Introduction

Shortly after the publication of her 1931 novel *The Waves*, Virginia Woolf received a letter of admiration from her friend and fellow member of the Bloomsbury Group, Goldsworthy Lowes Dickinson. In his letter, Dickinson specifically commented on the novel’s affinities with science. *The Waves*, he wrote, ‘makes clearer to me what literature really is. It’s not (as it is so often in fact) a kind of antithesis to science. It’s science made alive.’ The present book shares Dickinson’s insight that Woolf’s novels resonate with the language and conceptions of contemporary science. More specifically, it demonstrates the importance of science to Woolf’s modernist depictions of identity – to her conception of selfhood as a multiple, expansive entity.

As we shall see, the practice of applying scientific conceptions to questions of identity is not limited to Woolf’s writing. It is a consistent feature of the popular science of the modernist period, which frequently articulates a model of selfhood that bears a significant resemblance to the fragmented, boundless self associated with modernist writing. Examining Woolf’s novels alongside the scientific radio broadcasts and popular science books of the 1930s, I show that in these texts, and in modernist culture more broadly, scientific entities – the waves and particles of quantum physics; the long, connective nerve cells of the body; radio waves that travel over the surface of the Earth; common anatomical structures shared between human beings and other organisms – become associated with the rejection of a stable, individualized conception of selfhood.

Cross-Disciplinary Resonances

In late 1929 and early 1930, the BBC broadcast two series of radio talks entitled ‘Points of View’, in which prominent figures summarized their

*Quoted in Forster, *Goldsworthy Lowes Dickinson*, p. 233.*
view of the world and their own place in it. Contributors included Goldsworthy Lowes Dickinson, George Bernard Shaw, the biologist J. B. S. Haldane, the physicists Oliver Lodge and James Jeans, and the composer Ethel Smyth. In October 1929, the novelist, public intellectual, historian, and popular science writer H. G. Wells made his contribution to the series. The talk was enormously popular, and Wells received a large number of letters in response to it. In his talk, Wells addresses ‘a question I have often asked myself. What is this H. G. Wells who is now thinking before you and with you?’ To answer the question, he employs metaphors and definitions drawn from contemporary science. He begins by rejecting a straightforward equation of selfhood with his life as a physical organism, reflecting that he can no longer remember much of his earlier life and that he identifies ‘much more closely’ with his son, with whom he has recently been collaborating on his vast biological compendium *The Science of Life* (1929–30), than with his own self of 1886 or 1896. Shared thought, Wells argues, connects people. The person expressing the ideas disseminated by the broadcast is ‘something very much more than H. G. Wells’, because he is building upon thoughts and questions that existed long before his birth.³

To illustrate the continuity of human thought, Wells employs a metaphor drawn from physics. The discussion of ‘what is immortal in ourselves’, Wells argues, is like a light passing through a prism which may test it, refract it perhaps, polarise it perhaps, and send it on again changed. We are the prism. The thoughts existed before we were born and will go on after we are finished with altogether.⁴

Having drawn upon this physical parallel, he goes on to consider his own broadcast as a dissemination of his own selfhood:

H. G. Wells is something, a living growth and a continual refining of ideas, a thought process which is bringing our minds together, expressed by his voice and carried far and wide in radiations from this centre in London….

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³ Wells, ‘Points of View’, 566. Throughout this book, quotations from broadcasts are taken from transcripts in the BBC magazine *The Listener*, with the exception of broadcasts delivered prior to *The Listener*’s inception in 1929 (in this case, quotations are from transcripts in the BBC Written Archives Centre). In the interwar period, it was not practicable to record broadcasts; as a result, as Paddy Scannell and David Cardiff discuss, ‘the vast bulk of output perished in the moment of transmission’ (Scannell and Cardiff, *Social History of British Broadcasting*, p. xiii). It should be noted, therefore, that these transcripts provide a limited record of an ephemeral, irrecoverable reality, and that their content is not necessarily identical to the original broadcast but was subject to editing (in 1937, Woolf recorded in her diary that her husband Leonard was writing ‘a strong letter’ to *The Listener*, criticizing it for cutting a phrase from one of his broadcasts (*D* 119).

⁴ Ibid.
Cross-Disciplinary Resonances

We are not ourselves only; we are also part of human experience and thought.\(^5\)

Wells thus employs two physical metaphors, that of the refraction of light and that of the radiation of radio waves, in order to suggest his continuity with the tradition of human thought and the dissemination of his being among those listening to his broadcast.

In the next stage of his broadcast, in which he begins to address ‘the question of what is an individual’, Wells moves beyond scientific metaphor, considering what modern science can explicitly say about the nature of identity:

If one pries into descriptive biology or into modern psychology, one finds first one curious fact and then another coming up to weaken and undermine this idea of the complete integrity of individuals. They are not so definitely marked off as we are disposed to think.\(^6\)

Looking first at biology, Wells brings up examples of a lack of individuality in nature. Plants, for instance, ‘seem much more individualised than they are’. They can be broken up through cuttings or joined together through grafting. ‘What is the grafted plant, a new individual or one or both of the old ones?’, Wells asks. Animals, too, are not all individualized. Among the ‘lower animals’, ‘two sometimes come together and coalesce into one and one will break up into two or many’. Other kinds ‘branch off others but never separate and so become what are called colonies, a sort of superindividual’. Wells then asks his listeners to consider what it would be like if human beings could multiply and coalesce in the same way as ‘lower animals’:

we should have Mr. Lloyd George coalescing with Mr. Snowden into one individual – which I am sure would be a terrible nightmare for the publicists of France – and we should have Mr. Winston Churchill breaking up into dozens and scores of Winston Churchills and writing books, painting pictures, forming governments, commanding and constituting armies and navies and carrying every aspect of his versatility to the last extreme.\(^7\)

Wells’s rhetoric takes a notable turn in this section of the broadcast. Ostensibly, he is imagining a fantastical, alternate version of reality in which the identity of human beings is transformed. His examples, however – David Lloyd George and Philip Snowden becoming one person,
and Winston Churchill dissolving into many–have a grounding in reality. Churchill did in fact have a varied career in which he occupied many roles, and Lloyd George and Snowden were, in this period, working together in pursuing a policy of appeasement towards Germany that supported the withdrawal of French troops from the Ruhr – thus, presumably, both angering ‘the publicists of France’. Examples of a lack of individuality in non-human organisms are thus used to emphasize the potential for a single person to have multiple identities and for two people to merge through joint activity.

As Wells continues, he further undermines the distinction between unindividualized ‘lower animals’ and individualized human beings. Even human beings, he explains, are ‘not completely individualised’.

[I]f you will let the biologist run on he will tell you that in the blood, vessels and substance of our body are millions of little beings, which are extraordinarily like some of the smallest, lowest microscopic animals which lead independent lives, and these go about in our bodies as citizens go about in the streets and houses of a city. These little beings, these corpuscles, kill disease germs, carry food and air about and do a multitude of services. They have minute individualities of their own. We are made up of millions of such minute creatures, just as cities and nations are made of millions of such beings as we are. There are, you see, different ranks and kinds of individuality.

The stability of human selfhood is thus undermined by being placed on a scale of ‘different ranks and kinds of individuality’. Human beings, Wells suggests, at once are a multiplicity of parts and are themselves parts of greater wholes: societies and nations. Individuality dissolves in two directions: by breaking up into multiplicity and by expanding into a larger entity. At the end of the talk, Wells concludes,

I think I have at least said enough to show you the support I find in these sciences for my profound doubt whether this H. G. Wells of mine is really the completely independent, separate, distinct being, that it is our habit of mind to consider him.

The tendency of science, Wells asserts, is to break down traditional notions of what constitutes selfhood.

This book demonstrates that Wells’s broadcast is representative of a broader tendency in the literature and science of the interwar period to employ scientific ideas to ‘undermine’, in Wells’s terms, the ‘idea of the

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8 Rudman, Lloyd George, p. 154.  
9 Wells, ‘Points of View’, 593.  
10 Ibid.
In the novels, broadcasts, and popular science books that I will be examining, scientific concepts and discoveries are invoked in order to construct a version of human identity that is made up of multiple parts and/or is continuous with other people, animals, or the material world. The connection between scientific concepts and human identity is usually made in one of four ways, all exemplified in Wells’s broadcast. The first way is to use an analogy, as in Wells’s comparison of himself to a prism refracting light. The second way is to make a direct equation between the human body and human identity, with the multiple cells of the body, and its material continuity with the rest of humanity or the external world, being used to imply the multiplicity and expansiveness of identity. A third, related strategy is to suggest that there is a material connection between technology and the human body, so that technology extends the self into the external world. Finally, evolutionary interrelationships and bodily resemblances between humanity and other species are used to place human beings on a spectrum with other, less individualized forms of life, thus undermining any attempt to provide a stable definition of the word ‘individual’. The chapters of this book broadly correspond to these four related tendencies. Chapter 1 looks at how explications of quantum physics draw analogies between subatomic entities such as electrons and human identity. Chapter 2 looks at how neurological theories are used within popular science to support a conception of the body (and consequently identity) as at once unified and fragmented. Chapter 3 focuses on the ways in which, in scientific and sociological discourse, radio extends the boundaries of the body, incorporating the individual as part of a collectivity. Finally, Chapter 4 examines how evolutionary interrelationships are used to destabilize the boundaries of human identity.

In the chapters that follow, I demonstrate that this practice of applying scientific concepts to questions of identity is a key feature both of the popular science broadcasting and writing of the modernist period, and of the writing of Virginia Woolf, particularly her novels of the 1930s and early 1940s. Throughout her career, Woolf was preoccupied with representing the multiple, expansive nature of selfhood. In *Jacob’s Room* (1922), she questions the idea that defining the identity of the main character is a realizable aim, while simultaneously constructing a patchwork narrative that combines the viewpoints of multiple characters into a composite whole. In *Mrs Dalloway* (1925), she suggests that characters separated by

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11 Ibid., 592.
social class can become continuous with one another through a shared occupation of the same space and time. In *To the Lighthouse* (1927), she tests the limits of sympathetic connection, interrogating the possibility of becoming ‘inextricably the same, one with the object one adored’ (*TL* 44). In *Orlando* (1928), she depicts a counterfactual reality in which a single person is able to occupy multiple subject positions: subject positions which encompass a plurality of genders, time periods, and occupations. It is her later novels, however, that form the culmination of Woolf’s articulation of a multiple, expansive model of selfhood. In her three major novels of this period, the community takes the place of individual protagonists. Each novel centralizes a different kind of community: *The Waves* (1931) focuses on a group of friends, *The Years* (1937) on the family, and *Between the Acts* (1941) on the inhabitants of a village. In each novel, the boundary between individual and community is interrogated and undermined. As in Wells’s broadcast, the individual is found to be continuous with those around it – and to be itself a composite of multiple parts.

Not only does Woolf’s writing share with Wells’s broadcast (and with the popular science of the period more generally) a preoccupation with multiple, expansive forms of identity; it also shares its tendency to conceive of those forms of identity in scientific terms. Though multiple examples of this tendency are presented in later chapters, it may be helpful, by way of illustration, to consider one instance here, from a letter that Woolf wrote to the novelist Hugh Walpole in July 1930. Walpole had recently returned from a lecture tour in Germany.

I envy you, on the strength of your flying picture of German life: Einstein etc. But I always hope other people’s lives aren’t so wildly exciting as they seem. Another touch, and I should jump from my orbit in a vain endeavour to be you. I’ve been only Mrs Woolf of 52 T.S. all the summer, seeing Ethel Smyth, Vita, Christabel, Lytton and so on. I wish I could think of anything to make you envious. I like printing in my basement best, almost: no, I like drinking champagne and getting wildly excited. I like driving off to Rodmell on a hot Friday evening and having cold ham, and sitting on my terrace and smoking a cigar with an owl or two. (*L*4 188–9)

Walpole’s report of seeing Einstein in Germany appears to have inspired Woolf, by a process of mental association, to employ a physical metaphor to express her jealousy: specifically, the metaphor of electron orbits. The mention of ‘orbits’ would, in itself, be inconclusive; it would be as likely (if not more likely) to refer to the orbit of a planet as to the orbit of an electron. However, planets do not ‘jump’ from their orbits. A central development in quantum physics in this period was Niels Bohr’s
adaptation of Ernest Rutherford’s ‘solar system’ model of the atom, in which electrons orbit a central nucleus. Bohr demonstrated that there was a limited set of orbits within an atom that an electron could occupy; this distinguished their orbits from those of planets, which could have a radius of any length. When the atom absorbed or emitted radiation, the electron would move from one orbit to another, a transition that was referred to in the popular science of the period as a ‘jump’.\(^{12}\) Bohr’s model was based upon the theory developed by Max Planck and Albert Einstein that electromagnetic radiation, as well as acting as a continuous wave, sometimes acted as a discontinuous stream of particles. It was, moreover, ‘mechanically indescribable’, contradicting Newtonian models of the motion of particles.\(^{13}\) A sense of discontinuity and paradox is essential to this passage. Although Woolf, like an electron, can jump from her orbit, this would be a ‘vain endeavour’, because she cannot as a result become Hugh Walpole; he is in one of the orbits that she cannot occupy. She is anxious, however, to show him that she herself is not merely ‘Mrs Woolf of 52 T[avistock] S[quare]’, but can occupy many orbits of her own; she is a publisher, a social being, a companion of owls. This passage is highly relevant, not merely because it indicates Woolf’s familiarity with the foundational concepts of quantum physics, but also because it shows her aptness to use those concepts to think about identity. Here, the idea of electron orbits is associated both with the multiple subject positions available to the self and with the desire to merge with other human beings.

This book is largely concerned with tracing multiple moments like this one: moments in which Woolf uses scientific terminology, and scientific concepts, to depict the self as a collection of multiple aspects and as potentially expansive. (Although here Woolf describes the desire to become Hugh Walpole as ‘vain’, elsewhere, as we shall see, she is more optimistic about the possibility of the members of a community merging with one another.) It explores the implications of such moments for our understanding of Woolf’s novels: their form, their politics, and their conception of community. At the same time, it identifies broader tendencies within modernist culture. It demonstrates that the modernist preoccupation with fragmented, dispersed selves is mirrored in the scientific discourse of the period, and that the popular science broadcasting and writing of the 1930s are modernist in their (often self-conscious) rejection of what they conceive of as traditional, individualistic models of identity.

In doing so, it adds to a growing body of work which identifies common concerns in the literary and scientific discourse of the modernist period. Rachel Crossland’s recent study *Modernist Physics* demonstrates that the writings of D. H. Lawrence and Virginia Woolf grapple with various conceptual questions – duality, relativity, and the relation between the individual and the mass – ‘in parallel with’ contemporary physicists.¹⁴ A recent edited collection by Robert Bud, Paul Greenhalgh, Frank James, and Morag Shiach, meanwhile, identifies ‘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’.¹⁵ Like both of these works, this book traces preoccupations that have a broad existence in modernist culture. In particular, it analyses constructions of identity by Woolf, by popular science broadcasters and writers, and by writers within other disciplines, and it highlights the congruences between these constructions (while at the same time remaining alert to tensions and irregularities). Like ‘being modern’, identity is a conception with a wide enough applicability to make it a subject of concern to multiple disciplines, while remaining specific enough to enable us to draw connections between its various cultural occurrences. In a period in which a definite gap had emerged between the methodologies of science and literature – with the major developments of quantum physics, for example, often being expressed in the first instance in mathematical terms – studying articulations of identity is an effective way of illuminating the commonalities between the disciplines.

Because this book is primarily a historicist study of the construction of identity in modernist culture, I avoid as far as possible imposing more recent identity categories upon my chosen texts (for instance, I do not refer to posthumanism or to the extended mind thesis, despite their conceptual proximity to some of the historical models of identity I explore). In general, I limit myself to terminology that is as close as possible to that used by the writers and broadcasters of the period. Thus, I refer to ‘singular’, ‘individualized’, or ‘limited’ versions of identity being rejected in favour of selves that are ‘multiple’, ‘dispersed’, or ‘expansive’. By the same token, because many of the scientific broadcasters and writers I discuss implicitly invoke a materialist philosophy in which the self is identified with the body (so that, for example, the multiplicity of the cells of the body translates to the multiplicity of the self), while others adhere to a more idealist perspective in which it is mental faculties such as memory

¹⁴ Crossland, *Modernist Physics*, p. 43.  
¹⁵ Bud et al. (eds.), *Being Modern*, p. 2.
and intuition that extend the self beyond its apparent boundaries, I do not seek to define selfhood as either a bodily entity or a mental production, but rather shift between the two definitions according to the particular texts I am analysing.

Many of the texts studied in this book describe selfhood in terms that are either spatial or grammatical. For instance, in a popular work of evolutionary sociology, *The Ascent of Humanity* (1929), the philosopher and science popularizer Gerald Heard states that ‘we can no longer take for granted that we ourselves are unalterable, indivisible, inassimilable “kernels of consciousness”’; while, in his book of essays *Possible Worlds* (1927), the biologist and popular scientist J. B. S. Haldane argues that if, like ‘Kings and editors’, we spoke ‘in the first person plural’, ‘we should understand a good deal more about how we work’.16 Woolf shares this tendency to define the self in spatial and grammatical terms. Bernard in *The Waves* states, ‘I do not believe in separation. We are not single’ (*W* 52), while in a diary entry of 1938 Woolf defines her project of representing community in *Between the Acts* as ‘“I” rejected; “We” substituted’ (*D* 135). It is not only the discourses of literature and science that apply such terms to their conception of selfhood; the philosopher Edward Carpenter, in a book published in 1904, similarly rejects ‘The (false) notion of a separate and atomic self, apart and having interests distinct from the rest of the universe’, instead characterizing the individual as ‘an aspect, an affiliation’ of ‘The “I,” the Ego, of his race’.17

The definition of identity being rejected here – single, indivisible, and represented in grammatical terms – is one that we would associate with the Enlightenment construction of the subject, particularly with a Cartesian conception of a singular, active consciousness (Heard’s ‘kernels of consciousness’). However, the science writers of the period do not usually historicize their accounts of identity, instead treating an individualistic conception of the self as an assumption or illusion that is somehow ingrained in the human condition (one which, it is often suggested, science can help to challenge and reject). H. G. Wells, Julian Huxley, and G. P. Wells, in their biological compendium *The Science of Life*, state that

The reader has a feeling of single individuality; he or she feels and acts as one; the various parts of his or her body work smoothly and harmoniously together. But he or she is also a community, a vast assemblage of invisibly small cells.18

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17 Carpenter, *Art of Creation*, pp. 97, 214.
Here, individuality is presented as commonsensical: as an intuitive perception based upon bodily experience. The idea that the body is made up of cells – a piece of knowledge that is acquired through scientific investigation, rather than being obvious or intuitive – is then cited in order to challenge this ‘feeling’. Even when the writers do historicize identity, they do so in extremely general, apolitical terms:

The conception of the conscious individual that is built up by modern biological science and introspective psychology differs in many respects from the older idea of a human self. The older idea was more compact and definite and altogether unified. John Everyman was just plain John Everyman and evermore should be so. In those unanalytical days people no more questioned that than they questioned that Old England was Old England or that people were either good or bad. But the scalpel, the microscope, the study of the less familiar aspects of life and the searchlight of an intensive criticism have all combined to undermine our confidence in the simplicity and absolute integrity of individuals. We begin to apprehend the transitory, provisional, and fluctuating factors and aspects of a human self.¹⁹

Here a spatialized, singular selfhood – ‘compact and definite and altogether unified’ – is just one of the ‘unanalytical’ assumptions of a vague, generalized past (“Old England”) and is deconstructed by modern science, which reveals the actual ‘transitory, provisional, and fluctuating’ nature of the self. Similarly, in a diary entry of 1924 Woolf records her belief that ‘we’re splinters & mosaics; not, as they used to hold, immaculate, monolithic, consistent wholes’ (D2 314). Once again, a modern conception of selfhood as multiple is contrasted with the assumptions of a generalized past, and both are expressed in spatial terms.

Woolf’s writing, then, shares with contemporary popular science writing and broadcasting a (distinctively modernist) tendency to reject traditional notions of selfhood in favour of a self-consciously modern conception. But how should we theorize the congruence between these literary and scientific articulations of identity? To argue that one comes about as a result of the influence of the other would be deeply reductive. The field of literature and science studies has for several decades largely abandoned the influence model on two grounds: firstly, that it constructs a false hierarchy which conceives of one discourse as dependent upon the other for its ideas; secondly, that it produces a reductively determinate conception of cultural interchange, one that forecloses other avenues of...

¹⁹ Ibid., pp. 832–3.