramic, metal, horn and wooden vessels required for these occasions. Potters, metalworkers, wood carvers and turners, hornworkers, and weavers of textiles for other furnishings, would therefore have been deeply valued for their knowledge and expertise in materializing the appearances and significances of the feast. This socio-cultural background to commensal hospitality is further explored through the ceramic case study in this thesis (*see* **6.2**).

developed through the interdependencies that emerged from initiating, maintaining and renegotiating concepts of identity, power and place-making by individuals and groups in society. The interactions that take place during the transmission of concepts and techniques of practice indicate that effective design depends on the support and accommodation of the community in which it is intended to be deployed. The conversations between commissioners and practitioners concerning how an artefact should achieve its required effect, and an awareness of the limitations and appropriateness of its potential attributes, are central to its formulation as a successful statement of design.

Aspects of socio-cultural design – inter-relations and differences

Iron Age peoples probably arranged their societies to accommodate both their inter-relations with others and the differences between them. If Iron Age peoples structured their communities and societies heterarchically and according to varying degrees of hierarchy in different local, regional and temporal contexts, it is possible to conceive of how power relations were articulated and expressed in more complex ways.

Matters of communal concern, such as managing resources, construction and defence, would have been discussed and decided upon in larger assemblies. These occasions provided the opportunity for the exchange of information and ideas that would otherwise be confined to the different groups involved, and for social relations to be confirmed and established through feasting and ceremonies. These, in turn, would have provided the stage for the display of the artefacts that furnished the rituals of ceremony and behaviour, such as painted ceramics, patterned textiles and embossed and engraved metalwork. Through these assemblies Iron Age peoples reaffirmed their social relationships in ways that networked them together beyond their household and community (González Ruibal 2012, 259). At Corent (Auvergne-Rhône-Alpes, France), for example, an open communal space gave access to a sanctuary, an assembly building and extensive areas of houses and workshops (Poux and Demierre 2016). Designers and makers were well accommodated, and probably travelled to and from the settlement to exchange concepts, techniques and designs for

2007; Megaw and Megaw 2008). Approaching this material culture through the processes and practices of design, as a socially-constructed network of integrated people and things, offers a different way of exploring how designers and makers operated within their own cultural and creative regional environments.

How practitioners constructed their concepts for the design and making of Iron Age and early Roman artefacts has mainly been discussed with reference to metalwork and ceramics with elaborated surfaces. Furthermore, surface designs on pottery have been perceived as being derivative of those in metal; for example, that patterns on Glastonbury ware were adapted from those on metalwork made in southwest Britain (Leeds 1933, 28; Fox 1958, 135). Artefacts with elaborated surfaces in iron, wood and bone found on settlement sites were referred to as 'peasant art', made in households to meet their everyday requirements Fox 1958, 132). These studies have fundamentally informed the attitudes towards most of the media of Iron Age and early Roman material culture that have informed research in the field of 'Celtic art'.

The dichotomy between 'art' and 'craft' has been used to frame how practitioners working in different media have been discussed. While metalworking was viewed as a complex procedure, weaving textiles, leatherworking and woodwork were still perceived as locally sourced and practised household 'crafts' (Cunliffe 1974, 265–7, 279). Complex, elaborated artefacts were considered as having been made by specialist practitioners based in 'a highly skilled workshop geared to the aristocratic market' (Cunliffe 2005, 515). This separation of the processes and practices of design and making into 'art' and 'craft' has been critiqued through ethnographic studies of communities in which practitioners working in one media inter-related with those with expertise in another, or produced artefacts in different media themselves (for example, Sofaer 2006). The division of artefacts into categories of 'art' and 'craft' and the associated ways they have been perceived has also been critiqued in some archaeological studies (for example, Chittock 2014).

This thesis explores how designers and makers in the Iron Age and early Roman period inter-related with each other, their communities and wider society through their creative practices and the processes. These networks of design would have been

have been commissioned by a ruler in the south of Britain or acquired by them as a diplomatic gift (Leins and Farley 2015, 123–4). This composite design of northern European torc form and southern Mediterranean technology and techniques may have constituted a conspicuous statement of prominence by a British ruler during the initial expansion of Roman territorial power towards the region under Caesar.

As makers continued to create and articulate concepts of design through their materials, they accumulated knowledge, memory and meaning which they invested in the artefacts they produced. This is explicit in the case of composite artefacts, where parts of designs that had been in use over a long period were combined with other materials as new artefacts. During the negotiation of new identities at the frontier regions of the Roman empire during the first century AD, in Britain regional designs were both adapted to include classical Mediterranean concepts and also incorporated into new forms of designed objects, as 'frontier art' (Hunter 2008). This remaking of the familiar in combination with the new embodied a powerful concentration of cultural experiences in the material that would have had a pronounced effect within the social contexts in which the artefacts were deployed.

Designers and makers

The identities of the people who designed and made Iron Age and early Roman artefacts, and modelling how they conducted their creative practices, have long been matters of archaeological enquiry. Researching into the painted surface designs of Greek ceramics, the classical archaeologist Paul Jacobsthal identified 'styles' of painting with particular individuals, groups or workshops (Jacobsthal 1925). This equation of 'style' and practitioner, applied to late Iron Age artefacts through Jacobsthal's *Early Celtic Art* (1944), has deeply influenced the ways in which archaeological studies have conceived of designers and makers. Many subsequent studies have used art-historical approaches, ultimately related to Jacobsthal's work, to define stylistic sequences for Iron Age and early Roman material throughout Europe, and to comment on their similarities, differences and inter-relationships (for example: Frey and Schwappach 1973; Duval and Hawkes 1976; Jope 2000; Harding

serving drink and a pair of drinking horn mounts were designed with reference to Etruscan concepts although adapted to regional tastes, such as the ram's horn elements in copper-alloy on the sides of the vessel and in the gold-alloy ram's heads of the horn terminals. This drinking equipment also included ceramic cups that had been imported through contacts with the Mediterranean.

These new and unfamiliar designed objects were selectively included into traditional ways of performing commensal hospitality with feasting gear. The artefacts reflected the roles of the participants, the servers and the consumers, all directed and overviewed by the host. Bringing new designed objects to the feast, acquired directly from Mediterranean workshops or indirectly from other leaders of regional communities through gifting or exchange, would have distinguished the host in significant ways. Their presence demonstrated the host's special access to long-distance connections or inter-relations with peers in other regions, and their acquired knowledge of the ways of using the artefacts or how their contents should be consumed (Dietler 1999, 146).

While long-distance connections through exchange networks brought them into contact with novel concepts for design, through both artefacts and conversations, the ways in which designers and makers transformed their experiences into material forms would have had a profound effect on their creative strategies and decisions. Such new artefact designs therefore connected past experiences and present encounters through the representation of older and new artefact traditions in combination, enhancing and complicating further the aspects of the finished object. It may also be that, the further designers and makers were based from the Mediterranean region, the more nuanced were their designs in terms of integrating them with the older and newer regional traditions already available to them. The logistical concerns of viewing, having the opportunity to converse about, and exchanging artefacts would have been an important part of the transmission of design across these long distances.

Other designs were brought directly from Mediterranean workshops. The two torcs found at Owslebury (Hampshire, England), made with flexible hoops of interlinking gold-alloy rings and granulated hollow terminals around 75–25 BC, may

The idea of transmission

Many researchers have sought to identify the cultural contacts and artefacts that inspired and informed different aspects of Iron Age and early Roman designs. Stylistic markers from longer-distance connections have been identified as indicators of populations moving, the exchanges of traders and diplomats, and makers travelling. The different archaeological regional sequences known as the 'central European Urnfield', 'Hallstatt', 'La Tène' and 'Atlantic Europe' mainly consist of artefacts with higher survival rates such as elaborate metalwork, deposited by or on behalf of particular social groups or representing special communal occasions. Designed objects with high visibility for occasions of prestigious display, worn on the body, for feasting and drinking, and for horse gear, have been regarded as principle sources for studies of 'decorated' artefacts (notably: Garrow *et al*. 2008; Garrow and Gosden 2012; Gosden *et al*. 2014).

These studies have dominated debates concerning the transmission of 'Celtic art' and have effectively confined the discussion of the exchange of concepts of design to high-ranking groups in Iron Age and early Roman society with access to power and resources. Through a design approach to the study of material culture it is possible to reposition the making of artefacts as processed and practiced by people working in households and workshops associated with all levels of society. Designers and makers would have articulated creative concepts current in their communities to produce artefacts for purposes ranging from everyday personal use to special individual and communal display.

Transmitting Mediterranean design

Marking the end of one of the richly-appointed funeral ceremonies that had taken place near the Hohenasperg (Baden-Württemberg, Germany) during the later fifth century BC, the burial at Kleinaspergle was furnished with vessels for serving and drinking wine that had been commissioned from creative practitioners who were familiar with Greek and Etruscan design. A tall copper-alloy spouted vessel for

5 Design in the context of Iron Age and early Roman societies

Introduction

Throughout the Iron Age of western and central Europe the social and cultural structures of the lives of many communities became fundamentally changed, as they developed long-established social and cultural traditions to consolidate and expand their networks of relations both within their own territories and in inter-regional ways. These changes were expressed and articulated through the design of new types of enclosed settlements and associated burial arrangements, such as those constructed in the 6th c BC for the highest level of society across central Europe, known as 'princely seats' (*Fürstensitze*), and the embanked settlements or *oppida* of the later Iron Age and early Roman period constructed throughout the European region. How most people living in the wider landscapes of Iron Age and early Roman Europe negotiated and maintained their social relations, both within their own communities and also with others, are also explored through connecting artefacts in different media through ideas of design.

Technologies and their material supply required to produce all types of artefacts on a larger scale necessarily depended on local, regional and inter-regional for the transmission of concepts and techniques of design in the form of both material objects and knowledge. By the mid-first millennium BC design concepts and techniques for creating artefact forms and surface treatments were being transmitted through far-reaching networks of contact and exchange from lands far to the east of Europe, extending between Atlantic Europe and the Eurasian steppe, and between southern Europe and the Near East (Gosden *et al*. 2020, 2–3). For example, significant and widespread social, cultural and economic changes took place from the third or second centuries BC in the region of Atlantic Europe with makers using similar materials and techniques, accompanied by the mutual exchange of design concepts and expertise.

6 Exploring design through case studies

The following case studies explore aspects of the design and making of four artefacts within their regional and temporal contexts during the Iron Age and early Roman period. Each case study artefact has a different potential for exploring these aspects of design. Designed objects made in different media and from different regions of Europe have been selected to demonstrate the applicability of design, irrespective of materials used, time, place and social context. The complex roles of creative practitioners are emphasised and their inter-relations with their commissioners in the designing and making of artefacts explored. Fundamental to this thesis is the concept of the integrated nature of design practices and processes that operated within society at all levels and scales, from households to individuals or groups establishing and maintaining their regional and cross-regional relations. The case studies explore how the design of an artefact may be considered to be continued even after its recovery from the ground, acquiring further aspects through its subsequent reception, display and remaking. Against a background of transformations in materialities and social relations that took place in Europe throughout the Bronze Age, the direction of the emerging and continued design of each case study artefact is explored, within its original temporal context and into the present.

The universal application of the design approach in this thesis to the study of material culture is explored through the case study artefacts. Each case study artefact is discussed through the contemporary social environment of its design, and by drawing in comparative designs made in both the same and different media. Wider material culture from this period is drawn in to the selected case studies in order to discuss these themes within the social context of each artefact. This leads to further ideas about how and why designers and makers created these artefacts, both within their own social contexts and also as constituent within a network of inter-relations of associative design. In exploring aspects of the design of Iron Age and early Roman material culture, the visible, invisible and transmitted aspects of design are discussed.

Other artefacts made in the same and in different media are drawn into the discussion as associated designs in social context, showing how aspects of design connect them in ways that are independent of conventional archaeological categories such as material, form and elaboration. Exploring the case study artefacts through their different media and regional socio-cultural contexts as designed objects has the potential to reframe them in terms of how and why their particular forms emerged. Emergent from the 'conversations' of creative practitioners and their commissioners, these artefacts are shown to be informed by transmissions that are multi-directional and far-reaching both through time and across distance. How communities accommodated the designs of these artefacts to connect with their pasts in their negotiation of their identities, both between themselves and with others, are set out through the case studies.

The Iron Age and early Roman design of each case study artefact is explored through a consideration of the social background context of the region where it was made and deposited. This situates a discussion of how the processes and practices of design were accommodated by communities and their wider societies, and how the concepts that were required to be embodied in an artefact were addressed by creative practitioners through their design strategies. How practitioners may have inter-related with individual or group commissioners through the making of objects of design and how their designs may have affected their communities are considered.

The conceptualizing and making of each designed object are explored through the sourcing of its materials, the techniques used, the social and geographical contexts of its production, and its final deposition. In order to examine the cultural networks of association for the artefacts under close consideration in this thesis, the creative practices of the Iron Age and early Roman designers and makers are explored through information drawn from published analyses of their technologies and techniques. This may allow ideas to emerge regarding how the creative practitioners who made these artefacts 'informed' their materials with concepts drawn from their cultural experiences and contacts within their own societies. Each case study explores how associative aspects of design were drawn together by designers and makers through

their knowledge, experience and technological practices and processes to produce the object of their design.

The case study artefacts are held in the collections of the Naturhistorisches Museum in Vienna (a textile from Hallstatt, Austria) and the British Museum in London (a ceramic vessel from Prunay vase' from Marne, France; two gold-alloy 'torcs' from Orense, Spain; and a shale vessel from Old Warden, Bedfordshire) (**figure 6**). These artefacts have been selected in order to explore how artefacts are used and responded to in society in the particular contexts for which they were designed. Each case study considers the social environment for design at the time of their making, use and deposition. Exploring the making and use of these artefacts as designed is less dependent on information such as the precise location of their deposition in the past, and may be a more useful approach where this is absent, as exemplified by the subjects of the ceramic and gold-alloy case studies (*see* **6.2** and **6.3**). The transtemporal aspect of design is explored as embodying traditions of knowledge and expertise that are fundamental to the work of Iron Age and early Roman creative practitioners in collaboration with their own communities.

Conversations with contemporary practitioners of design have constituted a crucial part of the methodology of this thesis. Talking with bespoke furniture designer Rupert McBain about the concept of design, and how it is practiced within a collaboration makers with high-level expertise in different techniques, has been informative regarding the dynamics of a multiple workshop environment. Each case study has been deeply informed by the insights of designers and makers working in comparative media to those from which the subject artefacts were made. Their observations on the practical and creative aspects of the processes and techniques of making each case study artefact has enabled a 'design story' for each artefact to be developed within its own social and cultural context, such as how each was assembled, why particular tools were used at different stages in the design process, and the decisions behind the shaping of particular parts (*see* appendix).

6.1 Hallstatt textile band

'Weaving can be and mean many things. It is a network of connections. But weaving can also pay as much attention to the spaces it creates as the connections it establishes … intricate networks that have been woven in a search of new forms'.

Jessica Hemmings, 'A certain kind of judgement', *Warp and weft*, 14 (2010)

Introduction

The tablet-woven bands excavated from the salt mines at Hallstatt and nearby Dürrnberg (Salzburg, Austria) are part of the largest assemblage of prehistoric textiles recovered from Europe (**figure 7**). The underground saline conditions have preserved high levels of both their material structure and the colours of the textiles, allowing researchers to conduct extensive analyses of fibres, dyes and techniques in order to explore the processes and techniques of their design and making. These textiles have also been the subject of experimental archaeology for the purposes of research and public display (Karisto and Grömer 2017) and have been remade in adapted forms by contemporary designers and weavers in commercial contexts (Grömer 2017a). The tablet-woven bands recovered from the modern Kilbwerk and Kernwässerrungswerk salt mines at Hallstatt have been broadly dated by radiocarbon analysis to the Bronze and Iron Ages, *c*. 1500–300 BC (van Strydonck and Grömer 2013).

The textile which is the subject of this case study, 'HallTex123' (Natural History Museum Vienna inventory number 89.832), was excavated from the Kernwässerrungswerk mine in 1990 and is currently held in the archive of the museum; it has been dated to *c*. 800–300 BC by radiocarbon dating (Grömer, pers. comm.) (**figure 8**). This tablet-woven band has been selected as a case study in this thesis due to its complex integration of materials, pattern and colours in its design, and the extension of aspects of its design into the present through the use of other media. The research and analysis of the textile bands recovered from the Hallstatt

mine, particularly by Karina Grömer, has resulted in a large amount of published information on their production, which has been drawn on in this thesis.

The technical aspects of the design of Halltex123 have been researched through experimental reconstruction as part of the project 'Dyeing techniques of the prehistoric textiles from the salt mine of Hallstatt – analysis, experiments and inspiration for contemporary application' (2008–12). This textile has also been analysed to determine yarn resilience, weaving techniques and the surface quality of the textile and to assess the application of the skill that was required to make it (Sebolt 2009, Grömer in progress, Castle pers. comm.). The fibres of HallTex123 have not been sampled for dye analysis, although extensive studies have been made of the sources of the colours used in the designs of other tablet-woven bands recovered from the Hallstatt salt mines.

This thesis has particularly benefitted from the published work and advice of Dr Karina Grömer of the Prehistoric Department of the Natural History Museum in Vienna, Austria; from the guidance of Frances Pritchard, lately textiles curator for the Whitworth Art Gallery, University of Manchester; and from conversations with weavers Cynthia Sebolt and Alison Castle, who have both generously provided their insight into the conceptual and practical aspects of tablet-weaving.

The social environment for design

The Iron Age communities of the lakeside settlement at Hallstatt in Austria lived on the intersection of significant routeways through central Europe, the River Danube connecting west with east and the overland route between the Baltic Sea in the north and the Adriatic Sea in the south (Ramsl 2018, 41–2). As people travelled these routeways with their creative knowledge, technologies and artefacts, concepts for changing design were transmitting through local, regional and trans-regional networks (*ibid.*). During the earlier Iron Age in Austria (*c.* 800–450 BC) local people lived in small settlements with communal cemeteries. Regional networks were developed by people setting up exchange arrangements for artefacts and concepts of making from meeting and interacting with each other to discuss long-term business.

The trans-regional transition of design concepts is exemplified by the hollow copper-alloy bracelets that emerged through contacts between makers in eastern Austria, Hungary, Moravia and Slovakia, connecting the Hallstatt region in a long-distance network of travelling and exchange of knowledge and ideas between France, Switzerland, the Rhineland and northern Italy. For example, analyses of the materials, techniques and colour patterns used to create tablet-woven textiles from the burial chamber at Hochdorf (Baden-Wu̇rttemberg, Germany), dated to the early 5th century BC, has identified design connections between artefacts made in textile, ceramic and copper alloy in central Europe (Banck-Burgess 1999) (**figure 9**; discussed further *below*).

At Hallstatt and at Dürrnberg, around one hundred kilometres to the west, communities established their settlements based on the extraction and supply of salt, operating a complex of three mining areas from the Bronze Age to the Roman period. Mineralized textiles that had been placed in contact with metal artefacts in graves at the community burial ground at Hallstatt were comparable in design with those that had been recycled for use in the salt mines (Grömer 2013, 49; *see below*). Textiles for clothing were produced by weavers operating vertical looms with warp threads under tension tied to loom weights, and by specialist tablet-weavers designing and making the finishing bands to be sewn to cuffs and hems, and also for belts and wall-hangings (Grömer, forthcoming). Some of the textiles found at Hallstatt may have been acquired from farther afield through exchange along with other artefacts used in daily life such as pottery. The communities lived and worked in the valley of the River Traun, part of the route northwards towards the Danube and its connection to regions far distant to both the east and west (Ramsl 2018, 40). The level area to the north of the lake at Hallstatt and around other lakes in the region would have been suitable for pasturing sheep for wool and for cultivating the plants required for dyestuffs. Excavations at settlements in this region such as Buchberg (Eibner 1975; cited in Grömer 2013a, 51) and Waschenberg (Pertlwieser 1970; cited in Grömer 2013a, 51) have recovered large quantities of spindle whorls and loom weights.

Workshops connected by concepts and techniques of making artefacts had an important part in the regional distribution of both the designed objects and their

technologies of making, which in turn affected local aspects of design (Ramsl 2018, 46). Garments were woven mainly from wool yarns on upright warp-weighted looms, and were made and worn by the people living in the local salt-mining communities. Clothes were trimmed, applied or belted with bands that had been tablet-woven with patterns in natural or dyed colours. Weavers designed and made textiles according to traditions, fashion and occasion. Individuals working in households or collaborating in workshops produced lengths of cloth on upright looms or patterned bands with weaving-tablets. These designers and makers would have followed the traditions of their own practice in articulating motifs, patterns and colours, perhaps changing them subtly to extend their designs, while observing and re-envisaging the concepts embodied in the artefacts that arrived at or passed through their communities.

Associated design in social context

By the Iron Age, weavers had developed the techniques for using tablet looms to create patterns that were significantly more complex and precise than could be achieved by any other type of weaving technology (Grömer in progress). Preserved textiles recovered from sites in central Europe such as Hallstatt have shown that practitioners were using the tablet-weaving technique from at least the Bronze Age, around 1500 BC. These striped or checked bands were made as starting-borders for textiles woven on upright warp-weighted upright looms (Grömer forthcoming). Bands preserved in Iron Age deposits in the salt-mines at Hallstatt and Dürrnberg, dated to around 800 to 300 BC, were woven as separate items to be sewn onto the edges of garments. They include bands with pattern elements in diagonal arrangements, such as HallTex123, that can be sharply rendered by the tablet-weaving technique, enabling the clear display of intricately combined motifs such as triangles, meanders or lozenges. This transition to more complex, more technically challenging designs constituted a distinctive change in how a garment, and the person wearing it, would have appeared.

These patterns were woven into textiles for clothing and furnishings for building interiors and burial chambers, painted on to ceramics and tooled into copper-alloy

artefacts, particularly in eastern Europe, where the work of creative practitioners would have long been affected by designs being brought though exchange networks from Eurasia (Wells 2020a). During the Iron Age such designers and makers would have been commissioned increasingly by clients who sought to distinguish themselves within their communities through such extended networks of design. The intricate compositions of triangles, lozenges and angled meandering lines woven into the textile bands recovered from the salt mines at Hallstatt have been compared with those in designs by specialists working in other media in the early Iron Age, such as pottery and copper-alloy (Grömer in progress). Ceramic vessels, such as those placed in burials at Nové Košarisk (Slovakia), were painted with encircling bands of angled meanders and patterns of triangles filled with lozenges of intersecting lines, elements that are comparable to those built into the design of HallTex123 (**figure 10**). Such triangular motifs could be adapted to reference the human figure. The ceramic vessel recovered from a burial mound at Sopron (Hungary) featured an incised design of a wide band of triangular motifs developed as human figures engaged in spinning and weaving, and also carding wool fibres (Castle, pers. comm.) (**figure 11**). From the analysis of the technical details of the complex tablet-woven bands from Hallstatt it has been suggested that the weavers who made them may have lived further east along the valley of the Danube (Grömer 2013, 52). Weavers of bands such as Hallstatt123 may have chosen these triangular forms to represent themselves or their skilled techniques, embedding the knowledge they possessed of designs in eastern Europe into the clothes worn by members of their own community through this design.

The angled meander motif of the HallTex123 design, also referred to as a 'key pattern' (Newall and Unwin 2011, 29), had been extensively applied within the design of artefacts and buildings in Greece. As pattern concepts for working in different materials were transmitted through the network of trade routes between the regions of Iron Age Europe and the Mediterranean, the angled meander was circulated, adapted and conceptually transformed. This pattern, based on a single line that turns at a right-angle both forwards and backwards, reflects the path of a weft thread as the weaver passes the weft-wound shuttle either between the weighted warps of an

upright frame loom or the through the warp shed while tablet-weaving. The angled meander also has the attribute of contrast as a significant part of its visuality; the line in a light or dark colour is clearly defined against the background material it has been woven into, painted on, or into which it has been incised. The motif is usually applied to a designed object in a place that is physically or conceptually a 'border', for example, the tablet-woven band sewn to the edge of a wool garment from Hohmichele, below the rim of the ceramic vessel from Prunay, and on the long edges of the copper-alloy belt plate from Hettingen (**figure 12**).

These different materials of textile, ceramic and metal artefacts were interrelated by their design in the application of surface patterns that visually referenced each other and were conceptually connected. Bands in complex tablet-woven designs had been sewn onto the edges of textiles that wrapped copper-alloy artefacts in the burial at Hochdorf, including an example with border patterns closely comparable with the design of HallTex123 (Bank-Burgess 1999). Such combining of artefacts of different media as an aspect of social display further reinforced the material forms and surface treatments that had been integrated by their design.

Designing the pattern

Weavers who use tablet looms know that they are in command of the knowledge and skill to design and produce patterns that cannot be made with any other weaving technology (Knudsen 2014, 35). The differently coloured warp threads may be twisted together as cords to weave straight diagonal lines that opens up the design possibilities for creating many intricate and varied patterns.

The Iron Age weavers at Hallstatt used yarns in the natural colours of the wool combined with dyed yarns to design striped and chequered patterns to be woven on upright looms and complex patterns for tablet-woven bands. HallTex123 was designed with both undyed brown-black and dyed yellow, blue-green and olive green yarns, with a pattern of lozenge-filled triangular motifs alternating with diagonally aligned angled meanders arranged alternately in opposing orientations between the striped selvedge borders of the band (**figure 13**). Visually prominent in yellow against

the background striped in blue-green and olive green, the motifs are unified in a diagonal rhythm of alignment that is both truncated and contained by the fine lines of brown-black and the unpatterned blue-green spaces of the selvedge borders. The diagonal weaving of the angled meander complements the triangular motifs and further directs the viewer's gaze to track its convoluted line as it traverses the length of the band. The selvedge at the left side of the band, as viewed by the weaver as they worked, was widened with eight more warp yarns than on the right, as this was intended to be the cuff edge of the finished garment.

Sourcing the materials

The landscape around the settlement of Hallstatt was exploited to provide the material resources for making textiles for its community. Analyses of wool textile remains recovered from excavations in central Europe have indicated that Iron Age farming communities selectively bred sheep to produce fleeces with optimal fibres for processing into clothing, including some with a long staple (average fibre length). These longer fibres enabled the spinners to use techniques that produced high quality yarns (Grömer and Saliari 2018, 141–2).

The wool used for making the Iron Age Hallstatt tablet-woven bands, including HallTex123, has been found to be comparable with fleece fibres from the older sheep variety from Vrin (Switzerland) (Rast-Eicher 2013, 177). These small, curved-horned sheep had white, brown or silver-grey fleeces, and were also valued for the flavour of their meat. For making the reconstruction of HallTex123, the wool fibres from the fleece of the indigenous sheep breed Montafoner Steinschaf were the most closely comparable to that of the Iron Age textile, consisting of finer undercoat and kemp (thick, stiffer fibres) (Hofmann-de Keijzer *et al*. 2012, 21; Grömer in progress) (**figure 14**). Macroscopic observation and scanning electron microscopy (SEM) research into the textiles from Hallstatt have demonstrated that throughout the Bronze Age and the Iron Age the sheep farmers of Hallstatt selectively bred and cross-bred their sheep to produce fleeces with fibres of certain qualities and with particular colours for producing cloth. During the Bronze Age sheep were selected for future flocks whose

fleeces contained less kemp, enabling spinners to produce a more compact yarn and weavers to make a softer textile for clothing. A small proportion of sheep were kept for their highly pigmented dark brown or black fleeces, while most had whiter coarse-fibre kemp and fine underwool which could be dyed with other colours more successfully. During the Iron Age farmers bred sheep to produce whiter fleeces with more regular, medium-width fibres with a longer staple throughout that was more suitable for spinning into yarn (Rast-Eicher 2013, 168).

The fine wool fibres of the particular hues required to make HallTex123, both for dyeing and to be used in their natural brown-black colour, were removed from the sheep's fleece by plucking or shearing. Plucking the fibres at the natural breaking point in their structure would be carried out in late spring, as the animal prepared to shed hair during its annual moult (Rast-Eicher 2013, 170). Fleece fibres at Hallstatt were probably also cut with shears, an example of which has been found at Pottenbrunn (Austria) and dated to *c*. 350–300 BC (Grömer 2013, 42).

The design for HallTex123 required yellow, blue-green and olive-green dyes (Hofmann *et al*. 2013). The yellow dyes luteolin and apigenin may have been extracted mainly from the plant weld (*Reseda luteola*), though also from dyer's broom (*Genista tinctoria*) and sawwort (*Serratula tinctoria*). The yellow dye rhamnetin was processed from buckthorn (*Rhamnus* species) and crocetin may have been extracted from saffron (*Crocus sativus*). Woad (*Isatis tinctoria*) was harvested since the Bronze Age at Hallstatt for dyeing the yarns blue and in the Iron Age also for mixing with yellow to obtain green dyes (Hofmann-de Keijzer *et al*. 2012 and *et al*. 2013).

Bronze Age and Iron Age textile workers sourced the tannins they required for binding colour to yarns from a wide range of plant materials, including leaves, barks and galls. The material to mix the alum mordants used to achieve brighter and longer-lasting colours during the dying process may have been gathered from clubmosses (*Lycopodiaceae*) which contained a high level of the mineral aluminium detected in the Hallstatt textiles (Hoffman-de Keijzer *et al*. 2012).

Techniques of making

Selecting the fibres

As a first stage in the tablet-weaver's design strategy for Hallstatt123, fibres were carefully selected from fleeces for the different parts of the textile; longer, thicker wool fibres for z-spinning into yarn for the warp, and narrower shorter fibres for plying together into a strong yarn for the weft (Rast-Eicher 2013, 177). The kemp was reduced by picking out the coarsest fibres by hand, followed by combing to further refine the wool (Grömer 2005, 86). Horse hair was sourced for adding to the weft yarns with a view to increasing the stiffness of the finished textile as it was intended to be a trimming for the cuff of a sleeve. The horsehair would have increased the resilience of the cuffs of the garment, which would be particularly exposed to wear, although the weaver would also have incorporated this material into the band in order to display the intended colour pattern to maximum effect.

Combing and carding the fibres

The fibres were well combed to be parallel with each other, to facilitate spinning the yarns and to give surface lustre to the final woven fabric. Using a long-toothed comb on wool fibres straightened and separated longer and shorter fibres while removing any debris from the wool (Belanová-Štolcová and Grömer 2010, 11; Rast-Eicher 2013, 172). The longer fibres left in the comb were removed and placed aside, aligned in the same direction, ready for spinning. A spinner who used fibres prepared in this way would be able to produce a more even, tighter and stronger yarn where for a resilient textile, such as the cuff band of HallTex123.

Spinning and plying the yarns

To make the warp and the weft threads required for tablet-weaving, the spinner teased out the prepared wool fibres and attached the hand-twisted end to a drop-

spindle; this comprised a narrow wooden or bone shaft fitted with a whorl of ceramic, stone or metal (Belanová-Štolcová and Grömer 2010) (**figure 15**). The spindle was set spinning in a clockwise direction at high speed, the momentum gradually loading the firmly s-twisted yarn to the shaft (Grömer in progress). The resulting high angle of twist was essential to bind fibres with a shorter staple into the fine yarn and to prevent tearing during the weaving process. This also gave the yarns a smooth surface that would allow them to move easily through the holes in the weaving tablets and past each other when the weaver separated the sets of warp threads in order to pass the shuttle between them.

The technique of tablet-weaving generated a high level of mechanical stress on the warp threads, although experiment has shown that warps whose fibres had been carefully prepared and spun performed well during the weaving process. Two of these threads were then plied together with a z-twist to make a firmer yarn of 0.2–0.4 millimetres thickness (Grömer in progress). The attention paid to the preparation of the wool fibres and to their spinning is reflected in the smooth finish of the HallTex123 band. The ply of the weft threads of HallTex123 were reinforced with fibres of undyed, brown-black horse hair during spinning.

Washing the yarns

The plied yarn was tied in looped hanks and washed to remove the oils from the wool as a prerequisite to dyeing. Experiment has shown that an infusion made from the plant soapwort (*Saponaria officinalis*) added to containers of water raised to a temperature of around 50°C cleaned the yarns effectively (Grömer forthcoming).

Dyeing the yarns

The colours of Hallstatt textiles have been examined to determine the materials used to compose the dyes in the coloured yarns. The fibres of the yarns were analysed by optical light microscopy and scanning electron microscopy (SEM) and chemical elements were detected by scanning electron microscopy with energy-dispersive x-ray

analysis (SEM-EDS). The dyes in the yarns were analysed by photo diode array detection (HPLC-PDA) (Hofmann-de Keijzer *et al*. 2013).

