The Celebrity Scientists: A collective case study

Declan Fahy, B.A. M.Sc.

Submitted for the award of Ph.D.

Dublin City University

School of Communications

Supervisor: Professor Helena Sheehan

Submitted: May 2010

One Volume

Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Ph.D., is entirely my own work, that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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Acknowledgements

I would like to express my deep and lasting gratitude to my supervisor, Professor Helena Sheehan, for her intellectual guidance, supportive encouragement, and constructive criticism throughout the six years of this project. As I said at the seminar held in 2009 to mark her retirement, I will never again finish a piece without, mentally at least, first passing it across her desk. My thanks also to Brian Trench, for his help and support over the past six years. Thanks also to Pat Brereton for his comments on a draft chapter, and to my friends and colleagues Pádraig Murphy, Yvonne Cunningham and Mark O'Brien.

My sincere thanks for their constructive comments to my examiners Dr. Aileen Fyfe, Professor Massimiano Bucchi and Professor Michael Cronin.

This dissertation is dedicated to Louisa, for her endless patience, support and understanding throughout this project, and in so much else.

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Abstract

This collective case study examines how four contemporary British scientists and popular science writers, Stephen Hawking, Richard Dawkins, Susan Greenfield and James Lovelock, are portrayed in mass media as celebrities. It finds that the scientists' private and public lives merge in their representations, their images commodified and marketed by the cultural industries, their mediated personae embodying abstract ideas of truth and reason. The celebrity scientists base their authority on their scientific credentials, achieve public appeal through popularisation, particularly publishing popular science books, and speak in general culture on behalf of science. The subjects, to varying degrees, embody scientism as the supreme epistemology, but their public intellectual work is marked by a weak engagement with philosophical, cultural and sociological discourses. They engage with the cultural industries in the construction of their celebrity personae, and are criticised by their peers because their popular renown is considered to have eclipsed their internal scientific status. Using approaches from celebrity studies, science studies, biography, intellectual history and historiography of science, the study contextualises the celebrity scientists in late modern Britain, shaped by Thatcherism, Blairism, commercialism, globalisation, mediatisation, public science, and conceptions of the public intellectual. The subjects share characteristics with iconic historical scientists, including Isaac Newton, Charles Darwin, Albert Einstein, Fred Hoyle, Robert Oppenheimer, Rachel Carson, Carl Sagan and Stephen Jay Gould. The representations of the contemporary celebrity scientists feature associations with these famous historical figures, associations that provide cultural continuity to science and serve as a means of marketing modern scientist-authors. The four subjects each have a distinctive celebrity persona. Dawkins is the positivist atheist. Hawking is the disembodied genius. Lovelock is the environmentalist guru. Greenfield is the glamorous female scientist. The subjects are extreme examples of mediatisation in post-academic science, are protagonists in an increasingly commercialised era of public science, and have contributed to a richer general scientific culture.

SECTION 1. CONCEPTS

Chapter 1. The pop scientists of the nineties

Vogue magazine in April 1997 published an article it headlined "scientific sex appeal". The magazine devoted to couture and celebrity opened the piece with an anecdote about the late Harvard palaeontologist Stephen Jay Gould, who had been diagnosed in 1982 with a rare cancer, abdominal mesothelioma, that had initially left him with a predicted eight months to live. After absorbing the diagnosis, the magazine said, Gould used his scientific training in statistics to probe deeper into his projected remaining lifespan, which was based on the average length of life of patients with the condition. Gould was not old (he was then aged 40), weak or infirm, so he reasoned that he might survive longer than the average. His scientific understanding motivated him to fight. The *Vogue* article took up Gould's story 15 years later, when the scientist was in London, signing copies of his book *Life's Grandeur* (1996) – which had sold out two printings in Britain before it went on general sale – after a packed-out lecture. An audience that included students and businesspeople queued to get their copies signed. Scientists were not expected to attract that sort of "hero worship," the magazine noted, but "that's exactly what's been happening since serious science became sexy" (Turner 1997 p41).

Vogue went on to describe science's supposedly new-found glamorous status by zeroing in on a coterie of British scientists who were simultaneously researchers, intellectuals and authors. Their marketed books became best-sellers. Their opinions were described and dissected in mass media. Their talks packed out literary festivals and lecture theatres. Cosmologist Stephen Hawking was described as "the most famous scientist of our time" after writing *A Brief History of Time* (1988), which became the biggest-selling popular science title ever. Zoologist Richard Dawkins was "already famous – or notorious" (Turner 1997 p41) as an atheist before becoming the first Professor of the Public Understanding of Science at the University of Oxford. Susan Greenfield, professor of pharmacology at Oxford and the first woman to give the annual Royal Institution lectures, challenged the image of science as "a bit of a boy's club" (Turner 1997 p43).

The Independent noted it was "an age when science [was] dominated by its media superstars" (Connor 2001 p11). There were other scientist-authors, including geneticist Steve Jones, embryologist Lewis Wolpert, whose *Malignant Sadness* (1999) was a deeply personal book about the biological basis of depression, and neurologist Oliver Sacks. Collectively they were the "pop scientists of the Nineties" (Turner 1997 p41). Cultural critic Melvyn Bragg (1999 p1) wrote that that decade saw the rise of the "media-friendly, transparently learned scientist [as] an icon". Bragg used Hawking, Dawkins and Greenfield as examples of this phenomenon, situating their prominence against the backdrop of C.P. Snow's 1959 lectures on the two cultures of the sciences and the humanities, a thesis that has continued to "run through British intellectual life like the San Andreas Fault" (Bragg 1999 p1).

Literary agent John Brockman (1991) said that scientist-authors had taken over in the nineties from literary intellectuals, constituting a new third culture. The boom in popular science publishing, a genre with its own rich history, ignited by Hawking's book, resulted in scientists earning six-figure advances for titles that often promised a scientific explanation for humanity's deeper existential truths. Between 1996 and 1999, Greenfield's *The Human Brian* (1998) and Dawkins's *Climbing Mount Improbable* (1996) and *Unweaving the Rainbow* (1997) were among the bestselling popular science titles in Britain (Leane 2007). Not all scientists and science writers viewed this as progressive for science communication. Biologist and author Colin Tudge (1997 p17), said that the collusion between editors, publishers, editors and broadcasters to grant "a coterie of scientists whom they perceive to be gurus," including Gould, Hawking and Dawkins, almost exclusive authority and opportunity to discuss science in public has left little room for a wider critical community of scientists and non-scientists that could comment freely about science and society. Nevertheless, the Royal Society called it a "golden age" for science writing (Ricket 2006 p23).

These scientist-authors emerged in a late modern Britain shaped by a series of interconnected intellectual, ideological, political, philosophical, economic, social and cultural currents, including increasing individualisation, globalisation, mediatisation, commercialisation and postmodernism. Since the 1970s, intensified globalisation provided the basis for accelerated industrial change. Traditional British industries, including coal and steel, moved into steep decline. The economy became increasingly internationalised, and was integrated further in the 1990s into the liberal global economy (Abercrombie and Warde 1992). The Conservative Party held power between 1979 and 1997, led by Margaret Thatcher and John Major. Their governments were underpinned by neo-liberal policies, including the liberalisation of markets, the privatisation of parts of the public sector, and the internationalisation of capital and labour (Jessop 1992). Thatcher (1987) argued that society consisted of atomistic, self-interested individuals. After the fall of the Berlin Wall in 1989 and the break-up of the former Soviet Union, philosopher and political economist Francis

Fukuyama argued in *The End of History and The Last Man* (1992) that liberal market democracy had emerged as the sole remaining post-cold war political ideology.

In the late 1980s, the British Labour Party acknowledged that, after four consecutive general election defeats, it would have to reorientate itself to a domestic political landscape altered fundamentally by Thatcherism. Former Labour leader Neil Kinnock restructured the party, detaching it from its traditional trade union power base, expanding its membership from predominantly working class citizens to include greater numbers of middle class voters, and centralising control among professional politicians and, crucially, the party leader. Labour was rebranded as New Labour. Tony Blair was the confirmation of this modernisation process, becoming party leader in the spring of 1994 (Douglas 1999, Applebaum 1997). As the trade unions' binding power within the party loosened in the 1980s, new forms of "ideological and organizational cohesion" emerged (Biagini 1999 p102) and from the early 1990s, "a new cement has been found in the authority of the leader, whose charisma and power is now constantly emphasized: New Labour is Tony Blair's party, and its ideology is Blairism" (Biagini 1999 p102).

Blairism aimed at achieving social justice and economic modernisation. Blairism rejected the traditional socialist foundations of the post-war Labour Party to create a centrist and pragmatic ideology based on changing ideas of social democracy, anchored in ideas of community and equality, positioned within a neo-liberal economic framework, rather than within Labour's traditional Keynesian economic policy that stressed state-driven redistribution of wealth to workers (Douglas 1999). Blairism's intellectual influences included philosopher Raymond Plant's *Equality, Markets and the State* (1984), which justified a strong government role to create equality within a market economy (Biagini 1999), and sociologist Anthony Giddens's *The Third Way* (1998), which argued that the liberal democratic market provided the foundation for society, but there was a strong role for the state in increasing equality, engaging civil society, supporting the family and increasing employment.

As Britain emerged from economic recession in the mid 1990s, the nation developed an increased cultural confidence and optimism. *Newsweek* codified this *Zeitgeist* in November 1996 as 'Cool Britannia' (McGuire 2001). *Vanity Fair* delved deeper into this end-of-the-century renaissance four months later in a long article titled "London swings! Again!" in which journalist David Kamp (1997) described Britian's thriving film, fashion, music and design industries, comparing London's cultural revival in the 1990s with that of the 1960s. Kamp later (2007) called the mid 1990s the era when "Britain woke up from its beans-on-toast dreariness, when it truly, finally stopped being a postwar country" (Kamp 2007). The arts thrived, funded heavily by the National Lottery, which was established early in the decade. In art, the BritArt movement emerged, featuring young and controversial modern artists including Damien Hirst and Tracy Emin. In music, the decade's notable trend was BritPop, which described the set of alternative bands including Blur, Suede and Oasis who sang about distinctively British topics and concerns. In architecture, the modernists Norman Foster and Richard Rogers were prominent. In fashion, Alexander McQueen, Stella McCartney, John Galliano and Ozwald Boateng developed their national and international reputations. There was a resurgence in Britishness as a cultural theme. *Vanity Fair* noted:

> In these confident, patriotic times, London culture has gotten to the point where it's not only addressing peculiarly British subjects, but outright reveling in its Britishness, fetishizing and deconstructing the things that set the U.K. apart from other countries . . . pubs, fish-and-chips, *The Sun*, English league soccer, the ancient soap opera *Coronation Street* (Kamp 1997).

Commentators in the mid 1990s predicted an end to Conservative government (McGuire 2001). *Vanity Fair* interviewed then Labour party leader Blair, who the magazine said had a "shiny nowness" (Kamp 2007) about him. Months after the article was published, Blair became Prime Minister, leading the Labour party in May 1997 to the largest parliamentary majority in its history. Blair seemed "like just the ticket to guide post-imperial, post-industrial, post-cold war . . . post-Thatcher Britain into the 21st century" (McGuire 2001).

As well as helping formulate – and embodying – the polticial modernisation of Labour, Blair was also described as "a political genius, with an uncanny capacity to spot new openings in the market place of rhetoric and image" (Marquand 2005). News management was central to the New Labour government (Kuhn 2007). The centrality of mass media to politics was indicative of the view that the dynamics of popular media, including an ill-defined celebrity culture, was increasingly governing the public sphere (Collini 2006). Contemporary Britain was a "media-rich and media-dependent society,[1]" noted media scholar Raymond Kuhn (2007 p1) who said:

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[1] In 1990s Britain, national titles dominated the newspaper market, although circulations have been declining since their high point in the 1950s. In 1995, the total national newspaper circulation figures for daily and Sunday titles was 29.22 million. This fell to 23.40 million in 2005 (Kuhn 2007). In terms of market segmentation, in 1994, 19 per cent of titles were in the quality bracket, with 27 per

> As both citizens and consumers, British adults rely on the mass media for most of their information, entertainment and cultural provision . . . In the light of the media's social and economic importance, it is not surprising that to a significant extent British politics has also become 'mediatized' (Kuhn 2007 p1).

This intensification of the mass media's role in social and cultural change in late modern society has been analysed using the concept of mediatisation[2], which rests on the assumption that the media have become increasingly "influential and formative, beyond their merely neutral role as mediator and channel of information" (Schrott 2009 p46). The historical development of mediatisation "has accelerated in the last decades of the twentieth century in high modern, mostly Western or westernized, socieities" (Lundby 2009 p10). Mediatisation, for Krotz (2009 p24), was an ongoing historical process where "media in the long run increasingly become relevant for the social construction of everyday life, society, and culture as a whole".

Communications scholar Stig Hjarvard (2008) argued that the institutional development of the media occurred in three broad phases, although he acknowledged that there were variations both in the development of individual media and in the different contexts in which this development took place. Generally, until the 1920s, mass media were instruments of persuasion for other institutions, like political parties. Between 1920 and 1980, mass media were cultural institutions, which were steered largely by the public (with public service broadcasters as an example). From 1980, mass media have been mainly independent institutions, serving audiences in a differentiated media system through largely commercial channels. Hjarvard defined the mediatisation of society as:

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cent in the middle market and 54 per cent in the mass market (compared with 22 per cent, 27 per cent and 51 per cent respectively in 2005). The 1990s saw the rise in the U.K. of satellite television, with the main supplier of satellite programming being BSkyB, part of Rupert Murdoch's portfolio of broadcasting and newspaper media interests in Britain, with the company regarded as a non-domestic broadcaster, thereby avoiding legal restrictions on cross-media ownership. In the mid 1990s, only about one quarter of U.K. citizens had a computer in their home and between four to six per cent used the internet. By 2005, 57 per cent of homes had internet access (Kuhn 2007).

[2] This concept has been described differently in various cultural and linguistic contexts. It has been called 'mediatization' in most of the academic literature cited in this study (see Hjarvard 2008, Schrott 2009, Krotz 2009, Lundby 2009), but Peters et al. (2008) and Weingart (1998) used 'medialization' to describe essentially the same concept. For the sake of stylistic consistency in this study, the English spelling of mediatisation has been used, except in direct quotation. Mediatisation, in this study, has been considered a synonym for mediatization and medialization.

> the process whereby society to an increasing degree is submitted to, or becomes dependent on, the media and their logic. This process is characterized by a duality in that the media have become *integrated* into the operations of other social institutions, while they also have acquired the status of social institutions *in their own right*. As a consequence, social interaction – within the respective institutions, between institutions, and in society at large – takes place via the media (Hjarvard 2008 p113, emphasis in original).

Anchored in wider movements of globalisation and the commercialisation of knowledge (Hessels and van Lente 2008), science became increasingly commercialised in the 1990s and 2000s, focused on attaining strategic economic goals and producing socially relevant knowledge[3]. In 1988, Thatcher – a chemist by training – gave a speech to the Royal Society in which she urged academic and industrial scientists to combine their expertise. Noting that "knowledge and its effective use are vital to national prosperity and international standing," she said science must not be exclusively driven by utilitarian concerns, nor should commercial science be viewed as inferior to university science. She said:

> Industry is becoming more scientific-minded: scientists more industry-minded. Both have a responsibility to recognise the practical value of the ideas which are being developed . . . It is only when industry and academia recognise and mobilise each other's strengths that the full intellectual energy of Britian will be released (Thatcher 1988).

Several academic accounts have described this movement to increasingly privatised science, conceptualising it variously as finalisation science (Böhme et al 1983), strategic research/strategic science (Irvine and Martin 1984), post-normal science (Funtowicz and Ravetz 1993), mode 2 science (Gibbons, Limoges, Nowotny et al. 1994), innovation systems (Edquist 1997), academic capitalism (Slaughter and Leslie 1997), post-academic science (Ziman 2000), and the triple helix model (Etzkowitz and Leydesdorff 2000).

The New Production of Knowledge by Gibbons, Limoges, Nowotny et al. (1994) has been a particularly influential text. The book described how scientific knowledge used to be produced primarily in scientific institutions, such as universities and state-run facilities, and was organised into established scientific disciplines. This was called mode 1 science. However, the practices of science have become more heterogeneous, produced not only in universitites, but in research institutes, research centres and industrial laboratories. Scientific

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[3] Since 1981, public funding for research in the O.E.C.D. fell from 44 per cent to 29 per cent, while private funding rose from 52 per cent to 65 per cent. In 2002, 55 per cent of research and development across the E.U., with some variation between nations, was funded by industry and 64 per cent was performed by industrial scientists (Bauer 2008).

work has focused on applications rather than pure research, and has been undertaken by scientists working in transdisciplinary collaboration. Scientists have been more reflexive about their work and have operated under novel quality controls that have supplemented peer-review, including criteria of economic, political, social or cultural value (although this view has been contested from various perspectives). This was called mode 2 science, which has supplemented, but has not replaced, mode 1 science (Gibbons, Limoges, Nowotny et al. 1994).

The alternative accounts of contemporary organisational change in science have contested some aspects of mode 2 science[4], but have all agreed that the contemporary research agenda has changed, becoming increasingly commercialised, focused on innovations and applications, with an intensified interactive relationship between science, industry and government. The triple helix model (Etzkowitz and Leydesdorff 2000) has contended that industry, university and government have become increasingly interdependent and have all contributed to knowledge production. Crucially, the "driving force" of the collaborations between industry, government and universities has been "the expectations of profits" (Etzkowitz and Leydesdorff 1998 p119). Moreover, as well as teaching and research, universities have become focused also on a "third mission": contributing to economic growth, and this mission has been called "entrepreneurial science" (Hessels and van Lente 2008 p747). The triple helix model has aimed to describe

> an innovative environment consisting of university spin-off firms, tri-lateral initiatives for knowledge-based economic development, and strategic alliances among firms (large and small, operating in different areas, and with different levels of technology), government laboratories, and academic research groups (Etzkowitz and Leydesdorff 1998 p112).

In a 2002 speech to the Royal Society, Blair stressed that contemporary science was globalised and was vital to Britain's "continued future prosperity". The research environment he described was one in which government, universities and industry interacted to produce knowledge. He called it "a major cultural change in higher education" (Blair 2002). He cited an unsourced survey that showed that in 1999-2000, there were 199

[4] A recurring criticism of mode 2 science has been the difficulty in determining exactly when it began, as the concept has been critiqued for giving too linear an account of the scientific process. For example, there were close links between science, entrepreneurship and innovation in the British industrial revolution (Freeman 1997 cited in Hessels and van Lente 2008). Weingart (1997) argued that mode 2 was limited to a small sub-section of science, such as environmental research, which was close to policy-making. For a full review of criticisms of mode 2, see Hessels and van Lente (2008).

companies developed as spin-offs from university research in Britain, compared with an annual average of 70 over the previous five years. Blair (2002) said:

> Government and business support for scientific research is not enough on its own. We also need to make sure that scientific innovation gets translated into applied uses in business . . . we are establishing strong links between universities and business through specific schemes.

Blair (2002) added that a "confident relationship" between science and the public could lead to Britain becoming "as much of a powerhouse of innovation – and its spin-offs – in the 21^{st} century as [it was] in the 19^{th} and early 20^{th} century". This emphasis on science's interaction with its various publics continued the strong political drive in Britain since the mid-1980s towards fostering the public understanding of science as a crucial part of democratic citizenship and as a key means of ensuring science's continued social support. This drive was codified in the Royal Society's *Report on the Public Understanding of Science* (1985) and the House of Lords *Science and Technology Third Report* (2000). The House of Lords report was produced in response to a perceived growing hostility and mistrust in science, caused in part by controversies over the feared human health effects of eating BSE-infected beef, environmental and health fears over genetically modified foods and uncertainty over vaccinations following concerns that the measles, mumps and rubella (MMR) vaccine was linked with autism. A recurring fear among various publics was that science's expert technological capacity had accelerated too quickly past its uncertain social implications.

Scientific authority has also been challenged since the 1960s by studies from within the history, philosophy and sociology of science, which argued generally that scientific knowledge was not a universal, timeless, progressive revelation of truths about the natural world. Scientific claims to knowledge were challenged also by historically-constituted alternative belief systems variously characterised as pseudo-science and anti-science. The response to these challenges climaxed in the so-called science wars of the mid 1990s, which featured an often strident defence from scientist-authors about science's cognitive power. The pop scientists of the nineties were, noted Turner (1997 p41), "rationalists to a man [sic], with broad intellects and an attractive boy-next-doorish intolerance of guff". In his book *Understanding the Present*, first published in 1992, journalist and writer Bryan Appleyard criticised the late modern era's intensification of scientism, the belief that scientific rationality can be applied to political and social issues. In the preface to the book's second edition, he said he wrote it because

> contemporary science was running out of control. We were entering a new era of scientific triumphalism . . . I wished to counteract a new wave of scientific propaganda by making two points: that the benefits of science are not cost-free and that we should not be deluded by those benefits into thinking that science can provide salvation from the human predicament (Appleyard 2004 pxi).

The 1990s scientism described by Appleyard emerged in the late modern era when postmodernism became a prominent intellectual and cultural movement in the history of ideas. In postmodernism, a secular and pluralistic intellectual environment has been undercut by what intellectual historian Richard Tarnas (1996 p409) called "stubborn conceptual disjunctions," with little coherence or a shared cultural vision, leaving a modern intellectual milieu "riddled with tension, irresolution, and perplexity". The grand narratives – philosophical, religious, scientific – that offered a unifying view of the world were no longer considered to be valid. The postmodern intellectual environment was profoundly "complex and ambiguous" (Tarnas 1996 p395). What constituted reality and knowledge was constantly changing. Tarnas wrote:

> The conflicts of subjective and objective testings, an acute awareness of the cultural parochialism and historical relativity of all knowledge, a pervasive sense of radical uncertainty and displacement, and a pluralism bordering on distressing incoherence all contribute to the postmodern condition (Tarnas 1996 p398).

In postmodernist thought, the nature of truth and reality for scientists and philosophers was ambiguous, as they could never transcend their subjectivity in their interpretation of the world. Philosopher Paul Feyerabend (1988) argued that the scientific method had no special claims to truth and was just one among several possible ways of interpreting the world. Sheehan (2001) called the conflict over the foundations of natural knowledge the "epistemological crisis of our times," a crisis that culminated in the science wars of the mid 1990s and which has reverberated through contemporary science and society mediations.

The idea that science could solve society's problems was challenged also by the 1992 publication of German social theorist Ulrich Beck's seminal *Risk Society*. He described contemporary society as one concerned with the production and distribution of global risks that were produced by modernisation itself, such as crime, illness, environmental pollution, and financial risk. Sociologist Giddens said risk society was one "increasingly preoccupied with the future (and also with safety)" (Giddens 1999 p2). Science and technology created as many risks and uncertainties as they dispelled – "and these uncertainties cannot be 'solved' in any simple way by yet further scientific advance" (Giddens 1999 p4). Because of this, the risk society challenged ideas of scientific progress. Moreover, expertise and expert authority clashed in risk society, often offering contrasting estimations of the risks of the same phenomenon.

These socio-historical factors coalesced at the end of twentieth century Britain, creating a milieu through which the scientist-authors moved. Moreover, modern British society became increasingly ethnically diverse and it featured a multiplicity of social movements and pressure groups (Abercrombie, Warde, Deem et al. 2000). *Vogue* and Bragg's article together identified several themes – science versus humanities, commercialised science publishing, personal-professional merging, media-savvy scientists, strident scientistic atheism – that were evident in the careers Hawking, Dawkins, Greenfield and others. These socio-historical factors influenced and shaped "what's been happening" (Turner 1997 p41) to create the idea of the celebrity scientist, a problematic phenomenon raised by *Vogue* and Bragg, but which was not fully explained, even within the constraints of their journalistic formats. *Vogue* hinted at this phenomenon, without describing its essential features, using the word 'famous' without precise definition or analytical sophistication. Bragg isolated one idea from British intellectual history, the two cultures, that contributed to the status of contemporary status, but did not explore further influences.

The current analysis explores, through four case studies, the phenomenon of the celebrity scientist, defining its central characteristics, explaining the process of its creation, analysing its socio-historical constituents, and describing its social function. The cases are situated within the larger historical concepts of the British public intellectual, the history of scientific fame, previous studies of famous individuals, and ideas of the public scientist and the science populariser.

Three of the four case studies were mentioned by *Vogue* and Bragg as representatives of the undefined phenomena: Hawking, Dawkins and Greenfield. The fourth, environmental scientist James Lovelock, was not mentioned by Bragg or *Vogue* as being part of the wave of popular scientists in the 1990s, but he was chosen as a case study to see if the patterns of representation used to portray him in mass media were similar or different to those used to describe Hawking, Dawkins and Greenfield. Collectively, the subjects offer a chance to examine the phenomenon of the celebrity scientist and, in doing so, to conceptualise it more clearly and to show its continuities and discontinuities with its historical antecedents.

The current dissertation aims to present a social recontextualisation of science, situating it as part of general public culture. This approach has been contentious. In their *Science Incarnate: Historical embodiments of scientific knowledge* (1998), historians of science Christopher Lawrence and Steven Shapin wrote that, in the current late modern culture, science has been equated uncritically with truth. Their study examined how scientific knowledge has been produced historically by humans who were morally and constitutionally similar to everyone else in society. That their analysis was viewed as original was a testament to how scientific knowledge has enjoyed "a special protection not extended to other, lower, forms of culture" (1998 p14). For historian of science Janet Browne (2003a p177), celebrity was an interesting area in which to "think about the manufacture of scientific identities," but science was viewed as being a special case because of its "claims to disclose truth in nature". Celebrities, she noted (2003a p176), had various combinations of "ambition, action, achievement, and talent, and these are surely qualities that also drive scientists". Science journalist Keay Davidson (2006), biographer of populariser Carl Sagan and philosopher Thomas Kuhn, sought in his reporting to write about science, not as unvarnished access to natural truths, but as an activity embedded in socio-cultural history.

This study has a similar aim, applying the maxim that Shapin used to inform all his studies: like other researchers in the field of science communication, he always treated "science as a typical form of culture" (2005 p242). Situating science within culture has meant first situating the core concepts used in this dissertation within history. Bragg linked historically the pop scientists of the 1990s with the influential series of lectures given by C.P. Snow in 1959, lectures that have continued to vibrate through history, shaping the contours of the celebrity scientist.

Chapter 2. Intellectuals, celebrities, popularisers

2.1. The British scientific intellectual

On 7 May 1959, Charles Percy Snow (1905-1980) stood at the lectern in the neo-classical Senate House in Cambridge to deliver the annual showpiece Rede lecture. He titled it 'The Two Cultures and the Scientific Revolution,' and its provocative questions have continued to resonate to the point where they must be addressed by any analyst of modern society (Collini 1998). The two cultures identified by Snow were those of the sciences and the humanities, as exemplified by physics and literature. He did not argue that science was a superior form of knowledge to literature, or that intellectuals in the humanities were less cerebral than their counterparts in the sciences, but instead he argued that the mutual suspicion and incomprehension between writers and scientists would damage the future application of technology to achieve global social justice (Snow 1998).

The lectures were largely autobiographical and Snow was qualified to comment. He had undertaken doctoral studies in infra-red spectroscopy at Cambridge's prestigious Cavendish Laboratory, under Lord Rutherford. After a messy withdrawal of a research publication in *Nature*, Snow left the sciences voluntarily in 1932. He created a successful career as a novelist and worked as a civil servant during the second world war, but his lasting renown has rested on the two cultures idea (Collini 1998). Snow's view was not entirely original. Cultural anxiety in Britain over the two cultures has existed at least since the late nineteenth century. That period's outspoken champion of science, naturalist Thomas Huxley, had argued publicly, for example, with the era's pre-eminent man of letters, Matthew Arnold, over the literary values of scientific works such as Newton's *Principia* (1687) and Darwin's *Origin of Species* (1859). The inter-war period in 1930s Cambridge remained for Snow the idealised state of scientific research, and it shaped his writing on the two cultures, as did the antagonism of the era's fashionable literary intellectuals, which amounted to a cadre of modernist writers in the 1930s, who were snobbish and apathetic to science (Collini 1998).

The hostility towards literary intellectuals typified an ongoing tension surrounding intellectuals in twentieth century Britain. This tension was characterised by historian of ideas Stefan Collini in *Absent Minds: Intellectuals in Britain* (2006) as a "a paradox of denial" (2006 p2) in which

> a tradition of self-satisfied hostility to the *idea* of 'intellectuals' has coexisted with the kind of respect for intellectual activity which is assumed to be characteristic of other societies (2006 p85).

Intellectualism has not been viewed as being a feature of British life. Collini called this "the absence thesis" (2006 p72), demonstrating how it has developed in historical parallel to the paradox of denial. Various formulations of the absence thesis have

> in fact coexisted with all kinds of assertions about the glories of English literary, cultural, or scientific achievements, or even about the efficacy in English public life of 'liberal ideals' or of 'men of principle', beliefs which, if elaborated, would lie somewhat athwart the stereotypes of the 'unintellectual English' (2006 p72).

The paradox of denial, and the idea of absence, have resulted from Britain's traditional intellectual orientation towards liberalism, pragmatism, pluralism and individualism. By the mid-Victorian era, the stereotypical image of the British intellectual was established: idea-resistant, abstraction-averse, peculiarly pragmatic[5]. (Eagleton 2006, Sheehan 1993, Collini 2006). George Orwell did more than perhaps any other writer to harden attitudes towards British intellectuals, a group he despised as cowardly, characterless, dishonest, unpatriotic and pretentiously fashionable. The most frequent targets of his sustained attacks were, like Snow, the 1930s left-wing literary intelligentsia.

However, the 1930s was the era also of the scientific intellectual. Historian Richard Overy in *The Morbid Age* (2009) said the inter-war years in Britain, which featured a crippling economic crisis, saw a particularly high level of engagement by scientists with society. In the 1920s and 1930s, there was widespread belief that science represented a form of absolute truth, and scientism – the belief that scientific rationality could be applied to political and social issues – was culturally dominant. Scientists were socially-influential and confidence was widespread that science could provide improvements for modern society.

At the time, zoologist Julian Huxley, grandson of T.H. Huxley and brother of novelist Aldous, was "an early science celebrity" and "the media's favourite scientist" (Overy 2009 p106, p120). He collaborated with the most famous novelist of the era, HG Wells, and

[5] British intellectual life has been framed historically in opposition to French intellectual culture, its philosphies more liberal and pragmatic, its history more progressive than revolutionary, its politics less radically ideological. France's intellectual orientation was more towards universalism, rationalism and idealism. Perry Anderson called France the Other of the English imagination (Collini 2006, Swartz 2003).

Wells' biologist son, George, to produce the 1,600 page *The Science of Life* (1931). It summarised for non-specialist readers the era's accumulated store of biological knowledge. Botanist Marie Stopes, one of an early generation of female academics in a predominantly male world, and who had a "formidable capacity for self-promotion" (Overy 2009 p95), advocated birth control as a means to liberate women from the burden of unwanted repeated births. Anatomist and anthropologist Sir Arthur Keith promoted Darwinism, writing regularly for the mass-circulation press including the London *Evening News* and the *Daily Mail*. They reciprocated by describing him as "Britain's most famous living scientist" (Overy 2009 p197).

In the 1930s, many scientists turned to left wing politics, most prominently crystallographer J.D. Bernal and geneticist J.B.S. Haldane, as well as biochemist Joseph Needham, mathematician Hyman Levy and biologist Lancelot Hogben. The five scientists were analysed collectively in Gary Werskey's *The Visible College: A collective biography of scientists and socialists of the 1930s* (1988). The 1931 Second International Congress of the History of Science and Technology, where a Soviet delegation described their socio-historic view of the philosophy of science, crystallised these scientists' world view. They were committed to a socially-conscious form of science that they believed would ultimately eradicate human misery and poverty. In addition to their contributions to their scientific fields, they wrote about the history and philosophy of science. Their guiding philosophy could be classed as Bernalism, after the views outlined in Bernal's *The Social Function of Science* (1939), a significant early contribution to the field that became known as social studies of science. In addition to Bernal's book, Lewenstein (2008) noted that the books produced in this social repsonsibility of science movement were "often cited as models of explanation and integration of science and culture," including Hogben's *Mathematics for the Million* (1936) and *Science for the Citizen* (1938). Haldane too wrote popular books and a newspaper column.

The writers, who had counterparts among concerned scientists in the U.S (Kuznick 1987), took part in an "unprecedented public debate about the social role of science" (Russell 1993 p37), arguing in essays, speeches, pamphlets and books that science had a social responsibility. The popularisation of this debate was a factor in its political prominence (Russell 1993).

Science was not only the preserve of the left. On the political right, between the wars, the eugenics movement was at its height in Britain and internationally. The movement, fearful of a threat of a biologically defective underclass, was eager to promote the replication of desirable physical characteristics. Supporters included Julian Huxley, economist JM Keynes and writer GB Shaw[6]. A counter-movement was established in opposition to Bernalism. It was the Society for Freedom in Science, set up by scientist John Baker and philosopher Michael Polanyi. Its manifesto was Baker's "Counterblast to Bernalism," published in 1939. It was devoted to a defence of "pure science," and it argued against any social control of science (Sheehan 1993 p308).

There were contrasts and contradictions in the era's scientism (Overy 2009). The period was marked by a culture-wide idea of a crisis of civilisation, driven in part by uncertainties in emerging science that seemed to emphasise the irrationality in nature. Relativity and quantum physics challenged the mechanical Newtonian universe. Biologists put forward the power of genetic inheritance. Eugenicists argued about potential genetic degradation. Psychoanalysts suggested that rational humans were driven by subconscious urges. Chemists created a new material world, but produced modern weapons of destruction. Social scientists argued that the capitalist system was corrupt and dying. Scientists James Jeans and Arthur Eddington were philosophically idealist, their philosophies of science, expressed in their popularisations, aimed at promoting the view of a divine solution to conceptual problems in contemporary science. Commenting on Bernal's *The Social Function of Science*, psychologist Cyril Burt said that, although it was "an age of science," it did not feature "scientifically-minded people," as the public treated scientific research with "indifferent ignorance" (cited in Overy 2009 p374).

Since the inter-war era, the scientific intellectual has remained a recurring feature of British public life. In the 1950s, Sir Fred Hoyle (1915-2001) became one of the master practitioners of popular cosmology. He used his prolific popularisation output – books, textbooks, national broadcasts, newspaper articles, novels, an opera – to advance his scientific aims throughout his career (Gregory 2005). His series of lectures, *The Nature of the Universe*, were broadcast on BBC radio in 1950 and were so successful that listeners that year voted him the most popular broadcaster in Britain. His clear explanation of cosmology, his evocation of familiar scenes, his soft Yorkshire accent (then a regional rarity on the BBC),

[6] See Overy 2009, pp93-135

all made high-end science a part of people's everyday worlds. Even professional physicists remembered stopping work and tuning in. So successful were the lectures that they were soon repeated on the popular Home Service channel, then printed in a book titled *The Nature of the Universe* (1960), which in six months sold 77,000 copies, making it an early scientific best seller. After its publication, Hoyle was an "international celebrity" (Gregory 2005 p61).

Before the broadcasts, Hoyle had achived a level of renown within the scientific community for his contested work on the steady-state theory of the universe, in which the cosmos had no beginning, but new galaxies formed as others moved apart: matter was continutally created, like – to use the simile that Hoyle found compelling – a film on a continuous loop. This contrasted with the now-conventional evolutionary cosmological view where the universe has had a linear history, continually expanding from its single point of development. It was Hoyle in a radio broadcast that first coined this rival theory "the big bang idea" (Hoyle 1950 cited in Gregory 2005 p47).

Even though he reached the heights of establishment science at Cambridge, Hoyle was antagonistic to aspects of science. He had a career-long aversion to peer-review, and saw popularisation as more than just a means of translating science into a form palatable to lay audiences. Popular books, lectures, newspaper interviews, and novels were a vehicle for floating new scientific ideas. Always fighting to have his work published, he felt the professional community was punishing him for his popularisation activities. Similar experiences were reported by other scientists with a public profile in Hoyle's generation. There were other perils of popularisation. The clergy criticised the lectures, viewing Hoyle as unqualified to discuss religion (Gregory 2005). The career of astronomer Patrick Moore, presenter of the BBC's *The Sky at Night* for more than 45 years, has shown that popular cosmology has continued to be a feature of British cultural life (Moore 2005).

Carl Boggs (2000) argued that the dominant modern intellectual was the techno-scientific intellectual, one grounded in an Englightenment rationality, viewing scientific and technological development as driving historical progress, and tied to freedom, democracy, community and justice. The technoscientific reliance of modern society has meant that these intellectuals would take up a "a dominant position . . . in public life". Their ideological perspective was one of "technological rationality (2000 p298-299). However, Boggs contended that the fragmented techno-scientific academic life prevented intellectuals from addressing political and social concerns, as there was a refusal to use holistic frames of reference in broad analysis.

This perceived narrowing of analytic focus by intellectuals has contributed to much contemporary discourse about the worldwide decline of the public intellectual[7]. Sennett's *The Fall of Public Man* (2002), Posner's *The Public Intellectual: A study in decline* (2001), Jacoby's *The Last Intellectuals: American culture in the age of academe* (2000), Hofstadter's *Anti-Intellectualism in American Life* (1964) and Furedi's *Where Have All the Intellectuals Gone?* (2004) all contained culturally pessimistic views on what they saw as the fall and fall of the public intellectual from an ideal, though generally unspecified, past.

Several interrelated factors influenced this slide in stature. Contemporary society has experienced a retreat from Enlightenment values of rationality and truth-seeking (Furedi 2004). Academic work has accelerated towards a culture of disciplinary micro-specialism in a university system influenced more than ever before by commercial values (Turner 2006, 2006a, Said 1996, Foucault 1980, Jacoby 2000, Parsi and Geraghty 2004). Instrumentalism has emerged as the dominant value in culture. The value of ideas has been replaced by a concern with practicality, contributing to the transformation of the intellectual into a narrow academic expert (Furedi 2004, Parsi and Geraghty 2004). In universities, there has been a declining rewards system for long-term qualitative work (Rojek and Turner 2000). The mass media has grown in power displacing other sectors of authority, including the university (Furedi 2004, Posner 2001, Swartz 2003). The public sphere[8], where an intellectual's ideas have been disseminated, has gradually been eroded (Furedi 2004, Sennett 2002). British academics, furthermore, unlike their French counterparts, were not closely aligned with trade publishers, making it difficult to reach mass markets (Rojek and Turner 2000).

Critical writing on public intellectuals has agreed that they applied, through writing, a central feature of their work, ideas to broad issues of public concern. They have been socially and politically engaged (Furedi 2004), offering opinions to an educated public on issues containing political or ideological concerns. They have clarified public issues and vivified public debate (Posner 2001). They were "opinion-formers and cultural

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[7] The 'public' was an addition to earlier conceptions of what was just called the intellectual (Collini 2006).

[8] The public sphere being, in the classic Habermasian sense, a shared space for "rational critical debate, the means by which society challenged or kept in check the exercise of power by the state" (Russell 1993 p39, Habermas 1991).

commentators" (Eagleton 2006). However, much of the contemporary writing on the public intellectual has consisted of repeated attempts to define the role. Core thinkers have been recurringly cited. Italian marxist, journalist, political activist and political philosopher Antonio Gramsci (2000) described what he called the organic intellectual, connected to particular social classes, who consolidated and developed power through their work.

Literary and cultural critic Edward Said drew on Gramsci's work in his much-cited *Representations of the Intellectual* (1996). He argued that intellectuals, guided by universalistic principles, created representations, embodied attitudes and questioned orthodoxies. Cultural critic Julian Benda in *The Treason of the Intellectuals* (1969), first published in France in 1927, said intellectuals worked with ideas, but intervened to oppose injustice (cited in Collini 2006). The treason of the intellectuals, as a phrase, has been used to complain about intellectuals who failed to intervene in society to uphold universal principles, but it also criticises intellectuals who do intervene, therefore abandoning their other-wordly calling, an inconsistent central idea that was the book's chief weakness (Collini 2006).

Collini (2006) formulated the clearest definition of the public intellectual, based on the process of how the role was attained. Outlining a simple schema to overcome the difficulties of definition, he argued that four elements have had to combine. The intellectual, firstly, has attained a level of achievement esteemed for its "non-instrumental, creative, analytic, or scholarly capacities". There was, secondly, an availability of media channels reaching publics other than those of the qualifying activity. The intellectual, thirdly, has expressed views that engaged with the concerns of the publics, and the intellectual, fourthly, has established a reputation for having interesting things to say to these publics through various media (2006 p52).

Collini (2006) noted that terms such as marginal, dissident, oppositional *etc* were not part of the concept of the intellectual, although these characteristics have been associated with intellectuals historically. Intellectuals should neither be conceived of as a class, nor could an intellectual be conceived of as being independent from a patron or institution. Three frequently overlapping concepts contributed to the cultural authority of intellectuals: expertise, celebrity and reputation. Expertise was a validated skill or form of knowledge, demonstrated by holding qualifications or a position. Celebrity was focused on the personal and was governed by commercial forces. Reputation was personal, but involved "achievement in an activity which attracts cultural deference *independently* of that individual's contribution to it" (Collini 2006 p484, emphasis in original).

Collini wrote that intellectuals had cultural authority and were identified by various publics as "the prime bearers of certain values or capacities". Cultural authority was not decided individually:

> there has to be some pre-existing disposition in the culture to assign value or standing to the activities in which that figure is seen to be distinguished, and there has to be some pre-existing disposition to be receptive to the expression of views on the topics they address (Collini 2006 p57).

The pre-existing disposition towards scientific intellectuals has resulted from science's position as the dominant way of knowing in modern society, equated often uncritically with truth. Because of this, it attracted cultural deference (Lawrence and Shapin 1998, Cunningham and Williams 1993). Large-scale surveys have shown the consistent society-wide trust in science (Eurobarometer 2005, National Science Board 2008). Said (1996) noted that intellectuals derived much of their social power from their affiliated institutions. This closeness to the university has been one source of scientific authority. Writing about the construction of expert power, sociologist Magali Sarfatti Larson (1984 p53-54) noted that "ideological legitimation" of knowledge emerged from the university, from where scientific authority radiated. Credentials from a university not only validated an expert's knowledge claims, but institutionalised university science assisted and embodied "the transcendent authority of science as a knowledge system," where "scientific knowledge identified with technological utility [has been] seen as the ultimate guarantor of validity and as the implicit standard that all serious forms of knowledge must emulate". Science's subject matter, methods, recruitment, training have been connected, in the public mind, to the "supreme objectivity of technique – a presumption which scientists do nothing to discourage" (Larson 1984 p58). Public faith in the

> paramount superiority of science rests on the untested belief in the superiority of the scientific methods. In the ideology that surrounds modern science, only the 'method' appears to unify the most different and disparate areas of research (Larson 1984 p54).

Success in science meant not to control nature, but to earn "the right to speak in the name of Science" (Larson 1984 p56), a point closely related to Said's view that the intellectual's role was to represent values and to articulate the views of a professional constituency. Scientists have been endowed with this objectivity and appeared disinterested because at stake was "the authority to speak, however provisionally, for the only truth we have left" (Larson 1984 p58).

More so than any other discipline, science has become increasingly specialised, splitting into more and more sub-disciplines. The research careers of most scientists usually spanned one or two sub-fields. The natural sciences provided the model for specialisation and many arguments against it have come from the humanities and social sciences, where practitioners feared it prevented them from general analysis (Ziman 1987 cited in Collini 2006). Specialisation has simultaneously called for intellectuals and threatened to eliminate their role. The modern public intellectual has represented, in part, an attempt to "counter the limiting effects of specialization while drawing on the authority which the process confers" (Collini 2006 p464). Collini (2006) argued that the tension between specialisation and generality was inherent in the concept of the public intellectual itself. The structural tension involved in the need for intellectuals to vault outside their speciality to speak as a non-specialist accounted for the repeated and repetitive criticisms of their work. Those who wanted to become public intellectuals, or who refered to themselves as intellectuals, have been pejoratively tagged with long-standing negative labels: fame-seekers, careerists, elitists (Alcoff 2002). Academics faced with peer criticism of their popular role often scurried

> back to the conference and paper-giving circuit, anxious to shore up the sea wall of their scholarly reputation . . . this movement between these two poles is inherent in the logic of the role itself (Collini 2006 p58).

The specialisms suited to public intellectual work have changed over time. Literature specialists no longer have the public status they held from the 1930s to the 1960s. The discipline now has a reputation for introverted unreadibility and only works by well-known critics such as Frank Kermode or John Carey can expect wide readership. Historians have been the one remaining group whose work could attract general and professional readers and who could criticise specialisation. Their route to the cultural mainstream has been their self-proclaimed ability to provide a national narrative, writing simultaneously for general and specialised readers (Collini 2006), providing a a broad focus that Boggs (2000) said techno-scientific intellectuals were constrainted from producing because of professional disciplinary fragmentation.

2.2. The celebrity intellectual

Increased specialisation has been one structural tension for the contemporary intellectual. A second tension identified by Collini (2006) was a claimed pervasive celebrity culture which meant, the argument ran, that the nuanced arguments of intellectuals were constrained in public discourse, forced into broadcast-friendly soundbites. Celebrity from this perspective has been a feature of modernity and has had a corrosive effect on public life. This has been a consistent argument in critical writing on celebrity, which has been embedded in wider debates about elite and popular culture. Cultural pessimists argued – similar to discourses surrounding the claimed disappearance of the public intellectual – that celebrity has been another symptom of cultural decline, a fall in standards from a previous unspecified age, where ephemeral, superficial stars have become divorced from genuine cultural achievement (Boorstin 1980, Postman 1985, Gitlin 1998, 2002, Schickel 1985, 2000).

These critiques have been rooted in the cultural heritage of western society devoted to classical ideas of public service, national acclaim and civic duty and Christian values of privacy, humility and modesty (Braudy 1997). Cowen (1988) argued that cultural pessimism's intellectual history has been rooted in Plato, Augustine, Rousseau, Pope, Schopenhauer, Nietzsche and Spengler. Criticisms of celebrity culture have been examples of the traditional elite criticisms of popular culture, associated with figures including Matthew Arnold and FR Leavis (Storey 1994) and also to the mass culture approach advocated by Adorno and Horkheimer (1979), who said celebrities were another commodity for mass consumption, fitting into a larger system of capitalist production. This was a related argument to ongoing anxiety among elite culture over the rise of egalitarian conceptions of culture (Collini 2006).

Many of the perceived novel features of fame are not new. The concept of celebrity has had its own history. Cultural critic Leo Braudy's *The Frenzy of Renown: Fame and its history* (1997) has remained the most rich and vivid analysis of the history of fame, demonstrating the centuries-old continuities in conceptions of celebrity. The book's central argument was that the history of fame was an examination of the ways in which individuals had sought to gain attention over others throughout western history, attainting power over them. It argued that fame has been bound up with changing notions of individuality over twenty five centuries of western intellectual history. Combining literary analysis, psychology, and social history, the rich cultural and intellectual history was a coherent and cohesive large-scale analysis of fame.

The book's analysis of a substantial amount of evidence gathered from several historical eras, and the constant force of his argument throughout vast bodies of literature, was synthesised into a coherent, dense, textured, closely-argued whole where the

> concept of fame . . . sits at the crossroads of the familiar and the unprecedented, where personal psychology, social context, and historical tradition meet (1997 p16).

For Braudy (1997) fame consisted of four elements: a person, their accomplishment, their contemporaneous publicity and their place in posterity. Historical figures acknowledged as greats have been reinterpreted in every age. Braudy discussed, over seven hundred pages, case studies as varied as Homer, Alexander the Great, Cicero, Cesar, Chaucer, Augustine, Jesus, Dante, Pope, Keats, Lincoln, Hemmingway, Baudelaire, and Marilyn Monroe. (He did not mention a single scientist).

The history of fame has been underwritten philosophically by individualism. Fame promised a personal liberation from a complex world of "powerless anonymity" (Braudy 1997 p7). Contemporary fame has been influenced significantly by changing conceptions of individuality after the Renaissance, the collapse of the monarchy and religion as a means of granting distinction, the rise in democratisation, and the spread of mass communications. The urge to fame has produced tensions between individualism and the obligations of living in a society (Braudy 1997). Celebrity has come to operate "at the very centre of culture as it resonates with conceptions of individuality that are the ideological ground of Western culture" (Marshall 1997 px). Celebrity's concern with individuals has meant any analysis of fame has had to examine historical figures as they were "vehicles of cultural memory and cohesion," allowing contemporary readers to see the past in the present (Braudy 1997 p16). In the movement from one historical era to the next, the different values attached to celebrity were differences of degree, instead of substance, each era featuring a tension between individuality and collective social responsibility in the attainment of social achievement (Braudy 1997).

Other theorists, many building on Braudy's work, have argued that celebrity has had positive social and cultural consequences. It represented individualism, meritocracy and egalitarianism, where the benefits of achievement were not accrued through elite networks or inheritance (Evans 2005a). Studies of celebrity have shown how conceptually separate spheres such as public and private, high art and popular culture, art and commerce have now merged (Sennett 2002), although these were not solely features of modernity (Braudy 1997). Critics also saw the increased emphasis on celebrity as expressing a change in the function of the media as it moved from its role of providing information to helping to construct social identity (Turner, Bonner and Marshall 2000). Turner (2004 p6) said celebrity has become

> a key site of media attention and personal aspiration, as well as one of the key places where cultural meanings are negotiated and organised.

From within this tradition, celebrity studies has been an emerging interdisciplinary academic field, drawing its influence from cultural studies, media studies and film studies, particularly Richard Dyer's (1998) work on film stars. Celebrity has been an increasingly difficult concept to define, as its discourses have seeped into so many media formats and practices. The concept has often been defined tautologically:

> Celebrities are people the public is interested in; if the public is interested in this person, they are a celebrity; therefore, anyone the public is interested in is a celebrity (Turner, Bonner and Marshall 2000 p9).

Much early work in celebrity studies sought to produce a definition that identified the concept's core features. Mass media portrayal was viewed as central to celebrity. For Turner, Bonner and Marshall (2000), celebrity was constituted discursively, through how the individual was portrayed. Evans (2005a p19) argued that celebrity existed in texts that circulated in various forms and formats and genres throughout culture, creating a "mediated persona" that was loosely attached to a living person. Rojek (2001) noted that celebrity was the consequence of the attribution of qualities to a particular individual through the mass media. Celebrities have been cultural fabrications created through public impression management. Fame has been carefully constructed to give an individual maximum impact in the public mind. Personalities have been mediated through cultural intermediaries – agents, publicists, marketing experts, promoters, photographers, wardrobe staff – who stage-managed fame. A celebrity's persona has featured a blurring of public and private selves. Giles (2000) said fame was a process, a consequence of the way individuals were treated by the media. Their high public profile often outstripped their original achievement (Turner 2004).

Celebrities have needed an audience (Braudy 1997) and the relationship with this audience has been, at least in part, constructed commercially. Adorno and Horkheimer (1979) presciently identified that promotion and selling were essential elements of contemporary celebrity (Turner 2004, Wernick 1991). Indeed, Wernick (1991) defined a star exclusively in these terms: their live appearance, representation or reference was an act of promotion for a commercial or cultural product.

A celebrity's social function has focused on their role "as a location for the interrogation and elaboration of cultural identity" (Turner 2004 p24). Celebrities have also represented something more than themselves, supplying "a human dimension to the public world, personifying or personalising things that may otherwise be quite abstract (Evans 2005 p6). Stars' social function has been related to the reductionist portrayal in emblematic journalism (Schiekel 2000) in which a celebrity has been used as a shorthand for a larger idea. This has been a version of the literary and rhetorical trope of personification: investing abstractions with human characteristics (Corbett and Connors 1999). This has become more pronounced in contemporary celebrity where "human faces are plastered on every idea and event . . . [and] complex phenomena wear the reduced features of emblematic individuals" (Braudy 1997 p601). Journalists used the term 'icon' as a description to "exploit an atmosphere of transcendence" (Braudy 1997 p604). Celebrities occupied positions as ritualistic figures (Gitlin 2002). The cultural power of celebrity concerned their ability to structure social meanings, crystallise ideological positions and provide cultural coherence (Marshall 1997).

A celebrity has been a mediated persona whose meaning circulated around different texts, genres and formats, and cultural mediators had a role in constructing fame (Evans 2005a). This study's definition of celebrity has been taken from Turner (2004), who built on earlier work. He described celebrity as:

> A genre of representation and a discursive effect; it is a commodity traded by the promotions, publicity and media industries that produce these representations and their effects; and it is a cultural formation that has a social function we can better understand (2004 p9).

A related concept has been celebritisation or celebrification: "a process in which someone is turned into a celebrity, or to put it more strongly, the process in which a celebrity is fabricated" where verbal and visual techniques were used to portray someone as "a personality, a distinctive individual, even a glamorous person" (Evans 2005a p12). There was intense personalisation in the portrayal, a merging of public and private lives, to try to describe the authentic nature of the individual (Turner, Bonner and Marshall 2000, Dyer 1998). Theorists have noted that evidence of celebritisation has been found in many professional domains – a sign of celebrity's increased and unprecedented prominence in our culture (Evans 2005a, Turner et al 2000, Marshall 1997). Influential media theorist Todd Gitlin (1998) argued that so pervasive has celebrity become in contemporary culture that it was redundant to speak of a culture of celebrity, as news has become more and more anything that happened to newsworthy people. In this study, the terms celebrity and fame have been used synonymously, as they have been defined as synonyms in their dictionary definitions (Collins 1995). The terms eminent and renown have also been used synonymously, indicating "an *achieved* recognition and ranking by others who are expert and experienced enough to appreciate particular performances and results" (Albert 1992 p7).

Writers on celebrity have shared core assumptions, agreeing that celebrity has an increased contemporary significance, expressing a *Zeitgeist* of contemporary society (Evans 2005a). Egalitarian attitudes have also stripped many sources of social power of their standing, and the expansion of higher education has reduced the status of academics (Collini 2006). Compared with previous eras, the media have ceased to be just a medium, but have "become the determining cultural power in their own right" (Collini 2006 p482), with media celebrity creating a unique form of cultural authority. In the twentieth century, British intellectuals have reached relatively small audiences, operating usually through print, but the cultural profile of the publication was important. The plurality of media has now offered new opportunities to reach new publics (Collini 2006). The current age has been the age of media unlimited, with multiplying channels of constant communication (Gitlin 2002). Appearing in the media became another "structural truth" for intellectuals. Public intellectuals who appeared regularly in the media must be reminded that their staus has been built first on a scholarly specialised sphere, and they must continue to produce in that sphere or become full-time celebrities: "intellectual capital needs to be constantly reinvested" (Collini 2006 p486).

These characteristics were common for all celebrities, but the process of fame generation has been analysed in specific historical and organisations contexts, each professional domain having some of its own characteristic features of fame, or more or less magnified features of celebrity generally[9]. By the seventeenth century, the book was a chief site for creating fame, as it represented the measurable achievement of the mind's workings. Later, Hazlitt and Keats reflected on what their era's fame had done to the idea of the author. Indeed, the romantic writers seemed obsessed with fame and posterity (Braudy 1997), as were eighteenth century writers including Oliver Goldsmith and Laurence Sterne. Goldsmith, in the eighteenth century, argued for a government academy that would evaluate writing, officially commending authors for their literary merits (Cowen 1998).

Authors did not become famous in a vacuum. The production of literary fame was a process in which writers and publishers and reviews and reporters competed for authority and commercial success (Moran 2000, McCrum 2008). Famous authors did not accept grudgingly unwanted celebrity. They actively shaped their public profile, often through private disclosure, as Mark Twain noted when he said:

> I am in some sense a public man . . . but my private character is hacked, & dissected & mixed up with my public one & both suffer in consequence (cited in Steinbrink 1991 cited in Moran 2000 p23).

Writers' personalities were often reduced to symbols within emblematic journalism (Schickel 2000), with the authors themselves centrally involved in the creation of themselves as emblems. Ernest Hemingway and F. Scott Fitzgerald were represented as celebrity writers in the 1920s. Coverage and commentary of Hemingway and Fitzgerald focused on their extra-literary activities. No longer were their personalities a function of their writing and ideas, but their writing was one expression of personality (Shumway 1997). Several anecdotes circulating about Hemingway and his love of masculine pursuits (fishing, bullfighting, fighting in the Spanish civil war) were entirely fabricated, though steered by Papa himself: he "allowed himself to be fictionalised as the Great American Writer" (Braudy 1997 p28). Contemporary authors have needed to be similarly emblematic. A literary agent in Martin

[9] These cultural, social and historical contextualisations of celebrity have been more persuasive than some of the attempts to model categories of celebrity. James Monaco's 1978 study (cited in Turner 2004) divided celebrities into: heroes, whose achievement attracted attention; stars who achieved prominence though a public personality more interesting than their professional standing; and, third, what he termed the quasar, a type of accidental celebrity. Rojek (2001) developed a model that argued celebrity could be ascribed through blood relations, like royalty, or could be achieved in open competition, like sports stars, or could be attributed by the media, in the case of television personalities. There were elements of overlap and combination that could be more richly explored through close cultural and historical analysis, this study has argued.

Amis's novel *The Information* (1996 p130) told an author: "Writers need definition. The public can only keep in mind one thing per writer. Like a signature."

A powerful concept for explaining literary fame has been self-fashioning, as described by literature scholar Stephen Greenblatt (1984). He described how, since the sixteenth century, writers had self-consciously fashioned their own identity, creating a distinctive personality and way of behaving and communicating, sometimes having the experience of being molded in part by external forces, so that they become the embodiment of abstract ideas. Greenblatt used the works of Renaissance poet Thomas Wyatt as an example of how the process of self-fashioning worked. Wyatt revealed himself and his thoughts through discourse. He submitted to a powerful authority outside himself. He fashioned his identity against something perceived as alien. This alien, a distorted image of the authority, had to be created or invested in order to be destroyed. Self-fashioning was concerned with a value being lost, threatened or undermined. This self-fashioning occurred in language and its aim was power.

Literary critics have also been represented as celebrities in the post-war period, having previously been identified by the black and white institutional photographs, which were not disseminated (Shumway 1997). Modern critics, such as Harold Bloom and Jacques Derrida, have had their crafted, personality-focused images promoted widely. Being portrayed in this way reflected their star status within literary studies, just as photo-spreads of film stars indicated their professional status. Furthermore, gossip has become as significant to literary stardom as to film, evidence for which is found in the autobiographies of literary academics, a means by which they established their own authority. Shumway (1997) argued that these developments ultimately harmed the credibility of the field as it confused value and fame.

The emphasis on stardom can be seen in contemporary publishing, in which pinpointing the reasons for success was notoriously difficult, where about 20 per cent of books accounted for 80 per cent of a publishing house's sales in a constantly changing market in which past successes did not guarantee future sales (Greco 2005). The most important motivation that prompted an individual to select a book was its cover art, followed by reviews, word of mouth and price. "Star authors" and extensive marketing campaigns guaranteed that some books were placed prominently, and in significant amounts, in bookshops (Greco 2005 p6). In 2001, "brand name" authors (Greco 2005 p136) dominated all sales categories of publishing.

Academics in other fields have been similarily celebrified. These star academics had usually first achieved high status within their disciplines through established means of evaluation, including peer review (Shumway 1997). Academic stardom was linked to the emergence of a business-orientated university. Staff were human capital containing skills that generated income through boosting research rankings. Although public intellectuals who presented their ideas to a non-specialist public have always presented themselves competitively, academic fame has come to operate in the wider promotional culture where individual researchers saw promotion as crucial for survival. (Wernick 1991). Moreover, academic publishers promoted their authors as personalities, extensively advertising books by academics marketed as "celebrity-academics – brands, in effect" (Moran 1998, Gibson and Klocker 2004 p433). Academic conferences were the crucial catalyst for creating academic stars (Shumway 1997). There were tensions surrounding the status of star academics, tensions evident in the oppositional readings of literary and cultural critic Camille Paglia. For Shumway (1997 p98), she was a "talk-show celebrity," but not an academic star, as her television appearances reduced her value within the academy, which never rated her work highly. For Moran, she was probably "the best example of [a] crossover success" from academia to mainstream celebrity (2000 p45). Academics that achieved wider fame yet maintained their high status among their peers were Cornel West and Edward Said (Shumway 1997).

Sports stars have been viewed, to a degree, as unique. Their achievement has been classed as meritocratic, less likely to be the result of intensive mass media construction and promotion (Giles 2000, Andrews and Jackson 2001, Whannel 2002, Cashmore 2004). Comparison-based achievement has been defined easily and measured statistically (Foster Wallace 2005). Competition in sport was unscripted and, therefore, more authentic (Andrews and Jackson 2001). Sports stars' images have been entwined with discourses about masculinity, primarily, but also achievement, excellence, transcendence, and have been frequently explicitly tied to nationality and ethnicity (Whannel 2002, Foster Wallace 2005). Footballer David Beckham has a heavily-manufactured and marketed public image that appealed to different markets worldwide (Cashmore 2004) and he has come to represent the so-called new football, focused on commercial goals, marketing and celebrity power (Carlin 2004).

Politics and entertainment, always close historically, have come to be linked explicitly with celebrity (Gitlin 1998). Contemporary western politics has overwhelmingly been concerned with the management of an individual politician's image and the public presentation of specific areas of debate. The public persona of the politician has been created using the same processes as those in the entertainment and sports industries. News-management and public-impression management have come to occupy a crucial and central part of political campaigns and governing (Turner 2004, Street 2004). Marketing techniques and detailed visual and verbal presentation have been used to turn politicians into distinctive personalities, and have also been used as indicators of political viewpoints (Corner and Pels 2003). Performance in the media, including physical characteristics, were essential criteria for promotion within political ranks. Politicians have presented themselves as ordinary and the mass media have used personal information to assess a politician's public status: political competence, therefore, rested on personal integrity, and so the public has had to judge their potential representatives on private preferences (Corner 2003 cited in Evans 2005a). Personality has always been entwined in a politician's policy and ideological standpoints, even if this has been neglected in political theory. Personal qualities have been seen as a means of underwriting political values (Corner 2000, Corner and Pels 2003, West and Orman 2003).

2.3. The populariser and the public scientist

The socialist scientists of the 1930s were part of a larger tradition of "public science" in Britain, which Turner (1980 p589-590) defined as "the body of rhetoric, argument and polemic" used to justify science to political powers that have acted as scientific patrons. Those who put forward these usually honestly-held views, public scientists, have not been motivated to communicate science for its own sake, but rather to persuade influential publics that science supported socio-political goals. They have also argued that science could perform social and economic functions, and public scientists have underlined the importance of public issues that science could investigate. Crucially, public scientists defined scientists' position compared to "other rival intellectual or social elites". In public science, scientific work has been inseparable from its socio-cultural environment.

A related concept has been popularisation, but defining this idea has been problematic, as there have been contending definitions from various disciplines of what has been usually been understood as the communication between scientific specialists and non-specialist publics[10]. The traditional conceptualisation of this process has been of the transmission or

[10] See Leane (pp7-13) for a full discussion of various positions on popularisation.

translation of a simplified version of accepted scientific knowledge to passive publics (Hilgartner 1990). This conceptualisation has been criticised as insufficiently complex by theorists from various perspectives (McRae 1993, Russell 1993, Leane 2007, Hilgartner 1990). A strong argument has been made that popular texts were part of a unique system of knowledge production (McRae 1993, Leane 2007). Popular science writing was, as McRae called it, "a literature of science" (1993 cited in Leane 2007 p10) that was open to literary analysis, including realistic literary analysis (Tew 2001).

The definition used in this study has drawn on Leane's (2007 p11) work on popular physics books, principally because the subjects of this study have all written popular science texts. Leane (2007 p11) defined popular physics texts as

> full-length expositions of physics primarily aimed at a general readership, written in the form of a monograph rather than a dictionary or encyclopedia.

For this study, that definition has removed the focus on physics, but also the term expositions, as it was too reductive. Mellor (2003) divided popular texts into narratives, which told a story of an incident or individual from the history of science; expositions, which described a particular subject or theme; and investigations, which were usually journalistic investigations into topical issues. However, as Leane (2007) noted, such styles often combined. Furthermore, she argued that popularisations have mediated between the two cultures, explaining a concept or field within science, acting as forums in which scientists promoted or defended rival views. In this, popularisation has overlapped with public science – and popular science books have performed a particular rhetorical role for science. The definition of popularisation for this study, then, has been the book-length presentation of science-based topics aimed at a general readership, written in the form of a monograph rather than a dictionary or encyclopedia, and which often defended and enhanced science's position in public.

Popular science texts have been viewed critically as promoting a particular view of the nature of scientific knowledge. The texts, even though they could be judged according to literary criteria, including structure and style, tone and tropes, ultimately conveyed science's claimed ability to access truths about the material world. The texts were "a literature of reality, of *how things are*" (Turney 2007 p85, emphasis in original). Jurdant (1993) argued that these truth-claims made popular science similar as a genre to autobiography. It was the autobiography of science. It aimed to create a foundation for non-specialists to create an epistemological framework for understanding the world. It meant truth-claims made by scientists lost their representational dimensions. Scientists, through popularisation, combined sucessfully claims to “universal validity and social utility,” providing a foundation for the current domination of the sciences in contemporary culture (Whitley 1985 cited in Shermer 2002 p495).

Popular science writing throughout history has had similar stylistic and commercial features, underwriting – and promoting – a shared philosophy and ideology. It was not technical science as appeared in scientific journals, but combined quality writing and scientific depth, and aimed often to increase human self-knowledge through the extrapolation of the humanistic implications of scientific work. Concerned with subjects containing social, philosophical or humanistic elements, the books were written mostly by scientists, especially “famous” ones, or science writers. The book was particularly suited to popularisation as it had sufficient space for extended exposition, as well as continuing to have a cultural cachet in the multi-media age. As well as conveying scientific ideas, the popularisers were shaping their science in public (Eger 1993 p187, Whitworth 2001, Turney 2008, Myers 2003).

Critic Eger (1993) argued that the best examples of popular science writing genre combined the timelines of various disciplines to form a new epic of science that was focused on grand narratives. These works were conceptually structured as philosophy-science-philosophy. This made them structurally similar, beginning with a science-related social or human problem, the scientific dimension of which was then expounded, before the book finished with responses offered to the original problem, based on the already-presented scientific content (Eger 1993). Cosmology and evolutionary biology made suitable subjects for these epics, as narrative was an intrinsic part of their disciplines (Turney 2004). This original form of knowledge production has caused pragmatic difficulties for publishers, whose function was to move ideas to markets. While the form of a scholarly book depended mainly on the discipline within which it was written, a popular science book has been viewed as an interdisciplinary text – and promoting this type of work was difficult for publishers (Germano 1999). Popular science writing has been largely positioned commercially within market-driven trade publishing, rather than within academic publishing, where university presses aimed to contribute to scholarship while covering costs (Greco 2005).

Science popularisation has been viewed as an extended exercise in boundary work (Gieryn 1983), where scientists fashioned a public image for science that separated it from non-science. Science has been described in ideological discourses that have presented it as "distinctly truthful, useful, objective or rational" (Gieryn 1983 p792). Science was an autonomous sphere of intellectual work, essentially different from religion, as well as being the basis of technological progress. Science was described as "near to being *the* source of cognitive authority" and anyone who sought to interpret the natural world needed "a license from the scientific community" (Barnes and Edge 1982 p2). Scientists' vocabulary for the ideological descriptions of their work was drawn from Mertonian norms, outlined by sociologist Robert K. Merton (1942). He argued that these norms were a set of principles that guided scientific endeavour. They were: communalism, which said that scientific results should be availabe to the entire open scientific community; universalism, which said that scientists should not be prevented, on discriminatory grounds, from producing scientific knowledge; disinterestedness, which said scientists should favour the objective pursuit of knowledge; and organised scepticism, which said that all ideas were subject to critical scrutiny. The vocabulary for scientists' ideological descriptions of their work, argued Gieryn (1983), was also drawn from utilitarian claims for technological advance, military success and supposedly neutral means of settling policy disputes (Gieryn 1983).

Boundary work has had difficulties in fully demarcating science, because science has not been a single entity. Different disciplines have been, to different degrees, theoretical and empirical, pure and applied. Science's boundaries have been historically flexible and constantly redefined. Scientists with different ambitions have contested boundaries. These different conceptions of science have emerged at different historical points as science sought to define itself against challenges. Its emphasis on facts made it different from religion. Its use of theory made it non-mechanistic (Gieryn 1983). Some of these issues have been explored in writing about science, where science was situated in the culture that enabled scientific knowledge to be produced, relating science to ideologies, values and discourses (McRae 1993).

Books have had a crucial role in communicating science, contributing to science's social authority, and fostering a *culture scientifique*, "the idea of everyday culture as infused with science" (Lewenstein 2008 p158). Books have been sites for a shared social experience, crossing audience communities, serving as social memories, "providing cultural touchpoints that allow communities to express their common norms and interests," uniting "communities of scientific interest" beyond the professional scientific world, encompassing various publics. The ideas in science books could shift in their meanings in different contexts. (Lewenstein 2008 p151). Books, furthermore, have been traditional repositories of culture, as well as a focus for public debate (Lewenstein 2002). The history of science and the history of the book, furthermore, have been entwined, and the book market became commercialised between 1688 to 1815, the period that, according to Jürgen Habermas, saw the emergence of a public sphere (Frasca-Spada and Jardine 2000, Habermas 1991).

Although there have been public champions of science since Bacon, the late Victorian era and early twentieth century were what historian of science Frank Turner (1980 p590) called the "premier age" of British public science. He divided it into three periods. From approximately 1800 to 1851, science was stressed as being useful knowledge, an aid to rational economic activity. By the 1850s, a scientist's writings were divided into those that contributed to a scientific reputation, but did not pay much, and writing that earned money, but did not advance a scientist's reputation. There was in the mid-nineteenth century a close, but ambivalent, relationship between the popular science author and the professional scientist (Fyfe 2005).

From the mid 1840s to the 1870s, science was equated with the progress of civilisation. In this period Victorian "scientific publicists" (Turner 1980 p591), including Thomas Huxley and John Tyndall, used theories of evolution and atomism, among others, to challenge the clergy's cultural dominance and attack religious and metaphysical elements of scientific thought. In the third period, after approximately 1875, the spokesmen of British public science emphasised, among other concepts, collective values, nationalism, patriotism, and military readiness.

Popular science periodicals in London in the middle decades of the nineteenth century served literate and well-paid social groups. These periodicals were also shaped by the cultural values of high scientific communities in England: they moved from encouraging the amateur ethos to arguing for the discipline-specific scientific expert – and popularisation was seen as a means of encouraging support for academic, high science (Sheets-Pyenson 1985). Amateur scientists were able to contribute to the advance of knowledge, activities that included them in what Shapin and Thackray called a "Republic of Science ideology" where even amateur scientists had a role (1974 cited in Sheets-Pyenson 1985 p554). The rhetoric of public science, overall, had an ideological function, favouring the position of science in society generally and the material position of elite scientists. Science writers argued polemically for science to be a UK social and intellectual institution (Turner 1980). However, Gregory and Miller (1998) linked the public science movement to the role of disseminator of scientific knowledge, which has a long tradition in Europe, dating back to the Enlightenment, and, in the US, to the early nineteenth century. Popularisation has been viewed as a second-order activity, not part of knowledge production, something left to "non-scientists, failed scientists or ex-scientists," but the goals of public science were often expressed through popularisation works (Whitley 1985 cited in Shermer 2002 p494).

At the beginning of the twentieth century, a significant proportion of the scientific community wrote popular science and took part in theological debates on science and religion. Popular writing that educated the public or publicised science did not harm a scientist's career, although on occasion some harm did occur (Bowler 2006). Large numbers of scientists, sought out by publishers because of the educational value of their work, wrote for a non-specialist audience. Even high-level science was its own brand of publishing with esoteric content used as a means to market theoretical innovations that included relativity. The emphasis on promotion and spin was evident then as publishers only dealt with authors who tailored their writing and subjects to the publisher's idea about what would sell – with the result that "scientists can well be seen as spin-doctors, with publishers as the arbiters of what kind of spin was most effective" (Bowler 2006 p166).

Popular science books of the 1920s and 1930s sold well. In 14 months, Eddington's *The Nature of the Physical World* (1928) sold more than 10,000 copies and James Jeans's *The Mysterious Universe* (1930) sold 70,000 in its first two months (Whitworth 2001). Both books inferred that the crisis in physics, caused by relativity and quantum theory, meant the universe could have been created by a mathematically-minded God (it was, Sheehan (1993 p305) noted, "the sure way to a best seller"). By the 1940s, there were enough science writers to form a professional community, which opened the path for the modern situation in which "a small number of high-profile media-savvy scientists competed and sometimes collaborated with professional science writers" to produce works that publishers believed would sell (Bowler 2006 p184).

In the closing decades of the twentieth century, writing by professional scientists emerged as a profitable and popular non-fiction genre. Sales figures matched the six-and-seven-figure advances secured by literary agents from major trade publishers. Popular science became an established publishing category and *Cosmos* (1980) by Carl Sagan, *The Selfish Gene* (1976) by Richard Dawkins, and *A Brief History of Time* (1988) by Stephen Hawking, were early successes of the genre (Shermer 2002, Turney 2007). The industry was dominated by a coterie of science writers and scientists with established reputations, and, unlike earlier decades of the twentieth century, "with the exception of the few 'big names,'" the attraction of the professional scientists' authority no longer excited publishers' interest (Bowler 2006 p185).

The movement was underpinned also by commercial forces. An influential factor was literary agent John Brockman, a powerful cultural intermediary in popular science publishing at the end of the twentieth century, who was involved in the creation of the scientist-author as literary celebrity. In 1997, Brockman told the *New York Times* that, ten years previously, scientists would have earned modest advances from specialist publishers, but advances have since, partly influenced by him, risen to as much as one million dollars. He said:

> Scientists are getting what celebrities got 10 years ago – well, actually, they're getting as much as celebrities in many cases . . . To me the people that I work with are the glamorous people. They're the beautiful people. Is there something wrong with an evolutionary biologist being paid as much as a rock star? (cited in Gorman 1997 p1).

Anonymous sources from the publishing industry told the paper that Brockman recruited professors who have received positive publicity for their work as another agent "might recruit actors or quarterbacks" (cited in Gorman 1997 p1), although Brockman has stressed that the author and manuscript were centrally important. The scientist-authors he has represented have included Steven Pinker, Stephen Jay Gould, Lee Smolin, Alan Guth, Niles Eldredge, and philosopher Daniel Dennett.

The success of *A Brief History of Time* (1988), along with the fact that few scientists had agents, led him to specialise in scientist-authors. Brockman founded the online scientific discussion salon Edge.org and, in the early 1990s, he published his manifesto for what he called the third culture, in which scientist-authors have taken the place of literary thinkers as society's public intellectuals. Acknowledging the obvious influences of CP Snow's essays, he said the third culture was not shared between literary intellectuals and scientists, but one where scientists wrote directly for the public. This intellectual elite was restricted "only to those scientists and others whose anchor is in the empirical world" as opposed to traditional literary intellectuals who are "nonempirical" and "cut off from the real world" (Brockman 1991). Kohn (2000) noted that Brockman's third culture was anticipated by Haldane and Julian Huxley.

At its peak, the contemporary boom in popular science created several visible scientists or scientist-authors, but sales of titles and profits dipped in the opening years of the twenty-first century (Turney 2007, 2008). The sales decline could be explained, in part, argued Turney (2007), by a mismatch between publishers' promises of popular science titles and their content. Publishers pitched the books as answering questions on life and the universe, but science – concerned with "scepticism, tentative theories, and the fascination of unanswered questions" (Turney 2007 p85) – could not offer these promised solutions, something readers came to realise. Appleyard (2005) concurred, writing that science books were among those marketed around the big ideas of their titles, but the titles often presented inaccurate accounts of the books' contents.

There were other criticisms. Chemistry professor and prize-winning French populariser Pierre Laszlo said popular science books were formulaic, emphasised personality and lacked quality control. He was especially criticial of popular accounts of the history of science where "name-dropping" was "very much part of a successful selling formula," with Darwin, Galileo, Newton and, most popularly, Einstein, being among the most frequently invoked, with the result that cosmology received a disproportionate amount of attention, compared with the global number of its practitioners (Laszlo 2005 p224).

Contemporary discussions of science popularisation have occurred with the rise of the public understanding of science movement, itself linked with the movement variously called science studies, the sociology of scientific knowledge (SSK) or the social studies of science that expanded since the 1960s. These approaches aimed to show the historical, cultural, social and political forces that influenced the development of science, challenging the traditional view that scientific development was progressive, autonomous and ideologically neutral. Collectively, the SSK movement argued against the received view that truth and rationality were unquestionably accepted in the history of science and did not require sociological analysis. SSK theorists not only situated scientific theories historically, but examined the process of theory formation itself, arguing that social factors – including the status of the scientist, the experimental protocols, the public presentation of the science –

were inherent in the production of all scientific knowledge, and were not just distortions or contaminations of this production. SSK argued that knowledge was produced amid a confluence of influences, including a culture's existing knowledge, information received from natural reality, and the producers' individual and collective purposes. Although the field contained a variety of epistemological perspectives, SSK theories moved epistemologically from naturalism and positivism to different degrees of constructivism, arguing that scientific knowledge was constructed socially, rather than being revealed individually (Sheehan 2007, Bucchi 2004).

The field has tended, especially since the 1970s, towards micro case studies, which were usually documented in minute detail. The tightly-focused analyses constituted the empirical case studies on which central SSK claims could be based. However, larger scale analyses have not followed these micro studies. The field has

> tended increasingly to back away from the big ideas that were once in play. It is becoming too small, too introverted. Its exponents esoterically cite themselves and each other and fail to look wider (Sheehan 2007 p207).

A major intellectual accomplishment of science studies has been its demonstration that social, ideological, historical and human factors were inherent parts of scientific practice, and not merely constraints, interferences, intrusions or distortions, as was believed by philosophers including Popper and Lakatos who offered internalist, ahistorical explanations of scientific development (Sheehan 2007a).

Social studies of science have been viewed as an attack on reason, rationality, realism and the scientific enterprise by predominantly left-wing academics from the humanities, a position that reached its climax in the science wars of the 1990s when physicist Alan Sokal published in the journal *Social Text* a parody of extreme constructivist views of science (Sokal 1996). This was followed by Sokal and Bricmont's *Intellectual Impostures* (1998), Gross and Levitt's *Higher Superstition* (1994) and Gross, Levitt and Lewis's *The Flight From Science and Reason* (1996). These books contained a strong defence of empirical and positivistic approaches to science, but featured a crude conceptualisation of critical approaches to social studies of science, which it aligned in an unnuanced way with extreme forms of constructivism, irrationalism and anti-realism.

Collectively, these works largely to a defense of scientism: the belief that the scientific method was not only the chief means of discovering knowledge about the natural world, but that scientific knowledge could solve political and social issues. As a philosophy, it had had its roots in the reconciliation of Baconian inductive empiricism and Cartesian deductive rationalism that occurred in the seventeenth century. From this world view, scientific thinking produced tangible results and progress was inevitable. Humankind's destiny was based on reason and evidence. Human

> fulfillment would be propelled by increasingly sophisticated analysis and manipulation of the natural world, and by systematic efforts to extend man's intellectual and existential independence in every realm – physical, social, political, religious, scientific metaphysical (Tarnas 1996 p281).

An education would produce rational individuals, free of supersitition and prejudice, who would establish for themselves "a rational world within which all could flourish" (Tarnas 1996 p281).

Industrialised so-called "big science" emerged in the inter-war years (Bucchi 2009 p26). The challenges to science in the 1960s contributed to the end of what Ziman (2000) called pure academic science, governed by Mertonian norms, when it has been replaced by post academic science that has transformed science organisationally, managerially, and professionally. In post-academic science, government and industry played an increasing role in how science is conducted and evaluated. This marked also a significant challenge to what Ziman (2000 p58) called the "Legend": that "science is magically endowed with an infallible method for achieving absolutely perfect truth".

Many central assumptions of science studies – the existence of a multiplicity of scientific approaches, science's embeddedness in wider contexts, the importance of representation of science – combined with features from the history of public science in the political and cultural movements in the closing decades of the twentieth century that concerned the public understanding of science. The field was judged to have developed through three overlapping paradigms: scientific literacy, public understanding of science, and science and society. Scientific literacy, which took place chiefly in the U.S., from the 1960s to the mid 1980s, argued that citizens should know science as part of their general cultural knowledge. Public understanding of science, which occurred between 1985 to the mid 1990s, focused on public attitudes, but was underpinned by a deficit approach: the public were deficient in their scientific knowledge, so scientists had to communicate in understandable terms their work to a passive and receptive audience. The science and society paradigm, occurring from the mid 1990s onwards, focused on changing policy and institutions and emphasised dialogue with various non-specialist publics (Bauer, Allum and Miller 2007).

The second two paradigms took shape around two science policy documents in the UK. The Royal Society-commissioned *The Public Understanding of Science* (1985) codified the deficit approach, while the House of Lords's *Science and Technology Third Report* (2000) noted there was a new mood for dialogue between science and the wider society, rooted in what it called the crisis in confidence caused by public techno-scientific controversies, including BSE and genetically modified foods. There has been a gradual shift in policy discourse over some 25 years from ideas of popularisation and public understanding of science to dialogue, engagement and participation (Bucchi and Trench 2008). These collective policy-driven movements led to a renewed interest in the concept of public science and the public scientist, characterised as civic science and the civic scientist, who used scientific knowledge to increase public awareness of science or to facilitate democratic decision-making around science (Clarke and Illman 2001)[11]. Scientists, in a similar characterisation by Peters (2008), could be public experts, questioned by journalists about solving particular social and political problems, aiding in decision-making.

However, Trench (2008) argued that the grand narrative of science communication's recent development, a progression from deficit to superior dialogue approaches, described in policy statements, academic research and public debate, has been more nuanced, with several models coexisting. Sociologist Brian Wynne (2006) noted that, although the vocabulary has changed from deficit to dialogue, the underlying approach to science communication has remained driven by deficit approaches with changes "more nominal than real," normative rather than descriptive (Trench 2008 p122). Symbolic of this deficit approach was the Committee for the Public Understanding of Science, Copus, established in 1986, which

> does not function simply as a lobby. Increasingly it operates as a kind of Academie Francaise: overseer; guardian of the truth; a significant, direct influence on the means of communication; and an even more significant controller of funds (Tudge 1997 p17).

[11] Civic science has been defined differently. Kallenberg (2000 cited in Kyvik 2005), for example, identified two types, one that disseminated knowledge from specialists to non-specialists, and one that acted as an informed social critic. However, in practice, work agreements and informal norms, these roles have been difficult to differentiate (Kyvik 2005).

The deficit approach has traditionally underlined analyses of science in the mass media, particularly the news media. The role of the news media, the argument ran, was to translate simplified scientifically-approved information to knowledge-deficient publics. This dominant portrayal has been chiefly ideological, with mass media historically complacent in advancing "an essentially positivist portrayal of science as heroic, apolitical, and inherently rational endeavor" (Dornan 1990 p50, Jarvie 1990). As a result of decades of research since the first major work on the topic appeared in 1967, the science-media relationship has been classed as more complex, with science in the media driven by "complex processes of claims-making, organisational arrangements, economic imperatives and cultural values" (Hansen 2009 p108)[12]. The mass media acted as "an important reservoir of readily available images, meanings and definitions" for science and a shared cultural space where various images of science, created by different agents, competed for attention (Hansen 2009 p117).

Scientists have used the mass media for "the promotion of a personality, idea or cause, fame, money" (Gregory and Miller 1998 p9). Prominence has remained a news value and those on the news agenda had a tendency to find future access easier (Gregory and Miller 1998). At the same time, news has become increasingly scientised over the past 40 years, increasingly reliant on scientists and other experts (Albaek, Christiansen and Togeby 2003). A recent research theme in science communication has argued that science has become increasingly mediatized, with a stronger orientation towards the mass media within science, resulting in media norms affecting scientific norms (Weingart 1998, Bauer 2008, Peters, Heinrichs, Jung et al 2008). This has reflected a wider socio-cultural movement towards mediatisation (Lundby 2009). Mediatisation has been linked to public science, a result of science's close connection to its social context and its efforts to assert its social legitimacy, increase its politial influence, and develop support for positions in disputes within science (Weingart 2001 cited in Peters, Heinrichs, Jung et al 2008). A manifestation of mediatisation has been that media reputation could enhance scientific reputation and vice versa (Weingart 1998). If the gap between scientific work and its public presentation widened, there was a risk that this separation would be analysed critically by journalists, creating "a legitimacy crisis" within science (Peters, Heinrichs, Jung et al 2008 p89).

[12] For discussions of science-media interaction, see Nelkin 1995, Gregory and Miller 1998, Bucchi 1998, Hansen 2009, Allan 2009.

An influential text for the idea of mediatisation was Rae Goodall's *The Visible Scientists* (1975 p31), which analysed the phenomenon of what she termed "the visible scientist" through close examination of case studies of seven U.S. scientists she found to be the most high-profile during the 1960s and 1970s. They were astronomer Carl Sagan, anthropologist Margaret Mead, psychologist B.F Skinner, ecologist Barry Commoner, chemist Linus Pauling, biologist Paul Ehrlich, and physicist and eugenics advocate William Shockley. Goodall chose them because they shared a core characteristic: their visibility to general audiences. Visible scientists were not public interest scientists, working for citizens' groups, nor were they researchers known widely within their particular fields. Goodall's case studies shared specific personal traits and professional attributes that coalesced to achieve this visibility. They had a "hot topic;" they were controversial; they were articulate; they had a colourful image; and they established a credible reputation (1975 p19). The visible scientists, wrote Goodall, have been criticised for having too much media coverage and commanding too much authority and have "an overrated credibility with the public" (1975 p202). Their prominence, fundamentally, was not due to their scientific expertise alone. Their visibility was linked to their political role; they influenced science policy by presenting scientific controversies in public via mass media, providing non-specialist audiences with alternative viewpoints to government on science-based issues.

There has been a move from the visible scientist, such as those analysed by Goodall, to stars created by public relations, as part of a new mode of science communication provocatively called "PUS Inc" where science communication has been utilised chiefly to market and promote increasingly commercialised scientific practice (Bauer and Gregory 2007 p44). Science communication, they argued, has moved from a post-war 'logic of journalism' to a current 'logic of corporate communications'. Public communication has become the preserve of a few scientists skilled in the public relations techniques they have used to promote themselves.

The concepts of the public intellectual, the celebrity intellectual and the science populariser have come together in 1990s and 2000s Britain, and together they have constituted the theoretical framework for analysing the chosen scientist-author subjects. The only study – to this researcher's knowledge – to have addressed scientific fame from within a celebrity studies framework was *Illusions of Intimacy* (2000) in which psychologist David Giles said that scientific fame was gained meritocratically, with "the most famous scientists . . . usually either outstanding writers or researchers or both" (2000 p113). Scientists became famous when they wrote an influential book or paper (Hawking was his example). Goodall has already disputed this claim and an SSK-informed history of both science and public science has shown that promotion has long been a feature of individual scientific lives, going back to what became known as the scientific revolution.

Chapter 3. A brief history of scientific celebrity

A recurring narrative in the historiography of science has been the unproblematic presentation of its past as a progressive series of cumulative successes, achieved largely through a positivistic science recounted in an internalist history. Newton, Einstein and Darwin have become central figures in this narrative, which has shaped public perceptions of the scientist, structured some popular history of science narratives, and helped create the professional identity of researchers. These scientists have become mythical characters, symbolising something larger than themselves, playing a metaphorical role in relation to other lives, making concrete stories and values, legitimating institutions and codes, reflecting historical facts and processes, embodying society's grand narratives. Their lives have a world-historical quality, reverberating through centuries (Polanyi 1962 cited in Nye 2006, Sheehan 1987, Cunningham and Williams 1993, Haynes 1994, Fara 2003, Fyfe and Smith 2003, Shapin 2005). Myths have created communities, "typically by giving them an origin" (Fara 2003 p195). A close analysis of a selection of these mythic figures can demonstrate how promotion, commodification and image-creation have been present, to varying degrees, in some of science's eminent figures – therefore being part of the historical cultural authority of science. The figures discussed are illustrative instances, arranged chronologically, and are not presented as a comprehensive survey or outline. They illustrate that scientific fame can be traced back to the end of what became known as the scientific revolution, to a figure whose historically "sifting representations [have been] inseparable from the rise of science itself" (Fara 2003 pxv).

3.1. Isaac Newton: Constructing scientific genius

Science magazine called Isaac Newton (1643 - 1727) "the most renowned figure in the annals of science" (Hahn 1981 p998). The Englishman marked the culmination of what became known as the scientific revolution, completing the Copernican revolution, establishing quantitatively gravity as universal force. He synthesised in one theory Descartes's mechanistic philosophy, Kepler's laws of planetary motion and Galileo's laws of terrestrial motion. Newton's three laws of motion and his theory of universal gravitation, described in his masterpiece, *Principia* (1687), were underwritten by a practical synthesis of Baconian inductive empiricism and Cartesian deductive rationalism. "After Newton," wrote intellectual historian Richard Tarnas (1996 p280), "science reigned as the authoritative definer of the universe".

Newton was also called the "first public scientist" (Waller 2004 p108), becoming the most influential English figure in the creation, during the seventeenth and eighteenth centuries, of the new idea of the scientist. The foundational principles of the scientific revolution, including quantification and the mathematical description of nature, were distilled into the *Principia*, which, combined with *Optics* (1704), meant Newton the man and Newton the natural philosopher merged so tightly that he effectively defined what science would come to mean and ensured the "perception of him as the embodiment of modern science" (Westfall 1987 p551).

Consequently, he has been understood as an emblematic figure in the history of science. Newton's life has been represented thousands of times over, but much common knowledge was "mythical," based on representations that changed over time depending on the intentions of, and sources available to, those telling Newton's life (Whiteside 1982 p100). Newton has merged in the popular imagination with his theory of gravitation, symbolised by the apple falling from a tree in his mother's garden that supposedly inspired his consideration of impact and motion (Browne 2001). There have been many versions of how Newton came across the theory, but not all mentioned the apple (Keynes 1995). Newton engaged in myth-making himself, telling one of his early biographers that the notion "'was occasion'd by the fall of an apple, as he sat in a contemplative mood'" (cited in Keynes 1995 p22).

Moreover, aspects of Newton's intellectual life that did not conform to ideas of the scientific exemplar were suppressed, including his contentious anti-Trinitarian religious views, his years of devoted alchemical and Biblical study, his mental collapse in the early 1690s, and his bitter scientific disputes with John Flamsteed, Gottfried Wilhelm Leibniz and Robert Hooke. His character has been referred to as "complex and difficult" (Keynes 1995 p1). The changing image of Newton was dependent largely on the access of researchers to his personal manuscripts, which were managed, after he died intestate, by his family and close friends. As new sources and new interpretations emerged, Newton's image was continually revised. Various conceptions of Newton also existed simultaneously (Fara 2003).

In his lifetime, Newton was feted as a hero and genius. The publication of the *Principia* made him "so famous" (Iliffe 1998 p138) that he he could no longer retreat into the seclusion he cherished. Eighteenth century poems, encyclopedias and dictionaries characterised him as "the epitome of intellectual sagacity" (Yeo 1988 p259). As president of the Royal Society between 1703 and 1727, he operated with "dictatorial severity," using it as "an elevated soapbox" seeing his prestige as a natural philosopher grow with his institutional stature (Waller 2004 p109). He fashioned his own reputation, sitting for more than 20 busts and portraits, having a portrait in the Royal Society, and sending pictures to contemporaries (Fara 2003).

At the end of the seventeenth century, he had been known only to a circle of natural philosophers, but at end of the eighteenth century, he was celebrated universally. Voltaire, who wrote a popularisation of Newtonian thought, *The Elements of Sir Isaac Newton's Philosophy* (1738), called Newton the greatest man who ever lived (Tarnas 1996). Alexander Pope wrote "God said Let Newton be! And All was Light" (cited in Packer 2004 p277). At the end of the eighteenth century, his image was commodified, with "countless ephemeral items displaying England's new intellectual hero" for sale (Fara 2003 p50). Popularisations of the *Principia* brought its theories to a wider readership. Poems, paintings, writings on religion, treatises on aesthetics were "steeped in Newtonian imagery, and made vital contributions to establishing Newton's fame" (Fara 2003 p62).

After Newton's death, early biographies were hagiographical, portraying him as distinguished in morals as he was in mathematics. