At the beginning of the year 1901, *The Scotsman* newspaper peered into the future and, under the title ‘Poetry of the Twentieth Century’ reported:

Two things we seem to see, that it will be an era of empire, or the struggle for it; an era perforce of larger national aggregations, and an era of scientific discovery, progressing in an accelerated ratio.¹

Expectations of ‘the era of scientific discovery’ would become a commonplace in the new century. At a time when new findings in electricity and chemistry seemed to be revolutionising life, invocations of ‘science’ entailed much more than reference to esoteric knowledge and methodology. Cars, aeroplanes, telephones, ‘talkies’ and poison gas could all be included within its ambit at a time when use of the word ‘technology’ had not yet been standardised.² A 1941 study by Mass Observation reported that people ‘look upon progress in the familiar and by now traditional light, as an amalgam of scientific invention, social improvement and increased knowledge and educational opportunity’.³

In line with contemporary ways of doing things and even of knowing, during the early part of the century the concept of ‘being modern’ captured a reinterpretation of aesthetics and even ethics. Thanks to radically new techniques in fields from dentistry to road transport, ways of life seemed to a new generation fundamentally different from those of the past. Repeatedly, the experience of the First World War would be drawn upon to emphasise the caesura. It is now some years since Robert Hughes argued that in art, literature, theatre, music, cinema, dance, architecture, design and beyond, there was a clear sense of a change of aesthetic which, although it had its beginnings long before the war, was able to flourish following the disintegration of long-standing social structures during and after the conflict.⁴
The arts drew upon the ideas, metaphors, symbolic meaning and practical potential of science. In widespread and rich discourses about and between sciences and other cultural areas, science was used variously as a coherent hegemonic authority and as an epistemologically and methodologically diverse category. It was also used to generate an important series of metaphors and images that supported experimental cultural practices.

The nature of this inter-relationship is the subject of this book. Contributors engage with a broad range of disciplines and a variety of contexts in which the notion of ‘being modern’ was deployed, and allied with conceptions of science. Respecting the ‘modern’ and ‘science’ as categories deployed by our historical actors, the disciplines discussed include psychiatry, physics, literary studies, mathematics and theology, while the contexts range from popular movements to science journalism, and from religion to electrical engineering. The volume is distinctive in its own interdisciplinarity, drawing on literature studies, the study of art and design, and the history of science and technology. It seeks to enable cross-disciplinary insights and understandings, drawing in contributors from a diverse set of disciplinary perspectives to interrogate a shared set of questions that offer insight into the experience of modernity and the relations of this to scientific discourse and practice. It also explores the engagement with and interpretation of science and technology by an unusually wide-ranging set of diverse actors ranging from elite writers and artists to Kibbo Kift, local politicians, radio hams, science fiction enthusiasts, historians of science and architects.

The modern

This volume interrogates the category of ‘the modern’ as an actors’ category, teasing out the richness, the complexity, and the shared concerns of a range of articulations of the idea of ‘being modern’, particularly as it informed thinking about science and culture in the early years of the twentieth century, rather than proposing any higher-order analytic definition of ‘modernity’. Such a methodological approach is commonly used within a range of disciplines, including sociology, history of science, and science and technology studies, but has been less common in interdisciplinary work on literature, culture and science. There are, of course, both advantages and disadvantages to such an approach. As Charles Rosenberg argued in 1988, ‘An actor-oriented approach seeks to appropriate the individual in the service of transcending the individual
and thus the idiosyncratic; it seeks to use an individual’s experience as a sampling device for gaining an understanding of the structural and normative. This approach is designed to avoid anachronism, and to build a framework on which it is possible to move from the particular to the more general. But Rosenberg also highlighted the importance of generating a productive tension between actors’ categories and more analytic and retrospective categories to the generation of historical understanding. Similarly, in ‘Actors’ and Analysts’ Categories in the Social Analysis of Science’, Harry Collins proposed that ‘it be accepted that sociological explanation must begin with the perspective of the actor. The causes that give rise to anything that can be seen as consistent actions among actors turn on regularities as perceived by the actors first.

The twenty-first century digitisation of literature and the press enables us to gauge the rapid ascent of ‘modern’ as such an actors’ category. Google Books Ngram Viewer offers some insight into the usage of words and phrases in a large corpus of books in English across decades or indeed across centuries. The word ‘modern’ saw a sharp increase in frequency between 1870 and 1930, with its annual usage doubling over these years. Its most common usage was in phrases that sought to capture the specific character of the contemporary world, with ‘modern times’ and ‘modern world’ being the most frequent uses between 1870 and 1950, while ‘modern life’ was overtaken in frequency by ‘modern science’ only in 1940. The term ‘modern science’ itself had seen a certain currency as a phrase in the late sixteenth century, but then more or less disappeared until the early nineteenth century. It then grew steadily in usage throughout the nineteenth century, reaching peak frequency of usage in 1930. A cognate term such as ‘modern physics’ saw its usage increase significantly between 1880 and 1920, and grow five-fold between 1920 and 1960; while ‘modern mathematics’ increased in usage significantly between the 1890s and the 1960s, but declined rapidly after this date. The phrase ‘modern poetry’ tripled in frequency of usage between 1910 and 1960, while ‘modern industry’ was most frequently deployed between 1915 and 1950. Usage of ‘modern’ in all these combinations declined significantly in the second half of the twentieth century, suggesting that it became less useful in capturing what felt to people like the most significant aspects of culture, of economy and of science in that later period. The British Library sponsored ‘British newspaper archive online’, which covers a large number of regional newspapers, provides a comparable insight. ‘Modernity’, a term known but hardly used in the 1870s, was deployed over two thousand times, across this corpus, in the first decade of the twentieth century.
The association between science, modernity, modernism and progress was envied, drawn upon and exploited. The material presented here builds on the many studies of the interactions between science and other aspects of culture. Modernity too has been the subject of a rich literature, and the distinctive American context has already been the subject of many studies. Scholars have, for instance, explored how this nexus was expressed in the World Fairs of the period. We have also drawn upon the scholarship detailing the interest of modernist writers in the relations between literary writing (and creativity more broadly) and science.

Scholarly thinking and writing about the relations between literature and science have been driven by different epistemological, historical and aesthetic impulses since the early years of the twentieth century. The institutionalisation of thinking about the relations between science and literature increased over the century, with a steady growth in the number of learned societies, research centres, and specialist degree programmes in these fields. Critical and theoretical work on the relations between literature and science became important and influential in Britain in the 1980s, with studies such as Gillian Beer’s *Darwin’s Plots* (1983) and Sally Shuttleworth’s *George Eliot and Nineteenth-Century Science* (1984) providing new methodologies for thinking about the ways in which scientific inquiry shaped forms of narrative. Scientific writing and practice offered rich metaphorical possibilities; and scientific thought offered new understandings of historical time for nineteenth-century writers, particularly novelists. This kind of exploration was then further developed in the late-twentieth and early twenty-first centuries in a number of scholarly works that focussed on early twentieth-century scientific innovations, addressing in particular new work in Physics. Examples of this are Daniel Albright, *Quantum Poetics: Yeats, Pound Eliot, and the Science of Modernism* (1997), Michael Whitworth, *Einstein’s Wake: Relativity, Metaphor and Modernist Literature* (2002) and Katie Price, *Loving Faster than Light: Romance and Readers in Einstein’s Universe* (2012).

Such work had its theoretical and critical roots in literary studies, albeit very significantly influenced by the critical theory that had become so important for that discipline by the 1980s, as well as by the methodologies of cultural history and cultural studies. This literary grounding remains very significant for the majority of work addressing science and literature today. Looking at the exciting range of research societies, centres and journals focussed on this field, such as the *Journal of Literature and Science*, the British Society for Literature and Science,
or Literature and Science, Oxford, it is notable that while they express a clear and important commitment and enthusiasm for promoting ‘interdisciplinary research into the relationships of science and literature in all periods’, the majority of the editors of, contributors to, and participants in their activities come from the discipline of literary, and specifically English, studies. They are however moving into fields which could profitably engage other disciplines.

The breadth of approach now called upon is illustrated by recent research on modernism and science which has focussed particularly on the social, cultural and artistic impacts of new communication technologies. For example, Friedrich Kittler, a Professor of Aesthetics and Media Studies, has produced an important and influential body of work that draws on discourse analysis, media theory, psychoanalysis and history to consider how modernity is shaped by technology. In a volume such as Gramophone, Film, Typewriter he examines the ways in which subjectivity, artistic practices and social forms of organisation are shaped by the developing technologies of communication. Thus, for example, he writes that:

*Mechanization Takes Command* – Siegfried Giedion could not have come up with a better title for a book that retraces the path from Marey’s chronophotographic gun via modern art to military-industrial ergonomics. The automatized weapons of world wars yet to come demanded similarly automatized, average people as ‘apparatuses’ whose motions – in terms of both precision and speed – could only be controlled by filmic slow motion.Kitillr draws tight, and compelling, links between technologies, cultural forms and individual subjectivity that create a powerful but constraining sense of the nature of modernity. He later writes that, ‘films are more real than reality, and that their so-called reproductions are, in reality, productions. A psychiatry beefed up by media technologies, a psychiatry loaded with scientific presumptions, flips over into an entertainment industry’. Drawing on the theoretical insights of Heidegger and Lacan, and the technological innovations of Edison and Turing, however, Kittler offers a model of history that, despite its subtlety and sophistication, can be seen as amounting to a form of technological determinism. Contributors in this volume challenge such determinism in a variety of ways, while acknowledging the psychic and social significance of science and technology for early-twentieth-century thinkers. They do this by focussing on the negotiations that take place between
science, technology, and culture, which generate never fully resolved tensions and productive sites of resistance and of imagination.

A more recent and important study of the interconnections between modernity and technology can be found in *Moving Modernisms: Motion, Technology and Modernity* (2016). This collection of essays focusses on the idea of ‘movement’ as expressed in relation to space, place, energy, mathematics, cinema, cycling and urban transport. Movement, the editors argue, ‘becomes definitional of modernity’, and contributors to the volume also argue that ‘new technologies of transportation, communication, and representation in the urban context’ are central to understanding this relationship. Again, the contributors to *Moving Modernisms* all write broadly from within the space of literary studies, but bring to that field a strong sense of the ideas, metaphors and images that were being generated in other disciplines in the modern period.

As the reference to the work of Giedion makes clear, historians of design have long been concerned with the meaning of science and technology. The *Journal of Design History* was established in 1988 and its second article dealt with the theory of machine design in the second industrial age. The idea of ‘the modern’, ‘modernity’ and modernism run strongly through this journal too. In 1998, a special issue devoted to ‘Craft, Modernism and Modernity’ discussed the tension between the modern movement, mass production and handwork. In the introduction, Tanya Harrod provides a context from the history of the visual arts; however, she is dealing also with the tension between the attractions and threats of modern life and modern means of production. Such arguments can be linked to discussions elsewhere within the broader space of ‘history’, and need locating within common cultural frameworks.

This book

Within Europe, as Daunton and Rieger explained in the first lines of their 2001 *Meanings of Modernity*, ‘The study of British modernity is in its infancy when compared with the prominence of this field in other national historiographies.’ This volume will go some way to building understanding of the British case in an international context. It is therefore important that it does also include several chapters dealing with German, French and Austrian topics. Far from emphasising a British exceptionalism, this volume will be conducive to interpreting the British experience within an understanding of broader European conversations.

In the past, the disciplinary diversity that has always underpinned approaches to thinking about the relations ‘between science and the arts’,
as well as investigations into the history of science, has led to separation. Now there are new opportunities, and we have sought to benefit from a confluence of scholars from disciplines that do not always talk to each other in depth or productively, drawing upon diverse disciplinary approaches and interdisciplinary methods.

Contributors do seek to develop insights into both science and culture in the early twentieth century by beginning with the ways in which writers, artists, designers, scientists, journalists and other relevant actors sought to understand ‘being modern’. But they also seek to develop an understanding of the significance of ‘consistent actions’ and ‘regularities’ among actors, that are necessary to a broader historical understanding of the relations between science, culture and ‘being modern’.

In their different ways, the chapters in this book deal with a problematised view of science. Tensions between the modern industrialised science and a postulated purer or more innocent past science are explored. The alternative attractions of mathematics and physics on the one hand, and biology and living shapes, on the other, for writers and designers provide the stimulus for authors. For the contributors have shared a common interest in understanding how the centrality of science in twentieth-century culture generated a range of ideas, images and practices that shaped what it meant to be ‘modern’.

As Oldenziel argues in Chapter 12, ‘what being modern meant was contested and unstable’ and ‘how-to-be-modern could be declassed, reclassed, and recycled’. She argues that only by paying close attention to local discursive and social contexts can the semantic and social complexity of ‘being modern’ be grasped: ‘focussing on the bicycle let us view what being modern has meant, how it was contested, and who controlled its narrative’. Jeff Hughes points out in Chapter 4 that ‘the modern’ does not designate an ‘epistemologically uncontentious or ontologically fixed’ category.

Yet our understanding of the flexibility of the term need not undermine our recognition of its potency. In Chapter 1, Mitchell G. Ash deals with Vienna, perhaps the single site most associated with the shock of ‘modernity’. From visual arts to psychiatry, engaging with the ‘modern’ was the ambition, and thinking about science was a central part of the means. Ash argues that there were affinities and even linkages between ‘modern ways of thinking about science’ and the radical development of the visual arts. The significance of technological modernism, he argues following Mehrtens, ‘presupposes a concept of knowledge based less on self-referential abstraction than on what can be done with, or to, nature as well as other human beings’. The plurality of the ‘modern’ extended
even into the sciences themselves, because what counted as ‘modern’ was different, often fundamentally so, in different disciplines. In Chapter 9, Pyenson also builds upon Mehrtens in his study of the hugely influential mathematician Felix Klein. Amongst his many legacies, as well as the Göttingen Institute of Applied Physics, was the building and use of mathematical models for teaching (he may be best remembered today as the conceiver of the four-dimensional Klein bottle). Pyenson explores the role of the work of the Italian sculptor Umberto Boccioni as a mediator between the models of Klein and the cubism of Picasso. In Chapter 8, Nina Engelhardt, dealing with Musil and Zamyatin, looks at how these writers explore implications of new mathematics for literary fiction. Concepts of Life, as deployed by the German writer Alexander Döblin, are explored by Esther Leslie in Chapter 16.

Conceptions of what science is like would, repeatedly, serve as a reference. Charlotte Sleigh, in Chapter 7, explores the science fiction writing of engineers. She points out, ‘Science, for the fans, was a generalised toolkit that allowed one to have one’s say, to apply general technical skills to any area of culture’. Yet science too was contested. The breadth of the meanings of ‘science’ for writers in the early twentieth century is a key concern for contributors to this volume. They show how the term could denote a general sense of abstract and structured thinking, or suggest a particular scientific discipline that was seen as demonstrating the characteristics of modernity with significant force, or indeed invoke popular and applied forms of scientific knowledge as central parts of their sense of modernity.

Thus, for example, in his 1920 essay on Dante, T.S. Eliot refers to ‘the greater specialization of the modern world’ and connects this to his cultural and historical argument about the ‘dissociation of sensibility’.20 Here the experience of modern culture and modern science is one of fragmentation and specialisation, which act as inhibitors rather than producers of significant understanding. Strength and solidity are also ascribed to modern science by Hugo Münsterberg, the organiser of a Congress of Arts and Sciences that was part of the St Louis World Fair held in 1904, as Kevin Brazil observes in Chapter 4. Münsterberg described his aim in organising the Congress as being to offer a synthesis of the ‘specialization which makes our modern science and scholarship solid and strong’. As Brazil points out here, the sense that specialisation was what made both science and culture ‘modern’ can also be found in various writings by Eliot, for whom this was understood broadly as a negative element of ‘being modern’, which he associated with a loss of the scientific and cultural sensibility of earlier periods. As Virginia Woolf
polemicises about modern fiction as a necessary counter to the weight and solidity of naturalist novels, or Eliot develops his arguments about modern tendencies in poetry (writing for example in his essay ‘Tradition and the Individual Talent’ that ‘it is in depersonalization that art may be said to approach the condition of science’), so we can, as this volume so clearly demonstrates, map what is at stake for them in the question of ‘being modern’.

By contrast with Eliot’s sense of fragmentation across culture and the common thread of specialisation, two articles here deal with Le Corbusier, the best-known architectural exponent of modernism. Judy Loach in Chapter 10 examines his concept of ‘purism’, his distillation in a single word of the ‘modern spirit’. Loach here is dealing with the young Corbusier enamoured of geometry and lines that underlay both science and art. In the final chapter, Tim Benton looks at how Corbusier later sought to reconcile with this geometrical Nature, a more messy nature, which Benton distinguishes with a lower-case ‘n’.

This was an era in which the scope of science was expanding. The doyen of British science between the wars, Lord Rutherford, was however famous for distinguishing between what he saw as the only two sorts of science, physics and stamp collecting. This frequently cited aphorism can be seen as the arrogant self-affirmation of the Director of the Cavendish Laboratory, but also as the characteristic defence of the qualities of a private club at the time of its expansion to a rich and diverse movement. As Michael Guida shows in Chapter 13, the naturalist’s recording of birdsong won a wide public following. Eliot famously argued in 1919 that ‘poetry is a science’, and that a mature poet ‘works like the chemist’, while Ezra Pound insisted on the significance for the modern creative artist of the cultural and imaginative changes he associated with his contemporary scientific world:

The mind, even the musician’s mind, is conditioned by contemporary things, our minimum, in a time when the old atom is ‘bombarded’ by electricity, when chemical atoms and elements are more strictly considered, is no longer the minimum of the sixteenth century pre-chemists.

There has been significant discussion of the meaning of Eliot’s claim, and Kevin Brazil argues here that for T.S. Eliot reference to ‘science’ might invoke ‘not the natural sciences, but the disciplines which have come to be called in the English-speaking world the social sciences’. In his 1926 Science and Poetry, I.A. Richards asked how our estimate of poetry
is going to be affected by science, and argued that ‘if only something could be done in psychology remotely comparable to what has been achieved in physics, practical consequences might be expected even more remarkable than any engineer can contrive’.\textsuperscript{25} He further argued that ‘the first positive steps in the science of mind have been slow in coming, but already they are beginning to change man’s whole outlook’. Richards is privileging psychology in his representation of ‘science’ and its impacts on poetry, while for other literary figures disciplines such as physics, mathematics or, on the other hand, the studies of biological organisms and of life, were key to their conceptions of the new aesthetic of modernism.

From the end of the nineteenth century, issues raised by the phenomena of ‘life’ raised increasing interest. Organicism emphasised the emergent properties of the whole as greater than merely the interaction of the parts and the significance of biological form. The work of Donna Haraway on crystals, of Oliver A.I. Botar and Isabel Wünsche on biocentrism, Smith on organicism and Huxley, and, more recently of such scholars as Juler and Esposito, has explored the stimulus given to both science and the arts.\textsuperscript{26} The approach of the naturalist Julian Huxley, known for his contribution to the integration of Mendelian Genetics and Darwinian natural selection was underpinned by his love of nature, and he has been described as fundamentally a ‘vitalist’. His greatest book was the study of a bird, the crested grebe.\textsuperscript{27} Rather than privileging any particular interpretation of science, this book is organised around the competing attractions of the physical and the organicist sciences.

From a distance, it might have seemed obvious that science and modernity should go hand in hand in a spirit of mutual support. This has been suggested by the constant contemporary refrains of politicians, scientists and engineers that we should look to the future, and that our continuing prosperity demands a scientific knowledge base. But the success of such rhetoric depends to a large extent on endowing the term and concept of modernity with a positive progressive aura and this has not always been the consensus. Mass Observation introduced its 1941 report on everyday attitudes to science with its dominant impression that people felt ‘science has got out of control’.\textsuperscript{28}

Interpreters of science could cope by redefining the reference of the term from the urgent, contemporary and scary to the beautiful, enduring and old. In Chapter 6, Frank James cites the views of Rupert Hall, who was appointed to a lectureship in the History of Science at the University of Cambridge in 1948, as found in his influential study, \textit{The Scientific Revolution 1500–1800: The Formation of the Modern Scientific Attitude}:
‘[science] is the one product of the West that has had decisive, probably permanent, impact upon other contemporary civilizations. Compared with modern science, capitalism, the nation-state, art and literature, Christianity and democracy, seem regional idiosyncrasies, whose past is full of vicissitudes and whose future is full of dark uncertainty’. In an age that had just seen the use of atomic weapons and of gas in the concentration camps, Hall had sought to rescue the reputation of science by disconnecting it from modernity. Bud too, in Chapter 5, deals with the competing images of science as urgently contemporary, expressed in the design of the Hornsey Town Hall complex and the appeal to deep time in the Museum of History of Science in Oxford.

The chapters

The book is structured in four sections. The first section deals with ‘science, modernity and culture’. It includes four chapters. The first by Ash looks at the relationships between scientific and artistic modernism in Vienna, the heartland of both movements. Two theses are advanced: first, that there are certain affinities, and in some cases actual linkages, between the breakthrough to modern ways of thinking in the natural sciences and mathematics and the radical changes in the arts that occurred at the same time; and second, that modernism, and hence ‘cultural modernity’ in these fields was nonetheless fundamentally plural and not the “totalizing project” that postmodernist thinkers have claimed that it was. Modernism in the sciences, as in the arts, often involved a break with pictorial representation of nature and a turn toward giving free play to abstraction and theoretical imagination. Alongside this, Ash points to technological modernism, which presupposed a concept of knowledge based on what can be done with nature as well as human beings. As he argues, these two styles of modernism in science were not fundamentally opposed, but in certain respects deeply related to one another.’ Boon then, in Chapter 2, looks at an exemplary case of convergence between scientific and artistic modernism. He deals with a different and completely modern art form: the sound track of a film. The cinema itself was a new and apparently science-based art form and synchronised sound only became routinely possible around 1930. His chapter argues that filmmakers in the first decade of sound on film used sound to represent industrial modernity. ‘Taking the contrasting examples of Paul Rotha’s 1935 British Documentary The Face of Britain and René Clair’s 1931 French feature, À Nous la Liberté, it listens to their...
respective soundtracks and situates the sonic practice of the directors and those responsible for the soundtracks within the debates of the period.’ Shiach follows in Chapter 3 by exploring in more detail the ways in which three modernist writers engaged with scientific ideas and deployed explicitly scientific metaphors in the year 1919. She offers ‘new insights into the extent to which, at this particular historical moment, the theorisation and the creation of what was understood as “modern” writing happened in the interstices between science and literature. The writers discussed are T.S. Eliot, Virginia Woolf and Dorothy Richardson, and the analysis of their texts engages with the metaphor of “the atom”, and “the catalyst” and the idea of “waves of light”.’ In Chapter 4 Brazil looks in more detail at the work of Eliot. He focuses on a different meaning of ‘science’, central to Eliot’s graduate studies in philosophy – science in the sense of an academic discipline.

Tracing Eliot’s engagement with issues of disciplinarity in relation to fin-de-siècle debates about the epistemological foundations of the social sciences, and situating them in relation to broader theories of disciplinarity in modernity, this essay argues that it was science’s disciplinary status as a social form that made it an ambiguous model of emulation for modernist poetry.

The second section looks at tensions over science. Strikingly, in rather different chapters, a few key figures appear, including William Inge, the Dean of St. Pauls, and the writer C.S. Lewis. Although none would commonly feature in a history of science, as agents and as targets both were important. Bud deals in Chapter 5 with the circulation of the applied science and its use as a rich and contested concept in a range of discourses. He looks at the role in ‘dissemination of a few national politicians such as R.B. Haldane and such well-known writers as H.G. Wells, but also of local figures such as Alderman Moritz, responsible for the selection of the pioneering modernist design of the Hornsey town hall complex.’ The term came alive too through the arguments of the ‘other side’ concerned with the impact of applied science on the development of inhuman weapons, of which gas was the archetype, on culture and unemployment. In Chapter 6 James looks at the same disagreements to argue that

history of science in Britain began as a response to issues raised in the inter-war years by the potential role of science in the future development of society and culture. Authors with wildly different views and agendas, for instance Dean Inge and Aldous Huxley,
predicted far future utopias and dystopias that contemporaries found both disturbing and damaging to the contemporary status of science. To circumvent such issues scientists and historians with similar outlooks began studying seventeenth-century science in the belief that this illustrated that science was an independent epistemic entity and its cognitive content therefore had no relation to other areas of culture and society.

Sleigh’s contribution in Chapter 7 shifts attention to the work of young science fiction fans in 1930s Britain and their creation of home-made magazines as a means of participating in the mediatised era of knowledge and culture in the interwar period. It asserts that science was a flexible cultural resource from which they attempted to assemble their identity, and most especially that this assemblage needs to be understood as an exercise in literary criticism.

The third and fourth sections deal with two competing scientific modes used as metaphors and agency in the arts. They deal, respectively, with mathematics and physics on the one hand, and, on the other, with biology and the natural form. The third section, ‘mathematics and physics’ contains five chapters. Engelhardt and Pyenson (Chapters 8 and 9) deal with mathematics as a metaphor. Engelhardt treats ‘Austrian author Robert Musil and Russian writer Yevgeny Zamyatin who draw on the period of redefinition and the modern(ist) notion of mathematics in their attempts to develop new literary forms with which to respond to the pressures of modernity’. Both authors set out their visions for a mathematically inspired literature in their essayistic work as well as in fictional texts. Engelhardt’s essay ‘examines both in order to explore the role of mathematics in their ideas of being modern and writing modern literature’. Pyenson interprets Picasso’s 1914 sculptures called Glass of Absinthe in the light of mathematician Felix Klein’s promotion of plaster models for abstract mathematical surfaces, notably the non-orientable surface known as a Klein bottle, which received attention as a popular, mathematical curiosity. By the first decade of the twentieth century, scores of mathematics faculties and schools had extensive collections of Klein’s plaster models, notably the Paris Conservatoire des Arts et Métiers. The Klein bottle, like Picasso’s vessels and a related sculpture by Umberto Boccioni, is unable to contain liquid.
In Chapter 10, Loach is concerned with architecture as art, and with the role accorded to science in the aesthetic rather than technological aspect of buildings, in the avant garde around the time of the Great War. Her chapter seeks to explain why science, and most overtly mathematics, played a key role in modern architectural theory, and how it did so after being mediated through theories developed in other art forms, most notably painting but also music; and that it did so, at least in part as a result of personal association with artists from other genres, through a wider range of scientific theorising, notably psychological theories of sensual perception and its mental impact. It focuses on the work of the most influential theorist and designer of the period, one working across the fields of fine art and architecture: Le Corbusier. He found, in Parisian avant garde circles at the end of the Great War, a preoccupation with science – most explicitly mathematics – which offered artists a way of vindicating the importance of their contribution to, and thus validating their own position within, a society that saw science as the inevitable means for ‘becoming modern’.

The two final chapters of this section are concerned with the technological aspect of science. Focussing on the Cavendish Laboratory, Cambridge, Hughes shows in Chapter 11 how the electronics skills of young wireless enthusiasts were channelled and mediated by the Cambridge University Wireless Society, which acted as a space for the sharing of materials and practices and the development of members’ wireless technique and ideological values. Wireless and the growth of organised broadcasting in the 1920s transformed the public sphere and many aspects of social, economic and political life, as well as material, spatial and sonic cultures. Embedded in a network created by the University Wireless Society – ranging from the BBC and the General Post Office to Marconi, EMI and other characteristically modern industries, the Cambridge University Officers Training Corps and national military and civil research establishments – these researchers developed skilled wireless techniques that cut across the boundaries between civil and military, university and industry, and ‘pure’ and ‘applied’ research. Their practices simultaneously shaped both the development of military field communications and research at
the Cavendish Laboratory, including ionospheric research and Lord Rutherford’s experiments in nuclear physics. The chapter thus proposes a radical new framing for interwar nuclear science and its modernity.

Oldenziel is concerned in Chapter 12 with competing modernities between two novel technologies of the early twentieth century: the bicycle and the car.

By the eve of the First World War, the thriving literary production (cycling travelogues), the explorations of experimental artists (Futurists), and the sponsorship of commercial art (advertising posters) had helped to establish cycling as truly modern. The same market players, civil-society actors, and experts once involved in the bicycle business, shifted to the car industry in the 1910s – and with them the discourse of modern mobility. The debates on modern always implied opposites: ‘fast’ versus ‘slow’ traffic; motorized versus non-motorized circulation; flow and disruption; modern versus old fashioned – in short, a distinction between future and past. Mobilizing modernity is as much about one’s identity in the present as an aspiration for the future – about the road ahead beyond the horizon. Building that road was not just a metaphor, but also a reality – including the question of who had the right to ride on it.

The final section deals with the interest in ‘life, biology and the organicist metaphor’. As good naturalists ourselves, we might note the recurring presence in several of the accounts of Julian Huxley, a leading public intellectual of the interwar years. In Chapter 13, Guida deals with the work of the pioneering natural history broadcaster, the German refugee Ludwig Koch, and his unique British birdsong broadcasts. Though these have been ‘little considered for their place and purpose in the crisis of war’, Guida argues that Koch’s broadcasts provided an emotional sustenance that was quite distinct from what could be derived from the BBC staples of talk and music. Koch’s work was promoted and supported by several leading naturalists and ornithologists, Julian Huxley and Max Nicholson in particular. They agreed with Koch that birdsong was a universal human pleasure that anyone could experience, without training or knowledge.
Guida considers ‘how listening to birdsong on the radio can be conceived of as an act of citizenship through knowing and relishing the sound signatures of the nation’s bird heritage’.

Nature was of course widely seen as dynamic, and evolutionary theory provided a model for how change occurred. In Chapter 14, Pollen explores the ways that ‘popular scientific ideas about life force, degeneration, cultural evolution and the biogenetic law were disseminated and incorporated into the symbols, philosophies and practices of experimental woodcraft campaign groups in interwar England.’ She draws on works that assess the intersection of scientific ideas in application, from Beer and Stephen Gould to Oliver A.I. Botar.

Evolution was one aspect of biological thinking, organicism was another. This has been frequently associated with the authoritarian consequences of neo-Kantianism. In Chapter 15, Gordon argues that the organicism articulated by interanimation of early twentieth-century biological, philosophical and literary discourse provides significant resources for reassessing modernist attempts to theorise the role of aesthetics in mediating different conceptions of individuality and forms of socio-political organisation. He pursues this claim through a detailed exploration of the relationship between Whitehead’s *Science and the Modern World*, the organicist biology of Needham and Bertalanffy, and the literary writings of Lewis and Lawrence. In Chapter 16, Leslie takes a look at competition between mechanical and organicist metaphors in chemistry and literature by studying Alfred Döblin’s *Our Existence*.

Its major concern is to categorize life, and to categorize it in relation to questions of crystal formation and the roles of seas in the origins of life. It focuses the debates about life, as mechanical, chemical and physical force, that were extant from the late nineteenth century, more popularly than institutionally received. This essay sets the ideas on life as liquid and crystal in relation to marginalised science of the time.

Finally, Benton addresses some of the fundamental issues of the book in Chapter 17, looking again at Le Corbusier. While in the previous section Loach reflected on the young Corbusier intoxicated by mathematics, Benton looks at a competing strain within his thought.

From his earliest training at the arts and crafts school at La Chaux-de-Fonds, Switzerland, the young Charles-Édouard Jeanneret was trained to believe that all beauty derived from nature. Through to
the end of his career, nature remained a fundamental issue: its infinite variety and mysterious laws of growth and decay had to be understood. The paper argues that for Le Corbusier there were two forms of nature. Geometry belongs to an order of Nature – let us give this order a capital ‘N’, from which the so-called Laws of Nature are derived. Absolute, unchanging, universal, the Laws of Nature are the product of human reason and are thought to derive from some higher order. Modern architecture derived from geometry – ‘Nature’ –, but nature – the wet, messy, sensual and gratifying kind – was also essential for human satisfaction. The paper is centrally concerned with how Le Corbusier sought to reconcile nature and Nature.

This book is distinctive, therefore, in the conjuncture of specialists from a variety of disciplines addressing the interpretation of the role of science in the search for ‘modernity’ in the arts and culture of the early twentieth century. They show how the meaning of such concepts as Nature, the organic, specialisation, speed, applied science and ‘science’ itself were explored and deployed to address what seemed to be a new world. Sensitive to the contestation of these categories at the time, the contributions offer rich interrelationships rather than simple generalisations. The volume is offered as evidence of the potential of such studies, and as an inducement to further multidisciplinary historical work on the relationships of science and art.

Notes

2 Before the Second World War the use of the term ‘technology’ was still unstable. It differed between the UK and the US. For the US, where MIT was influential, see Eric Schatzberg, ‘Technik Comes to America: Changing Meanings of Technology before 1930’, Technology and Culture 47, 3 (2006): 486–512. In Britain references to Imperial College were remarkably prominent. Of 2639 uses of the word ‘technology’ in The Times between 1900 and 1939, more than 20 per cent (582) were in relation to references to ‘Imperial College of Science and Technology’.
7 See for example, Philip Brey, ‘Theorizing Modernity and Technology,’ in Modernity...

See for example the dominance of American material and paucity of references to the British context in the chapters relating to the twentieth century in Stephen Kern, The Culture of Time and Space, 1880–1918: With a New Preface (Harvard University Press, 1983).


This is the explicit mission of the British Society for Literature and Science, as announced on their website http://www.bsls.ac.uk.


Kittler, Gramophone, Film, Typewriter, 145.


T. S. Eliot made this claim in ‘Modern Tendencies in Poetry’ (1920), which was written just after his rather better known essay, ‘Tradition and the Individual Talent ’ (1919). ‘Modern Tendencies’ was initially delivered as a lecture in late 1919, and first published in an Indian Journal, *Shama’a* 1, no. 1 (April 1920), 9–18.


Quotations in this section of the chapter are from abstracts prepared by the authors themselves, in the course of the preparation of the book.