The examination of the archaeological remains at Hallstatt has demonstrated that textile workers had been applying their technological knowledge for dyeing yarns since the Bronze Age. This was carried out by lowering the looped and tied yarns into vats of differently coloured liquid dye that were then hung up to dry. The yarns for HallTex123 were dyed in vats of yellow, blue-green and olive-green, the sheep wool fibres easily absorbing the colour through most of their thickness. Blue and yellow dyes were mixed in different proportions for the green dyes. The olive green in the design of HallTex123 was achieved by double-dying the yarns, by immersing them in a vat of woad followed by a bath in a yellow dye that had probably been extracted from weld.

Experimentation has shown that fine hand-spun yarns must be over-twisted to increase their resilience to prevent them from fraying and breaking during the weaving process. The dyed yarns were twisted further in the direction of their ply, wound tightly over a frame and moistened with water. Once dried, the yarns became less susceptible to tangling during the setting up of the weaving equipment (Grömer 2005, 87).

Setting up the weaving space

A tablet weaving loom of twenty-one tablets was set up for the design of HallTex123. The weaver selected the coloured and natural yarns for the warp threads and threaded them in sets of four through twenty-one tablets. The weaving tablets were probably cut from, leather, wood, antler or bone, at a thin and consistent thickness to maintain a regular line for the weaving. Experimental weaving has been carried out with leather and wood tablets shaped to a rectangle with sides of five or six centimetres (Grömer and Röpsel-Mautendorfer 2012, 21; Knudsen 2014, 40). Each tablet was cut with rounded corners to facilitate the turning movements during the weaving process and was pierced near each corner with a circular hole to allow the threading of a warp thread; each tablet was threaded with four threads in the required

colour sequence for the intended pattern. A shuttle, possibly of wood, was wound with the weft thread to bind the warps together as the work progressed.

The weaver of HallTex123 may have made this tablet-woven band on equipment set up according to either the 'backstrap' or 'fixed point' method (Sebolt 2009). A backstrap loom consists of the warp threads being stretched out horizontally and secured at one end to an item such as a vertical wooden post or ring, and at the other to the weaver's belt. This method is particularly suited for weaving bands of shorter lengths and for adding borders to the edges of textiles. The weaver using this method is able to control how much twist builds up during the turning of the tablets and must diligently maintain an even tension while they weave. A fixed point loom is prepared by looping the warp threads around two upright or horizontal pegs, each fixed to the end of a beam or narrow plank of wood. This arrangement maintains an even tension on the yarns while the weaver is working. The tension of the warp threads may be further adjusted by the attachment of a leather stirrup below the weaving point, manipulated by the weaver's foot (Collingwood 2002, 33–9). A fixed point loom may also may be left in place if the weaver requires to leave the weaving area, such as in a workshop environment.

Weaving the band

Ethnographic observations of the practices of traditional weavers in India and central Asia have indicated that they had memorized this numerical information as rhythmic chants in order to create the patterns they required (Tuck 2006, 539). Such complex woven patterns of the manipulation of warp and weft threads are constructed from numerical sequences that Iron Age weavers may have memorized in the form of chants, songs or stories in order to build them into their knowledge of making. The weaver of HallTex123 may have worked entirely or partly from a memorized pattern, or developed their own concept for the overall design.

Following the pre-conceived strategy of their pattern design, the weaver began to engage with the routine of their practices of making, raising sets of tablets and turning them forwards or backwards through ninety degrees according to which colours were

required for the pattern. Following each single rotation of the tablets, the weaver passed the shuttle through the 'shed' space beneath the raised warp threads, alternately from left and right (**figure 16**). The weft thread was then beaten back with the edge of the shuttle, pushing the different coloured warp threads together to build the pattern. Seventy-two passes of the shuttle and picks (rows of weaving) were made for each pattern repeat (sequence), before reversing the rotation of the tablets to alternate the direction of the motifs within the pattern (Sebolt 2009, 1).

Turning the tablets produced a build-up of twist in the warp yarns, which particularly affects spun fibres such as wool. The weaver of HallTex123 avoided this by rotating the selvedge tablets on their axes after each two pattern repeats to reverse their direction of threading, turning the pattern area tablets an equal number of times throughout each sequence so that the weave became 'twist neutral' (Sebolt 2009, 4).

The weaver of HallTex123 used a 3/1 broken twill technique, in which the warp threads are floated to the surface in a staggered alignment to create diagonal twill ribbing, an optical effect that complements the angles of the colour pattern. This technique required a high level of expertise, as the weaver was constantly noting the order of the coloured yarns at the top of the weave as they turned the tablets through the pattern repeats. The polychrome pattern in yellow, blue-green and olive-green, woven between the selvedge edges of blue-green and brown-black stripes, appeared in reversed colours on each side of the textile band as a double-faced weave. In contrast to the clearly delineated pattern on the front of the band, the pattern on the reverse has the feathered outlines which are a result of this type of tablet weaving (Elliott-Minty 2015, 13).

Finishing

The completed band, comprising eighty-four fine warp threads woven into a width of 1.3 centimetres, was removed from the loom equipment and the ends of the warp threads tied off and trimmed. The length of around 22 centimetres (Grömer 2005, 85) required to trim the garment sleeve was sewn to the cuff edge with paired fine blue-

green yarn. It may be assumed that both cuffs of the garment were finished with bands woven in the same pattern.

Production

The designing and making of textiles in the Iron Age involved a programme of activities and processes, from sourcing, gathering and preparing the materials and equipment required for spinning and weaving to the finishing and sewing of the final article. These activities required spaces at different scales that could be accessed from the household or the workshop, from the farmland fields and enclosures where sheep were grazed and herded together for plucking or shearing to the domestic and communal workshops where weavers could set up their looms and tablets to work. The many aspects of textile production, such as of the suitability of wool fibres, dyestuffs and weaving techniques, were brought together in a collaborative process of design.

Excavations at Iron Age settlements on hilltops and in lowland areas of Austria have generally recovered equipment that would have been used by spinners, weavers and needleworkers. At the lowland settlement of Michelstetten a weavers' workshop had been installed (Lauermann 2000; cited in Grömer 2013, 48); and the location of spindle whorls throughout the settlement indicated that householders practiced spinning as part of their daily lives. Activities such as spinning and tablet weaving could be accommodated by most domestic spaces and routines, although the time and complexity built into the making of HallTex123 may indicate that bands such as this were specialist designs (Grömer 2013, 48).

The design of HallTex123 was experimentally remade in order to estimate the amount of time and labour that would have been required. The warp threads, threaded through twenty-one tablets, were set up to a length of 1.30 metres. This produced a band of around 90 centimetres long, due to compaction of the yarns and allowing for the extra length to accommodate the tablets. It was calculated that around thirty minutes were required to prepare the warps and one and a half hours to weave each pattern repeat of around 10 centimetres (Grömer 2005, 89). Comparisons

with the experimental remaking of two other tablet-woven bands from Hallstatt has indicated that the time invested in weaving HallTex123 was at least twice as long.

The high quality and complexity of the HallTex123 design demonstrates that the weaver possessed expert knowledge that required prolonged mental focus, the ability to think in three dimensions, and dextrous fingerwork to handle the very fine yarns. The time invested in the acquisition and preparation of materials and the weaver's skill in making this band reflect the value attributed to this particular design. This band was therefore probably made for a garment required for a social occasion, perhaps one where the wearer wished to display their knowledge of aspects of design connected with places far from their own community in order to confirm or extend their social position.

Deposition

At Hallstatt a large amount of the textile, leather and wooden objects were carried by miners into tunnels hundreds of meters below ground. Most of the textiles were recovered from redeposited debris, where they were preserved by the penetration of salt solution. They had become compressed together with waste materials from the salt extraction process that had eventually completely filled the galleries (Grömer 2017b, 87). The debris also contained broken tools, such as picks with copper-alloy blades and wooden handles, burnt fragments of wood used for lighting, grass and bast ropes and cords, and deerskin bags for carrying salt to the surface. Textiles recovered from the Hallstatt salt mines by excavation are represented by more than seven hundred fragments. Fragments of a wide range of everyday clothing taken into the mines included those cut or torn from fur caps, textile garments, and leather caps and shoes (Reschreiter 2012, 16). Worn and discarded clothing and domestic fabrics, such as blankets and cloths, were probably gathered together and fragmented at the settlement (Grömer *et al*. 2014, 131).

The tablet-woven bands such as HallTex123 were probably taken into the salt mines as part of a supply of textile to be recycled as required (Grömer 2017b, 88). The recycling of these textiles has been considered as a practical way of assisting in the use

of tools or receptacles during mining operations at Hallstatt. For example, they may have been used as bindings wrapped around the handles of iron picks, wound as a protective covering around a tool-user's hand, or as ties for hauling loads or for securing the joists of timber scaffolding in the tunnels of the mine (Bichler *et al*. 2005). Some textiles were reshaped for particular purposes before being re-used in the mine, for example HallTex7, which was removed from a worn garment, torn, folded and the layers irregularly stitched together with thick thread (Rösel-Mautendorfer 2011, 73). It was probably intended to fit into the palm of a miner's hand to protect it while they handled tools or hauled on ropes (Reschreiter and Kowarik 2009, 57).

This re-use of a skilfully-woven textile may be considered in terms of the wealth derived by the Hallstatt community from their extraction of salt and its exchange as a material for its preservative properties. The fabric fragments transported to the mines, textiles woven on household and workshop upright looms and tablet-looms for people throughout the settlement, represent the communal investment and reliance on the exploitation of the mines by the whole of society.

Display and remaking

The textiles excavated from the Hallstatt salt mines have been the point of departure for present-day designers and makers to create new designs for purposes of textile research, 'historical re-enactment', 'living history' and commercial production.

Contemporary designers and artists are generally drawn to the specific techniques that were used by the tablet-weavers of the Hallstatt bands and the patterns they produced. Cynthia Sebolt has a particular research focus on Iron Age techniques of making, particularly tablet-weaving and leatherworking, with a view to re-creating patterns for an increasing demand for accuracy from re-enactors of the past (Sebolt 2009, 1). She has remade three of the Hallstatt bands with the most complex patterns, including HallTex123, drawing on academic research studies such as those of Karina Grömer of the Natural History Museum Vienna. Remaking has enabled her to analyse the process and practice of weaving the bands and to refine her choice of yarn for the warp threads. She has concluded that the Iron Age weavers would have only

produced short lengths of up to around 60 centimetres required for trimming garments, due to the high incidence of warp threads breakage during the weaving process (*ibid*., 11).

Although currently stored in the archive of the Natural History Museum in Vienna, HallTex123 and a reconstruction of its design was put on public display in 'Colours of Hallstatt – textiles connecting science and art' at the Museum in 2012–13 (Hofmann-de Keijzer *et al*. 2012). This public exhibition was the showcase for a collaborative project backed by the Austrian Science Fund between academic researchers from the Natural History Museum, the University of Natural Resources and Life Sciences Vienna (BOKU) and the Cultural Heritage Agency of the Netherlands, and students from the University of Applied Arts Vienna. The participants in the project had conducted experimental research into the raw materials, dyestuffs, and the spinning and weaving techniques of the Hallstatt bands. The results were used both to inform reconstructions for the display and as a basis for collaborating with contemporary designers of fashion, textiles and jewellery. The contemporary designs in the exhibition were informed by a wide range of approaches and techniques drawn from the arts and sciences, while as a body of work they communicated the interconnections and transformation processes that arose from the exploration of the textiles from Hallstatt. The tools used to make the reconstruction of HallTex123 and its documentation, including a film of the weaving process, were also included in the display. As a result of these cross-disciplinary encounters, the exhibition substantially extended the design network of the Bronze and Iron Age textiles into the present and into a public domain of wider concerns. For example, studies by BOKU researchers on the plants used to colour the yarns of Hallstatt textiles have regained knowledge on the use of sustainable dyestuffs, contributing to present requirements for more environmentally-conscious textile and clothing (Hofmann-de Keijzer *et al*. 2012, 10).

Textile design student Anna Moser was motivated by the skilled technical and creative effects of the Hallstatt designs in metal worn by those buried at Hallstatt, and woven into the complex textile bands excavated from the salt mines. From her collaborative research with specialists at the University of Vienna's Department of

Archaeometry into the ways metal in contact with textile fibres can mutually alter colour, she was inspired to experiment with different materials in challenging ways, transposing techniques used by Iron Age creative practitioners from one medium on to another. Moser drew on the spiralling forms of copper-alloy brooches from the Hallstatt burials and also the technology, patterns and effects of the tablet-woven technique of the bands to create new designs in silver wire and silver and silk thread) (**figure 17**). For example, she specifically extended the design of HallTex123 into a mixed-media ribbon of silver and indigo-dyed silk thread (Moser 2012). Moser's engagement with the Iron Age past in using aspects of the design of this textile to inform the first principles of her own work in other media constitutes a practice that may be applied to the practice of Iron Age creative practitioners. The close placement of artefacts of different media in burials, such as the cauldron wrapped with a textile edged with a tablet-woven band at Hochdorf, demonstrates a conceptual link between media that could be communicated through aspects of designs such as the belt-plate from Hettingen and the Prunay vessel.

Other groups in the wider community today have engaged with the textile designs recovered from the salt-mines at Hallstatt in contexts of non-academic discourse. The tablet-woven borders are of particular interest to participants in re-enactment and 'living history' who articulate ideas about Iron Age ways of life through recreating clothing designs from the period. Viewing the archaeological remains of these textiles has enabled these groups to revisit concepts of and experiences of making through the techniques of dyeing, spinning and weaving used in their design and of sewing and wearing the completed garments. Spectators of re-enactments and 'living history' are also able to engage with these remakings of Iron Age designs through observation and conversation with the actors, deepening their experience of the events in more accessible ways.

Conclusion

The Iron Age weavers who produced complex, multi-coloured patterned bands were drawing on a tradition of technical knowledge and skill that had been developed from

at least the Bronze Age. This was dependent on, and also affected, the selective breeding of types of sheep for the particular qualities of their fleece that facilitated the spinning of fine yarns of smooth appearance and resilience that was required to withstand the stresses of the weaving process. The sourcing and production of a wide range of pigments and tannins required for colour dyes were also networked into the making of these textiles. These processes and practices of producing intricately-patterned textiles were connected with the agricultural seasons and the labour invested in them by the community in an overall strategy of design.

The long-established practice of investing time and expertise in refining and assembling the materials for making these vibrantly-coloured, tablet-woven bands indicates their high level of social desirability (Grömer 2014). These designs would have drawn the gaze to the wearer's appearance. In the case of the cuff bands represented by HallTex123, the pattern and colours were integrated with the gestures of the wearer and would have drawn attention to the movements of their hands during social interaction. Experimental research into blue-dyed textiles in early Iron Age Europe has concluded that the knowledge, resources and skilled practices required to prepare and apply woad successfully were less accessible than those for other dyeing methods (Hopewell and Harris 2019). Textiles coloured with woad may therefore have been only available to those with adequate resources to acquire the materials and expertise required to make them (*ibid.*, 53). Textiles with innovatory pattern designs would have been intended for garments whose wearers wished to communicate a degree of social difference or distinction, at least on particular occasions of assembly within their communities.

The expertise demonstrated by the patterns and techniques assembled and articulated by Iron Age weavers in these Hallstatt designs has inspired present-day designers and artists, They have worked collaboratively with academic textile researchers and have drawn on the patterned bands as a source for their own designs. Through their close studies of the materials, dyes, colours and mechanisms integrated in a tablet-weavers' processes and practices of making, present-day creative practitioners have extended the networks of Iron Age design.

6.2 Prunay ceramic vessel

'We could make the potters recline on couches from left to right before the fire drinking toasts and feasting with wheel alongside to potter with when they are so disposed … But urge us not to do this, since, if we yield [the potter] will not be … a potter.'

Plato *Republic* VI, 420e–421a (375 BC)

Introduction

The ceramic vessel known as the 'Prunay vase', dated to *c*. 400–350 BC (British Museum online catalogue, *http://www.britishmuseum.org/collection/object/H_ML-2734*), was recovered at Prunay in Marne, France (**figure 18**). The vessel was acquired by the French antiquarian, Léon Morel, whose collection of prehistoric, Roman and medieval antiquities was purchased by the British Museum in 1901 (Stead and Rigby 1999, 13). Referred to as the 'Prunay (Le Champ de Guerre) vase', the vessel was entered as ML.2734 in the Museum's Register, and was described as 'from a chariot-burial at Prunay, Marne'. Part of the 'Morel Collection' of the British Museum in London, this pot has been widely featured in studies of Iron Age material culture as 'an outstanding example of Celtic ceramic art' (Rigby *et al*. 1989, 2) (**figure 19**). The cleaning and restoration of the vessel in 1980 presented the opportunity for detailed visual and computational analyses to be carried out, and a small fragment was removed from the base for thin-section analysis.

A comparative study of the Prunay vessel and other painted pots from excavated settlement sites in northeast France has been drawn upon in this thesis to explore aspects of its making by potters who were not following the regional tradition of design that was emerging during the fifth century BC (Rigby *et al*. 1989, 11). How the design concept was formed and materialized and a context of use is explored through a social setting of assembly, feasting and funeral ceremony. This thesis has been further informed from correspondence with potters Gerry and Lyn Grant of Fangfoss

Pottery at Fangfoss, near York. A remaking of the Prunay vessel by Gerry Grant has revealed information that differs from the sequence of making suggested in a published account (Rigby *et al*. 1989). Engagement with contemporary pot-throwing and painting through a process of remaking has provided insights into the mapping, painting and firing of the surface patterns of the Prunay vessel. By exploring the materials, form and techniques integrated into this artefact through its remaking by a contemporary potter, it may be seen how aspects of its Iron Age design have become extended into the present.

The social environment for design

Since the Bronze Age there had been a long tradition throughout the Near East and the Mediterranean region of furnishing the graves of particularly influential individuals with vehicles, weapons and elaborately-designed ceramic and metal-alloy vessels. The deposition of this 'elite set' of artefacts, or selected items, was also associated with hoard and sanctuary contexts, connecting the domain of the dead with that of the living and the spiritual through the articulation of their designs (Diepeveen-Jansen 2007, 383). In central and western Europe the deceased were equipped in this way from the thirteenth century BC, buried beneath prominent mounds in the landscape. These artefacts, acquired and placed together in burials to express social difference and influence in complex ways, were designed for applying within different contexts of social ritual. For example, wheeled vehicles may be perceived as signifiers of battle or ceremonial procession, while weapons communicated concepts of extending the body through the gestures of warfare, hunting and physical prowess. Elaborate containers of drink to be distributed among others through commensal hospitality embodied the host and their generosity and were designed as mechanisms of social bonding between those present at the feast. These artefacts were designed as identifiers to both unify and distinguish particular groups of people within their communities and to relate them within wider society. Through the connectivity of socio-cultural concepts, aspects of the design of these ceramic vessels were also transmitted in other media such as textile, ceramic or metal.

If this broad system of social connection and differentiation was defined and articulated through designed objects, decisions and requirements to instigate social change would therefore be communicated through the same devices. Subtle changes introduced within established traditions would be more readily acceptable, as design could be articulated to shift concepts of material cultural use between the familiar and the novel. These new aspects of design could therefore be accommodated by enabling cultural norms to be renegotiated without destabilizing the constructed social lives of communities. Requirements for social change initiated by influential individuals or groups would have been both formulated and responded to through the creative processes from which artefacts with novel aspects of design were emerging. This would have required that creative practitioners were continually fully integrated within their communities.

The stimulus of receiving new forms of design and their associated technologies into society changed the social environment as leaders of social groups and communities sought to re-negotiate the relations between themselves, their communities and wider society. This phenomenon continued to evolve and emerge in more complex ways, as influential individuals and groups drew on the new knowledge and expertise of creative practitioners to materialise both their differences and commonalities through objects of design. The settlement of peoples from the Greek world during the early sixth century BC at the port settlements of Massalia and Emporion increased the networks of cultural exchange between the region of southern France and the Mediterranean region (Fernández-Götz and Arnold 2017, 192–3; Curé 2012, 243).

By adopting the rotating wheel-table to shape ceramic vessels and the two-chambered updraft kiln to refine their control of firing temperatures and conditions (Curé 2012, 244–5), potters fundamentally changed their technological practices to engage with and materialize these new concepts of design. A wooden wheel from a potter's turning device, preserved in waterlogged conditions, was excavated from a mid fifth-century building at Lattara (Hérault, France), a port settlement on the Mediterranean coast that was inhabited from the sixth century BC to the first century AD. Potters converted knowledge of heat convection to the making of pottery,

adapting kilns from culinary ovens that had been in use since the late Bronze Age (*ibid*.). These were constructed with a firing space above a combustion chamber, separated by a perforated floor, and covered with a domed superstructure (*see below*). Two kilns of this design excavated in southern France at Béziers (Hérault) have been dated to the fifth century BC. These devices enabled potters to produce evenly-fired vessels and ceramics with paler surfaces more suitable for painting with more vibrant colours, as shown by the narrow, pale orange unpainted area around the Prunay vessel. Integrated with these technological changes was the design and appearance of the pottery form. Smoothly curving and composite forms, such as the pedestal foot derived from Greek designs to contain wine, were shaped in the paler fabrics achievable by firing in an updraft kiln. As in the case of the Prunay vessel, a range of brushes were used to apply painted patterns in horizontal bands. This was a radical departure from the regional traditions of surface design on handmade pottery that mainly comprised impressed or incised patterns.

The workshop that produced the Prunay vessel would have been located among the early Iron Age communities of north France who were living in open settlements on the plainlands or the rivers Oise, Aisne and Marne that flowered westwards towards the Seine. People lived and worked in timber buildings of post-built construction with rectangular plans that were generally up to twenty metres in length (Haselgrove 2007a, fig. 3). Some of the smaller timber buildings, such as those at Herblay, were rebuilt several times and may have been workshops or stores (Marion 2004, 236–9). Workshops for designing and making ceramics may have had cellars for storing materials, equipment and finished ceramics and would have been designed to provide convenient access to outside spaces dedicated to the firing of pots.

It has been suggested that communities living in the Marne region during the early fourth century designed burial structures to be highly visible in the landscape for disposing of their dead as 'agents' in extending relations within and between more hierarchical households who were integrated into extensive client networks (Diepeveen-Jansen 2007, 387). Painted ceramic vessels were designed to be accommodated within these networks, as a possession that was associated with social identity in life and as its signifier if placed in a burial context. Families who had

differentiated their social position within their communities were buried in small burial grounds demarcated by curvilinear or rectangular ditches and palisades, often with two or three individuals placed in the same grave. Particular individuals were laid in two-wheeled vehicles that either stood within a timber chamber or were lowered into a grave cut into the chalk subsoil (Diepeveen-Jansen 2007, 377–8). Both men and women with resources and wealth were buried in this tradition in the Aisne–Marne region (Fernández-Götz 2014, 94) and were interred within separately marked plots. Cemeteries at Ville-sur-Retourne, Ménil-Annelles, Buoy and Bucy-le-Long contained single graves dug within adjacent rectangular, ditched enclosures (Haselgrove 2007b, 497). Three vehicle burials have been found at Prunay, at 'Les Marquises' and two at 'Les Commelles' (Favret 1929), and it is possible that the Prunay vessel was recovered from a similar context.

Elaborately painted vessels may have been commissioned as an act of competition among peers, who had conversed with designers and makers attached to their own communities or who had sought aspects of novel design from further afield. The materialization of novelty in design, especially within an established tradition, may well have required stimuli from cultural sources unfamiliar to the community. This may have been the case with regard to the potters who produced the Prunay vessel, who possibly had access to a wide-ranging network of design contacts. Ceramic containers such as the Prunay vessel had become embodied with the commensal gestures of the feast through their patina of wear, and may have been removed to the context of burial through a fragmenting of the social network of the people involved. It is possible that these vessels may have been commissioned by the individual with whom they were buried, and that their kin or community sought to initiate a change in how they were perceived among their peers or within their social group. These changes in social behaviour may have affected the design strategy of these painted pots, realigning it with the concept of producing ceramics in closely associated designs specifically for funerary contexts.

The funerary ceremony was a designed event of co-ordinating people, timing, behaviours, built structures, portable artefacts and spaces. These spaces afforded the preparation of the body of the deceased, the arrangement of the funerary ceremony in

terms of gathering the participants together from within a family, community or from wider afield as was necessary, and the assembling of the artefacts required for the ceremony, including those for placing in the grave. Planning such ceremonies probably always offered opportunities to stage new aspects of the design of the occasion, including the display of portable things of with novel aspects of appearance that affected changes in the familiar dynamic of the ways in which people interacted with each other through material design.

The assembly of people and things in a particular setting for a shared purpose affords the confirmation of existing bonds through shared practices. Assembly afforded a social environment for people to interact through mechanisms such as sharing food and drink, and for using particular artefacts with which to serve and consumed them (Joy 2014). This 'commensal' ('being together at the table'; Dietler 1996) behaviour would involve dining together to create a setting for negotiating, establishing and confirming social relationships, formally or informally exchanging information, and for setting up obligations through the generosity of the host.

These obligations may be required to be fulfilled, for example, where significant resources needed to be mobilized by the wider community for building large-scale structures in the landscape or for the harvesting and storage of crops. The ability to produce an agricultural surplus and the obligations articulated in how it was redistributed would have been a significant source of influence for the individuals and communities who directed such activities through their social connections (Isaksson 2000, 59–60). Where people were placed in relation to one another and how food and drink, both shared and exclusively consumed by particular individuals, was presented and circulated, would have been significant aspects of the design of the feast. Serving food and drink at the table by the host's kin may have been required for high-ranking guests where obligations were being sought on a more reciprocal basis, or where influence or resources outside the host's community was being solicited. The artefacts that contained the food and drink at the feast were incorporated into the occasion through their making as designed objects.

The redistribution of food and drink within a setting of commensal hospitality had been used as a significant bonding device among groups of people since at least the

Neolithic (Sherratt 1987). Assembling to take part in a feast enabled social relations to be initiated and maintained, agreements to be made concerning alliances and marriages, and afforded time and place for the discussion of particular concerns to the community and for ceremonies to bury and commemorate their dead. The continually changing nature of societies, integrated with changes made to the construction of designed objects, is represented through the selective articulation involved in designing the feast throughout the Iron Age and early Roman period. Individuals and groups who arranged and supplied the artefacts for these feasting occasions would therefore have been in conversation with designers and makers, the creative practitioners who possessed the knowledge and expertise to materialize the concepts of identity their clients wished to project. The selective deposition of artefacts from these large assemblages of feasting equipment, accompanying the remains of those who had been influential at these occasions, varied in terms of the types, media, number and arrangement. This may be perceived as an indicator of the role of the deceased within the context of bonding their group through the feast, whether this was one of the development of personal influence and acquisition of wealth, empowering individual or group identity, affirming their patronage to their clients, or the diacritically differentiating their status among their peers (Dietler 1999).

How the participants at the feast handled the filled and emptied artefacts would have also involved certain modes of etiquette of expected and accepted ways of speaking and gesturing. The role of drinking in Iron Age communal feasting facilitated an aspect of communal interchange that would have been subject to particular social rules and ways of expected behaviour (Dietler 1990, 361). As a social group's rules and expectations with respect to eating and drinking together would have been linked to the quality and quantity of the items consumed, the design of the containers from which food and drink was formally served, emptied and set aside or removed would have been subject to the particular attention of the participants at the communal meal. If food or drink was to be served in a new way designated by the individual host or the community, the design of the artefact would necessarily have accommodated this. In the context of a funerary feast, the makers and designers within a community would have had a significant role in the staging of these feasts

and ceremonies, using their knowledge and skilled practices to provide the material expressions for feasting together, for processing from the settlement to the burial ground, and for furnishing the grave.

The way the Prunay vessel was handled in this type of social context may be indicated by the wear marks on its painted surface. The dark red paint of the pattern around the neck of the pot has been considerably worn, and below the body the black paint has been very abraded around the column of the pedestal foot. These are the parts of the vessel which would have been gripped while it was carried around the feasting table and drink was being poured. As the vessel measures around 30 centimetres high, its contents may have been shared between a small number of people. Aspects of its design, such as its pedestal form, colours and the horizontal banding of its surface patterns, have been transmitted from Mediterranean Greek concepts for wine containers, although this vessel may have been used to serve ale or mead in the regional social context of northeast France. It is possible that the liquid it contained was only drunk among a selected social group to which the host was closely connected though kinship or affiliation based on landholding or access to labour or material resources. If there were multiple similar vessels at the feast, this may have represented the extension of the host's social network towards their guests, such as on the occasion of a marriage ceremony that afforded the extension of the kin group. The relatively worn appearance of the vessel's surface design may be the result of it having being used in this way over a long period of time. If the pot had been specially commissioned as part of a set of ceremonial feasting gear, perhaps the person who acquired it made it available for use at the feasting occasions of their kin, who then inherited and regarded the vessel as an heirloom that was used over several generations, curating this design through a sense of past times as a valued connection with their predecessors.

Consumers and makers, materials, techniques and technologies, were all interconnected in the design of the Iron Age funerary ceremony. Having been used over a long period of time, this vessel may have been placed in the grave at Prunay to mark a particular event in the lives of the deceased's kin. If the funeral feast was designed or intended to confirm the place and obligations of the deceased within their

community or with people outside this group, this disposal of a part of the feasting gear by their kin may have represented a change or endpoint in these relations. The establishment of pottery workshops in northeast France, suppling new types of feasting to communities who later placed in them burials, facilitated the regional mobility of both the concepts and forms of ceramic design. Associated with the negotiation of new social relations between communities constituted an important aspect of the chorographical place-making of the region during the fourth century BC.

Associated design in social context

The design of the Prunay vessel was closely related to other pots made in the same workshop, including the painted pedestal-foot vessels from burials at Suippes and Marson (B), and the unpainted pot from Saint-Rémy-sur-Bussy, and 'Pedestal vase B' and an unpainted pot of unknown provenance (Rigby *et al*. 1989, 10) (**figure 20**). Textural analysis of the fabrics has shown that the sizes of the quartz grains in the vessel from Prunay, Saint-Remy-sur-Bussy, 'Pedestal vase B' and the unpainted pot cluster closely, and thin-section analysis has confirmed that there were close links between the making of the Prunay vessel and 'Pedestal vase B' (Rigby *et al*. 1989, 6, fig. 4 and 5).

Many aspects of the design of the vessel from Caurel (grave 51, 'Fosse Minore', Marne) (*see* **figure 20**) are closely comparable with those of the Prunay vessel. Both of these pots were produced in the same workshop (Stead and Rigby 1999, 49), and probably by the same potter and painter, for clients who may have been affiliated through the same social network and who wished to communicate similar concepts of their social position within their communities through their feasting gear. It is also possible that the vessels buried at Caurel and Prunay were originally used in the same feasting set. The Caurel vessel was placed in an inhumation grave with three small spearheads dated to the fifth century BC, a lance and two other pots, one of which was hand-made (Charpy 1987, 50, plate III). The composite assemblage of wheel-turned and handmade vessels in the Caurel feasting set represents a conflation of traditional and new concepts of dining together. It is possible that the host attached

significance to the continued use of familiar designed objects while introducing novel artefacts to this commensal context. It has been suggested that two individuals had been buried in this grave (Charpy 1987, 50), although the grave may have been re-opened for the interment of the second body. There was a tradition of multiple burials in the region of the rivers Aisne and Marne during the fifth and fourth centuries BC, involving ceremonies at which graves were re-opened and the remains selectively removed or added from earlier burials (Diepeveen-Jansen 2007, 378).

The X-ray defraction analysis of the vessel from Marson (A) has indicated that the surface was initially coated with a thin red haematite slip. It has been suggested that this vessel may either have been made in the same location as the Prunay vessel, or at another workshop closely linked through concepts of design (Rigby *et al*. 1989, 10). Other workshops in northeast France were working in the same tradition of curvilinear forms for their painted designs, for example the potters who made the vessels for burials near Prunay at Beine-Nauroy (**figure 21**).

Designing the patterns

The design of the Prunay vessel may be perceived as part of a widespread creative and socially-constructed response by potters developing new regional concepts of form and surface patterning. Informed by vessel shapes and surface patterns initially observed on pots imported from different regions of Greece for serving wine during the sixth and fifth centuries BC (Wells 2020b), designers and makers of ceramics in northeast France developed their commissions within the existing traditions of hospitality practised by their clients within their own communities.

The striking appearance of Greek pots and their transportation over a perhaps inconceivably long distance from their Mediterranean workshops, may have been drawn on by potters in northeast France in the design of their own wheel-thrown ceramics. This transmission and referencing of Greek design attributed a distinctiveness to an artefact such as the Prunay vessel that its owner would have appreciated. Creative practitioners would have been able to transfer these aspects of

design between the objects they produced, and perhaps across different media, through sampling Greek concepts of form and pattern.

The distinctive red and black design of Greek ceramic vessels was a visual outcome of combining the mineral nature of the clays with the particular sequence of the firing process. Potters created the vivid reds and deep blacks of these designs by manipulating the atmospheric conditions within the kiln. Areas on the surface that the potter intended to be black in the final design were painted with a solution of a finer clay than the body of the pot. Air was admitted through a vent in the wall of the kiln during the first phase of firing to oxidize the ferric oxide within the clay, resulting in the entire surface of the pot becoming red. Moisture was then added to the kiln as green wood to emit carbon monoxide, and the vent was closed during a second phase. This reduced the oxygen in the kiln and raised the temperature, firing the entire pot grey-black and fusing the finer particles of the painted areas permanently to glossy black. The potter then re-opened the vent for the third phase, admitting some air into the kiln, slightly lowering the temperature and oxidizing the coarser, more porous unpainted clay to a vivid orange-red (Clark *et al*. 2002).

Designs on late Iron Age pottery in red and black have conventionally been called 'bichrome'. The term 'bichrome positive' has been used to describe what has been observed as a darker motif or pattern elements on a paler background, and 'bichrome negative' to describe paler elements on a darker ground (for example, Rigby *et al*. 1989, 1). The use of these kinds of descriptors has categorized surface designs, disconnecting them from their variety of expression and their associative inter-relationships created through making.

The Prunay vessel was coated and painted with a surface design of three patterns in reds and black. These comprised an angled meander around the neck of the pot, a curvilinear pattern deployed over the upper and middle body, and an undulating line below. The painter designed these patterns to inter-relate with each other and with the form of the artefact, engaging the viewer in a visual journey across its surface (Newall and Unwin 2011, 34–5). The 'framing devices' of the angled meander and the undulating line, and the larger curvilinear pattern they contained, were painted as integral parts of the visual and spatial field of the surface design. The curvilinear

pattern has been painted so that the curving shapes do not meet the edges of its field, focusing the attention of the viewer on its rhythmic movement. Late sixth-century BC Greek wine *amphorae* painted with red-figure images were generally painted with complex pattern borders in order to define their visual space (Marconi 2017, 117), a concept which has been drawn upon by the painter of the Prunay vessel. The visual effects pot, combined with the social intent of its owner or the host, were heightened as the vessel was handled, rotated and tipped in the act of pouring the liquid with which it had been filled.

An angled meander band was painted around the neck of the pot above the cordon, emphasising its division from the outward curve of the body. The pattern includes right-angled brush strokes that finish before reaching the dividing line to the right, all contributing to a sense of movement to the right. This pattern is often associated with material and conceptual borders and edges in different regional Iron Age societies (*see* **6.1**). In the design of the Prunay vessel it draws the viewer's attention to the liminal space between the lip and neck of the pot, open to both the exterior light and the closed dark space within the body. The deployment of this pattern near the rim may have been intended to emphasise the significance of its liquid contents through the actions of filling and pouring as gestures of commensality. The vessels designed with variations of the angled meander produced in this workshop, such as those placed in burials at Prunay, Suippes and Marson (A), may have been designed for serving drink at occasions of assembly that were considered as particularly significant for the host, such as the funerals of their kin or meeting with their peers.

Designs on late Iron Age pottery in black and red finishes have conventionally been called 'bichrome'. The term 'bichrome positive' has been used to describe what has been observed as a dark motif or pattern elements with a paler background, and 'bichrome negative' to describe pale elements with a darker background (for example: British Museum online catalogue; Rigby et al. 1989, 1). The use of these kinds of descriptors has categorized surface designs painted in contrastive red and black, disconnecting them from their variety of expression and their associative inter-relationships of design created through making.

The curvilinear pattern designed to rhythmically fill the upper and middle area of the body of the Prunay vessel also has a visual directive to rotate the pot towards the right, but not continuously. It is possible that this directive is connected to the way the vessel should be handled while serving its contents, that it was customary to rotate the pot to some degree between pouring. The three-pointed curving black spaces of the curvilinear pattern painted around the body of the vessel constantly lead the eye to three points charged by tight scrolls in red. This constituted a visual directive to rotate the pot in the hands towards the right, but not continuously. The three points in the path of the viewer's gaze, deployed around the upper and lower parts of the pattern area, each have their own alternating visual rhythm. This rhythm of alternating concentrated and released visual energy affected by the expanding and contracting red and black areas of the pattern communicates a sense of movement. The painter would have been able to visualize the layout of the curvilinear pattern over the height and width of the pot in an integrated way and would have been well practised at meeting the challenge of executing a surface design in three dimensions.

The shapes and colours of the inter-related surface patterns of the Prunay vessel were created within a design strategy of painting and firing, layering techniques developed from the acquired knowledge and long practice indicative of specialization in these ceramics (**figure 22**).

Sourcing the materials

The material for making ceramics in Iron Age northeast France was probably extracted from clay outcrops extending for considerable distances in the landscape. Through long experience of working clay and firing ceramics, Iron Age potters would have known that, once the rough surface layer of the clay had been removed, the material could be dug out to a depth of around five metres. Down to this level, the ground pressure would not have significantly altered the quality or the mineral composition of the clay (Albero Santacreu 2014, 65). Clays that have been sifted by river currents may have been usable without further refinement (*ibid*., 67). Familiarity with the sources of materials and their properties would have been a significant part

of the potter's acquired knowledge. It is also possible that more complex techniques were used to extract the clay, such as the construction of galleries into the slopes of hillsides (*ibid*.).

In northeast France the clay was probably transported to storage buildings near the potters' workshops by cart, along trackways or by barges along the river routes of the Aisne, Vesle and Marne. If wrapped in textile fibres and stored in a cool environment that would not be subjected to freezing temperatures, the properties suitable for making ceramics in the clay could be preserved for over a year without degrading, even with no prior purification (*ibid*., 66). When the raw material was required, the clay was carried from storage to outdoor ponds or tanks in the vicinity of the pottery workshop. The considerable weight of the clay, and the effort and time involved in its extraction and conveyance, would have necessitated the workshop being located close to the outcrop, or on a river route from the source. The clay was then slaked; mixed with a large quantity of water and left to stand, allowing larger inclusions to sink to the base in order to increase its plasticity (Grant, pers. comm). The potters would have stirred the solution with wooden paddles to increase the proportion of finer clay particles left in suspension. When the water had evaporated, the purified clay was lifted out and brought into the workshop. The very fine-grained sediments required by the potters for mixing thinner pastes or slips for painting, were obtained by the further levigation of clay in ponds or tanks.

Techniques of making

Preparing the clay

The potter would have further refined the clay by removing small stone and plant fragments and then kneading it to increase its malleability for shaping and to prevent fracturing of the ceramic forms during firing. Iron Age potters formulated different pastes from the same batch of raw clay brought from their stores into the workshop, according to the type of ceramic they were intending to make. The potter prepared the clay for the Prunay vessel by adding quartz sand as a temper that constituted 30–

40% of the mixture (Rigby *et al*. 1989, 6), creating a paste that would require less water in the mix and would result in a compact, thin-walled pot (Albero Santacreu 2014, 69) that could contain liquid.

Thin-section analysis of the Prunay vessel has shown that the potter prepared the paste for shaping and firing by mixing a temper of 30–40 per cent of well-sorted, pale quartz sand with 70–60 per cent of dark red-brown clay (Rigby *et al*. 1989, 6). The quartz particle temper allowed heat to be evenly distributed throughout the hardening form of the pot and also reduced the rate and amount of shrinking or expansion of its form during the firing process.

Shaping the vessel

The potter's wheel mechanisms that equipped Iron Age workshops comprised a circular turntable of wood or stone fixed to a vertical axle extending from a heavy horizontal kick-wheel at the base. This enabled the potter to shape the clay pot with both hands while rotating the wheel with one foot. Ethnoarchaeological research in India and France has demonstrated that potters must undergo 'a long and difficult apprenticeship' to acquire the practised gestures for making pottery on the wheel (Roux and Corbetta 1989, 88).

The Prunay vessel was formed on a turning wheel in two sections, the main body form and the pedestal, indicated by the horizontal rilling on the interior of the pot (**figure 23**). Water was regularly applied to the surface of the clay to maintain its workability. The potter threw the prepared, buff-coloured clay onto the centre of the wheel, hollowing the upper surface to begin to form the hollow interior of the vessel and gradually drawing up the surrounding clay to increase the height. The vessel shape was then developed towards its intended final form. This was done gradually to prevent the collapse of the pliable, wet clay, drawing it outwards by reciprocal pressure and always working from the base to the rim. Once the planned height of the vessel had been reached, the potter widened the girth of the body to reduce its thickness and used the fingers of both hands to evert the rim. The fine undulations of the throwing rings formed by the pressure of the potter's fingers were smoothed out

with a wood or bone tool with a straight edge, working upwards. The cordon at the base of the neck was formed as part of the process of shaping its angle with the body.

A smooth external finish was essential for the successful application of painted designs and for firing. The potter would have finished the clay form using some soft material, possibly wool or moss soaked in water, to smooth over the outer and inner surfaces of the vessel. The final clay form was then removed from the wheel with a length of wire and set aside to partially dry out and stiffen to a 'leather hard' condition.

The pedestal foot of the Prunay vessel was shaped separately into a hollow form on the wheel, made to the dimensions required for fitting to the body of the vessel. While turning the shape for the foot, the potter would have also moistened the surface of the body, so that the degree of hardness of the clay of both parts of the vessel corresponded to ensured their firm attachment. Placing the inverted body precisely in the centre of the wheel table, the potter used a scraping tool with a curved blade to roughen the surfaces to be joined to ensure a firm attachment and brushed them with a thick clay slip. The foot was then placed into position, turning the wheel to make sure the it was correctly centred on the body, the security of the join was tested by manual pressure. The potter then removed the excess slip from the join with their fingers, both on the inside and outside of the hollow pedestal foot, leaving a cordon at its junction with the body. While turning the wheel and working upwards with a scraping tool, the potter trimmed off the excess clay on the body near the join with the foot. The assembled pot was then left on the wheel to again partially dry out and stiffen to a leather hardness.

Drying the form

The different thicknesses in the various parts of the vessel form would have dehydrated at different rates, and so the potter would have ensured that the water in the clay evaporated gradually and consistently throughout in order to prevent the pot from cracking (Albero Santacreu 2014, 80–1). This was crucial for the making of the Prunay vessel, which had been hollowed out on the wheel to achieve a body with thin

walls (**figure 24**). The time required for drying a clay form varies according to the type of clay and admixture used for the paste, and the thickness of the walls of the vessel. Although the potter of the Prunay vase would have considered the temperature and humidity of the drying space, they would have known how the type of clay and the constituents they had mixed it would affect the rate of dehydration. Ceramic forms decrease in volume and weight during drying, with around 15% of the water content of the paste drawn to the surface by evaporation due to the surrounding temperature. This shrinkage isolates water in the micro-pores of the paste walls that takes longer to evaporate to the surface, so during this phase the rate of dehydration is slower (Grant, pers. comm.). The Prunay vessel form was therefore probably dried in a temperature-controlled space, such as a draught-free room in a workshop with no external doors.

Applying the red coating

The clay form of the vessel was left to dry out enough so that it could be handled and the surface coating applied without deforming the wheel-turned shape. The potter prepared a thick red paste of powdered dark red haematite iron ore, or red ochre mixed with water (Middleton 1987, 259; **figure 25a**). This was carefully applied by brushing downwards, over the lip, neck and around two-thirds of the body (**figure 25b**). Analysis by X-ray defraction has shown that a haematite-rich powder coating was applied to other vessels in the workshop, including those deposited in burials at Suippes and Marson (B), and two of unknown provenance (Rigby *et al*. 1989, 8). In remaking the Prunay pot, a red clay slip was brushed over the upper part of the vessel and left to dry out completely to prevent fracturing (Grant, pers. comm.).

Photomicrograph images from the scanning electron microscopy (SEM) analysis of two other vessels made in the same workshop, Marson (B) and 'Pedestal vase B', compared with that of the coating on a modern replica has shown that the potter burnished the red coating of the Prunay vessel with a wood, bone or pebble tool to a smooth and even surface (Woods 1982).

Mapping the curvilinear body pattern

The most challenging aspect of remaking the Prunay vessel was the deployment of the curvilinear pattern over the convex body surface (Grant, pers. comm.). Although the design has been recorded in two-dimensions (**figure 26**), a technique often used to demonstrate surface design in archaeological publications, the pattern was not intended to be read in this way but as integral with the form of the pot as it was turned and viewed as a coherent design. In the process of remaking the vessel, it was necessary to analyse the published two-dimensional representation of the pattern in order to make working drawings. This process took a highly experienced potter two hours to achieve (Grant, pers. comm.) (**figure 25c**). The salient points of the black elements of the pattern could then be mapped on to the surface and its shapes outlined. A slip mixed with copper, cobalt and manganese was then painted into the shapes and along the lines drawn over the red slip with the intention of producing an intense black (Grant, pers. comm.; **figure 25d**).

Painting the body patterns

The visually contrasting surface design of the Prunay vessel was completed with flowing interconnected black shapes and lines applied over the dried red coating between the neck cordon and the lower body, reserving a band of red below that was intended for another pattern.

To complete the surface design of the body, the painter prepared a paint by mixing powdered red haematite with fine organic material that was intended to carbonize to a dark red during the final stage of firing (Noll, Holm and Born 1975).
Using a fine-tipped brush, the lines of an angled meander pattern band were painted around the neck, lifting the brush gradually from the surface at the end of each horizontal line within each section of the pattern. The painter may have marked out this pattern with the vessel standing on the potter's wheel, turning it incrementally as an aid to determining the points of the angles and for applying the brushwork. A single undulating line was painted around the reserved red band immediately below

the curvilinear body pattern. A similar dark red paint was used in the workshop for linework on the vessels from Suippes, Marson (B) and 'Pedestal vase B' (Rigby *et al*. 1989, 5).

A narrow area of unpainted buff-coloured clay was left unpainted below the patterns, revealing the fabric, and the remaining lower body and pedestal foot were painted black. The close relationship of the curvilinear pattern to the form of the vessel indicates that it was probably painted with the expertise formed by long practice of working on three-dimensional surfaces. It may be possible that, if this was a specially commissioned piece, a highly skilled painter was able to compose the pattern spontaneously and that they never repeated it in the same way on another ceramic.

Firing the pot

Any water that remained in the thicknesses of the vessel walls after a prolonged period of dehydration would be evaporated during the firing process, increasing the micro-pores in the fabric and further decreasing its weight (Albero Santacreu 2014, 81). It has previously been suggested that the Prunay vessel was fired with a small number of other pots in a 'clamp' kiln, a shallow pit covered with combustible material that could reach temperatures of up to 800°C (Rigby *et al*. 1989, 8). Under such firing conditions, however, the large amount of smoke generated by carbonizing organic matter would have turned the fabric of the pot black (Grant, pers. comm).

The analysis of the fabric of the Prunay vessel has shown that it is buff-coloured throughout, except at the foot where the thickness of the form has a light grey core between buff surfaces, indicating that there was long period of firing (British Museum online catalogue). In addition, the narrow unpainted area around the lower body of the vessel has remained in the pale buff colour of the clay. The Prunay vessel was therefore probably fired in a closed kiln where the internal temperature could be controlled. The remaking of the vessel has indicated that the pot may have been fired to a temperature of 1100° C (Grant, pers. comm.), which could only be achieved in a closed kiln.

The design of the kiln structure has been suggested through an experimental reconstruction of an Iron Age kiln that had been excavated at Alcalá de Júcar (Valencia, Spain) (Cardona Colell *et al*. 2014). This was based on the materials recovered at the site and on ethnographic information from Verdú (Catalunya, Spain), Morocco and other locations in the Mediterranean. The kiln was reconstructed at Verdú, with a firing chamber of circular plan, a stoke-hole, a grate supported by a central pillar, a firing chamber and a door for loading and unloading the pots. The hypothetical superstructure was reconstructed in clay bricks with a corbelled dome-shaped interior (**figure 27**). All the pots that have been identified as having been made in the same workshop as the Prunay vessel were fired in an upright position, indicated by the black surface to the underside of their bases resulting from the oxygen-reducing conditions associated with the exclusion of air at this point. The pots were spaced apart to allow good circulation of heated air and the oxidation of their painted surfaces.

Analyses of the fabric of the Prunay vessel have previously suggested that, after painting on the red coating and an initial firing in oxidizing conditions, a wax resist was applied to reserve the intended red shapes of the pattern; an organic paint was then applied over the whole pot and fixed by reheating in the kiln to create the black pattern shapes (Rigby *et al*. 1989, 12–13). The remaking of the Prunay vessel, however, has indicated that the use of a wax resist would not be appropriate for the patterns with the sharply-defined shapes of the Prunay vessel, as it would have quickly melted in the high temperatures of the kiln, blurring the edges of the surface design.

Finishing

The skilled knowledge and practice of the Prunay vessel painter enabled them to make a pot with an exterior surface that was completely smooth between the differentially fired areas of the colour design. All the painted and unpainted ceramics produced in the workshop were finished by being burnished to a high sheen, bringing

out the richness of the reds and blacks of their curving external surfaces to enrich the effect of their appearance and increase their visual attraction.

Production

Ethnoarchaeological research into the technique of throwing clay on a potter's wheel has shown that it required adult strength and that a potter must practise for several years before attempting to make larger vessels (Roux and Corbetta 1989, 88). In an Iron Age context, the investment of time, labour and materials in acquiring the technological expertise for designing and making wheel-thrown ceramics would have been dependent on a social environment that allowed for, or encouraged, the higher levels of specialization involved when compared to the production of handmade designs. Workshops and outside spaces for kilns and the storage of materials and equipment would have been a necessary part of this new system of production. This may imply that most households who made everyday ceramics according to their own or their neighbours' requirements continued to do so, while wheel-turned vessels were generally made by specialist potters in designated workshop buildings.

In transferring their existing knowledge and expertise to the new working practices of using the turning-wheel and the updraft kiln to shape and fire ceramic vessels, potters would have decided to make significant changes in how they conceived of, planned and performed their design processes and organized the production of their ceramic vessels. The specific techniques for throwing pots on a fast-turning wheel with timing and precision required particular instruction and long practice in order to develop new expertise and for the creative distinctions of each potter to emerge. Controlling and creatively exploiting the potter's wheel would have also necessitated the learning of a complex new set of manual gestures.

It is probable that many potters in northeast France who undertook to change their design practices continued to produce handmade ceramics in their workshops during this period of transmission, as pots made by hand and fired in open or covered fire pits were still made until the end of the Iron Age in France (Curé 2012, 247–8). Potters would have had to make a significant investment of their material and spatial

resources in order to acquire the tools and equipment for producing wheel-thrown ceramics. They would have had to make decisions concerning the allocation of workshop space for turning mechanisms and of exterior space for kilns, and whether to acquire the knowledge to construct and maintain the equipment themselves (*ibid*.).

Potters who developed their practices in this way were then able to design and make larger numbers of pots in a shorter time for a wider distribution than handmade ceramics; in France during the sixth to fifth centuries BC potters producing wheel-made ceramics fired in updraft kilns regularly delivered pots to customers living up to sixty kilometres from their workshops (*ibid*., 247). These advantages would have encouraged increased specialization among potters, some of whom would have continued to produce pots by hand while others invested in new ways of working. As potters became more specialized they would have become more dependent on the success of their workshops in order to continue production and to maintain their buildings and equipment.

Being able to meet the demands of their clients would have enabled potters to build good reputations among their customers and their peers at other workshops, heightening their presence in the socio-cultural networks of their communities. A reputation for creative and innovative work would have also attracted customers who were seeking difference in the artefacts they brought into association with themselves. Mediterranean concepts of patterns and their spatial arrangement on smoothly curving forms, and for visually contrastive glossy reds and blacks, were integrated with regionally evolving traditions of design. This constituted a re-assertion of regional design that would have attracted clients who sought to acquire ceramic artefacts that were different or novel, that reflected their attitudes to their social position among their kin and in assemblies at feasts and ceremonies. Consequently, handmade pots were removed from dining sets as clients introduced their newly-acquired, colourfully-painted ceramics in vibrant designs to their households and their guests.

The Prunay vessel exemplifies the innovative designs being produced by potters and painters using new layered procedures of preparing clay, painting and firing. The high proportion of crushed quartz sand temper added to the clay prepared for the

pots from this workshop was more commonly used by potters and painters working at a later period, around 300–250 BC (Rigby *et al*. 1989, 10–11). The analysis of other ceramics from excavations on Iron Age sites in the Champagne–Ardennes region have indicated that, at the time the Prunay vessel was made, most potters were mixing finely-crushed fired ceramic or glauconite into the clay for their designs, pots with sharply-angled bodylines that were fired in one stage (*ibid*.). This workshop was therefore innovative and influential, and comparable designs were only produced in greater numbers in the later Iron Age and early Roman period.

Deposition

Communities living in the early fourth-century region of the Marne attended to their burial rites in conspicuous ways. Well-dressed bodies equipped with metal artefacts and ceramic vessels were interred below highly visible features in the landscape, mounds of earth that gradually changed colour with weathering and eventually became covered with vegetation. If these structures were expressions of the new social inter-relationships being negotiated by communities (Diepeveen-Jansen 2007, 387), the artefacts with which they dressed their dead and furnished the graves were part of their design. The novel concepts embodied in the painted pots of the Prunay vessel workshop may constitute early reflections of these new socio-cultural relationships. The potters who produced these ceramic designs enabled their clients to express their new social connections within their own communities through the mechanism of the feast. The conspicuous consumption afforded by assembly for feasting at funerary occasions, furnished by coloured and patterned ceramics, would have reinforced the social bond between the living community and the deceased before the body was removed from the domain of the living. Artefacts that had been used to serve and contain food and drink such as the Prunay vessel were finally removed from the ceremonial context of feasting and placed in the grave to mark the connections between the living and the dead.

Recovery

Emile Chance excavated three burials furnished with wheeled vehicles at Prunay between 1908 and 1912, termed 'Les Commelles' (Favret 1929, 13, fig. iv) and 'Les Marquises' (Coulon 1930); Bosteaux-Paris 1898); Dechelette 1912, 46–7). Vehicle fittings from these graves, including a linchpin, have been catalogued in the Morel Collection (Stead and Rigby 1999, 130). The burial in which the Prunay vessel had been placed may have been uncovered by Charles Coyon, who excavated several burial Iron Age grounds around Prunay and Beine-Nauroy. 'Le Champ de la Guerre' at Prunay was listed as a cemetery, but without further detail (Bosteaux-Paris 1898). When the burials were published, it was suggested that the Prunay vessel had been placed in one of these vehicle graves (Rowlett 1969).

Present display

The Prunay vessel is currently on permanent display in the Iron Age (*c.* 600 BC – *c.* 1st century AD) Gallery 50 of the British Museum, in case G50/dc9 (**figure 28**). This also contains a handmade carinated vessel with incised surface design dated to the fifth century BC and other copper-alloy and iron artefacts designed in northeast France between the later fifth and the early third century, including a lynch-pin, a handle, plaques, a belt-hook and a helmet cheek-guard. This arrangement has the effect of isolating the associative designed object of the Prunay vessel, disconnecting it from the practices and processes of design and making.

The research that has been done to reconnect ceramic vessels in the Museum's Morel Collection within the practice of workshop design and production (Rigby *et al.* 1989), fully acknowledged in the British Museum Collection online, could potentially form the basis of a display that articulates the concept of design process and practice. The vessels from Prunay, Beine-Nauroy and other ceramics in the Collection that have been attributed to particular workshops in northeast France could be displayed together to reconnect their aspects of design and making. The idea of design as a cross-media phenomenon could also be communicated through the addition to the

display of artefacts made in other media attributed with 'external differences' (Shanks 1999, 30), crucially linked through the pattern aspect of design.

Remaking

In May–June 2020, potter Gerry Grant of Fangfoss Pottery undertook a remaking of the Prunay vessel, working from information for its dimensions and surface design currently publicly available in the British Museum online catalogue (**figure 29**). Correspondence throughout this process has informed the research for this case study, enabling ideas to be drawn out that differ from the available published information regarding its making.

The remaking of the pot has confirmed that it was fired in one stage, in oxidizing conditions. It was not subjected to a reducing atmosphere at any stage, as was the case for Greek pots, which were fired in three stages (Rigby *et al*. 1989). This is indicated by a narrow area of unpainted buff-coloured clay below the painted area of the body, and the buff colour of the interior of the vessel, which have retained the colour of the clay fabric and have not blackened (Grant, pers. comm.).

Beyond the concept of experimental reconstruction, this remaking has provided different information on the Prunay vessel than the results of previous analyses by exploring the nature of its attributes. This case study has also drawn on Flusser's concept that an artefact constitutes embodied tacit knowledge that continually waits to be 'filled', interacted with or completed by other associations and attributes. As a statement in the continuing conversation of design, the remaking of the Prunay vessel has extended its network of associated people and things from the past into the present.

Conclusion

This vessel has been selected as a case study in this thesis to demonstrate the ways in which potters were able to articulate the material appearance of social interactions in a commensal setting, by responding to their commissioners' requirements for new

visual effects in the domain of drinking and dining. Designed to be accommodated into existing traditions of hospitality, such vessels attracted the gaze of those present at the feast though their designed aspects of form and appearance. The social relations between the host and their guests were confirmed, maintained and manipulated through the communal consumption of the contents of these containers. The design of the Prunay vessel integrated form with pattern that continually changed through the gestures of carrying and pouring. These gestures of social bonding between the community present at the feast were eventually extended into the context of burial through the act of depositing the pot in a grave as a material marker of the link between the deceased and their community.

The workshop that produced the Prunay pot was instrumental in this manipulation of the customary appearances of material objects in the funerary setting, artefacts that were commissioned to express something new about the attitudes of the those who furnished the grave and possibly about the nature of the deceased themselves. Individuals or groups seeking new ways to socially differentiate themselves from others or to align themselves with their peers would have changed the material expressions of their social position they possessed, such as their clothes and appearance, and the designed objects they supplied for use at gatherings. The increasing change in burial custom from cremation to inhumation in the Aisne–Marne region around 450–350 BC would have radically realigned trajectories of design for both commissioners and designers. The production of desirable new ceramic vessels to hold drink in shining red and black, inspired by the work of designers working with Greek and Etruscan creative and technological concepts, may have also been associated with these transformations in the ceremonies concerned with the display of the dead.

The painted vessels produced in the Iron Age potteries of northeast France were part of the network of social inter-relations with artefacts made in metal, wood and textile that was articulated by communities through their feasting occasions. The Prunay vessel, the practitioners involved in its design and making, and its commission for a ceremonial feasting context, have become connected with the present through the process of remaking. Conversations with potter Gerry Grant have enabled the

design process for this artefact to be mapped in this thesis. His observations on a range of creative and technical issues that emerged during his remaking of the Prunay vessel have led to different conclusions with regard to the sequence of making this pot, notably the suggestion that it was fired in one stage. This remaking of the Prunay vessel, constituting a new formulation of a design from the Iron Age past, has been conceived with a future potential for display and use in new ways within a continuing network of design.

6.3 Orense gold-alloy torcs

'And the gold is not only mined, but is also washed down; that is, the gold-bearing sand is carried down by the rivers and the torrents, although it is often found in the waterless districts also; but in these districts it cannot be seen, whereas in the flooded districts the gold-dust glitters. Besides, they flood the waterless districts by conducting water thither, and thus they make the gold-dust glitter; and they also get the gold out by digging pits, and by inventing other means for washing the sand; and the so-called "gold-washeries" are now more numerous than the gold mines.'

Strabo *Geographica* III, 2, 8 (7 BC to AD 23)

Introduction

Two gold-alloy torcs, dated to *c*. 350–150 BC (British Museum online catalogue, *https://www.britishmuseum.org/collection/search?title=Orense%20Torcs*), were found together near Orense in Galicia, northwest Spain) (Sotherby's catalogue) (**figure 30**). The torcs were purchased through Sotherby's by the British Museum in 1960 and were registered as 1960,0503.1–2. The Orense torcs have been displayed in the exhibitions 'The past from above' (November 2006 to February 2007) at the British Museum, and 'Celts: art and identity' at the Museum of Scotland in Edinburgh (11 March to 25 September 2015) and at the British Museum in London (24 September 2015 to 31 January 2016).

In the discussion that follows, these artefacts are referred to as 'Orense torc 1' (**figure 31**) and 'Orense torc 2' (**figure 32**). This case study has been informed by the detailed analytical research into the processing of Iron Age and early Roman gold alloys and on the differing representations of images of torcs in Iron Age society in northwest Spain and north Portugal (for example: Armada and García Vuelta 2018; Armada and García Vuelta forthcoming). This case study draws on this work to show how torcs constituted connective devices in societies through the design and making of their images in different media.

The mainly unfragmented and, in the case of torc 2, restored condition, of the Orense torcs prohibits any physical examination of their internal state and they have not been the subject of any metallurgical analyses. This case study therefore draws on information from research into comparative gold-alloy torcs and other artefacts of association from Iberia to explore their material and social design. It has also been informed by the insightful comments of the goldsmith Andrew Ashcroft. During a conversation over the photographs of the torcs in the British Museum online catalogue and from subsequent correspondence, some finer points of the aspects and processes of making these artefacts have emerged and theses have been incorporated into this case study.

A review of the term 'torc' demonstrates how terminology operates as a network of assumed ideas regarding the purpose and use of an artefact. The term has been derived from Latin *torquere* ('to twist', 'to turn') and *torquis* or *torques* ('twisted neckchain' or 'collar') (Smith and Lockwood 1976). The hoop may also be made by other methods, however, such as cast from solid metal without twisted characteristics or applied techniques. In archaeological literature, a 'torc' is generally conceived of as a metal hoop with an opening, with or without applied terminals, intended to be worn as a 'neck-ring', particularly in the case of gold- or silver-alloy examples, by a person or a figurine as a signifier of social status or divinity (for example, Harding 2007, 48 and 129). These assumptions have continued to influence the perception of 'torcs' (for example: Goldberg 2015, 165; Joy 2015, 41), although more nuanced notions of how these artefacts variously operated in the societies within which they were designed have been offered (for example: Harding 2007, 206; Joy 2011) and these are developed further below.

The term 'double scotia' has been used in this case study to describe the form of the Orense torc terminals (Armbruster and Perea 2000, 99), which have been described as 'reel-shaped' (British Museum online catalogue). This term has been based on the architectural term 'scotia', for a deep concavity around the base of a classical column. Applied to the design of the torcs, 'double scotia' describes the form of the terminals in a way that does not allude to other specific objects or solid forms, but is confined to their surface curvature.

The social environment for design

The workshops where designs in precious metal such as the Orense torcs were produced may have been located at one of the settlements known as 'castros' that were constructed on hill-tops and at coastal locations throughout northwest Iberia. Developed from later Bronze Age settlements during the seventh to fifth centuries BC, some of these places continued to be occupied into the second century AD of the early Roman period (Queiroga 2007, 170).

By the fifth century BC communities began to change their building traditions from timber and clay to stone, constructing a boundary wall within which curvilinear and rectangular buildings of cut stone were built in granite and schist, laid in dry-stone technique, and interconnected by paved roads and lanes (*ibid*., 171; Parcero Oubiña *et al*. 2020, 163). From the fourth century BC further material cultural changes among these communities were stimulated by the transmission of concepts for artefact design from the Mediterranean region, such as Greek ceramic containers for wine and perfume, and the Punic and Italic pottery found at coastal settlements such as Castelo de Gaia (Queiroga 2003, fig. 51). These concepts were incorporated into the design of artefacts made in this region, such as the glossy black surfaces of Greek vessels that were applied to pottery found at Penices (Braga, Portugal) (Almeida 1974, 190). During the late Iron Age some settlements were reconfigured into larger *oppida* of up to forty hectares in extent, defined by substantial walls and ditches. The exterior walls of particular granite buildings were elaborated with carved motifs and patterns, such as the sauna buildings on the edges of the settlements of Briteiros and Eiras (Braga, Portugal). Stratigraphic evidence has indicated that the community at Sanfins (Porto, Portugal) was reorganizing its settlement after the final incorporation of the region under Roman rule (Silva, 1999), and that Monte Mozinho (Porto, Portugal) may have been planned and built as a new *oppidum* during this period, inhabited by people drawn from smaller settlements that were consequently abandoned (Carvalho and Queiroga 2005).

The rich gold resources in the hills of northwest Iberia and the gold-bearing streams that distributed nuggets and dust of this precious metal more widely had been

exploited by goldworkers in their long tradition of designing and making since at least the third millennium BC (Armbruster and Comendador 2015). The practices and processes of making gold-alloy torcs in Iron Age Iberia were developed from late Bronze Age traditions of conceiving and making artefacts in designs with related forms and applied techniques, such as the bracelets from Lebuçâo (Vila Real, Portugal). Techniques such as soldering for joining metal parts, *filigree* for applying fine wires, and granulation for fixing small spheres of gold-alloy were transmitted to goldworkers' workshops in central and western Europe through concepts from the Mediterranean region brought by people travelling through networks of contact and exchange (Armbruster and Perea 2000; Perea 2003). Workshops in northwest Iberia were producing gold-alloy artefacts throughout the first millennium BC. During the period of the gradual Roman acquisition of Iberia (218 to 19 BC), including the century-long process of bringing the northwest region of the peninsula into the empire, the consequent renegotiation of regional and local social identities resulted in some community leaders taking on a newly-formulated warrior status (Armada and García Vuelta 2018, 333). The reorganization of social hierarchies brought about by these political transitions required changes in how ideas of power were visually communicated. Consequently, the design of particular artefacts, such as torcs in precious metal, was realigned through the adoption and development of novel techniques that contributed to new forms of personal and communal display.

Exploring the technological variability of torcs within the regional goldwork of northwest Iberia has allowed them to be conceptualized as 'a collective investment within a diachronic context' from the late Bronze Age into the Roman period (Armbruster and Perea 2000, 97). As in other regions of continental Europe, more gold-alloy artefacts were made and circulated in northwest Iberia from the beginning of the second century BC. At the beginning of the Roman period gold-alloy artefacts were worn as part of bodily display, used in transactions as coins and accumulated as wealth in the form of ingots (Armada and García Vuelta 2015). This may be perceived as reflecting a new emphasis placed by individuals or groups on the social desirability of acquiring designs in this material, and their ability to access the materials and design concepts required to make them. In certain contexts, such as hoard deposits in

Iberia and other regions of Europe, torcs and their fragments may have represented a communal investment in the materials, practices and processes required for making these artefacts, rather than the specific commission of an individual.

Late Iron Age torcs were designed and made within a long goldworking tradition that was being articulated towards providing visible aspects of powerful identity as northwest Iberian communities realigned themselves as a consequence of their contact with Roman authority. The high degree of variation in the design of torcs may reflect the nuances of expressing identity that had become required between individuals and community groups during periods of increasing social tension (Armbruster and Perea 2000, 110–11; Garrow and Gosden 2012, 5). The continuing development of torc design in northwest Iberia may indicate that communities and their leaders were investing in these artefacts in order to represent themselves within their wider society by deploying them as gifts, payment of debts, and as exchange items in alliances with their peer groups (Armbruster and Perea 2000, 111).

These elaborate artefacts may also have been presented to other groups with the resources or expertise required for warfare or landscape construction, extending the abilities of the community through these connections and integrating new services and labour resources into their social networks. Communities may therefore have been concerned to be able to access the human and material resources required to bring these artefacts into their social lives. If not already present, the knowledge and expertise, as well as the materials, required for an intended designed object were perhaps sought through personal connections with other groups through the communication of chosen representatives. These people may have been designers and makers themselves, possessing the creative experience and expertise required to negotiate for appropriate technical knowledge and materials on behalf of their communities.

Associated design in social context

Torcs made in Iberia throughout the Iron Age and early Roman period may be conceived of as designs interrelated with other types of artefacts in different media.

Images of torcs were incorporated into the design of stone statues and figurines, copper-alloy representations of sacrificial rites, and gold-alloy ceremonial belt-plates in the period just prior to and after the final Roman acquisition of northwest Iberian territory during the first century BC to the first century AD. These different designed objects were visually associated through the image of the torc that constituted an embodied marker of complex individual and group identities within these networks of design.

The granite male figures found associated with the late Iron Age 'castro' settlements of northwest Iberia incorporated images of artefacts that referenced a wide range of designs in other media. These figures were generally displayed as wearing a short-sleeved tunic with a wide belt at the waist, a torc worn around the neck and an armlet around each upper arm. They were shown equipped with a small round shield, presented towards the viewer at the front, and a dagger or short sword, either drawn or in a scabbard and, occasionally, a helmet and boots or greaves. The artefacts represented within these statues have been drawn from two centuries of design, dated from the later second century BC to the first century AD (Quesada Sanz 2003). They constitute images of association with the materials and technological practices and processes of spinning and weaving textiles, gold-, silver- and copper-alloy metallurgies, and leatherworking within the regional communities of the northwest. Imposing conveyors of community identity, the images of artefacts within these granite designs also represented particular dividual relations, those of the metalworkers, spinners, weavers and leatherworkers of the community.

The statues have been interpreted as representative of warrior elites, divinities and mythical figures, based on connections that have been made with the Bronze Age tradition of carving images of warriors on stone stelae in western Iberia (Prociuk 2016, 162). By the time of the Roman territorial acquisition of northwest Iberia, the design concept of these statues may have been extended to represent the commanding position of local leaders (Lorrio 2014) or their kin groups. Installed with their gaze directed across the landscape beyond the enclosed buildings of their communities, these larger-than-life-size figures may have been intended to project a pronounced sense of individual and community identity towards their neighbours.

The design of the statue at Sanfins incorporated a helmet, probably a tunic, and a torc with double-scotia terminals (Cálo Lourido 1994, 485) comparable with those of Orense torcs 1–2 (**figure 33**). The feet were found where the statue had originally been installed, in an outcrop near the main gateway of the second enclosure of the settlement, while the other fragments had been buried with stone altars in a rectangular building at the centre of the settlement (González Ruibal 2004, 119). The statue had been removed from its location, brought into the central space of the settlement and then fragmented. This may have been done during a performance staged by the community at Sanfins as part of the changes they required in how power should be represented by designed objects under Roman rule in the later first century AD. The display of this imposing granite figure, equipped as a powerful warrior, may no longer have been deemed an appropriate or effective display within the new socio-cultural environment.

Images of torcs in stone were also carved around the necks of female figures. An example of these smaller sculptures has been recovered with other fragmented sculpture and human remains from the hill settlement of Briteiros in northwest Portugal (Cálo Lourido 1994, 97; González Ruibal 2004, 123–4) (**figure 34**). The position of the arms, held in front of the body, flexed at the elbows and with the hands curved inwards, may be compared to the gestures of a female figure on the gilded silver-alloy cauldron that was probably made in eastern Europe around the second to first centuries BC and found at Gundestrup (Fyn, Denmark) (**figure 35**). Such figures have been interpreted as images of deities; epigraphy for the Roman period in northwest Iberia records the names of Nabia and Deva, whose toponymic associations were water, valleys and slopes (Marco Simón 2005; Prociuk 2016, 24–5). The deposition of the figure at Briteiros, in an assemblage at the central area of the settlement comparable to that of the fragmented statue at Sanfins, may indicate that these significant carvings were also removed from their socio-cultural network as the community fundamentally reconceptualized their territorial and social identities and affiliations.

The image of the torc was also incorporated into late Iron Age copper-alloy representations of ceremonial animal sacrifice combined with implications of feasting

display (Armada and García Vuelta 2015, 328–31). Cast in the form of an 'axe' with an overall length of up to 17 centimetres, these figurative artefacts show a complex interplay between images of particular material objects (torc, axe and cauldron), humans and animals, in a ritualized setting. The example from Cariño (Galicia, Spain) has been cast with a bull's head at one end and a torc at the junction between the 'axe handle' and 'axe head', its terminals pointing towards the 'axe blade' (**figure 36**). Other designs have been cast with more complex arrangements of images. An example of unknown provenance (Instituto Valencia de Don Juan, Madrid) was cast with a bull's head at one end of a flattened base on which a line of human figures and animals, including a goat, pigs, a bird and a collared bear, process towards a large torc placed before a cauldron, significantly where the 'axe head' meets the base ('handle') of the artefact (**figure 37**). The space within which this performance is displayed has been demarcated by a braided cord around the edge of the base. The two male figures closest to the cauldron wear a torc around their necks, and the large torc before the cauldron has its double-scotia terminals turned towards the 'blade', the focal point of the gesture of sacrificial ceremony. The torc and its associations are represented in these scenes as a complex object of personal and communal prestige and of performed ritual, constructed as designed objects to be worn on the body and as representative of ceremonial power.

This image of the torc in ceremonial performance is also represented on the belt-plates from Moñes (Asturias, Spain), designs originating around the fifth century BC that were reinterpreted during the late Iron Age. Each was made from a single gold-alloy sheet, thin and flexible, with narrative scenes hammered into relief from the reverse. The plates would have been attached to a wide band of leather or textile to display them around the waist of the wearer, who was perhaps officiating at the performance themselves. The designs incorporate a procession of human figures with the heads of deer and birds, alternately walking and riding horses, accompanied by animals (quadrupeds, birds and large fish) and equipped with cauldrons and torcs (**figure 38**). The Moñes I belt-plate has been designed in two registers, each with a procession of walkers and riders. The figures on foot each carry two cauldrons and the figures on horseback hold aloft a torc in both hands. The procession represented

on the Moñes II belt-plate shows figures wearing torcs, both walking and riding, each carrying short swords or spears in their right hand and torcs in their left.

The torc-rich scene in the design of the Moñes belt-plates have been variously identified as a water ritual (López Cuevillas 1951), a ceremony of sacrifice (López Monteagudo 1977), a funeral associated with the hero's transformative journey through water to the afterlife (Marco Simón 2005), and mythical or ceremonial ritual associated with regeneration displayed to reinforce traditional ideologies in an unstable time of cultural change (Armada and García Vuelta 2014, 84). The deer and bird heads of the human figures and the sinuous bird forms shown between them contribute to powerful ideas of transformative states enabled by performances involving particular artefacts – torcs, cauldrons, short swords or daggers and spears. In these scenes the torcs are always held in the left hand, elevated through a gesture of the arm while walking or riding, while spears, short swords or daggers are grasped in the right, though not always elevated. These gestures would have increased the visibility of the elaborated terminals of torcs that draw the gaze to the space between them, the materially invisible focal point of the design of the artefact.

Visually powerful, gold-alloy torcs were designed to be multi-sensory. A metal fragment or a small stone was sometimes enclosed within the hollow sheet-metal terminals or the hoop of a torc to produce a rattling sound when the artefact was handled in a particular way. This feature was incorporated into the design of one of the double-scotia terminals of the torcs from Cangas de Onís (Asturias, Spain) and from Lugo, Melide and Ribadeo (Galicia, Spain) (Armbruster and Perea 2000, 102; García-Vuelta 2007, 50), and into the hoop of the torcs from Vilas Boas (Bragança, Portugal). Torcs held aloft by walkers and riders in ceremonial procession on the Moñes belt-plates perhaps represent one of the necessary audial aspects of these ceremonials. These torc-stances may be compared with an image on the Gundestrup cauldron; at a focal point in the scene, an antlered male figure with a torc encircling his neck, identified as the deity Cernunnos, grasps a torc in his raised right hand and a powerful serpent in his left (Hunter *et al*. 2015, 269) (**figure 39**). These images of torcs both worn and grasped in an upward gesture by this horned figure may be compared with the animal-headed participants on the Moñes belt-plates, some of whom carry

cauldrons. Torcs and cauldrons were also integrated into the design of the animal sacrifice scenes in copper-alloy from northwest Iberia, such as those from Cariño. All of these representations were designed with the sounds of their ceremonial movements and actions in mind, including the rattling of torcs.

Sourcing the materials

The alloy used to design the Orense torcs has not been analysed, but it is probable that it mainly consists of gold, silver and copper. In northwest Iberia Iron Age and early Roman artefacts made from gold alloyed with silver, or with silver and copper, include ingots and over one hundred and fifty torcs, with smaller numbers of earrings, bracelets, belt-plates, pendants and hair-rings. In contrast to neighbouring regions of Iberia, few of the artefacts in the northwest were made with a predominantly silver content (Armada and García Vuelta 2018, 321), although products of preparatory alloying, melting masses and ingots, contained higher amounts of silver than gold (Armada and García Vuelta 2015). The Orense torcs were probably designed and made in a workshop environment where the goldworkers had access to both the regional gold supply and also networks connecting northwest Iberia with sources of silver and copper transported from the south and from the Mediterranean region (Murillo Barroso 2014; Núñez García 2016).

The raw material gold was widely available in northwest Iberia as nuggets and flakes extracted from river gravel deposits by hand during the Iron Age and early Roman period, as noted by Strabo (III, 2, 8–9), although it is possible that it was also mined in the uplands on a small scale (Villa Valdés 2010). Few resources of silver and silver ores were available in northwest Iberia, although gold alloys containing 10–25% silver were used for 'castro culture' designs (Martinón Torres and Ladra Fernandes 2018, 51). Isotope analysis of Bronze Age silver artefacts from this region indicates that the metal was transported from further south at this period (Comendador *et al*. 2014) and this may have continued to be the case during the Iron Age and early Roman period (Pérez Outeiriño 1992, 107).

Techniques of making

Technological analyses used to explore the materials of Iron Age and early Roman metalwork in northwest Iberia have demonstrated a wide-ranging technological variability in designing in gold-alloy. The assemblage from the hill settlement at Recouso (Galicia, Spain) contained materials representing different stages in the process of designing and making a range of artefacts (Armada and García Vuelta 2018, 323–7). A melting mass, ingots and pendant elements in varying stages of assembly, possibly intended to be incorporated into a complex artefact of chains and penannular pendants, all consisted of gold-silver-copper alloys (García Vuelta and Armada 2011, 458–9). Optical microscopy, macro-photography and the archaeometric technique SEM-EDX has revealed repairs and heavy wear on the artefact surfaces where they had been frequently polished. SEM analysis also confirmed the application of fine wirework and granules to the flat surfaces of the hollow sheet alloy pendants in the form of penannular boxes, the flat shape of each side soldered to a curved surface that had been stamped with triangular plates simulating granulation (Armada and García Vuelta 2018, 325). The varying visual complexity of the pendants, from the simpler to the more elaborately applied combinations of surface treatments, shows how makers of gold-alloy artefacts deployed their range of skills in different designed objects.

This rich technological variability of goldworkers' designs is also evident in the case of the hoops, terminals and applied surface treatments of torcs with double-scotia terminals (Armbruster and Perea 2000). These included casting the artefact as a solid entity by a single lost-wax operation, as for the torcs from Astorga (León, Spain) and Recadieira (Galicia, Spain); casting the terminals individually around a small organic or mineral core and then soldering them to a hoop, as for examples from La Madorra (Galicia, Spain) and Estela (Porto, Portugal); and soldering three or more shapes cut from sheet metal to create hollow terminals, as for the torcs from Paradela do Rio (Vila Real, Portugal) and Orense.

Alloying

The principal way of combining and storing the raw materials required for goldwork was in the form of ingots. As a preparatory stage, gold was alloyed with silver and copper into a 'melting-mass' (Armada and García Vuelta 2015, 379). Chemical pXRF analysis of the melting-mass from Recouso has showed that it contained 64% silver, 20% gold and had a relatively high copper content of over 17%, and was probably either formed from the residue of different castings or from an alloy that did not meet the workshop's requirements for intended objects of design. The three-part alloy in a melting mass was then processed into ingots, such as the examples from Recouso and Calvos de Randín (Galicia, Spain) (**figure 40**). These objects had a high silver content in relation to gold; those from Calvos de Randín contained over 90% silver, and less copper than the Recouso melting mass. These ovoid plano-convex ingots, around 8–10 centimetres across, were intended for transport and storage in preparation for further working. Raw materials were also gathered from rods and wire recycled from workshop projects and from fragmented items for personal wear (Armada and García Vuelta forthcoming).

Where gold has been alloyed with other materials, such as silver and copper, a higher gold content increases the potential for finer goldworking (Harrison *et al.* 2011). As the alloys of both the melting mass and the ingots have a much lower gold content than the Iberian gold-alloy artefacts that have been analysed, it is probable that the metallurgical composition of the ingots would have been modified to increase the proportion of gold before being used to cast the required forms for making into artefacts. This manipulation of the gold content in the alloys at an early stage in the design process ensured that the goldworker would be able to achieve the finer detailed working of the Orense torcs at the level of expertise expected by their commissioner.

The making of parts

The ingots were delivered from a supply forge or removed from storage to the workshop, where the goldworkers selected the required alloy for their intended

design. After melting an ingot in a crucibles, the alloy was cast into a range of forms close to the parts required, and forged into the solid hoops, rods, thick wires and sheets required for making the parts of a torc (Ashcroft, pers. comm.). The different parts of the Orense torcs were probably made in the same workshop, with Orense torc 1 slightly smaller and lighter in weight than torc 2 (**figure 41** and **42**).

The malleability of gold alloy, the mechanical property that allows it to be deformed under compressive stress, and its ductility, the property that allows it to be stretched under tensile stress, facilitated the creative processes used by goldworkers in their making of the solid, sheet and applied elements of a torc. All shaping in gold alloy was carried out as coldwork on metal that had been heated and allowed to cool (Ashcroft, pers. comm.). Solid hoops for torcs were formed by heating and hammering a straight bar to produce an angled or discoid cross-section. The goldworker often shaped the ends of the bar into a polygonal cross-section where they intended to fit the terminals, such as in the case of the torcs from San Lorenzo de Pastor (torc II) and Burela (both from Galicia, Spain) and from Cangas de Onís (Armbruster and Perea 2000, 103).

The hoops of the Orense torcs were shaped with a hammer on a flat anvil into bars that tapered slightly towards each end and had a quadrangular cross-section. The bars were then heated, cooled and restruck along the centre of each facet to achieve a concave curve between the angles, indicated by the subtle depressed hammer marks on the inner facets of the hoops. Each worked bar was then reheated, formed into the required curvature of the hoop, and quenched by emersion in cold water. The Orense torcs hoops were designed with an angled cross-section to be strong and rigid, as a discoid section would retain a certain degree of flex (Ashcroft, pers. comm.). The angled concavity of the hoops also reflects the design of the scotia elements of the terminals, unifying the design of these parts.

The high ductility of gold allowed the goldworkers to easily hammer a small quantity into the large fine sheets required for cutting into shapes for hollow terminals such as those for the Orense torcs, or into strips for twisting into wires. Thicker wires were hammered into lengths with quadrangular, discoidal or plano-convex sections and further combined into cords. Finer wires, such as those applied to

the end plates of the Orense torc 2 terminals, were formed by the Mediterranean *filigree* technique of hammering gold alloy into a thin strip and then twisting it into a length with a discoid section, the spiral surface trace of which would be obscured by polishing and subsequent wear during use (Armbruster and Perea 2000, 103).

Sheet metalwork

The design of hollow double-scotia terminals required the progressive hammering of an ingot with a high gold content to produce sheet gold with optimum thickness. As the goldworker would have been aware from previous experience, gold had a high degree of plastic deformation. They would have heated the surface frequently to restore the malleability of the alloy, plunged the metal into water to quickly reduce the temperature, and worked it with a hammer once the metal was cold. This annealing technique also prevented any fractures from forming in the metal due to the stresses caused by repeatedly hammering it into fine sheets (Harrison *et al*. 2011). The time a goldworker was able to work the alloy in one session was determined by its composition and the size and shape of the final piece required. The time available to work the alloy, the temperature reached by heating and the rate of cooling of the material were variables that required expert knowledge in order to control the outcome of annealing the metal. Modern gold-alloys may generally be softened by heating them to 677°C for ten minutes (Welch 2018, 1). Present practice has shown that a goldworker may manipulate a gold-alloy with a higher gold content for up to 60% of its ductile capacity before annealing is required, while an alloy with a high copper content (red gold) may be worked up for to 50% (*ibid*.).

Iron Age and early Roman goldworkers would have been aware that sheet gold had the potential to be cut and assembled into different designs. The hollow terminals in the double-scotia form of the Orense torcs were constructed from shapes cut from sheet gold-alloy hammered to a fine thickness. The hoop plates of the terminals of Paradela do Rio torc B, for example, had been cut from gold alloy 0.3–0.4 millimetres thick (Armbruster and Perea 2000, fig. I). Each terminal was assembled from pre-planned shapes: two end plates, two scotia elements and two hoop plates. For Orense

torc 1 an end plate was cut to close the face of the terminal, and for Orense torc 2 a flat ring and a shape to be formed into a cone. For both torcs the goldworker cut end plates with centrally-pierced holes for inserting the ends of the hoop into the terminals after they had been assembled.

The goldworker formed the scotia elements of the Orense torc terminals by the anticlastic technique of hammering the sheet gold-alloy shapes over a stone, ceramic or wooden former to create opposing curvatures on each surface, shapes that were longitudinally convex and transversely concave. The workers who practiced this technique were highly skilled, controlling the stretch of the alloy's gold content as they successively hammered the metal with bone or wooden tools and annealed it into the curvature required to complete the element and produce a smooth finish (Konstantinidi-Syvridi *et al*. 2014, 2–5). To achieve this a flat the goldworker cut a quadrangular shape to size, and heated, cooled and hammered it in sequence over a fixed former into a cylinder with the same diameter as the narrowest part of each intended scotia element. Each end of the cylinder was then probably placed over an iron stake or mandrel and hammered into an outwardly flaring edge with a much thinner thickness (**figure 43**). An expert goldworker would have been easily able to shape these elements from sheet alloy containing a higher percentage of gold in order to achieve these scotia forms for the Orense torcs (Ashcroft, pers. comm.).

Compasswork, punchwork, granulation and wirework

The pairs of end plates of each of the Orense torcs were designed to project a double image that was made with both raised and sunken elements. The engraver of Orense torc 1 used a fine-pointed compass tool to mark out a central and six encircling points where the gold-alloy granules were to be placed, and to draw arcs between them to define the six areas to be filled with punchwork. The goldworker who incised the end plates of the Orense torc 1 terminals was following the Bronze Age metalworking traditions of the Atlantic region, as exemplified by the torcs and bracelets produced by the workshops of the Sagrajas–Berzocana field of design in southwest Spain (Perea

1995) and the Lebuçâo (Vila Real, Portugal) bracelet (Armbruster and Perea 1994, 76) (**figure 44**).

These artefacts were worked with sets of finely-incised marks in alignment, made with a 'complex' punch tool that was incised or embossed with a convex tooling surface, comparable to a debossing tool used in present book-binding (Armbruster 1998, 56). The goldworker applied the punch-head to the surface of the end plate, repeatedly hammering while articulating the handle in an arc until the entire tooling surface had left its marks in the metal (**figure 45**). Workers who were particularly specialized in gold-, silver- and bronze-alloy punchwork were able to mark metal with lines or filled areas of incisions without any visual spaces or overlaps between each application of the tool-head (Armbruster and Perea 2000, 104). A supply of sheet alloy with a relatively high gold content for good malleability would have been required for applying punchwork to design surfaces (Ashcroft, pers. comm.). The goldworker who worked on the terminal end plates of Orense torc 1 used a punch tool cut with two rows of six minute conical incisions to fill the areas between the compass-inscribed arcs with fine raised points. Each lens-shaped area was tooled along the central line before being outlined around each curve, all three lines of punchwork meeting at the points where the goldworker intended to apply the gold-alloy granules.

To begin the granulation of the Orense torc 1 end plates, the goldworker prepared the gold granules by cutting very small square shapes from sheet gold alloy which were heated until they melted into spheres (Konstantinidi-Syvridi *et al*. 2014, 9–11). Small depressions were then finely hammered at the ends of each punched area with a round-ended tool, in which spot-solder was applied. Six gold granules were then intricately positioned around a central larger granule (**figure 46**). This granulation technique, which had been practised since at least the third millennium BC by goldworkers in the Near East, was transmitted through technology and exchange networks with the Aegean region of Greece into Iberian design. A comparable design to the Orense torc 1 terminals may be seen on the end plates of a torc from Chaves (Vila Real, Portugal), where a complex punch tool had been used to fill lens-shaped areas connecting both the central and the encircling points of granulation (Armbruster and Perea 2000, 105).

Each end plate of the Orense torc 2 terminals was designed with a concave conical depression set within a flat end plate. The straight-sided point, *c*. 8 mm long and *c*. 4 mm across at the base, that projected from the base of the cone may have been achieved by counterpunching the cone at its apex to invert it (Ashcroft, pers. comm.). The inner edge of each end plate was applied with a flat ring, worked using a complex punch tool of closely-set ridges, and edged with twisted wire soldered in place. Each ring was soldered into place and probably cut down from a larger shape of sheet alloy, as there is a slight variation in width on each side (Ashcroft, pers. comm.). This design may be compared with the terminals of a torc from Vilas Boas (Bragança, Portugal), each with a flat ring plate surrounding a concave hemisphere from which a three-dimensional image of a water bird projects; the birds face each other, towards the front of the torc, indicating this significant point in the visual design space of the artefact (**figure 47**). Finally, a ring of wirework with a beaded effect was soldered around the aperture cut to allow the insertion of the ends of the hoop into the terminals.

Assembling the torcs

In Iron Age Iberia the terminals and most of the applied surface elements of a torc design were assembled entirely or partially by soldering, using an alloy with a lower melting-point than the elements to be joined (Perea 1990). Goldworkers of torcs with double-scotia terminals often punched a small hole in one of the metal shapes with a conical- or pyramidal-point tool to emit the gas that would be produced during soldering. This aperture was made either in a double-scotia element of the terminal, as in the case of the Orense torcs, or in the end plate, as in the torc from Burela. The Orense torc terminals have been pierced with these air-holes on the less visible inner-facing curve of the scotia element, near the junction with the hoop end plate.

Metallurgical research has identified the presence of solder in torcs as small laminites where the joins between the shapes had failed; for example, in a terminal from Paradela do Rio (Armbruster and Perea 2000, 104). This technique of applying a metal filler with a low melting point, probably as a thin wire, to the fine edges of the

shapes has been connected with late Bronze Age metalworking practices in the Atlantic region (Armbruster and Perea 2000, 104). The end plates and the scotia elements of the Orense torc terminals were probably also assembled with this technique. Each pair of scotia elements would have been edge-filed to receive the wire, conjoined, heated to fuse them together, and then smoothed over to form a seam; finally, one end of each of these double-scotia elements was soldered to and smoothed over an elaborated end plate (Ashcroft, pers. comm.).

To complete the assembly of the Orense torcs, the hoops were inserted into the terminals. The hoop end plates were cut with apertures that could easily accommodate the angled profiles of the hoops so that these could be adjusted before being fixed in position with solder (**figure 48**).

Production

The technologies and techniques of working with gold alloys in the Iron Age were developed from the long tradition of Bronze Age goldworking that originated in the Atlantic zone of the Iberian peninsula. Although gold-alloy artefacts have usually been recovered as uncontexted finds in northwest Iberia, it has been proposed that they were mostly designed and made during the second to first century BC and that there was a continuation of goldworking until just after the Roman conquest of the region around 19 BC (Armada *et al*. 2018, 64–66).

Iberian goldworkers created a new wave of designs by integrating their long-established concepts and techniques with other those adapted from Mediterranean workshops. These included an expertise in fine *filigree* wirework and in the making of small spheres of gold for granulation, applied to heated metal surfaces by spot soldering (Armbruster and Perea 2000, 108). 'Castro culture' designs in precious metals were mainly formed from alloys of gold, while in other regions of Iberia designers and makers worked predominantly in silver (Armada and García Vuelta 2018, 321). Goldworkers varied their application of knowledge, skills and techniques to produce a wide range of designs for both the forms and surface treatments of torcs,

ear-rings, bracelets, complex pendants and belt-plates, balanced with the demands of their commissioners and the availability of the materials they required.

The goldworkers of northwest Iberia worked at high levels of technological variability, producing intricate gleaming artefacts for individual or communal commissions. Making these designs would have required organized specialized workshops connected to networks with reliable chains of supply of material resources. The transmission of knowledge of techniques and the accumulated expertise required for the design and making of artefacts would be dependent on such networks. This organizational flexibility would have enabled goldworkers to transfer or exchange concepts about designs and techniques, facilitating a creative environment that allowed them to experiment with concepts of form and to improvise solutions to issues of structural and applied design as they arose. This would have encouraged them to innovate in their design responses to commissioner's requirements, and this is reflected in the variability of making torcs and their components. These responses were materialized in an intensification in the production and number of torc designs from the early second century BC, representing a new complexity in cultural visibility in the face of territorial and political change.

Deposition

The Orense torcs were commissioned, designed and made before the comprehensive reorganization of production activities that followed the acquisition of northwest Iberia by Augustus in 19 BC, and the subsequent reformulation of the entire peninsula as a Roman province (Sánchez Palencia *et al*. 2011). This fundamental incorporation of territory into the Roman empire affected the management of all aspects of natural, inhabited and worked Iron Age landscapes, including the resources and networks for designing and making artefacts. The more substantial sources of gold, such as those at Las Medulas (León, Spain), were taken over and intensively exploited by substantial hydraulic works. These were maintained and seasonally worked by

communities in the region who would otherwise have been engaged in the agricultural management of the landscape.

The high investment of carefully sourced materials and expertise in the design of torcs probably indicates that they were commissioned to be used, curated and inherited for a long period. The process of making torcs would therefore have been widely separated by time from the deposition that removed them from the lives of communities at this period of fundamental socio-cultural change during the late Iron Age and early Roman period. The radiocarbon dating of the organic cores of the gold-alloy torcs from Snettisham (Norfolk), for example, has indicated that they were in circulation for fifty to one hundred years before they were buried (Joy 2015, 105).

The recovery of the two Orense torcs at the same location in Galicia probably indicates that they had originally been deposited in the ground together. It is possible that the torcs were officially buried as part of the renegotiation of status and identity required by particular communities in northwest Iberia during the second century BC. The design concept of the torc and its associated artefacts projecting powerful images of identity, such as granite statues of warriors and gold-alloy ceremonial belts, constituted part of a socio-cultural network that could no longer be sustained. The statues were fragmented and buried at significant central places within settlements as part of the dismantling of the 'monumental scenography of hillforts' (Armada and García-Vuelta 2018, 327). The Orense torcs may have been deposited as part of this process, to break the associated network of the torc as a projected image of power by ending its circulation in society. In this way, the forms, materials and communication of torc design could then be renegotiated under Roman rule.

The resilience of the image of the torc as a conveyor of authority and power is shown by its transmission into Roman period design. For example, it is represented twice on the upper body armour of Cnaeus Musius, standard-bearer of Legio XIV Gemina, carved on his tombstone in the early first century AD (Goldberg 2015, 165; **figure 49**). It is possible that this double image of the torc may have significance as a statement of imposed authority; notably, they are carved with the terminals downwards, an inversion of the ceremonial gesture of power depicted on the Moñes belt-plates. Connected to the traditions of visual representation that had been

developed by creative practitioners for their communities since the late Bronze Age, these images of the torc have been reconceptualized for designs of Roman military display and commemoration.

The two Orense torcs, closely related as a bipartite design for ceremonial use, were perhaps deposited together by a community who viewed them no longer as an appropriate means of displaying identity and power. The network of associative design connecting the granite statues of warriors and copper-alloy representations of sacrificial scenes through the image of the torc was dismantled within the changing socio-cultural environment that had been stimulated by the approach of Roman authority.

Present display

The Orense torcs are currently displayed in the Iron Age (*c.* 600 BC – *c.* 1st century AD) Gallery 50 of the British Museum, in case G50/dc18. The torcs have been arranged next to each other, tilted with the elaborated end plates of the terminals oriented downwards, and are described as 'jewellery' in the main information panel (**figure 50**). The rigidity of the hoops shaped with a quadrangular cross-section indicates that these torcs were designed for purposes of display, rather than for personal wear. Drawing on the iconography of the Moñes belt-plates, the torcs were probably designed to be held in an elevated position, with the terminals uppermost as part of the gesture of extending the arm. Re-arranging the torcs in this position for display would better communicate this aspect of their socio-cultural design.

Conclusion

Gold-alloy torc designs were made to adapt and transform how Iron Age and early Roman communities represented their own identities and how they wished to be perceived by other groups. The approach of Roman cultural difference inspired goldworkers to realign their design concepts in order to express new ideas of regional identity. Instructed within a long traditions of knowledge and expertise of making

precious-metal artefacts, Iron Age goldworkers continued to respond to the new requirements of their communities by adapting techniques of surface texture, newly-transmitted from Mediterranean workshops, to the differing regional forms of their designs.

The technique of granulation, transmitted through networks of technical knowledge from the Mediterranean region, was used in the composite design of the terminals of Orense torc 1. Traditional motifs of inscribed intersecting arcs filled with punchwork drawn from Bronze Age goldworking design were elaborated by the application of gold-alloy granules. This elaborated visual effect would have been accentuated by the knowledge that this inscribed and punchwork motif conflated past traditions with a more recently-learned technique. This may be seen as a materialized statement that accentuated a strong sense of a community's past while imposing an aspect of design from a newly encountered cultural domain in order to articulate a renegotiated social identity. For the design of the torc to communicate effectively in its intended social context, these concepts would necessarily also be possessed by its commissioner and by the people among whom the artefact would be displayed.

Flusser has discussed how a designer 'informs' materials with an 'immaterial form' though their techniques as they construct a designed object through a 'temporary filling of eternal forms' (Flusser 1999, 23). The idea of the 'eternal' or 'immaterial' form of a torc persists, irrespective of the actual physical form of its design, the medium it was made from, and how it was applied or used in different social contexts. Through the process of 'filling' the concept of a torc with alloys of gold, silver or bronze, Iron Age and early Roman metalworkers materialized infinite variations in its design attributes and enabled multiple uses of its image in their societies.

The incorporation of the image of the torc within other designed objects such as granite figures, copper-alloy sacrificial scenes and gold-alloy belt-plates expanded the conception of how such artefacts were perceived by the individuals and societies who commissioned their design. Such representations of torcs indicate that their 'polysemic nature … is manifested in both a diachronic and a synchronic perspective' (Armada and García-Vuelta 2018, 333) throughout the Iron Age and early Roman

period. The statements of the image of the torc in different media were closely connected through the knowledge of stonecarvers, bronzeworkers and goldworkers, rather than through an assumed 'pervasive style' (de Boer 1991) of this artefact. Imbued with a sense of future design and use, these representations extended the artefact of the torc beyond its own visual materiality, attributes and associations into other constructed networks of Iron Age and early Roman material culture.

The Orense torcs may be viewed as artefacts that were designed and made for a community according to particular traditions of material display. They constitute a bipartite design, related by aspects of form and techniques of making, though they differ significantly in the treatment of the elaborated terminals, the focal points of their visuality. This may have reflected different aspects of the community's social and cultural relationships that they required to be displayed. Each torc may have represented a different social network in which the community was enmeshed, perhaps one design representing the connections within the community and the other their wider social commitments and obligations to others.

The conditions of the Iron Age display of the Orense torcs operated in an interconnected network between past and present. How they were displayed during their curation and use in the Iron Age constituted an aspect of their design within this network of associations with other materials, artefacts and people. This network was disconnected when the torcs were removed from the domain of the living through their deposition. From the point of their recovery a new network of associations began to be constructed around the torcs that has been continually developed through analyses, terminology, reception and forms of presentation and display.

6.4 Old Warden shale vessels

'Quint's-hill. … two hoops of iron, one on the other's edge, inclosing the burnt bones and teeth of a human being. Close to them were two earthen urns of large size, with long handles, and also two wooden vessels, inverted; which being almost unique, merit particular description.'

Henry Dryden 'Roman and Roman-British remains at and near Shefford, Co. Beds', 20 (1845)

Introduction

Two shale vessels, placed in a cremation burial *c.* 50 BC (British Museum online catalogue, *https://www.britishmuseum.org/collection/object/H_1855-0710-1*), were found around 1843 to the north of Quint's Hill near Old Warden in Bedfordshire (**figure 51**). These artefacts have been selected for a case study in this thesis to explore how approaching the study of Iron Age and early Roman material culture through design may potentially identify creative concepts and techniques of making that were applied between different media. These vessels may also be situated within the cross-Channel contacts between Britain and France during this period as examples of the transmission of shaleworking concepts of design.

According to Henry Dryden's account, Thomas Inskip of Shefford had gained permission to investigate 'Quint's-hill, a small circular encampment' just to the north of Warden church (Dryden 1845, 20). Inskip located the burial group with the Old Warden shale vessels 'at about 40 or 50 yards from the outer edge of the ditch, on the north side of the camp, discovered at 4 feet below the surface'. Dryden remarked that the vessels were thought to be of oak, suggested by the wood-like decay pattern of the shale material, and that they were black. They were illustrated by Dryden on 8–10 June 1843, and this drawing is now in the collection of Northamptonshire Central Library (DR/01/119) (**figure 52**). Both vessels were acquired by the Cambridge Antiquarian Society Museum of Archaeology and Antiquity in 1845.

The vessel referred to in this case study as 'Old Warden 1' was registered by the Cambridge Museum as MAA:1883.190 and is currently held in the archive collections (**figure 53**). I am particularly grateful to Dr Julia Farley of The British Museum for drawing my attention to this artefact. Vessel 'Old Warden 2', examined for the purposes of this case study, was acquired by the British Museum in 1855 and registered as 1855,0710.1 (**figure 54**). This case study has been informed by the expertise of shale-turners Gareth Riseborough and Sally Pointer. In correspondence they have remarked on the nature of Kimmeridge shale, the process and practice of working this material on a pole lathe, and on aspects of the design of the Old Warden vessels.

The social environment for design

The later Iron Age has been identified from settlement and artefactual information as a period of particularly pronounced social transformation that was widespread throughout northwest and central Europe (for example, Haselgrove and Moore 2007). From around 400–300 BC communities began to realign the design of their artefacts, buildings and landscapes to renegotiate their places within networks of local, regional and transregional identity and interchange, The consequent changes were, in turn, Accommodated though design. In the British Isles and Europe the traditions of design knowledge, technologies and techniques from the Neolithic and Bronze Age pasts were drawn on and rearticulated in differing ways to generate and display new ideas of personal and locational place-making in society.

Archaeological research has demonstrated that there were networks of coastal exchange between the different Iron Age communities of Atlantic western Europe that had been developing since the Neolithic (Cunliffe 2001, 16–50; Webley 2015, 122). For example, tin deposits in southwest Britain, northeast France and northwest Spain had been mined, processed and transported through exchange links along the Atlantic coastal area of Europe during the late Iron Age (Carreras and Morais 2012, 420–1). A Bronze Age boat excavated at Dover contained a fragment of Kimmeridge shale (Bown *et al*. 2004). The design of this boat indicates that its crew probably navigated

the south coast of Britain and possibly also the Channel (Clark 2004, 316). It is possible that the partly-polished black-brown and white-speckled fragment may have been sent by a workshop in the Poole Harbour area (Dorset), perhaps on Green Island, as a sample requested for a particular commission. The black, glossy and cordoned vessels turned in shale, such as the two from Old Warden, were closely associated through the design of cremation practices with contemporary pottery from southern Britain and northern France. The forms, colour and reflective effects of these shale and ceramic containers were aspects of design particularly sought after by the communities in these regions who had associated with each other through a long tradition of affiliation and cross-Channel exchange.

Dark-coloured, cordoned vessels with pedestal feet termed 'black cordoned ware' have been described as belonging to the 'Aylesford–Swarling' tradition of cremation burial practised in southeast Britain, mainly in the area of Kent, Essex, Hertfordshire, Cambridgeshire, Bedfordshire and Buckinghamshire (Evans 1890; Bushe-Fox 1925; Fitzpatrick 2007, 125). This tradition has been equated with the 'Belgic' culture widely practised in the areas of Gaul in northeast France and in Belgium from the second century BC. The term 'Belgic' was derived from a passage in Caesar's *De Bello Gallica* (V, 12) referring to an earlier settlement of people *ex Belgio* in the coastal area of south-east England. The migration theory used to explain the material expressions of this tradition resulted in the concept that novel aspects of design in the archaeological record of the late Iron Age were introduced to southern Britain by incomers from continental Europe (following Hawkes and Dunning 1931, 322–3). This has been now been reassessed in the light of the large increase in archaeological information, particularly from northern France (*e.g.* Decheleprêtre and Ginoux 2002; Lepaumier 2012; Lefort 2015). Research perspectives have articulated towards accommodating multi-directional transitions of people, design concepts and material culture between southern Britain and northern France during the Bronze Age and Iron Age (*e.g.* Cunliffe 2009; Moore and Armada 2011; Webley 2015). These transitions affected many areas of the design of portable artefacts and their traditions of use, from everyday objects to special commissions.

The narrative account of Caesar's campaigns in *de Bello Gallica* described how he extended his military campaigns of the 50s BC from Gaul to Britain, apparently for the reason that most of his opponents in Gaul had received reinforcements from Britain (*de Bello Gallica* IV, 20). This implied that there had been long-established alliances and associated cultural exchanges between the peoples of Gaul and Britain. According to Caesar's account, traders from Gaul informed the Britons of his plans to cross the Channel and that envoys from different peoples subsequently sailed to Gaul to make terms with him. Caesar sent the envoys back to Britain with Commius, who he had made king of the Atrebates in Gaul and who had influence in Britain (*ibid*., 21). Caesar exploited the close connections already existing between Britain and Gaul in his strategy of extending Rome's territory towards Britain, attracted by the symbolic triumph of the conquest of this island in Ocean. By the time of Caesar's first invasion of 54 BC the different peoples of southeast Britain 'may often have felt closer connections with their neighbours across the Channel in Gaul than they did with each other' (Hingley forthcoming).

Societies in Britain and in Gaul were based on relations and ties between patrons and their clients, both within and between particular peoples, that were necessarily maintained by regularly conducting transactions such as gift-giving, feasting and marriage. Loose and unstable ties between separate peoples, reflected by the distributions of particular coins (Leins 2008; Hingley forthcoming), were reformed as leading figures in British communities had their names struck on coins as an expression of their negotiated power with Rome that had increased their power and status (Creighton 2000, 64). Leaders such as Cunobelin, whose influence extended over a large part of southeast Britain by the early 40s AD, reconstructed their status and power in relation to each other through their contacts with Rome.

Fine ware ceramics and *amphorae* containing wine and olive oil from the Mediterranean were acquired by influential individuals through the long-established cross-Channel connections between southeast Britain and Gaul. The transport of these artefacts was probably mainly organized through exchange networks with communities living in the coastal areas of Gaul. It is possible that diplomatic agreements had been made between rulers in Britain and Rome that allowed cargos to

be shipped by particular routes to Britain (Hingley forthcoming), sailing along the south and east coasts to harbours such as at Poole Harbour, Fishbourne (West Sussex), Sandwich (Kent) and Fingringhoe (Essex) (Markey *et al*. 2002; Willis 2007, 117; Fitzpatrick 2019, 140–5). At Poole Harbour boats would have been rowed and sailed to the warfside installations where their cargos of ceramics from northwest France were unloaded and stored in warehouses for onward transportation. These pots were then repacked for onward transport with cargos of Kimmeridge shale blanks, samples and finished artefacts, and with other commodities, such as pots designed and made in regional workshops, and ceramic containers for salt (Trott and Tomalin 2003, 177).

The archaeological remains of shaleworking and the making of these ceramics, including wasters from the firing of pots, indicates that there were many pottery workshops in the Poole Harbour area (Papworth 2008, 350–1). Practitioners in shale and clay worked in close contact with one another and would have observed and discussed each other's designs and techniques of working in different media. River barges were rowed inland along the rivers Frome, Stour and Avon for collection and further distribution of these goods from Pool Harbour and Hengistbury Head, including the onward transport of pottery designs from France (Papworth 2008, 360), and sailing ships carried these artefacts to other harbours along the coast of Britain. On the Isle of Wight, for example, shale blanks were unloaded to supply the workshop at Bouldnor where they were cut by hand into vessels and bracelets (Trott and Tomalin 2003, 177).

Blanks of Kimmeridge shale were also being transported by sailing ships to the coastal harbours of northern France. The navigational hazards in crossing the Channel in a direct route from the Poole Harbour area necessitated sailing to the island of Guernsey before making landfall on the coast of northeast France (de Jersey 1993, 331–2). Ships sailing from Poole Harbour with cargos of Kimmeridge shale would probably have taken this route to deliver this raw material to the workshops of Île d'Yoc'h and Alet in Brittany and Urville-Nacqueville in Normandy. Those who managed the sailing routes across the Channel would have relied on the collaboration

of local navigators with their detailed knowledge of the coastal waters and weather patterns of southern Britain and northern France (Trott and Tomalin 2003, 165).

During the first century BC people were increasingly exploiting the coastal area of Dorset and Hampshire for its natural resources such as shale and salt (Sharples 2010, 80). The enclosed settlement on the promontory and harbour site at Hengistbury Head was redeveloped (Cunliffe 1987) and a new settlement was constructed at Ower overlooking Poole Harbour in Dorset (Woodward 1987a). Since the late Bronze Age workshops at settlements in the Poole Harbour area had engaged in a long tradition of designing and making both artefacts from Kimmeridge shale and also large numbers of ceramics (Brown 1997, 41), such as those at Rope Lake Hole (Woodward 1987b), Eldon's Seat (Cunliffe and Phillipson 1969) and Compact Farm (Graham *et al.* 2002).

As shale-turning was an expertise that had been used to design artefacts in Britain since at least the Bronze Age, the communities who managed their production may have done so for a long time by the late Iron Age. Over time, this would have imbued dark glossy designs in shale with concepts of memory and possibly links with ancestors. Communities who had close access to shale sources, or among whom shaleworkers were based, would be able to present themselves as culturally significant contributors to the wider network of communities practising the new cremation burial rites. Although most people in late Iron Age society probably mainly inter-related at a relatively local level in their everyday lives and cultural practices, at the same time they were part of much more extensive socio-cultural networks which others in their communities could access according to the reach of their own social connections (Hill 2011, 248–9).

The significance attached to shale as a medium to be worked is reflected in how it was situated in different socio-cultural networks of differing geographical range. It is possible that workshops located with close access to the outcrops of shale, such as those at Rope Lake Hole, were also supplying the raw material to shaleturners based further afield in the southwest region at Green Island, Ower and Hengistbury Head. Finished artefacts, such as the Old Warden vessels, were transported to regions further east as part of the networks of cultural changes in these areas that

incorporated new aspects of cross-Channel design. These communities distinguished themselves from others through these networks, for example, by reorganizing and enclosing spaces in the landscape through the construction of *oppida* earthworks and by burying their cremated dead in demarcated areas that they may have assigned to households or kin (Haselgrove 2007b, 492, 513–4; Fitzpatrick 2007). The establishment of these networks of design, making and supply to communities seeking to redefine their identities would have created a cultural environment that was conducive to further specialization and associated innovation in design. This would have been developed further by creative practitioners as they responded to requirements for similar artefacts and, subsequently, for designs that differed from those in circulation.

While the late Iron Age social environment was being constantly reconstructed, maintained and managed through mechanisms such as gifting and feasting at the more local level, longer-distance networks were acknowledged through connections such as family ties, reciprocal obligations and the mutual supply and exchange of the materials and expertise required to express cultural similarities and differences. Individuals and their communities articulated these social mechanisms and strategies through material design, bringing into the physical world the conscious formulations and expressions of how they wished to conceive of themselves and to be perceived by others. The artefacts designed and made in the different media of shale, ceramic, wood and metal alloys that were incorporated into the late Iron Age cremation burial rites in southern Britain and northern Gaul were expressions of these multi-dimensional relationships, both in terms of local and regional supply, making and expertise, and of the concomitant inter-regional connections. It was also an environment that was fluid and changing, as connections were made, changed and broken within the different networks of embedded social and material design. The introduction of insistent Roman political compliance would have powerfully challenged this familiar way of conducting relationships and operating socio-cultural networks, giving rise to different kinds of instabilities more focused on leaders of communities in Britain and Gaul who aligned themselves with Rome.

There were also close connections and transmissions between the architectural traditions of Gaul and Britain. Most Iron Age houses on the continent were designed with a rectangular plan, although roundhouses excavated in northwest France, such as those at Saint-Gatien-des-Bois, have shown that building concepts had been exchanged across the Channel since the Bronze Age (Decheleprêtre and Ginoux 2002, fig. 3). The British roundhouse design, for example, has been identified from excavations in Brittany, Normandy and the northern valley of the River Seine. During the later Iron Age people in southern Britain and northern France were gradually changing the design of settlement layouts, from constructing their houses and workshops from being open to view in the landscape to being demarcated from their surrounding field systems by ditched enclosure. The mutual exchange of design concepts for portable artefacts and buildings may also have extended to ideas of land ownership, inheritance and place-making (Webley 2015, 132).

The deposition of shale vessels at Old Warden in the mid first century BC was associated with the significant socio-cultural changes in the lives of peoples in this area of southern Britain. The tradition of disposing of the dead in cremation burial grounds on the near continent, transmitted to southeast Britain during the second century BC, gradually replaced excarnation and inhumation to become the customary burial practice of the late Iron Age (Bradley *et al*. 2016, 313–4). These burials ranged from simpler assemblies of an urn and a few other associated artefacts to more complex arrangements that comprised ceramic and shale vessels with pedestal feet and other artefacts associated with feasting, such as *amphorae* filled with wine or olive oil, that had been designed in and imported from Gaul and the Mediterranean (Moore 2016, 263).

The widespread tradition of cremation burial was furnished with particular kinds of designed objects that were linked together within a complex network of materials and attributes by their makers and commissioners. Well-connected communities among the different peoples in southern Britain and northern Gaul were inter-related through the traditions of their disposal of the dead in ways that probably reflected their relationships with each other in life. Communities could therefore belong to

much larger socio-cultural networks, enabling them to define themselves in more subtle or complex ways from other networks of peoples and territories.

Associated designs in social context

Archaeological studies have previously focused on artefacts of elaborated surface design, particularly those in metals, in considering how people living on both sides of the Channel were connected with each other during the Iron Age and early Roman period. Some of these objects have been viewed as belonging to people who were incomers to the region where they were buried (*e.g.* Cunliffe 2009, 84) or as gifts or items of exchange between wealthier individuals as levers in a spiritual context to legitimize personal power (Sharples 2008, 211). This has created a dominant impression of special artefacts being passed between and then commissioned by particularly influential people.

By considering the design of artefacts made in different media within wider settlement and burial contexts, rather than conceptualizing artefacts as part of an economic model of trade, more nuanced socio-cultural associations may be drawn out. Social bonds that people wished to, or were required to, maintain, such as those of kinship, may have been powerful drivers to acquire designed objects or the materials to make them over longer distances. For example, through exploring the interconnective design of vessels turned from shale with unelaborated, smooth and reflective surfaces, the motivations behind the design of these artefacts deposited on both sides of the Channel may be re-assessed. Using the concept of design enables the exploration of how creative ideas were used across different media, rather than perceiving design in one material as 'influencing' another. Through technologies such as the pole lathe, a machine that could be adapted for cutting shale, wood or stone, makers could envisage how aspects of design could be transmitted between media. By combining taught and learned techniques of making, and long practice and experience, practitioners were able to creatively evolve their own expressions of socially-connective design.

Designs such as the Old Warden vessels resulted from the exchange and development of ideas of making transmitted between southern Britain and northern France. In Britain the exploitation of Kimmeridge shale since the Bronze Age, when complex designs such as the Caergwrle (Clwyd, Wales) bowl of around 1200–1000 BC were made (Davis and Townsend 2009), was continued throughout the Iron Age and Roman period. In Kent, Essex, Hertfordshire, Cambridgeshire and Bedfordshire, black lathe-turned shale vessels and wheelmade ceramics were buried variously with copper-alloy vessels, brooches in iron and copper-alloy, wooden containers with iron and copper-alloy fittings, iron firedogs and *amphorae*.

By the first century BC practitioners in this medium were also turning it on the pole lathe to make black, glossy armlets and vessels for cremation burials. The shaleworkers' adoption of the lathe as a cutting machine into their long-established tradition of working may be compared with the installation of wheel-turning devices in potters' workshops. Practitioners in both shale and ceramic transformed their long-practised knowledge, skills and concepts of design with mechanised technology that allowed them to produce forms with smooth, curving surfaces that could be finished to a high shine in a much shorter time frame. In particular, shaleworkers explored the ways that their new technological device could extend their concepts of design, producing novel forms such as the composite pedestal-foot vessels from Old Warden. To those who had seen and handled hand-cut shale items and hand-formed ceramic pots, these variations in design would have appeared both familiar and attractively different.

Practitioners who produced armlets and rings in large numbers at the workshop at Eldon's Seat (Dorset; Cunliffe and Phillipson 1969) may also have had the knowledge and expertise to design and make vessel forms in shale. Although supplies of shale were probably ordered by and transported to workshops in this region, finished artefacts may have been packed and transported to other more distant communities, such as the late Iron Age and early Roman settlement at Heybridge in Essex (Tyrrell and Major 2015), where they were eventually deposited in burials.

The two vessels placed in the burial at Old Warden were made in a tradition of shale-turned containers that extended throughout the region of present-day

Bedfordshire, Cambridgeshire and Essex (**figure 55**). Three comparable designs in lathe-turned Kimmeridge shale were placed in a burial at Harpenden in Hertfordshire (Kennett 1977; Denford and Riding 1991). A smaller cup-shaped design with a pedestal foot accompanied burials at Barnwell (Cambridgeshire) and at Great Chesterford and Lexden (Essex) (Denford 2000). Other shale-turned vessels have been found near to the source of their material on the Isle of Purbeck (Dorset) and at Glastonbury, Meare and Wookey(Somerset) (Cunliffe 1982, 49).

Lathe-turning workshops have been identified at Urville-Nacqueville, where a considerable amount of shale has been found in different stages of being worked into armlets (Lefort 2015, 86). Shale-turned containers from northern France include the lathe-turned cup-shaped cordoned vessel from Le Yaudet (Galliou and Cunliffe 1995, 80, fig. 65.4.1) in Brittany, and vessels from Saint-Gatien-des-Bois (*see* **figure 55**; Lefort 2015, fig. 84), d'Hérouvillette 'Les Pérelles' (Besnard-Vauterin *et al*. 2015, fig. 21.7) and Fleury-sur-Orne (Lepaumier 2012, 439) in Normandy.

Late Iron Age wheel-turned ceramic designs of the first century BC to the first century AD included vessels of different heights with lids, cordoned bodies and pedestal feet, variously termed 'jars', 'cups' and 'butt beakers', burnished to a glossy dark colour. These forms were made for households and for placing in cremation burials in Kent, Essex, Hertfordshire, Cambridgeshire and Bedfordshire in Britain, and in the regions of Champagne–Ardennes in northern France and in Belgium (Birchall 1965, 297). Designs for these pots, including 'butt beaker' forms such as those from Pegsdon in Bedfordshire and Verlam Hills Field in Herefordshire, were being wheel-thrown in workshops at the *oppida* of Camulodunon in Essex and Verlamion in Hertfordshire during the early first century AD (Cunliffe 2005, 133) (**figure 56**).

The late Iron Age and early Roman designs in shale from the Bedfordshire–Cambridgeshire–Essex region have associations with those of the contemporary ceramic taller vessels and smaller bowls or cups with pedestal feet made during the first century BC to early first century AD (Kennett 1977, 17). Late Iron Age pottery produced by hand in the area of Poole and the Isle of Purbeck in Dorset included designs of black vessels with cordons spaced at intervals around the body, and

burnished to a shine (Jones 2017, 80), designs that were then transferred to wheel-turned technology. Comparable pottery designs from southeast Britain made by the wheel-turned process were closely related to ceramic vessel designs placed in cremation burials in northern Gaul. Ceramic vessels with pedestal feet buried in the Marne region of northeast France were covered with a flat dish such as the example from Châlons-en-Champagne, or were fitted with a knobbed lid such as that from Montépreux (Birchall 1965, 260, Fig. 27; **figure 57**). Shale pedestal vessels such as the Old Warden vessels may have been originally fitted with turned lids of a similar design as an aspect of their design as funerary urns (**figure 58**). Late Iron Age shale vessels and pottery placed in cremation burials were linked by concepts of design that were exchanged between makers and their communities living throughout southeast Britain and northern Gaul.

Turning these designs in shale on a lathe and clay on a wheel were technologically closely related, involving knowledge and skilled use of tools that was also required for turning designs in wood. Practitioners with experience of turning forms in one medium may well have had the ability and the experimental will to transfer their working practice to another, perhaps working in different media as was required. This would have facilitated the transmission of material effects, such as the shaping of cordons with a hand tool by cutting into the rotating shale or wood, or by pressing into the clay. In this way, makers of shale, wooden and pottery vessels could explore and extend their techniques, experience and knowledge.

Designing the vessels

The concept of embodiment is one that deeply informs the design of artefacts. In archaeological studies the differently angled or curved parts of ceramic vessels, for example, are variously referred to in terms such as ‘lip’, ‘neck’, ‘shoulder’, ‘body’ and ‘foot’. This has arisen from how people have continually conceptualized the world around them in relation to their own bodily form (Lakoff and Johnson 1999, 6) and implies that vessel forms may be designed (conceptualized and made) as representing human bodies. The concept of ‘human body projection’ (Okimoto 2016, 10),

associates an artefact with the human body through attributes given to its material and form, and by referencing the matter it is intended to contain through aspects of its design, allowing it to become 'a bridge between the physical world and the mental world' (*ibid*., 33).

If the design of the Old Warden shale vessels was informed by this concept referring to the human body in the shape of the material artefact, this would directly reflect the nature of the intended contents, cremated human remains. Practitioners of working in shale would have been familiar with the nature of the composition of this light-weight stone that was half-composed of organic matter. The processes of weathering or decomposition open up the matrix of shale, giving it an appearance of old wood, and heating or burning this material produces a smell similar to that of sulphur. The oil-rich Kimmeridge shale outcrops could also be subject to spontaneous combustion (Denford 2000). By knowing the workability of this material, observing the effects of the process of decay on its fabric, and being aware of its natural attribute of burning, makers of shale artefacts may have been drawn to the concept of designing vessels for cremation burials. This design concept would apply whether the vessels were to contain cremated remains or were intended to stand alongside the ashes deposited in a grave.

The Old Warden vessels were designed with conjoining sections, comparable with the three tall shale vessels from Harpenden, at least one of which may have been assembled in three or five parts (Kennett 1977, Fig. 1; Freeman and Watson 1949, Fig. 1). Old Warden vessel 1 was designed in two parts, the sections shaped to conjoin at the third cordon down from the shoulder, while vessel 2 was designed in three parts to connect at the second and third cordon down from the shoulder (**figure 59**).

Experimental research to assess the use of flint tools in shaping artefacts from shale on a pole lathe has shown that the large piece removed to form the hollow interior of a section of a vessel could be reused to make armlets (Errington and Johnston 1981; Sloper 1985). This has demonstrated that the two designs of shale artefact, the vessel and the armlet, were not only closely linked materially but that they were also conceptually connected, cut from the same blank within a single design strategy planned ahead of working on the lathe. The close relationship with the body of a

shale armlet worn on the arm, and the smooth tactile quality of its surface, constitute aspects of design that may have been transmitted to the perception of shale vessels. The relative warmth of shale to the touch, compared to ceramic, may have been an attribute of this material that was associated within the design of other artefacts in the medium.

This burial of cremated remains represent a sequence of actions that led to the final covering and marking of the grave and its incorporation into a community's memory and visual experience of their landscape. The remains gathered from the funeral pyre were selectively layered within the shale and iron-hooped vessels, perhaps with other burned or unburned materials, and arranged in the space of the grave. The selection and layering of materials in containers is emphasized by the design of the shale vessels, which may have been carefully filled and assembled from the pedestal foot upwards as part of the funeral ceremony. The vessels into which the remains of the dead were placed effectively reincorporated them for burial (Rebay-Salisbury 2010, 68). In this way, the person of the deceased was materially transformed, fragmented through fire and finally reconstituted as an aspect of the container's design within the grave.

Sourcing the materials

The shale selected for making the Old Warden vessels originated from the Blackstone stratum of the Kimmeridge Clay formation outcropping at Kimmeridge Bay in Dorset, the main area of supply in late Iron Age Britain (*see* **figure 51**; **figure 60**). Kimmeridge shale from outcrops in Dorset, Lincolnshire and Norfolk, and similar oil shales in northern France, were widely exploited into the early Roman period (West 2016). Makers based in workshops at the *civitas* capital at Dorchester produced large quantities of artefacts made from this material, including bracelets, trays, plates and furniture (Eckhardt 2014, 117), for both local customers and for markets outside the region. The shale was either quarried in blocks from inland outcrops or gathered as large sea-worn cobbles from the shore where the Blackstone was exposed at the coast. It has been suggested that the shale-turner may have selected a sequence of gradated

sizes of blocks or cobbles from which each section of the Old Warden vessels would be cut (Riseborough and Pointer, pers. comm.; **figure 61**).

Practitioners in shaleworking had access to a wide variety of sources of this material and their workshops could order what was required for their regular supply as well as special cuts and sizes for particular commissions. Shale was quarried from sources such as the outcrop at Kimmeridge Bay, the main area of supply in late Iron Age Britain. Kimmeridge shale was transported through a widespread network of track and waterways between the south coast of England and southern Scotland, and has been found in unworked blocks and partly worked pieces at York (Allason-Jones, 2002, 127–8). The shale supplied for the Old Warden vessels was cut from a series of blocks or cobbles conveniently sized for transport, and selected with an experienced eye by the turner for the intended designed object (Eckhardt 2014). The turner may have therefore have contributed to a network of knowledge and experience shared by those who supplied the required material and those who worked at the sources of shale extraction, people who were often separated by a considerable distance.

The maker of the Old Warden vessels used a range of different tools to shape its conjoining sections. Makers who carved and used pole lathes to turn shale artefacts commonly used hand tools struck from flint throughout the Iron Age and early Roman period in areas of Britain such as the Dorset coast (Calkin 1953). At Green Island in Poole Harbour material for shaleworking was found associated with debris from knapping the flint tools required to shape the artefacts (Wessex Archaeology 2003, 10 and 17). At Potterne (Wiltshire) flint tools were found in association with worked shale and bone, hard materials for tools with edges that could be resharpened and easily replaced from a reliable supply (Pickstone and Mortimer 2011, 54–5).

Techniques of making

The hard oil-rich Blackstone shale, ranging from dark grey to dark brown in colour, was valued for its ease of working. A worker of this light-weight and versatile material was able to create a wide variety of shapes on a pole lathe (Denford 2000). This type of lathe, which was used to form the parts of the Old Warden vessels, was a

machine for creating artefacts with smoothly curving surfaces from hard materials such as wood or stone. Operated by a foot treadle, the lathe enabled the maker to work use their cutting and shaping tools with both hands. The lathe was constructed with timber beams and posts substantial and strong enough to withstand the forces generated when the maker turned the heavy shale blanks and applied their hand tools to cut into and shape the surfaces. This versatile type of mechanism could be installed in a workshop space, or easily assembled and taken apart again in an outside location (**figure 62**).

The lathe turning space of the was between two thick timber upright timbers, the 'headstock' and the 'tailstock', mounted on a substantial timber frame or bench; in a workshop space, this would be fixed to a timber base. A drive cord was attached to the top end of a springy ash sapling around 4–5 metres long, fixed to vertical post at a short distance from the timber uprights. At one side of the turning space, a mandrel (solid cylindrical wooden block with projecting iron spikes) was joined to a rotatable iron spindle fixed into the headstock. The maker was able to adjust the horizontal position of the spindle and mandrel during the gradual reduction of the cobble blank as each section of the shale vessels took shape. The free end of the drive cord was wrapped twice around the mandrel and then attached to a treadle fixed to the floor at one end, conveniently placed for the maker to depress the other end with their foot (Brennan 2012; Jones 2014). The coiled tension in the cord could also be adjusted during the turning process by changing the position of a forked pole braced against it.

Setting up the turning space

If the piece of shale selected for the vessel section was too large for turning on the lathe, the practitioner used an axe or an adze to cut it down to a blank of convenient size. Having adjusted the position of the stocks to create an adequate turning space between the mandrel and the tailstock, the maker carefully positioned the blank carefully on the lathe. Small holes drilled into one end allowed it to be accurately centred on the mandrel spike, and it was then sharply tapped into place with a

hammer. The blank was held securely in place between the mandrel and by a fixed spike projecting from the tailstock.

Turning the lathe and shaping the parts

To shape a shale artefact by hand required a knowledge of the nature of its material that could also be applied in the operation of a pole lathe. Shale-turners may have also acquired the knowledge and practised the skill required to produce a wide range of forms in wood, and it is possible that designs in shale were trialled in wood before the stone was cut. The shared technological concepts and procedures of shaleturners and woodturners created strong design connections between these materials that may have contributed to the selection of the media of shale for particular artefacts, such as funerary vessels.

The turner depressed the treadle so that the drive cord, under tension between the treadle and the pole, rotated the mandrel and shale blank towards them. Allowing the treadle to rise caused the mandrel and block to rotate away from the turner so that the sequence could be repeated in a reciprocal process. During the downward compression of the treadle, the maker applied flint or iron tools to the surface of the shale, shaping it in a spiral path and gradually reducing the blank towards the intended external shape. During this process the surface of the vessel section became grooved in texture as fragments of shale were tooled away in working towards the final form (Jones 2014).

When the shale blank had been reduced to the external shape of each section of the Old Warden vessels, the turner removed it from the lathe and reattached it in the reverse position, so that it could be hollowed out with long-handled flint tools and reduced to the intended thickness (Brennan 2012, 10) (**figure 63**). The reciprocal motion of the lathe mechanism enabled the turner to remove the waste pieces of shale easily. This also allowed the maker to apply subtler pressure with their foot to the treadle so that the action of a cutting tool could be stopped at any point in the working process.

The turner relied on the sharpness of their tools to obtain a good-quality finish on both the inside and the outside surfaces of the vessel sections (Jones, 2014). Shaleturners would have been equipped with a wide range of cutting and shaping tools designed for making artefacts of different sizes and shapes. These would have been placed ready to hand during the lathe-turning process, with a range of flint cutting edges fitted with long wooden handles to facilitate applying pressure and giving greater control (Riseborough and Pointer, pers. comm.). These cutting and engraving tools were specially made for turning shale and were possibly designed to the turner's own specification. When each pedestal-foot section of the Old Warden vessels was removed from the lathe, a carving tool was used to remove the small projection of shale where it had been attached to the lathe.

Experimental research has shown that, after approximately three hundred rotations of the mandrel, the edge of a flint tool had begun to wear down rapidly (Errington and Johnston 1981; Sloper 1985). A shaleturner would therefore require regular access to a supply of flint tools that had been knapped specifically for working in this material. Flint could readily be resharpened or reshaped if required; the turner may have had this expertise themselves, or they may have been in contact with someone who could knap flints to their requirements.

The sections of the Old Warden vessels were designed to conjoin with a double rabbet joint, allowing a close and secure fit between the sections and contributing to the overall stability of the assembled vessel (**figure 64**). The joints had been precisely cut due to the swift rotational motion of the lathe. Cutting the rabbet joints to interlock the sections of the Old Warden vessels could be easily achieved with a sharp flint point tool (Riseborough and Pointer, pers. comm.). Visualizing the precision of the interconnecting edges for these vessel designs would be a matter of acquiring a high level of skill in handling shale and in using flint-tool and lathe technologies, all acquired through long practice.

Finishing

All artefacts lathe-tuned in shale required hand-finishing by smoothing, burnishing and polishing. Each section of the Old Warden vessels was hand-tooled on the lathe to a smooth outer surface. The turner assembled the sections of the vessels and burnished them to bring oil in the shale to surface, creating a high gloss that brought out the deep brown-black colour of the material. Polishing the vessels in their assembled forms created the differential tones of glossy surfaces and matt incised lines around the base of the neck, at the shoulder and around the body of the vessels. The turner may have applied a finishing film of beeswax to the surface with a piece of leather or textile to increase the shine and reflective quality of the vessels' appearance (Riseborough and Pointer, pers. comm.; **figure 65**). Experiments have demonstrated that turning a shale vessel on a pole lathe required the investment of two-thirds of the time taken to carve and finish a similar artefact by hand (Sloper and Johnston 1986; Sloper 1989). The reciprocal rotation of the mandrel would have enabled the turner to also design artefacts with protruding features such as handles formed from the same blank, an aspect of the pole lathe that is not possible on a machine driven by continuous motion (Brennan 2012, 9).

Production

Geological analysis has shown that shale outcrops at Kimmeridge, Île d'Yoc'h in Brittany and Saint-Gatien-des-Bois in Normandy were being quarried to supply the workshops of shaleturners in southern Britain and northern France (Baron 2012; Lefort 2015, fig. 82). Journeys by sea supplied blocks of cut shale and finished artefacts to workshops in the Dorset area and at Île d'Yoc'h and Alet (Brittany) and at Urville-Nacqueville (Lefort 2015) where a large quantity of armrings were made. Sailing between the coastal areas of southern Britain and northern France could all be accommodated within two or three days, an important consideration for travellers who planned their itineraries for delivery and exchange (de Jersey 1993, 332).

Deposition

There are a few recorded details of the recovery of the burial space in which the Old Warden vessels were deposited (Dryden 1845, 20). The grave may have been defined by a rectangular enclosure set within a small burial ground located at some distance from the settlement (Hill, 2007, 28). The burial was also furnished with a wooden vessel hooped with two iron rings, variously termed *situla* (Latin 'bucket'; Fox 1923, 97) and 'bucket' (British Museum online catalogue), 'inclosing the burnt bones and teeth of a human being'; two *amphorae* described as 'of large size and with long-handles' (Dryden 1845, 20); and possibly a shale cup (MAA:1883.191). The shale vessels were probably also filled with cremated remains, as they were described as containing 'ashes and earth' (*ibid*.). The openings of the vessels were presumably covered or sealed, as it was noted that they had been placed in an 'inverted' position in the grave (*ibid*.; Fox 1923, 97).

Arthur Evans specifically referenced the two Old Warden shale vessels in his discussion of a cremation grave excavated at Aylesford in Kent. This was dated to around 50–75 BC and furnished with associated objects of design (Evans 1890, fig. 1) (**figure 66**). He remarked that the shale vessels were 'no doubt the product of the same race of Late-Celtic artificers who produced the Aylesford pots' (Evans 1890, 352 and fig. 8). Cremated remains had been placed in a wooden stave vessel bound with copper-alloy bands and fitted with an iron and copper-alloy loop handle, and also in two tall wheel-thrown pots with body cordons and pedestal feet. These funerary containers were closely linked by aspects of their design expressed in wood, iron, copper-alloy and clay. The concept of containment expressed by the cordons of these designs reflects their final intended use as receptacles for the remains of the dead. Perhaps each of the Old Warden vessels contained the ashes of a particular person, or cremated remains may have been selectively placed in different vessels to reflect the dividual roles of a person in the life of their family and of the wider community.

Present display

Old Warden vessel 2 is currently on permanent display in the Iron Age (*c.* 600 BC – *c.* 1st century AD) Gallery 50 in case G50/dc25, assembled with other shale and jet objects and ceramic vessels in the same case (**figure 67**).

The associative differences between shale and ceramic vessels explored in this thesis through design could form the basis of a different approach to the display of these artefacts. This could be an opportunity to show how peoples living in southeast Britain and northern Gaul were connected through concepts of design in these media that were transmitted through the connective technological practices of using the pole lathe and the potter's wheel. The processes and practices that were used to produce this carefully constructed shale artefact could be reassociated with its presence as a displayed object through its reconceptualization as an informed designed.

Conclusion

Communities living in the coastal areas of Britain and Gaul were connected by networks of friendship, alliance and the exchange of artefacts and concepts of material culture design that had been established through formalities such as patronage and clientage (Farley 2012, 13–23). Artefacts transported from Gaul included containers filled with wine and olive oil, designed objects associated with agricultural production, storage, travel and consumption. Concepts of design, observed and discussed through conversations between the practitioners and commissioners of these designed objects, would also have been integral with networks of exchange.

The shale vessels from Old Warden constitute examples of the cross-Channel design that was operating within the escalated socio-cultural changes of the late Iron Age. These transformations were both linked to and driven by the design and making of artefacts, realigned by networks of creative practitioners and their commissioners. Through networks of design, concepts that communicated particular aspects of society could be expressed in different media. By associating shale and ceramic vessels

through aspects of design and concepts of identity and community drawn from social change, it is possible to make connections between people living within differing socio-cultural networks and in different geographical regions of Iron Age and early Roman Britain.

The distinctive designed objects placed in the Old Warden grave, each with their own network of attributes and associations, were inter-related within a tradition of cremation burial current in southeast Britain and northern Gaul. At the same time these designs reflected the social connections and attributes of the cremated person and expressed their significance within the designed network of the grave, the context of the burial ground and among the local community in which they had lived.

7 Conclusion – the case for design

Exploring Iron Age and early Roman societies through design

Placing the gestures and actions of making as cognitive operations within the socially collaborative strategies of design reframes artefacts and how they came to be made. Through informing an approach that critiques the study of the elaborated material effects that have been attributed to 'Celtic art', the concept of design socially reintegrates Iron Age and early Roman creative practice. Designing and making may be perceived as fundamental to the structure and shaping of socio-cultural traditions during this period, in addition to facilitating and driving the renegotiation of differing and novel ways of communicating identity and power.

Through exploring artefacts made in different media from different regions, it may be seen that design universally persists in combining process and practice to inform materials with concepts of appearance and identity through the collaborative strategies of communities within their wider societies. This fundamentally challenges the idea of Iron Age and early Roman 'works of art', a concept which has been used to separate creative practitioners from each other and from their communities through the use of terms such as 'artist' or 'craftworker'. Creative practice is dependent on the accommodation of society for the cultural adherence of a designed objects. This adherence is only effective if commissioners are able to formulate, maintain, alter or renegotiate attitudes to cultural traditions and relations according to their own intended strategies. As a pre-requisite for these changes, a community would be required to both culturally resituate aspects of their past as a basis for renegotiating new attitudes and also approve potential future actions brought about by the effects of the designed object. In this way the past and the present could be conceptually conflated and materially expressed in new ways through particular aspects of design. With regard to the Iron Age and early Roman period, these socio-cultural actions were materialized through designed objects made in a wide range of media and with differing degrees of elaboration to their forms and surfaces.

The tablet-weavers working at the settlement of Hallstatt from the eighth to the fourth centuries BC integrated the creative traditions of their Bronze Age past with novel ways of articulating concepts of pattern-making transmitted from eastern Europe and the Mediterranean region. They designed multi-coloured bands in complex patterns were intended to elaborate garments for the display of social distinctiveness. The novel interpretation and small-scale detail of patterned bands such as HallTex123, designed to be applied to cuffs and necklines, communicated this aspect of their design in subtle ways. Framing the hands and accentuating the gestures, these designs may have been worn by those who were intending to renegotiate their social position among their peers or within their wider community.

In northeast France the social transformation represented by the gradual change in burial traditions during the later fifth and early fourth centuries would have required creative practitioners to produce designs that reflected the novel concepts that were being articulated by society. New artefacts appropriate for feasting occasions associated with the funeral rites of inhumation were commissioned for serving and consuming food and drink by communities who were no longer cremating their dead. Workshops producing vessels such as those buried at Prunay and Beane-Nauroy were painted in colours and patterns that had been transmitted from Greek and Etruscan design, expressing the new cultural attitudes of communities living in the region. The long-established custom of commensal hospitality into which these new designs were admitted also required artefacts made in other media, such as metals, woods and textiles. Furnishing the scene and dressing the participants through the design of the feast, these inter-related artefacts would have been subsequently redesigned to further embed concepts of social change.

In Iron Age northwest Iberia the practices and processes drawn from Bronze Age traditions of goldworking were developed by creative practitioners to meet the demands of their communities for new ways of repositioning their visual identity. The Orense torcs were designed within a socio-cultural environment that was gradually responding to the approach of Roman authority and territorial acquisition that had begun in the early third century BC. As communities in Iberia renegotiated their identities, the image of the torc from their late Bronze Age past was reassessed and

materialized in different media to express new concepts of warrior status and community investment in visual culture. Goldworkers reformulated their concepts of design to accommodate the changing requirements of their commissioners by learning and applying traditional techniques transmitted from Mediterranean workshops into their designs. The overlaying of motifs and techniques, such as compasswork and punchwork from Bronze Age design with soldered granules, exemplified by the end-plates of Orense torc 1, may be seen as a creative response that represented the repositioning of a community's past in their present.

The socio-cultural connections between south Britain and northern France during the first century BC had been formed through the long-established networks developed by communities in the Atlantic coastal region of western Europe since the Neolithic period. Networks of material exchange, alliances between leaders and formal patron-client relations had facilitated the conversations that enabled the transmission of concepts of design. The social changes required by communities in response to the approach of Roman cultural difference were accompanied by the development of new cross-Channel designs. Creative practitioners in both regions adapted their knowledge and expertise of hand-carving artefacts in shale to the technology of the pole lathe, producing vessels comparable with contemporary ceramic forms. Shale-turners and potters working in the Poole Harbour area, for example, would have had close associations between their workshops, conversing together, and comparing and exchanging ideas of turning techniques, production and design in their respective media. Shale vessels from cremation burials were closely associated through aspects of design with ceramic forms wheelmade from the first-century BC. These designs with curving profiles, cordoned bodies and highly-polished black surfaces, were also produced in ceramic form for burials in northeast France. The deposition of the two Old Warden vessels in a cremation burial in the mid first century BC reflected the fundamental change in funeral practice from inhumation to cremation being made by communities in southern Britain and northern France during the late Iron Age.

Design and making in society

Design and making were ubiquitous throughout Iron Age and early Roman society, with many people creatively engaged in different networks of association through which they acquired artefacts. Members of households with the requisite knowledge and expertise would have provided their own everyday items such as utensils, containers and textiles for clothing and furnishings, while part-time or full-time specializing practitioners worked collaboratively in workshops designated to accommodate their technologies and materials.

In this thesis, design has been mainly explored as a constitutive network of people, the concepts they formulated to instigate or respond to social change in their communities, and the creative practitioners and mechanisms through which these could be materialized in Iron Age and early Roman regional societies. These collaborative strategies of design would have been worked out through conversations, between commissioners and practitioners and between designers and makers, who together moved conceptually through technological practice towards the objects of their socio-cultural designs. Creative practitioners working as designers would drive and direct the structuring of artefacts as these emerged through the collaborative inter-relations of the design process. From initial conversations with commissioners, designers would have worked through concepts and manipulated materials with makers possessing the particular technical knowledge and expertise required for their strategies of design.

The pronounced social changes that were taking place throughout the regions of Iron Age Europe during the last centuries BC would have escalated the commissioning of new material design. Through these artefacts communities and their leaders could project their renegotiated identities, inviting responses from each other. These may have been expressed through actions such as the realignment of alliances in the context of the approach of Roman political authority. New designed objects for public and personal display became sought after, including redesigning bodily appearances through the 'technology of the body' with toilet implement sets and cosmetics (Eckhardt 2008). These responses were networked with the domain of

design and its practitioners, who materialized concepts of renegotiated appearance and identity for their communities.

While particular media may be related to the availability of local and regional knowledge, expertise, raw materials and their supply, design interrelates the socio-cultural traditions and requirements of communities in more complex ways. Creative communication between practitioners working in different media such as wood, shale and ceramic would have been facilitated by the connections between the rotative mechanisms of their technologies, as in the case of the pole lathes for wood- and shale-turning and the potter's wheel. This communication would have involved the transmission of changing knowledge and ideas between practitioners and workshops and also of new concepts of design, including those that had been acquired through long-distance networks of contact and exchange. Collaborating together across different media networks through sharing knowledge would have greatly increased the potential availability of expertise and technologies for working on different aspects of designed objects, such as the application of glass-pastework to copper-alloy or the gilding of silver-alloy surfaces. Finished artefacts embodied the conversations of their commissioners, designers and makers in their eventual materialities, as networks of associated ideas were amalgamated into strategies of design.

Design mobilities

The transmission of concepts of Iron Age and early Roman design would have been constantly bound up with the degrees to which people were able to travel within their own local and regional landscapes, or through those of others. These mobilities, for reasons such as exchange, relocation, assembly and ceremony, would have allowed ideas and objects of design and making to be passed between communities. Through travel, design concepts would have been transformed through conversations during the viewing, exchange and comparison of artefacts that took place on necessarily long and slow journeys.

Portable artefacts that had been brought from distant regions, such as the ceramics of Greek design transported by sea to the ports on the south coast of France and

unloaded for carriage northwards, may have been sought after by wealthier individuals and communities because of their distant origin, communicated through the design of their forms and surface effects. Power in society has been associated with the ability to gather information concerning distant peoples and places (Helms 1988) and, as artefacts made within these far-away societies, the design aspects of these ceramics were integrated within these networks of acquisition. Once accommodated within these networks, these aspects could then be transformed to realign them with their new regional socio-cultural contexts.

Design mobilities are also useful for critiquing the traditional assignment of types of artefacts made in different media to particular places and times as a basis for compiling archaeological databases and chronologies. If concepts of design, not only their material embodied forms, were considered fundamental for constituting culture by Iron Age and early Roman communities, the mobility of and access to these artefacts would have been sought after and therefore organized by particular groups in ways to support their own interests. Communities may have commissioned existing workshops or set up new establishments to design and make particular artefacts. By operating access to the design and production of these objects, communities would have been able to create markers of changing identity while containing these developments within the familiar structure of their social organization to maintain stability. Design mobilities may have been restricted to transmission within and between particular communities for their own purposes, while others were a phenomenon of trans-regional travel.

The presence of the past

Ideas for articulating the design of portable or fixed artefacts, buildings and landscape interventions towards projecting new aspects of identity may have been subjected to long periods of transmission among societies with complex and deeply-embedded cultural traditions. Traditions of design emerge through both accretion and change, as materials and artefacts are evaluated differently by societies over time, and are regularly practised. Societies instigate change as a necessary part of the emergence of

their traditions of social relations and the projection of their identity. How and when a society decides to 'innovate' within their material culture is therefore integrated with the construction of their traditions of design. This would have applied to Iron Age and early Roman artefacts such as those designed to be displayed in ritual ceremonial contexts to communicate aspects of belief fundamental to society's structure and stability. Observed changes in the archaeological record may therefore reflect the internal changes a society deemed necessary for maintaining its evolving traditions through time, rather than represent their response to the approach of external cultural change.

The belief system of a community would have affected by the renegotiation of social identity, as it would have been closely networked with their way of living. By performing ritual practices, communities were continuously renewing inherited aspects of belief by reassessing the significance they attached to them (Morgan 1996, 44–5; Morgan 2014, 173). Material expressions of belief, such as the construction and maintenance of sanctuaries and the design of portable artefacts such as the Orense torcs to equip displays and ceremonies, would also be subject to change. Tradition and innovation were therefore part of the same mechanism of design through which a community articulated ideas of ancestry, memory and new concepts of identity through the forms and effects of their material culture.

In the Iron Age and early Roman period aspects of design inherited from past lives may have been deployed in newly-made and partly-recycled artefacts to reinforce traditions, particularly in times of social change. Apparent continuities of material forms and surface designs observed in the archaeological record may therefore reflect periods of particular social instability, during which individual leaders and communities sought to restate their social position and influence in relation to each other (Morgan 2014, 173). By selecting memories of their ancestral past they would have been able to instigate social change or respond to external cultural transmission in ways that were deemed appropriate and which would be communicated effectively within their society. These aspects of materiality visually restated or invoked designs of the past already familiar to particular groups through their concepts of social position or spiritual power. The visual familiarity affected by artefacts attributed

with design aspects transferred or reworked from a community's past could be used to legitimate new traditions of social behaviour – such as hosting a feast and establishing a new sanctuary or ceremonial ritual – through their reference to the authority of an ancestral past. The references to a Bronze Age past incorporated into the design of the Orense torcs may indicate that these artefacts may have been used in this way to realign a community's sense of past within a new ceremonial context. The fragmentation and burial of artefacts of association embodying the image of the torc, such as the granite statues set up at settlements in northwest Iberia, may indicate that eventually communities deemed this reworking of memory and ideas of ancestral authority ineffective and that they required new forms of identity to be designed in the face of the Roman acquisition of their territories.

Recycling by design

Thinking of artefacts as assemblages within a complex, ever-changing relationship with the communities who produced them, rather than only as objects of creative expression, allows for the idea of enduring interdependencies that may explain gaps in the archaeological record.

For example, gold-alloywork was generally made and used throughout the first millennium BC in western European regions, while in Britain gold-alloy artefacts and fragments are almost absent from the archaeological record between the eighth and the third century BC (Armada and García Vuelta 2018). Artefacts made in a new tradition, mostly dating from the third to first centuries BC (Hunter 2015, 105), mainly comprised torcs and arm-rings (Garrow and Gosden 2012, 134–7). The Snettisham hoard complex, for example, contained gold-, silver- and copper-alloy torcs of different designs, ingots and fragments. These artefacts may have involved the recycling and reuse of much older material from Bronze Age traditions of design. This would imply that, after a period of significant social change had brought the tradition of depositing gold-alloy artefacts to an end in Britain during the eighth century BC, the established interdependency between communities and gold-alloy

design may have resulted in the long-term curation of artefacts, fragmented parts and materials of this metal until it was reformulated during the third century BC.

Rethinking material culture studies through design

In material culture studies the idea of 'influence' has conventionally been conceived of as a one-way process in the diffusionist mode of acculturation. By reconceptualizing how people with their ideas collaborated and travelled in a transformative cultural process, it may be seen that everyone within their social networks was affected by this as part of an interchange of experience. Conversation through both language and by demonstrating ideas and techniques has been used in this thesis to frame design as a collaborative concept. The acquisition of knowledge for design and making, the accumulation of expertise, and the skills developed through practice to assemble and articulate these in material forms, require collaborative effort. Teaching and learning are therefore significant fields of activity within the transmission of knowledge. Learning and developing technical skills and expertise depend on the presence of experienced instructors, the availability of raw materials and resources for their supply, appropriate spaces furnished with equipment for design and making, and time.

Many archaeological studies of Iron Age and early Roman artefacts have drawn on traditional art-historical 'ways of seeing', essentially focusing on description for the comparative categorization of material culture based on types of media and technologies. This approach has generated a significant dichotomy within the practices and processes of making. Artefacts made in media such as ceramic, textile, wood and shale have been distinguished as 'craft' from the 'art' of those made in gold-, silver- and copper-alloys. This thesis explores a different way of perceiving artefacts that have been termed 'Celtic art', through an approach that has been constructed through a socio-cultural concept of design. Within this collaborative phenomenon, Iron Age and early Roman designers and makers worked creatively within their communities, inter-relating with each other through their conversations of conceptual and technological design. These inter-relations facilitated the

transmission of ideas concerning the practices and processes of design though the interchange of knowledge and the awareness of expertise in different technological practices. Necessarily integrated within their communities, practitioners collaborated with their commissioners to work extrinsically towards the materialization of the effects that were required of objects of design. Throughout the regional societies of Iron Age and early Roman Europe, designers and makers working in different media in household and workshop spaces were continually creative in formulating and renegotiating ways of living for their communities through associative media design.

The potential for the approach of design archaeology

The ideas behind creating visual communication permeate all media and cultural contexts that embody how information is perceived. These systems of design – materialized in portable and fixed artefacts, buildings and landscapes – are ubiquitous and continuous in facilitating the presence or memory of the past in everyday life. Archaeological research constitutes the exploration of how designed things constituted by portable or fixed artefacts, buildings and landscapes have been constructed by past societies through time. Approaching the study of material culture through the practices and processes of design allows a new assessment of the relationships between theoretical and practical studies. Designs are necessarily made within their social context, and how people respond to these things shapes the way they continue to perceive their world. Societies must therefore constantly address issues of personal and group roles and identities through making, appearance, performance and display. The structuration of things constitutes the embodiment of changing identities both materialized as, and negotiated by, designed objects.

'Design archaeology' (Shanks 2018) has the potential to review and fundamentally realign the structures of research in material culture studies. The traditions of compiling databases, refining the results, and constructing categories and frameworks have informed the directions of many archaeological study projects. Approaching material culture through a concept of associative design, integrated with the processes and practices of making things in different materials from different regions, has the

potential to open up the exploration of complex inter-relations in society that are not constrained by geographical distances.

The design approach in this thesis has the potential for reviewing the idea of assemblage as a socially constructed phenomenon through the commissioning and gathering together of artefacts in different media. The assembling and placing of portable artefacts in a depositional group, each designed object being an assemblage of attributes and associations in itself, creates a new multidimensional context. The material and conceptional inter-relations stated through constructing an assemblage implies that the primacy given to the context of individual artefacts in archaeological studies is not necessary to a design approach. In an assemblage, the constituent image of an artefact becomes suspended within this contrived re-combination of concepts and materialities (*see* Shanks 1999, fig. 1.2). These multiple associative aspects of design, between artefacts that have been usually perceived as separated through their differences in form and material, may be used to resituate material culture as 'statements' in 'conversations' over crucial social concerns such as creating and renegotiating identity and influence within communities.

This design approach may also be applied to the study of buildings and landscapes. As in the case of artefacts, buildings are materialized through the sourcing of materials and applying cultural concepts through associative design within particular socio-cultural environments through the knowledge and techniques of making. These aspects of design are integrated with senses of private and public space, enclosure and place-making. These themes may potentially be brought together to explore the assemblage of a building as a design, both for single structures and for groups.

Using architectural design theory, Tanya Romankiewicz has analysed the construction and layout of late Iron Age roundhouses as 'event-based and concerned with process' to explore their potential as buildings intended for 'non-domestic' communal or ceremonial purposes (Romankiewicz 2018). Although, in this study, workshops are considered as being 'related to daily processes of industrial and agricultural function', the application of a more associative design approach has the potential for exploring excavated buildings as collaborative investments between creative practitioners and their communities.

As producers of material culture, Iron Age and early Roman creative practitioners would have necessarily been supported in their practices and processes of design and making by their communities. Beyond the everyday design and making that met the requirements of households, this communal investment in design would have comprised aspects such as the supply and transport of raw materials and finished artefacts to workshops, and the construction of the workshop buildings and their external working spaces. The socially-constitutive nature of design demonstrated by the creative dynamics that occur within a workshop of practitioners is also reflected in the arrangement of their spaces for working. Design research has demonstrated that creative practitioners value the collaborative effort and creativity of working together in studio or workshop environments, facilitating their interactions at different stages of the design process (Binder *et al*. 2011).

The landscapes of the past may perhaps also be explored through a design approach. It may be possible to consider the strategies for planning settlements and farming landscapes, and the socio-cultural requirements and interconnectivity of the communities who populated them. Buildings and patterns of settlement, the natural environments the inhabitants encountered and the artificial spaces they constructed, may be explored through this approach of associative networks. The design and management of the landscape, the exploitation of its material resources and agricultural practices and production, would also have been integrated with the design and making of tools and equipment.

Material culture may be comprehensively studied through a design approach that situates its material forms as assembled, associative devices within wider socio-cultural networks. This approach, that integrates people and the things they make, has the potential for studying how all past societies materialized and transmitted their concepts of community and identity in all aspects of their lives and for all periods of archaeological research.

Romano-British industries in Purbeck, 44–124. Dorset Natural History and Archaeological Society, Dorchester.

Woodward, P. J., 1987b. 'The excavation of a late Iron Age settlement and Romano-British settlement at Rope Lake Hole, Corfe Castle, Dorset'. In N. J. Sunter and P. J. Woodward (eds) *Romano-British industries in Purbeck*, 125–84. Dorset Natural History and Archaeological Society, Dorchester.

Young, J. O., 2004. 'Archaeology and aesthetics'. *Archaeological Review from Cambridge* 19.1, 12–27.

van Strydonck, M., and Grömer, K., 2013. '14C-dating of textiles from the Hallstatt salt mine'. In K. Grömer, A. Kern, H. Reschreiter and H. Rösel-Mautendorfer, H. (eds) *Textiles from Hallstatt: weaving culture in Bronze Age and Iron Age salt mines*. *Archaeolingua* 29, 189–92.

Villa Valdés, A., 2010. 'El oro en la Asturias antigua: beneficio y manipulación de los metales preciosos en torno al cambio de era. In J. A. Fernández Tresguerres (ed.) *Cobre y Oro. Minería y metalurgia en la Asturias prehistórica y Antigua*, 3–125. Principado de Asturias, Oviedo.

Waddell, J., 2009. 'The elusive image'. In G. Cooney, K. Becker, J. Coles, M. Ryan and S. Dievers (eds), *Relics of old decency: archaeological studies in later prehistory: festschrift for Barry Raftery*, 341–9. Wordwell, Dublin.

Wahl, D.C., 2016. *Designing regenerative cultures*. Triarchy Press, Axminster, England.

Webley, L., 2015. 'Rethinking Iron Age connections across the Channel and North Sea'. In H. Anderson-Whymark, D. Garrow and F. Sturt (eds) *Continental connections*, 122–44. Oxford, Oxbow Books.

Wells, P., 2020a. 'Eurasian Iron Age interactions: a perspective on the sources and purposes of La Tène style ("Celtic") art'. In C. Nimura, H. Chittock, P. Hommel and C. Gosden (eds) *Art in the Eurasian Iron Age. Context, Connections and Scale*, 37–52. Oxbow Books, Oxford and Havertown.

Wells, P., 2020b. 'Greeks in Iron Age central Europe: patterns of interaction and change'. In F. De Angelis (ed.) *A companion to Greeks across the ancient world*, 199–220. John Wiley & Sons and Blackwell.

Welch, R., 2018. 'Annealing gold, silver, and platinum'. From the Bench. *https://www.stuller.com/benchjeweler/resources/bencharticles/view/annealing-gold/*.

Wessex Archaeology, 2003. 'Green Island, Poole Harbour, Dorset. An archaeological evaluation and an assessment of the results'. *https://www.wessexarch.co.uk/sites/default/files/52568_Green%20Island.pdf*.

West, I., 2016. 'Kimmeridge – the Blackstone – oil shale. *https://www.southampton.ac.uk/%7Eimw/Kimmeridge-Oil-Shale.htm*

Williams, J. H. C., 2005. 'Coinage and identity in pre-conquest Britain, 50 BC – AD 50'. In C. Howgego, V. Heuchert and A. Burnett (eds) *Coinage and identity in the Roman provinces*, 69–78. Oxford University Press, Oxford.

Willis, S., 2007. 'Sea, coast, estuary, land, and culture in Iron Age Britain'. In C. Haselgrove and T. Moore (eds) *The later Iron Age in Britain and beyond*, 107–29. Oxbow Books, Oxford; David Brown Books Co., Oakville, Connecticut.

Witkin, R. W., 1995. *Art and social structure*. Polity Press, Oxford.

Woods, A., 1982. 'Smoke gets in your eyes: patterns, variables and temperature measurement in open firing'. *Bulletin of the Experimental Firing Group* 1, 11–25.

Woodward, P. J., 1987a. 'The excavation of a late Iron Age settlement and Romano-British industrial site at Ower, Dorset'. In N. J. Sunter and P. J. Woodward (eds)

Sherratt, A., 1987. 'Cups that cheered'. In W. H. Waldren and R. C. Kennard *Bellbeakers of the Western Mediterranean*, 81–106. Oxford International Conference 1986. British Archaeological Reports International Series 331. Oxford.

Silva, A. C. F., 1999. *A citânia de Sanfins*. Museu Arqueológico da Citânia de Sanfins, Paços de Ferreira.

Sloper, D., 1985. 'The Romano-British shale turning industry'. CBA Group 12 Newsletter 5–6.

Sloper, D., 1989. 'The experimental production of a replica of an Early Bronze Age shale cup from Farway Down'. *Proceedings of the Devon Archaeological Society* 47, 113–17.

Sloper, D., and Johnston, D. E., 1986. 'A controlled experiment concerning the production of early Bronze Age shale cups from Farway Down'. *Bulletin of Experimental Archaeology* 7, 12–16.

Smith, W., and Lockwood, J., 1976. *Chambers Murray Latin-English Dictionary*. Chambers, Edinburgh.

Sofaer, J., 2006. 'Pots, houses and metal. Technological relations at the Bronze Age Tell at Szazhalombata, Hungary'. *Oxford Journal of Archaeology* 25.2, 127–47.

Spratling, M., 2008. 'On the aesthetics of the ancient Britons'. In D. Garrow, C. Gosden and J. D. Hill (eds), *Rethinking Celtic art*, 185–202. Oxbow Books, Oxford.

Stead, I. M., and Rigby, V., 1999. *The Morel Collection. Iron Age antiquities from Champagne in the British Museum*, 49–50. British Museum Press, London.

Strabo *Geographica*. H. C. Hamilton and W. Falconer (transl.) 1857. e-book 2014 *http://www.gutenberg.org/files/44886/44886-h/44886-h.htm*

Tanner, J., 2017. 'Narrative, naturalism, and the body in Classical Greek and Early Imperial Chinese art'. In J. Elsner (ed.) *Comparativism in art history*, 180–224. Routledge, London.

Thomsen, C. J., 1836 'Kortfattet Udsigt over Mindesmaerker og Oldsager fra Nordens Oldtid'. In *Ledetraad til Nordisk Oldkyndighed*, 27–90. Kgl. Nordisk Oldskriftsselskab, Copenhagen.

Tischler, O., 1885 'Ueber gliederung der La-Tène-periode und über der Dekorierung der Eisenwaffen in dieser Zeit'. *Correspondenz-Blatt der Deutschen Gesellschaft für Anthropologie, Ethnologie und Urgeschichte* 14,157–61.

Trott, K., and Tomalin, D., 2003. 'The maritime role of the island of Vectis in the British pre-Roman Iron Age'. *International Journal of Nautical Archaeology* 32.2, 158–81.

Tuck, A., 2006. 'Singing the rug: patterned textiles and the origins of Indo-European metrical poetry'. *American Journal of Archaeology* 110, 539–50.

Tyrrell, R., and Major, H., 2015. 'Shale vessels'. In M. Atkinson and S. J. Preston 'Heybridge: a late Iron Age and Roman settlement, excavations at Elms Farm 1993–5'. *Internet Archaeology* 40. *http://dx.doi.org/10.11141/ia.40.1.major8*.

Roux, V., Corbetta, D., 1989. *The potter's wheel. Craft specialization and technical competence*. Oxford and IBH Publishing, New Delhi.

Rowlett, R. M., 1969. 'Une tombe à char de Prunay (Marne). *Bulletin de la société archéologique champenoise* 62, 12–17, fig. 14.

Sánchez-Palencia, F.J., Sastre Prats, I., Orejas Saco del Valle, A., and Ruiz del Árbol, M., 2017. 'Augusto y el control administrativo y territorial de las zonas mineras del Noroeste hispano'. *Gerión. Revista de Historia Antigua* 35, 863–74.

Sarantou, M. A. C., 2014. 'Namibian narratives: postcolonial craft and design identities'. Unpublished PhD thesis. http://search.library.unisa.edu.au/record/UNISAALMA21105844720001831

Sarantou, M. A. C., and Miettinen, S., 2018. 'The connective role of improvisation in dealing with uncertainty during invention and design processes'. Presented at the Design Management Academy.

Schaaf, U.' 1988. 'Zu den antiken Reparaturen der griechischen Schalen'. In W. Kimmig *Das Klein-aspergle: Studien zu einem Fürstengrabhügel der frühen Latènezeit bei Stuttgart. Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg* 30 191–5. Stuttgart.

Schön, D.A., 1987. *Educating the reflective practitioner: toward a new design for teaching and learning in the professions*. Jossey Bass Inc., San Francisco.

Sebolt, C., 2009. 'Hallstatt tablet weaving'. *Twist* XVI, 1 and 10–11.

Sennett, Richard, 2008. *The Craftsman*. Penguin Books, London.

Shanks, M., 1999. *Art and the early Greek state: an interpretive archaeology*. New Studies in Archaeology. Cambridge University Press, Cambridge.

Shanks, M., 2012. *The archaeological imagination*. Left Coast Press, Walnut Creek, California.

Shanks, M. 2017. 'Materiality of the invisible'. *http://mshanks.com/wp-content/uploads/Materiality-of-the-invisible-2.0.pdf*

Shanks, M., 2018. 'Design research and thinking'. *http://www.mshanks.com/design-research-and-thinking/*

Shanks, M., and Tilley, C., 1987a. *Social theory and archaeology*. Polity Press, Cambridge.

Shanks, M., and Tilley, C., 1987b *Reconstructing Archaeology: Theory and Practice*. Routledge, London.

Sharples, N., 2008. 'Contextualising Iron Age art'. In D. Garrow, C. Gosden and J. D. Hill (eds) *Rethinking Celtic art*, 203–13 Oxbow Books, Oxford.

Sharples, N., 2010. *Social relations in later prehistory. Wessex in the first millennium BC*. Oxford University Press, Oxford.

Quesada Sanz, 2003. '¿Espejos de piedra? Las imágenes de armas en las estatuas de los guerreros llamados galaicos'. *Madrider Mitteilungen* 44, 87–112.

Ramsl, P. C., 2018. 'Interregional relations and connections in central Europe's Iron Age'. In S. Berecki, A. Rustoiu and M. Egri, M. (eds) *Iron Age connectivity*. Proceedings of the International Colloquium from Targu Mures 13–15 October 2017. Cluj, 39–50.

Rast-Eicher, A., 2013. 'The fibre quality of skins and textiles from the Hallstatt salt mines'. In K. Grömer, A. Kern, H. Reschreiter and H. Rösel-Mautendorfer (eds) *Textiles from Hallstatt. Weaving culture in Bronze and Iron Age salt mines*, 135–62. Archaeolingua, Budapest.

Rebay-Salisbury, K., 2010. 'Cremations: fragmented bodies in the Bronze and Iron Ages'. In Rebay-Salisbury, K., M. L. Stig Sørensen and J. Hughes (eds) *Body Parts and whole. Changing relations and meanings*, 64–71 Oxbow Books, Oxford.

Reinecke, P., 1902. 'Beiträge zur Kenntnis der frühen Bronzezeit Mitteleuropas'. *Mitteilungen der Anthropologischen Gesellschaft Wien* 32, 104–54.

Reiterman, A. S., 2015. '"Keimêlia": objects curated in the ancient Mediterranean (8th–5th centuries B.c'. Publicly Accessible Penn Dissertations 2545. *https://repository.upenn.edu/edissertations/2545*

Reschreiter, H., 2012. 'Hallstatt: prehistoric mines'. In R., Hofmann-de Keijzer, A. Kern and B. Putz-Plecko, B. (eds) 2012. *Colours of Hallstatt: textiles connecting science and art*, 16–17. Exhibition brochure. Vienna.

Reschreiter, H., and Kowarik, K., 2009. 'The everyday life of a miner'. In *Kingdom of salt*, 57–9. Veröffentlichungen der Prähistorischen Abteilung. Verlag des Naturhistorischen Museums, Wien.

Rigby, V., Middleton, A., and Freestone, I., 1989. 'The Prunay workshop: technical examination of La Tène bichrome painted pottery from Champagne'. *World Archaeology* 21, 1–16.

Rigby, V. and Freestone, I. C., 1997. 'Ceramic changes in late Iron Age Britain'. In I. C. Freestone and D. M. R. Gaimster (eds) *Pottery in the making. World ceramic traditions*, 56–61. British Museum Press, London.

Rohl, D. J., 2012. 'Chorography: history, theory and potential for archaeological research'. *Theoretical Roman Archaeology Journal* 2011 19–32.

Romankiewicz, T., 2017. 'The line, the void and the current: Iron Age art from a design theory perspective'. *Oxford Journal of Archaeology* 37, 45–59.

Romankiewicz, T., 2018. 'Room for ideas: tracing non-domestic roundhouses'. *The Antiquaries Journal* 98, 17–42.

Rösel-Mautendorfer, H., 2013. 'Sewing techniques and design'. In K. Grömer, A. Kern, H. Reschreiter and H. Rösel-Mautendorfer (eds) *Textiles from Hallstatt. weaving culture in Bronze and Iron Age salt mines*, 99–118. *Archaeolingua* 29. Archaeolingua, Budapest.

Peacock, D. D., 1969. 'A contribution to the study of Glastonbury ware from south-western Britain'. *Antiquaries Journal* 49.1, 41–61.

Pearson, M., Shanks, M., 2001. *Theatre/archaeology: disciplinary dialogues*. Routledge, London.

Perea, A., 1990. 'Estudio microscópico y microanalítico de las soldaduras y otros procesos técnicos en la orfebrería prehistórica del sur de la Península Ibérica'. *Trabajos de Prehistoria* 47, 103–60.

Perea, A., 1995. 'La metalurgia del oro en la fachada atlántica Peninsular durante el Bronce Final: interacciones tecnológicas'. In M. Ruíz-Gálvez (ed.) *Ritos de Paso y Puntos de Paso. La Ría de Huelva En El Mundo Del Bronce Final Europeo. Complutum* 5, 69–78. Universidad Complutense, Madrid.

Perea, A., 2003. 'Los torques castreños en perspectiva'. *Brigantium* 14, 139–49.

Pérez Outeiriño, B., 1992. 'Almacenamento da materia prima entre os ourives castrexos: lingotes planoconvexos'. In F. Acuña (ed.) *Finis Terrae. Estudos en lembranza do Prof. Dr. Alberto Balil*, 97–130. Universidade de Santiago de Compostela, Santiago de Compostela.

Pichlerová, M., 1969. *Nové Košariska. Kniežacie mohyly zo staršjdoby železne*j. Bratislava.

Pickstone, A., and Mortimer, R., 2011. 'Excavation of the Iron Age ring monument 'War Ditches' at the East Pit, Lime Kiln Road, Cherry Hinton, Cambridge'. *https://library.oxfordarchaeology.com/2924/1/Report_1208_v2_LR.pdf*.

Piggott, S., 1970 *Early Celtic Art: From its Origins to its Aftermath*. Edinburgh University Press, Edinburgh.

Pitts, M., 2019. *The Roman object revolution. Objectscapes and intra-cultural connectivity in northwest Europe. Amsterdam Archaeological Studies*. Amsterdam University Press, Amsterdam.

Polanyi, M., 1966. *The tacit dimension*. Routledge & Kegan Paul, London.

Porter, J. I., 2010. *The origins of aesthetics thought in ancient Greece: matter, sensation, and experience*, Cambridge University Press, Cambridge.

Poux, M., and Demierre, M. (eds), 2016. *Le sanctuaire de Corent (Puyde- Dôme, Auvergne) Vestiges et rituels*, *Gallia*. Paris.

Prociuk, N. H., 2016. 'Inscribing identity: a case study of symbolic communication from the Iron Age castro culture of northwestern Iberia'. PhD thesis, University of Texas, Austin.

Queiroga, M. V., 2003. *War and castros. New approaches to the northwestern Portuguese Iron Age*. British Archaeological Reports S1198, Oxford.

Queiroga, F. M. V. R., 2007. 'The late castro culture of northwest Portugal: dynamics of change'. In Gosden, C., Hamerow, H., de Jersey, P. and Lock, G., 2007. *Communities and connections. Essays in honour of Barry Cunliffe*, 169–79. Oxford University Press, Oxford.

Moggridge, B., 2007. *Designing interactions*. MIT Press, Cambridge, Mass.

Molander, B., 2018. 'Creativity and knowledge'. In J. Sofaer, J. (ed) *Considering creativity: creativity, knowledge and practice in Bronze Age Europe*, 5–18 Archaeopress Archaeology, Oxford.

Moore, T., 2016. 'Britain, Gaul and Germany'. In M. Millett, L. Revell and A. Moore (eds) *The Oxford handbook of Roman Britain*, 262–82. Oxford University Press, Oxford.

Moore, T., and Armada, X.L., (eds), 2011. *Atlantic Europe in the first millennium BC: crossing the divide*. Oxford University Press, Oxford and New York.

Moser, A., 2012. 'Of twisting and turning'. In R. Hofmann-de Keijze, A. Kern and B. Putz-Plecko, B. (eds) *Colours of Hallstatt: textiles connecting science and art*, 24–5. Exhibition brochure. Vienna.

Murillo Barroso, M., 2014. 'Native silver resources in Iberia'. In *Metals of power: early gold and silver*, 1–11. Tagungen des Landesmuseums für Vorgeschichte Halle.

Newall, D., and Unwin, C., 2011. *The chronology of pattern. Pattern in art from lotus flower to flower power*. A&C Black, London.

Nimura, C., Chittock, H., Hommel, P., and Gosden, C., (eds) 2020. *Art in the Eurasian Iron Age. Context, connections and scale*. Oxbow Books, Oxford and Philadelphia.

Noll, W., Holm, R., and Born, L., 1975. 'The painting of ancient ceramics'. *Angewandte Chemie* 14, 602–13.

Núñez García, A. 2016 'A tale of exchange and symmetry: intercultural contacts between northwest Iberia and the Mediterranean (9th–7th centuries BCE)'. MA dissertation, University of Edinburgh.

Okimoto, M., 2016. 'The head/shoulder/flank/foot of a mountain: the metaphorical projection of human bodies to objects'. *Memoirs of the Tomakomai National College of Technology* 51, 21–48.

Olivier, L., 2014. 'Les codes de répresentation visuelle dans l'art celtique ancien'. In C. Gosden, S. Crawford and K. Ulmschneider (eds) *Celtic Art in Europe: Making Connections*, 39–55. Oxbow Books, Oxford and Philadelphia.

Olivier, L., 2020. 'How Celts perceived the world: Early Celtic art and analogical thought'. In C. Nimura, H. Chittock, P. Hommel and C. Gosden (eds) *Art in the Eurasian Iron Age. Context, connections and scale*, 95–109. Oxbow Books, Oxford and Philadelphia.

Parcero Oubiña, C., Armada, X.-L., Nión, S., and González Ínsua, F., 2020. 'All together now (or not). Change, resistance and resilience in the NW Iberian peninsula in the Bronze Age – Iron Age transition. In B. Currás and I. Sastre (eds) *Alternative Iron Ages. Social theory from archaeological analysis*, 151–75. Routledge, London and New York.

López Monteagudo, G., 1977. 'La diadema de San Martín de Oscos'. In L. Pericot García and A. García y Bellido (eds) *Homenaje a García y Bellido*, 99 ff. Fundación Pastor de Estudios Clásicos, Madrid.

Lorrio, A., 2014. 'Los pueblos celtas. Prothistoria de la península Ibérica: del Neolítico a la Romanizacíon'. In M. Almagro-Gorbea (ed.) *Iberia. Protohistory of the far west of Europe*, 217–49. Fundación Atapuerca, Burgos.

Luquet, G.-H., 1930. *The art and religion of fossil man*. Oxford University Press, Oxford; and Yale University Press, New Haven.

Machling, T., and Williamson, R., 2020. "'Damn clever metal bashers'. The thoughts and insights of 21st century goldsmiths, silversmiths and jewellers regarding Iron Age gold torus torcs'. In *Art in the Eurasian Iron Age. Context, connections and scale*, 179–96. Oxbow Books, Oxford and Philadelphia.

McLucas, C., 2000. 'Deep mapping'. *http://cliffordmclucas.info/deep-mapping.html*

Marconi, C., 2017. 'The frames of Greek painted pottery. In V. Platt and M. Squire (eds), *The frame in classical art. A cultural history*, 117–34. Cambridge University Press, Cambridge.

Marco Símon, F., 2005. 'Religion and religious practices of the ancient Celts of the Iberian Peninsula. In *The Celts in the Iberian peninsula*, 287–345. E-Keltoi (Journal of Interdisciplinary Celtic Studies). University of Wisconsin Press, Wisconsin.

Markey, M., Wilkes, E., and Darvill, T., 2002. 'Poole Harbour: an Iron Age port'. *Current Archaeology* 181, 7–11.

Marion, S., 2004. *Recherches sur l'âge du fer en Ile-de-France*. British Archaeological Reports International Series. Oxford.

Martinón-Torres, M., and Ladra Fernandez, X. L., 2018. 'A ourivería prehistórica no Museo Provincial de Lugo: unha aproximación desde a química'. In A. Balseiro (ed.) *A Colección de Ourivería Antiga do Museo Provincial de Lugo*, 46–58. Deputación de Lugo, Lugo.

Megaw, J. V. S., 1962. 'A bronze mount from Macon: a miniature masterpiece of the Celtic Iron Age reappraised'. *Antiquaries Journal* 42, 24–9.

Megaw, J. V. S., 1970 *Art of the European Iron Age. A study of the elusive image*. Adams and Dart, Bath.

Megaw, J. V. S., 1972. 'Style and style groupings in continental early La Tène art'. *World Archaeology* 3, 276–92.

Megaw, J. V. S., and Megaw, R., 2008. 'A Celtic mystery: some thoughts on the genesis og insular Celtic art'. In D. Garrow, D.Gosden, and J. D. Hill (eds) 2008 *Rethinking Celtic Art*, 40–58 Oxbow Books, Oxford and Havertown.

Mergelina, C., 1944. 'La citania de Santa Tecla'. *Boletín del Seminario de Estudios de Arte y Arqueología* 37–9, 14–54.

Middleton, A. P., 1987. 'Technological investigation of the coatings on some "haematite-coated" pottery from southern England'. *Archaeometry* 29, 250–61.

Koch, J. T., 2014. 'Once again, Herodotus, the Keltoi, the source of the Danube, and the Pillars of Hercules'. In C. Gosden, S. Crawford and K. Ulmschneider (eds) *Celtic Art in Europe: Making Connections*. Oxbow Books, Oxford and Philadelphia.

Kolen, J., 1995. 'Recreating (in) nature, visiting history'. *Archaeological Dialogues* 2, 127–59.

Konstantinidi-Syvridi, E., Papadimitriou, N., Philippa-Touchais, A., and Goumas, A., 2014. 'Goldworking techniques in Mycenaean Greece (17th/16th–12th century BC): some new observations'. In: *Metals of power. Early gold and silver*, 345–48. Tagungen des Landesmuseums für Vorgeschichte Halle.

Kuijpers, M. H. G., 2019. 'Materials and skills in the history of knowledge: an archaeological perspective from the "non-Asian" field'. *Technology and culture* 60.

Kopytoff, I., 1986. 'The cultural biography of things: commoditization as process'. In A. Appadurai (ed.) *The social life of things. Commodities in cultural perspective*, 64–91. Cambridge, Cambridge University Press.

Lakoff, G., and Johnson, M., 1999. *Philosophy in the flesh: the embodied mind and its challenge to Western thought*. Basic Books, New York.

Latour, B., 1987. *Science in action*. Harvard University Press, Cambridge, Mass.

Latour, B., 2005. *Reassembling the social: an introduction to Actor-Network-Theory*. Oxford University Press, Oxford and New York.

Lauermann, E. (2000) 'Archäologische Forschungen in Michelstetten, NÖ'. *Archäologie Österreichs* 11.1, 5–30.

Law, J., 2009. 'Actor Network Theory and material semiotics'. In B. S. Turner (ed.) *The new Blackwell companion to social theory*, 141–58. Blackwell, Chichester.

Leeds, E. T., 1933. *Celtic ornament in the British Isles down to A.D. 700*. Oxford University Press, London.

Lefort, A., 2015. 'Contribution bas-normande à une archéologie des relations transmanches à la fin de l'âge du Fer. Échanges matériels et culturels'. Université de Bourgogne, Dijon.

Leins, I., 2008. 'What can be inferred from the regional stylistic diversity of Iron Age coinage?'. In D. Garrow, C. Gosden and J. D. Hill (eds) *Rethinking Celtic art*, 100–112. Oxbow Books, Oxford.

Leins, I., and Farley, J., 2015. 'A changing world, c. 150 BC – AD 50'. In J. Farley and F. Hunter (eds) *Celts. Art and Identity*, 109–27. The British Museum Press, London.

Leroi-Gourhan, A., and Brézillon, M., 1966. 'L'habitation magdalénienne n° 1 de Pincevent près Montereau (Seine-et-Marne)'. *Galla préhistoire* 9.2, 263–385.

Lepaumier H., 2012. *Fleury-sur-Orne, Calvados, Les Mézerettes-ZL 7. Deux habitats enclos et une nécropole du second âge du Fer du réseau de fermes reconnu au sud-est de l'agglomération caennaise*. Inrap/DRAC, Caen.

Liddell, H. G., and Scott, R., 1968. *A Greek–English Lexicon*. Oxford University Press, Oxford.

Jacobsthal, P., 1925. 'The ornamentation of Greek vases'. *The Burlington Magazine for Connoisseurs* 47, 64–74.

Jacobsthal, P., 1944 *Early Celtic art*. Clarendon Press, Oxford.

Jones, A., 2005. "Lives in fragments? Personhood and the European Neolithic." *Journal of Social Archaeology* 5, 193–224.

Jones, G., 2014. 'Wooden bowl making: the last pole lathe turner in England'. Interview with Robin Wood. In *Merchants and makers: celebrating craft, design and heritage. http://www.merchantsandmakers.com/pole-lethe-wood-turner-robin-wood/*.

Jones, G. P., 2017. 'Sourcing the clay: Iron Age pottery production around Poole Harbour and the Isle of Purbeck, Dorset, UK'. Bournemouth University PhD thesis *http://eprints.bournemouth.ac.uk/29885/9/JONES%2C%20Grace%20Perpetua_Ph.D._2017_vol_1.pdf*.

Jope, E.M., [2000]. *Early Celtic art in the British Isles*. Clarendon Press, Oxford University Press, Oxford and New York.

Joy, J., 2008. 'Reflections on Celtic art: a re-examination of mirror decoration'. In D. Garrow, C. Gosden, J. D. Hill (eds), *Rethinking Celtic art*, 78–99. Oxbow Books, Oxford.

Joy, J., 2011. '"Fancy Objects" in the British Iron Age: why decorate?'. *Proceedings of the Prehistoric Society* 77, 205–30.

Joy, J., 2012. 'Exploring status and identity in later Iron Age Britain'. In T. Moore and X.-L. Armada (eds), *Atlantic Europe in the first millennium BC: crossing the divide*, 468–87 Oxford University Press, Oxford.

Joy, J., 2014. '"Fire burn and cauldron bubble"'. Iron Age and early Roman cauldrons of Britain and Ireland'. *Proceedings of the Prehistoric Society* 80, 327–62.

Jody, J., 2015. 'Approaching Celtic art'. In J. Farley and F. Hunter (eds), *Celts. Art and Identity*, 36–51. British Museum Press, London.

Kaiser, Jeff, 2018. 'Improvising technology, constructing virtuosity'. *Cuadernos de Música, Artes Visuales y Artes Escénicas* 13, 87–96.

Karisto, M., and Grömer, K., 2017. 'Different solutions for a simple design: new experiments on tablet weave HallTex152 from the salt mine Hallstatt'. *Experimentelle Archäologie in Europa* 16, 60–9.

Kennett, D. H., 1977. 'Shale vessels of the late pre-Roman Iron Age: context, distribution and origins'. *Bedfordshire Archaeology* 12, 17–22.

Knappett, C., 2013a. 'Using network thinking to understand transmission and innovation in ancient societies'. *http://philsci-archive.pitt.edu/9787/*.

Knappett, C., (ed.) 2013b. *Network analysis in archaeology: new approaches to regional interaction*. Oxford University Press, Oxford.

Knudsen, L. R., 2014. 'Ancient running animals: tablet-woven borders from China and Norway'. In *Global Textile Encounters*. Oxbow Books, Oxford.

Hingley, R., forthcoming. *Children of Ocean: the Roman conquest of Britain*. Oxford University Press, New York.

Hodder, I. R., 1982a. *The Present Past. An Introduction to Anthropology for Archaeologists*. Batsford, London.

Hodder, I. R., 1982b. *Symbols in Action*. Cambridge University Press, Cambridge.

Hodder, I., 2012. *Entangled: an archaeology of the relationships between humans and things*. Wiley-Blackwell, Malden (Massachusetts).

Hofmann-de Keijzer, R., Kern, A. and Putz-Plecko, B. (eds) 2012. *Colours of Hallstatt: textiles connecting science and art*. Exhibition brochure. Wien. *https://www.researchgate.net/publication/267150706_Colours_of_Hallstatt_-_Textiles_connecting_Science_and_Art_Brochure_for_the_exhibition_with_contributions_of_archaeologists_artists_and_scientists*

Hofmann-de Keijzer, R., van Bommel, M. R., Hartl, A., Grömer, K., Rösel-Mautendorfer, H., Reschreiter, H., Kania, K., Joosten, I., Proaño Gaibor, A. N., Erlach, R., Lachner, E., Wandl, M., and de Keijzer, M., 2013. 'Coloured Hallstatt textiles: 3500 year-old textile and dyeing techniques and their contemporary application'. In J. Banck-Burgess, C. Nübold (eds) *North European Symposium for Archaeological Textiles* XI, 125–9.

Hopewall, P., and Harris, S., 2019. 'Blue dyed textiles in early Iron Age Europe: accessible or exclusive?'. *Archaeological Textiles Review* 61, 42–55.

Horn, J. A., 2015. 'Tankards of the British Iron Age'. Proceedings of the Prehistoric Society 81, 1–31. *Proceedings of the Prehistoric Society* 81, 1–31.

Hunter, F., 2008. 'Celtic art in Roman Britain'. In D. Garrow, C. Gosden and J. D. Hill (eds), *Rethinking Celtic Art*, 129–45 Oxbow Books, Oxford.

Hunter, F., 2014. 'Art in context: the massive metalworking tradition of north-east antiquity'. In C. Gosden, S. Crawford and K. Ulmschneider (eds) *Celtic Art in Europe: Making Connections*, 325–40. Oxbow Books, Oxford and Philadelphia.

Hunter, F. 2015. 'Powerful objects: the users of art in the Iron Age'. In *Celts: art and identity*, 81–105. The British Museum Press, London.

Hunter, F., Goldberg, M., Farley, J., and Leins, I., 2015. 'Celtic arts in the long term: continuity, change and connections'. In J. Farley and F. Hunter *Celts. Art and Identity*, 261–79. The British Museum Press, London.Ingold, T., 2012. 'Thinking through making'. Presentation from the Institute for Northern Culture 'Tales from the North'. *https.//www.youtube.com/watch?v+Ygne72-4zyo*.

Ingold, T., 2013. *Making. Anthropology, archaeology, art and architecture*. Routledge, London.

Ingold, T., 2014. 'The creativity of undergoing'. *Pragmatics and Cognition* 22, 124–139.

Isaksson, S., 2000. *Food and rank in early medieval time*. Theses and Papers in Scientific Archaeology. Archaeological Research Laboratory, Stockholm University, Stockholm.

Haselgrove, C., 2007a. 'Rethinking earlier Iron Age settlement in the eastern Paris Basin. In C. Haselgrove and R. Pope (eds) *The later Iron Age in Britain and beyond*, 400–28. Oxbow Books, Oxford.

Haselgrove, C., 2007b. 'The age of enclosure: later Iron Age settlement and society in northern France'. In C. Haselgrove and T. Moore (eds) *The later Iron Age in Britain and beyond*, 492–522. Oxbow Books, Oxford; David Brown Books Co., Oakville, Connecticut.

Hawkes, C. F. C., 1931. 'Hill forts'. *Antiquity* 5, 60–97.

Hawkes, C. F. C., 1959. 'The ABC of the British Iron Age'. *Antiquity* 33, 155–68.

Hawkes, C. F. C., and Dunning, G. G., 1931. 'The Belgae of Gaul and Britain'. *Archaeological Journal* 87, 150–335.

Heidegger, M., 1977. 'The question concerning technology'. In W. Lovitt, *The question concerning technology and other essays*, 3–35. Harper and Row, New York.

Helms, M. W., 1988. *Ulysses' sail. An ethnographic Odyssey of power, knowledge, and geographical distance*, Princeton Legacy Library. Princeton University Press, Princeton.

Hemmings, J., 2010. A certain kind of judgement'. *Warp and Weft*, 14–16. Oriel Myrddin Galley, Carmarthen.

Henry, K. J., 2007. 'The shape of things: Vilém Flusser and the open challenges of form'. Presented at the MX Conference, Mexico City, Mexico.

Henry, J. K., 2010. 'Craftivism: reconnecting art and design education through the social act of making'. Presented at the European League of Institute of the Arts (ELIA) Biennial Conference, Nantes, France.

Hill, J. D., 1995. *Ritual and rubbish in the Iron Age in Wessex. A study on the formation of specific archaeological record*. British Archaeological Reports British Series 242. Tempus Reparatum, Oxford.

Hill, J. D., 2002. 'Just about the potter's wheel? Using, making and depositing middle and later Iron Age pots in East Anglia'. In A. Woodward and J. D. Hill, (eds), *Prehistoric Britain. The ceramic basis*, 143–60. Oxbow Books, Oxford.

Hill, J. D., 2007. 'The dynamics of social change in Later Iron Age eastern and south-eastern England *c.* 300 BC – AD 43'. In C. Haselgrove and T. Moore (eds) 2007 *The later Iron Age in Britain and beyond*, 16–40. Oxbow Books, Oxford.

Hill, J. D., 2011. 'How did British middle and late pre-Roman Iron Age societies work (if they did)?', in T. Moore and X.-L. Armada (eds) *Atlantic Europe in the first millennium BC: crossing the divide*, 242–62. Oxford University Press, Oxford and New York.

Hingley, R., 1995. 'The Iron Age in Atlantic Scotland: searching for the meaning of the substantial house'. In J. D. Hill and C. G. Cumberpatch (eds) *Different Iron Ages. Studies on the Iron Age in Temperate Europe*. British Archaeological Reports International Series 602, 185–94. Tempus Reparatum, Oxford.

Grimes, W. F., 1952. 'The La Tène art style in British early Iron Age pottery'. *Proceedings of the Prehistoric Society* 10, 160–75.

Grömer, K., 2005. 'Tablet-woven ribbons from the prehistoric salt-mines at Hallstatt, Austria – results of some experiments'. In P. Bichler, K. Grömer, K., R. Hofmann-de Keijzer, A. Kern, A., and H. Reschreiter (eds) *Hallstatt textiles. Technical analysis, scientific investigation and experiment of Iron Age textiles*, 81–92. BAR International Series 1351.

Grömer, K., 2013. 'Discovering the people behind the textiles: Iron Age producers and their products in Austria'. In M. Gleba and J. Pásztókai-Szeóke (eds) *Making Textiles in pre-Roman and Roman times: people, places, identities. Ancient Textiles* 13, 30–59. Oxbow Books, Oxford.

Grömer, K., 2014. 'Textile materials and techniques in central Europe in the 2nd and 1st millennia BC'. In *New Directions. Examining the Past, Creating the Future*. Textile Society of America Symposium Proceedings.

Grömer, K., 2017a. 'There and back again: world wide response to archaeological textile finds – case study Hallstatt'. *Experimentelle Archäologie in Europa* 16, 196–207.

Grömer, K., 2017b. 'Recycling of textiles in historic contexts in Europe: case studies from 1500 BC till 1500 AD'. In *Recikliraj. Ideje Iz Prošlosti*, 75–98. Arheološki muzej u Zagrebu, Filozofski fakultet Sveučilišta u Zagrebu, Institut za arheologiju. Zagreb.

Grömer, K., forthcoming. '"Tablet weaving is a small byway of textile production …": Bronze and Iron Age tablet bands with stripes, meanders and triangles from the salt mines in Austria'. *Textile History*.

Grömer, K. and Röpsel-Mautendorfer, H., 2012. 'The textiles of Hallstatt.' In Hofmann-de Keijzer, R., *Colours of Hallstatt – textiles connecting science and art*, 20–1. Exhibition brochure. Verlag des Naturhistorischen Museums Wien.

Grömer, K., and Saliari, K., 2018. 'Dressing central European prehistory – the sheep's contribution: an interdisciplinary study about archaeological textile finds and archaeozoology'. In *Annalen Des Naturhistorischen Museums in Wien*, A 120, 127–56.

Gwilt, A., and Haselgrove, C., (eds) 1997 *Reconstructing Iron Age Societies*. Oxbow Monograph 71. Oxbow Books, Oxford.

Hahn, H. P., and Weiss, H., 2013. 'Biographies, travels and itineraries of things'. In H. P. Hahn and H. Weiss (eds) *Mobility, Meaning and Transformations of Things*, 1–14. Oxbow Books, Oxford and Oakville.

Harding, D.W., 2007. *The archaeology of Celtic art*. Routledge, Abingdon and New York.

Harrison, A., Cullen Cobb, K., and Beaubien, H., 2011. 'Gold'. Objects Speciality Group Conservation Wiki. *http://www.conservation-wiki.com/wiki/Gold*

Giddens, A., 1984. *The constitution of society: outline of the theory of structuration*. University of California Press, Berkeley.

Giles, M., 2008. 'Seeing red: the aesthetics of material objects in the British and Irish Iron Age'. In D. Garrow, C. Gosden and J. D. Hill (eds) *Rethinking Celtic Art*, 59–77 Oxbow Books, Oxford.

Goldberg, M., 2015. 'Out of a Roman world, *c*. AD 250–650'. In J. Farley and F. Hunter (eds) *Celts: Art and Identity*, 153–71. British Museum Press, London.

Gombrich, E. H., 1960. *Art and illusion*. Phaidon Press, London.

González Ruibal, A., 2004. 'Artistic expression and material culture in Celtic Gallaecia'. *The Celts in the Iberian peninsula. Journal of Interdisciplinary Celtic Studies* 6, 113–66.

González-Ruibal, A., 2006. 'House societies vs. kinship-based societies: an archaeological case from Iron Age Europe'. *Journal of Anthropological Archaeology* 25, 144–73.

González Ruibal, A., 2018. *An archaeology of the contemporary era*. Routledge; Abingdon and New York.

Gosden, C., 2020. 'Art, ambiguity and transformation'. In C. Nimura, H. Chittock, P. Hommel and C. Gosden, C. (eds) *Art in the Eurasian Iron Age. Context, connections and scale*, 9–22. Oxbow Books, Oxford and Philadelphia.

Gosden, C., Chittock, H., Hommel, P. and Nimura, C., 2020. 'Introduction: context, connections and scale'. In C. Nimura, H. Chittock, P. Hommel and C. Gosden, C. (eds) *Art in the Eurasian Iron Age. Context, connections and scale*, 1–8. Oxbow Books, Oxford and Philadelphia.

Gosden, C., Crawford, S., Ulmschneider, K., and Megaw, J.V.S., (eds), 2014. *Celtic art in Europe: making connections: essays in honour of Vincent Megaw on his 80th birthday*. Oxbow Books, Oxford and Philadelphia.

Gosden, C., and Hill, J. D., 2008. 'Reintegrating "Celtic" art'. In *Rethinking Celtic Art*, 1–14. Oxbow Books, Oxford and Philadelphia.

Gosden, C., Hommel, P., and Nimura, C., 2016. 'European Celtic art and its eastern connections'. *Antiquity Project Gallery* 90 (349). *https://www.antiquity.ac.uk/projgall/gosden349*

Gosden, C., Hommel, P., and Nimura, C., 2020. 'Context, connections and scale'. In C. Nimura, H. Chittock, P. Hommel, P., and C. Gosden (eds) *Art in the Eurasian Iron Age. Context, connections and scale*, 1–8. Oxbow Books, Oxford and Philadelphia.

Graham, A. H., Hinton, D.A., and Peacock, D. P. S., 2002. 'The excavation of an Iron Age and Romano-British settlement in Quarry Field, south of Compact Farm, Worth Matravers, Dorset'. In D. A. Hinton (ed.) *Purbeck Papers*, 1–83 Oxbow Books, Oxford.

Greimas, A. J., 1983. *Structural semantics: an attempt at a method*. University of Nebraska Press, Lincoln (Nebraska).

Galliou, P., and Cunliffe, B., 1995. *Le Yaudet. Site multi-périodes. Fouille programmée rapport 1993–1995*. Service Régional de l'Archéologie Région Bretagne Ploulec'h (Côtes-d'Armor).

Gallois, R. W., 2004. 'The Kimmeridge Clay: the most intensively studied formation in Britain'. *Open University Geological Journal* 25.

Gallois, R. W., 2010. 'The stratigraphy of the Kimmeridge Clay Formation (Jurassic) of the Isle of Purbeck, Dorset, UK'. *Geoscience in South-West England* 12, 201–8.

García-Vuelta, O., 2007. *Orfebrería castreña del Museo Arqueológico Nacional*. Ministerio de Cultura, Subdirección Generalde Publicaciones, Información y Documentación, Madrid.

García Vuelta, Ó., and Armada, X.-L., 2011. 'Tesoros olvidados. Propuestas para el estudio e interpretación del conjunto de orfebrería castreña de Recouso (San Martiño de Marzoa, Oroso, A Coruña)'. In C. M. Braz Martins, A. M. S. Bettencourt, J. I. F. P. Martins and J. Carvalho (eds) *Povoamento e exploração dos recursos mineiros na Europa Atlântica ocidental*, 453–61. CITCEM–APEQ, Braga.

Garrow, D., 2008 'The space and time of Celtic Art: interrogating the "Technologies of Enchantment" database'. In D. Garrow, C. Gosden and J. D. Hill (eds) *Rethinking Celtic Art*, 15–39. Oxbow Books, Oxford and Havertown.

Garrow, D., and Gosden, C., 2012 *Technologies of Enchantment? Exploring Celtic Art: 400 BC to AD 100*. Oxford University Press, Oxford.

Garrow, D., Gosden, C., and Hill, J. D. (eds) 2008 *Rethinking Celtic Art*. Oxbow Books, Oxford and Havertown.

Garrow, D., Gosden, C., and Hill, J. D., 2009. *Technologies of enchantment: Celtic Art in Iron Age and Roman Britain.*
https://doi.org/10.5284/1000086
http://www.britishmuseum.org/research/research_projects/complete_projects/technologies_of_enchantment/the_celtic_art_database.aspx
http://www.britishmuseum.org/research/research_projects/complete_projects/technologies_of_enchantment/the_celtic_art_database.aspx
Gautam, V., and Blessing, L., 2007. 'Cultural influences on the design process'. Proceedings of ICED, 16th International Conference on Engineering Design, Paris, France.

Gell, A., 1992 'The technology of enchantment and the enchantment of technology'. In J. Coote and A. Shelton (eds) *Anthropology, Art and Aesthetics*, 40–67. Clarendon Press, Oxford.

Gell, A., 1998 *Art and Agency. An Anthropological Theory*. Clarendon Press, Oxford and New York.

Gerber, E., 2007. 'Improvisation principles and techniques for design'. Proceedings of the 2007 Conference on Human Factors in Computing Systems, 1069–72. *CHI*, San Jose, California.

Evans, A., 1890. 'On a late-Celtic urn-field at Aylesford, Kent'. *Archaeologia* 52, 315–88.

Evans, A., 1895. 'The origins of Celtic art'. Rhind Lecture.

Farley, J., 2012. 'At the edge of empire: Iron Age and Roman metalwork in the East Midlands'. Unpublished PhD thesis. *https://lra.le.ac.uk/handle/2381/10840*>.

Farley, J., and Hunter, F., (eds), 2015. *Celts: art and identity*. British Museum Press, London.

Favret, P.-M., 1929. 'Le cimetière de Commelles: fouilles de G. Chance'. *Bulletin de la société archéologique champenoise* 23.

Fernández-Götz, M., 2014. *Identity and power. The transformation of Iron Age societies in northeast Gaul*. Amsterdam Archaeological Studies 21. Amsterdam University Press, Amsterdam.

Fernández-Götz, M., and Arnold, B., 2017. 'Elites before *Fürstensitze*: Hallstatt C sumptuous graves between Main and Danube'. In R. Schumann and S. van der Vaart-Verschoof (eds) *Connecting elites and regions. Perspectives on contacts, relations and differentiation during the Early Iron Age Hallstatt C period in Northwest and Central Europe*, 183–99. Sidestone Press, Leiden.

Fitzpatrick, A. P., 2007. 'The fire, the feast and the funeral: late Iron Age mortuary practices in south-eastern England'. In V. Kruta and G. Leman-Delerive (eds.), *Feux des morts, foyers des vivants. Les rites et symboles du feu dans les tombes de l'Âge du Fer et de l'époque romaine*. Actes du XXVIIe colloque international de HALMA-IPEL UMR CNRS 8164. Villeneuve-d'Ascq, Lille.

Fitzpatrick, A. P., 2019. 'Caesar's landing sites in Britain and Gaul in 55 and 54 BC', in A. P. Fitzpatrick and C. Haselgrove (eds) *Julius Caesar's battle for Gaul*, 135–58. Oxbow Books, Oxford.

Flusser, V., 1999. *The shape of things: a philosophy of design*. Reaktion, London.

Frey, O.-H., and Schwappach, F., 1973. 'Studies in Early Celtic design'. *World Archaeology* 4, 339–56.

Friedman, K., Stolterman, E. (eds), 2011. *Design things*. Design thinking. MIT Press, Cambridge, Mass.

Fonatti, F., 1982. *Elementare Gestaltungsprinzipien in der Architektur*. Wiener Akademie, Vienna.

Fox, C., 1923. *Archaeology of the Cambridge region*. Cambridge University Press, Cambridge.

Fox, C., 1958. *Pattern and purpose: a survey of Celtic art in Britain*. National Museum of Wales, Cardiff.

Gaifman, M., Platt, V., 2018. 'Introduction: from Grecian urn to embodied object'. *Art History* 41.3 'The embodied object in classical antiquity', 402–19.

(eds) *Food and the Status Quest. An Interdisciplinary Perspective*. Berghahn Books, New York and Oxford.

Dobiat, C., 1982. 'Menschendarstellungen auf ostalpiner Hallstattkeramik. Eine Bestandsaufnahme'. *Acta Archaeologica Academiae Scientiarum Hungaricae* 34, 279–322.

Diepeveen-Jansen, M., 2001. *People, ideas and goods. New perspectives on 'Celtic barbarians' in western and central Europe (500–250 BC)*. Amsterdam University Press, Amsterdam.

Dietler, M., 1990. 'Driven to drink: the role of drinking in the political economy and the case of Early Iron Age France'. *Journal of Anthropological Archaeology* 9, 352–406.

Dietler, M., 1999. 'Rituals of commensality and the politics of state formation in the "princely" societies of early Iron Age Europe'. In P. Ruby (ed.) *Les Princes de La Protohistoire et l'émergence de l'État*, 135–52. Publications de Centre Jean Bérard, Naples.

Dietler, M., 2006. 'Celticism, Celtitude, and Celticity: the consumption of the past in the age of globalization'. In S. Rieckhoff (ed.) *Celtes et Gaulois dans l'histoire, l'historiographie et l'idéologie moderne*, 12.1, 237–48. Bibracte, Centre Archéologique Européen, Glux-en-Glenne.

Domanska, E., 2006. 'The material presence of the past'. *History and Theory* 45, 337–48.

Dryden, H., 1845. 'Roman and Roman-British remains at and near Shefford, Co. Beds'. Publications of the Cambridge Antiquarian Society 10, 1–22.

Dubuis, B., Josset, D., Millet, É., and Villenave, C., 2015. 'La tombe princière du Ve siècle avant notre ère de Lavau "ZAC du Moutot" (Aube)'. *Bulletin de la Société Préhistorique Française* 2, 371–4.

Duval, P. M. and Hawkes, C. F. C., (eds) 1976. *Celtic art in ancient Europe*. Seminar Press, London and New York.

ECAIC ('European Celtic Art in Context') *http://ecaic.arch.ox.ac.uk*.

Eckert, C., Clarkson, P. J., Zanker, W., 2004. 'Change and customisation in complex engineering domains'. In *Research in Engineering Design* 15 (1), 1–21.

Eckhardt, H., 2008. 'Technologies of the body: Iron Age and Roman grooming and display'. In D. Garrow, C. Gosden, J. D. Hill (eds) *Rethinking Celtic art*, 113–28. Oxbow Books, Oxford.

Eckhardt, H., 2014. *Objects and Identities: Roman Britain and the North-Western Provinces*. Oxford University Press, Oxford.

Elliott-Minty, C., 2015. 'Tablet weaving from the Austrian salt mines'. *Strands* 12–15.

Errington, A. M., and Johnston, D. E., 1981. 'Flint tools associated with the turning of shale bracelets on lathes'. *Bulletin of Experimental Archaeology* 2, 18–19.

Conference at the Austrian Archaeological Institute at Athens, 2012. ÖAI 34. Österreichisches Archäologisches Institut, Vienna 34.

Davies, M., and Gwilt, A., 2008 'Material, style and identity in first century AD metalwork, with particular reference to the Seven Sisters Hoard'. In D. Garrow, C. Gosden and J. D. Hill (eds) *Rethinking Celtic Art*, 146–84. Oxbow Books, Oxford and Philadelphia.

Davis, M., and Townsend, A., 2009. 'Modelling the Caergwrle bowl: ancient, historic and modern methods'. In J. Ambers, C. Higgitt and D. Saunders (eds) *Holding it all together; ancient and modern approaches to joining, repair and consolidation*, 177–83 Archetype Publications, London.

de Boer, W. R., 2000. 'The decorative burden: design, medium and change'. *Ceramic Ethnoarchaeology*, 144–61. University of Arizona Press, Tuscon.

Decheleprêtre, T., and Ginoux, N., 2002. 'Les constructions circulaires de la moitié nord de la France: état de la question'. In O. Buchsenschutz and C. Mordant (eds) *Architectures protohistoriques en Europe occidentale du Néolithique final à l'âge du Fer*, 77–89. Rouen.

Déchelette, F., 1908–14. *Manuel d'archéologie préhistorique, celtique et gallo-romaine*, 5 volumes. Picard, Paris.

Déchelette, J., 1912. *Manuel d'archéologie préhistorique, celtique, et gallo-romaine* II, 'Appendices', 46–7. Picard, Paris.

de Jersey, P., 1993. 'The early chronology of Alet, and its implications for Hengistbury Head and cross-Channel trade in the late Iron Age'. *Oxford Journal of Archaeology* 12, 321–35.

Deleuze, G., and Guattari, F., 1987. *A thousand plateaus: capitalism and schizophrenia*. University of Minnesota Press, Minneapolis.

Denford, G. T., 2000. 'Prehistoric and Romano-British Kimmeridge shale: a model for the analysis of artifacts'. Archaeology Data Service, York. (*doi:10.5284/1000090*)

Denford, G. T., and Riding, J. B., 1991. 'A note on the palynological analysis of a late pre-Roman Iron Age shale vessel from Harpenden'. *Bedfordshire Archaeology* 19,

DeRoche, C. D. 1997. 'Studying Iron Age production'. In A. Gwilt and C. Haselgrove(eds) *Reconstructing Iron Age Societies*, 17–25. Oxbow Monograph 71. Oxbow Books, Oxford.

Diepeveen-Jansen, M., 2007. 'Early La Tène burial practices and social (re)constructions in the Marne–Moselle region'. In C. Haselgrove and R. Pope (eds) *The earlier Iron Age in Britain and the near Continent*, 374–89. Oxbow Books, Oxford.

Dietler, M., 1990. 'Driven to drink: the role of drinking in the political economy and the case of Early Iron Age France'. *Journal of Anthropological Archaeology* 9, 352–406.

Dietler, M., 1996. 'Feasts and commensal politics in the political economy: food, power and status in prehistoric Europe'. In P. W. Wiessner and W. Schiefenhövel

Collingwood, P., 2002. *The techniques of tablet weaving*. Robin and Russ Handweavers, McMinnville, Oregon.

Comendador, B., Millos, J., and Álvarez-Iglesias, P., 2014. 'Provenance of the prehistoric silver set of Antas de Ulla, north-western Iberia, using lead stable isotope ratios'. In H. Meller, R. Risch and E. Pernicka (eds) *Metalle der Match – Frühes Gold und Silber*, 285–308. Landesmuseums für Vorgeschichte, Halle.

Coulon, P., 1930. 'Note sur un casque gaulois recueilli dans le cimetière des Marquises, près Prunay (Marne). *Bulletin de la société archéologique champenoise* 24, 44–5.

Courty, M. A., and Roux, M., 1995. 'Identification of wheel-throwing on the basis of ceramic surface features and microfabrics'. *Journal of Archaeological Science* 22.1, 17–50.

Creighton, J., 2000. *Coins and power in Late Iron Age Britain*, New Studies in Archaeology. Cambridge University Press, Cambridge.

Creighton, J., 2006. *Britannia: the creation of a Roman province*. Routledge, London and New York.

Criado Boado *et al*. 2019 'Coevolution of visual behaviour, the material world and social complexity, depicted by the eye-tracking of archaeological objects in humans'.

Cunliffe, B., 1974. *Iron Age Communities in Britain. An account of England, Scotland and Wales from the seventh century BC until the Roman Conquest*. Routledge, Abingdon.

Cunliffe, B., 1982. Britain, the Veneti and beyond. *Oxford Journal of Archaeology* 1, 39–68.

Cunliffe, B., 1987. *Hengistbury Head Dorset. Volume 1, The prehistoric and Roman settlement, 3500 BC – AD 500*. Oxford University Committee for Archaeology Monograph 13. Oxford.

Cunliffe, B., 2001. *Facing the Ocean. The Atlantic and its people, 8000 BC to AD 1500*. Oxford University Press, Oxford.

Cunliffe, B. W., 2005. *Iron Age communities in Britain: an account of England, Scotland and Wales from the seventh century BC until the Roman conquest*. 4th edition. Routledge, London ; New York.

Cunliffe, B., 2009. 'Looking forward: maritime contacts in the first millennium BC'. In P. Clark (ed.) *Bronze Age connections. Cultural contact in prehistoric Europe*, 80–93. Oxbow Books, Oxford.

Cunliffe, B., and Phillipson, D. W., 1969. 'Excavations at Eldon's Seat, Encombe, Dorset'. *Proceedings of the Prehistoric Society* 34, 191–237.

Curé, A-M., 2012. 'Wheelmade pottery and socioeconomic changes in indigenous Mediterranean Gaul societies during the early Iron Age. In W. Gauss, G. Klebinder-Gauss, G., and C. von Rüden (eds) *The transmission of technical knowledge in the production of ancient Mediterranean potter*, 239–56. Proceedings of the International

Cálo Lourido, 1994. *A plástica da Cultura Castrexa galaico-portuguesa*. Fundación Pedro Barrié de la Maza, A Coruña.

Camille, M., 1998. *Mirror in parchment. The Luttrell Psalter and the making of medieval England*. University of Chicago Press, Chicago; and Reaktion Books, London.

Cardona Colell, R., Pou Vallès, J., Calduch Cobos, N., Gil Limón, B., Gallego Cañamero, J. M., and Castillo Cerezuela, L., 2014. 'The Iron Age Iberian experimental pottery kiln of Verdú, Catalonia, Spain'. *Experimental archaeology* 4. *https://exarc.net/ark:/88735/10178*.

Carreras, C. and Morais, R. 2012. 'The Atlantic Roman trade during the Principate', Oxford. *Journal of Archaeology* 31.4, 419–41.

Carroll 1865 [1974]

Carvalho, T. P., and Queiroa, F. M, V. R., 2005. 'O castro de Mozinho: os últimos trabalhos desenvolvidos'. *Cadernos do Museu* 11, 121–23. Câmara Municipal, Penafiel.

Hugh Casson, H., 1979. Romanes Lecture, delivered 12th November 1979 at Oxford. *The Guardian*, Saturday 24 November 1979.

Chapman, J., Gaydarska, B. I., 2007. *Parts and wholes. Fragmentation in prehistoric context*. Oxbow Books, Oxford.

Chapman, J. (in progress). *Forging identities in Balkan Prehistory: dividuals, individuals and communities, 7000-3000 BC*. Sidestone Press, Leiden.

Charpy, J.-J., 1987. 'Les épées laténiennes à bouterolle circulaire et ajourée des IVe et IIIe siècle avant J-C en Champagne'. *Etudes Celtiques* 24, 43–80.

Cheetham, L., 1985. 'Pre-Columbian negative painted pottery; some notes and observation'. *Bulletin of the Experimental Firing Group* 3, 34–41.

Chen, B., Scardamalia, M., Resendes, M., Chuy, M., and Bereiter, C., 2012. 'Students' intuitive understanding of promisingness and promisingness judgements to facilitate knowledge advancement'. *The future of learning. Proceedings of the 10th International Conference of the Learning Sciences* 1, 111–18.

Chittock, H. L., 2014. 'Arts and crafts in Iron Age Britain: reconsidering the aesthetic effects of weaving combs'. Ox*ford Journal of Archaeology* 33.3, 313–26.

Chittock, H. L., 2016. 'Pattern and purpose in Iron Age East Yorkshire'. PhD thesis, University of Southampton. *http://eprints.soton.ac.uk/id/eprint/411870*

Clark, A. J., Elston, M, and Hart, M. L., 2002. *Understanding Greek vases: A guide to terms, styles, and techniques*. Getty publications, Los Angeles.

Clarke, P., (ed.), 2004. *The Dover Bronze Age boat*. English Heritage, London.

Coles, J. M., Minnitt, S., 1995. '"Industrious and fairly civilised". The Glastonbury Lake Village, Taunton'. Somerset Levels Project. Somerset County Council Museums Service.

Böhr, E., 1988. 'Das Kleinaspergle. Studien zu einem Fürstengrabhügel der frühen Latènezeit bei Stuttgart'. In W. Kimmig *Forschungen Und Berichte Zur Vor- Und Frühgeschichte in Baden-Württemberg*, 176–90. Stuttgart.

Bosteaux-Paris, C., 1898. 'Relevé d'une cart préhistorique des environs de Reims'. *Association française pour l'avancement des sciences* II, 560.

Bourdieu, P., 1977. *Outline of a theory of practice*. Cambridge University Press, Cambridge.

Bown, P., Bristow, C., and de Silva, N., 2004. 'The shale'. In *The Dover Bronze Age Boat*, 216. English Heritage, London.

Bradley, R., 2009. *Image and audience. Rethinking prehistoric art*. Oxford University Press, Oxford.

Bradley, R., and Butler, S., (series eds) 2019. *The Senses in Antiquity*. London, Routledge.

Bradley, R., Haselgrove, C., Vander Linden, M., and Webley, L., 2016. *The later prehistory of northwest Europe*. Oxford, Oxford University Press.

Brennan, B., 2012. 'The ancient craft of the pole lathe woodturner'. *https://www.academia.edu/7511378/The_Ancient_Craft_of_the_Pole_Lathe_Woodturner*.

British Museum online catalogue *https://www.britishmuseum.org/collection/object/H_1855-0710-1*

Brown, L., 1997. 'Marketing and commerce in late Iron Age Dorset: the Wareham / Poole Harbour pottery industry'. In A. Gwilt, and C. Haselgrove (eds) *Reconstructing Iron Age Societies*, 40–4. Oxbow Monograph 71.

Bryson, N., 1983. *Vision and painting: the logic of the gaze*. Yale University Press, Newhaven and London.

Bulleid, A., Gray, H. St. G., 1911. *The Glastonbury Lake Village. A full description of the excavations and the relics discovered, 1892–1907*. Glastonbury Antiquarian Society, Glastonbury.

Bulleid, A., Gray, H. St. G., 1917. *The Glastonbury Lake Village. A full description of the excavations and the relics discovered, 1892–1907*. Glastonbury Antiquarian Society, Glastonbury.

Bushe-Fox, J. P., 1925. *Excavations of the late-Celtic urnfield at Swarling, Kent*, Society of Antiquaries of London Research Report. Society of Antiquaries of London, London.

Caesar [1986]. *The Gallic war*. Loeb Classical Library. Harvard University Press, Cambridge, Massachusetts; and William Heinemann, London.

Calkin J. G., 1953. '"Kimmeridge coal-money". The Romano-British shale armlet industry. *Proceedings of the Dorset Natural History and Archaeological Society* 75, 4–71.

Arnold, B., 1999. 'Drinking the feast'. Alcohol and the legitimation of power in celtic Europe'. *Cambridge Archaeological Journal* 9, 71–83.

Bailey, G., 2007. 'Time perspectives, palimpsests and the archaeology of time'. *Journal of Anthropological Archaeology* 26, 198–223.

Banck-Burgess, J., 1999. *Hochdorf IV. Die Textilfunde aus dem späthallstattzeitlichen Fürstengrab von Eberdingen-Hochdorf (Kreis Ludwigburg) und weitere Grabtextilien aus hallstatt- und latènezeitlichen Kulturgruppen, Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg*. Theiss, Stuttgart.

Baron, A., 2012. *Provenance et circulation des objets en roches noires ('lignite') à l'âge du Fer en Europe celtique (VIIIème–Ier s. av. J.-C.)*. British Archaeological Reports S2453. Oxford.

Barrett, J. C., 2000. 'A thesis on agency'. In M. A. Dobres and J. Robb (eds) *Agency in archaeology*, 61–8. Routledge, London.

Bednarik, R. G., 2017. 'Pareidolia and rock art interpretation'. *Anthropologie* 55, 101–17.

Belanová-Štolcová, T., and Grömer, K., 2010. 'Weights, spindles and textiles: textile production in central Europe from Bronze Age to Iron Age'. *North European Symposium for Archaeological Textiles* X, 9–20.

Bender Jørgensen, L., 2013. 'Technology as practice'. In: M. L. Stig Sørensen and K. Rebay-Salisbury (eds), *Embodying knowledge: perspectives on belief and technology*. Oxbow Books, Oxford, pp. 91–4.

Benjamin, Walter, 1999. *The Arcades Project*. The Belnap Press of Harvard University Press, Cambridge, MA and London.

Berger, J., (ed.) 1972. *Ways of seeing*. British Broadcasting Corporation and Penguin Books, London.

Besnard-Vauterin, C.-C., Auxiette, G., Besnard, M., Deloze, V., Fiant, C., Giazzon, S., Le Puil-Texier, M., and Sehier, E., 2015. 'L'occupation d'un micro-terroir de la protohistoire à l'Antiquité: le site d'Hérouvillette "Les Pérelles" (Calvados)'. *Revue archéologique de l'Ouest* 32 (uploaded online 2018).

Binder, T., De Michelis, G., Ehn, P., Jacucci, G., Linde, P., and Wagner, I. (A. Telier) (eds) 2011. *Design things*. Design thinking, design theory. Cambridge, Massachusetts, and London.

Binford, L. R., and Binford, S. R., (eds) 1968. *New perspectives in archaeology*. Aldine Press, Chicago.

Bichler, P., Grömer, K., Hofmann-de Keijzer, R., Kern, A., and Reschreiter, H. (eds) 2005. *Hallstatt textiles: technical analysis, scientific investigation and experiment on Iron Age textiles*, BAR International Series 1351.

Birchall, A., 1965. 'The Aylesford–Swarling culture: the problem of the Belgae reconsidered'. *Proceedings of the Prehistoric Society* 31, 241–367.

Bibliography

Albero Santacreu, A., 2014. *Materiality, techniques and society in pottery production. The technological study of archaeological ceramics through paste analysis*. De Gruyter Open, Warsaw and Berlin.

Allason-Jones, L., 2002. 'The jet industry and allied trades in Roman Britain'. In P. Wilson and J. Price, J. (eds) *Aspects of industry in Roman Yorkshire and the North*, 125–32. Oxbow Books, Oxford.

Almeida, C. A. F., 1974. 'Cerâmica castreja'. *Revista de Guimarães* 84, 171–97.

Armada, X.-L., and García Vuelta, Ó., 2015. 'Dating Iron Age goldwork: first direct AMS ^{14}C results from northwestern Iberia'. *Trabajos de Prehistoria* 72, 372–82.

Armada, X.-L., and García Vuelta, Ó., 2018. 'Iron Age gold in northwestern Iberia: technology, chronology and social meaning'. In R. Schwab, P.-Y. Milcent, B. Armbruster and E. Pernicka (eds) *Early Iron Age Gold in Celtic Europe: society, technology and archaeometry*, Forschungen Zur Archäometrie Und Altertumswissenschaft. Verlag Marie Leidorf GmbH, Rahden, Westfalia.

Armada, X.-L., García-Vuelta, O., and Seoane-Novo, C., 2018. 'Cultural interaction in times of conflict: metals and ritual in the hillforts of north-western Iberia (2nd–1st centuries BC). In L. Fontes, G. Cruz and M. Alves (eds) *Cultural interactions and changing landscapes in Europe (2nd century BC / 2nd century AD)*, 55–71. Unidade de Arqueologia da Universidade do Minho, Braga.

Armada, X.-L., and García Vuelta, Ó., forthcoming. 'Plano-convex ingots and precious metalwork in northwest Iberia during the late Iron Age and early Roman period: an analytical approach'. *Archaeological and Analytical Sciences*.

Armbruster, B., 1998. 'Quelques aspects technologiques de l'orfèvrerie du Bronze Final au début de l'Age du Fer, au Portugal et Galice'. In G. Nicolini and N. Dieudonné-Glad (eds) 1995. *Les métaux antiques: travail et conservation*, Actes Du Colloque Int. de Poitiers, 53–8. *Monographies Instrumentum*, Montagnac.

Armbruster, B., and Comendador, B., 2015. 'Early gold technology as an indicator of circulation processes in Atlantic Europe'. In P. Prieto and L. Salanova (eds) *The Bell Beaker transition in Europe. Mobility and loca*l evolution during the 3rd millennium BC, 140–9. Oxbow Books, Oxford and Philadelphia.

Armbruster, B., and Perea, A., 1994. 'Tecnología de herramientas rotativas durante el Bronce Final atlántico. El depósito de Villen'. *Trabajos de Prehistoria* 51, 69–87.

Armbruster, B., and Perea, A., 2000. 'Macizo/hueco, soldado/fundido, morfología/tecnología. El ámbito tecnológico castreño a través de los torques con remates en doble escocia'. *Trabajos de Prehistoria* 57, 97–114.

Armit, I., and Grant, P., 2008. 'Gesture politics and the art of ambiguity: the Iron Age statue from Hirschlanden'. *Antiquity* 82, 409–22.

Appendix Directory of designers and makers

This thesis has been informed by insightful observations from conversations with the following contemporary designers and makers. They have generously given their time and provided expert comment on the techniques and materials used in the practices and processes of the design of the case study artefacts.

Andrew Ashcroft is based at Ashcroft Jewellery Design in Durham. A goldsmith and jewellery designer, he specialises in creating handmade bespoke pieces using a combination of traditional skills and modern technology.

https://www.ashcroftjewellery.com

Alison Castle is an accomplished weaver, including in the design of tablet-woven bands, and takes part in weaving demonstrations at the World Heritage Museum in Durham and the Shipley Art Gallery in Gateshead. She is a member of the Durham Guild of Spinners, Weavers and Dyers, affiliated to the worldwide Association of Guilds. The Guild promotes public interest and education in hand-spinning, weaving and related textile practices and processes such as dyeing and making, and the preservation and development of techniques and equipment.
https://durhamguild.com

Gerry Grant and **Lyn Grant** are founder-owners of Fangfoss Pottery, which has been making pots for over forty years. Fangfoss is one of the leading studio potteries in the North of England, making a wide range of stoneware pottery, selling studio ceramics to galleries throughout the region. All of the pots are handmade or wheel-turned and are finished with glazes developed and prepared in the studio.

http://fangfosspottery.co.uk

Rupert McBain is a contemporary furniture designer whose studio makes distinctive bespoke furniture to complement the rooms and spaces for which it is made, pieces with a unique sense of people and place. The highest standards of making are combined with technology and fine materials to produce extraordinary designs.

'There are not many substitutes for knowledge, experience, craftsmanship and flair. I have to set up the correct environment. So I have to have the correct technical knowledge, the correct craftsmanship, the correct knowledge of materials – how to use them, how to combine them and how to join them – and the correct intellectual and artistic eye to bring those elements together.

The client is the initiator and can bring ideas, materials and shapes to the process. Discussions, thoughts, guidance and input are all important as is trust that the eye and experience of the designer will give something truly special to the project. We welcome visits to the workshop so that clients can see the materials in their raw state and how the various processes transform them.' *Rupert Mcbain*

Rupert McBain Studio also restores furniture for private households, museum collections, Church commissioners and commercial companies.

https://rupertmcbainstudio.com

Gareth Riseborough and **Sally Pointer** are based in Herefordshire and South Wales. They explore aspects of early technology and material culture from prehistory to the present. A graduate in archaeology and Old English, Sally spent over a decade managing a hands-on gallery for the National Museum Wales, before becoming freelance in 2010 to pursue her interests in heritage education. Gareth originally trained as a chef before deciding it was more fun to work in a different century. Gareth currently specialises in early bone, horn, metalwork and shale. He regularly demonstrates historic cooking and craft skills from prehistory to the early modern, and his work is found in museum education, film and theatre the world over.

https://www.sallypointer.com

Cynthia Sebolt is an independent researcher based in San Antonio, Texas, USA. She has specialized in tablet-weaving, and specifically in the 3/1 twill technique. Combining a love of research with her weaving talent, she has recreated historical examples, has incorporated historical motifs into more modern pieces, and has created her own patterns. She has experimented with historically accurate materials, tools and looms to really 'get inside the head' of the weavers who practised in the past, and this experimentation has led to a greater depth of knowledge and skill. She has published articles on tablet-weaving for the Society for Creative Anachronism (SCA) and for Tablet Weavers' International Studies and Techniques (TWIST).

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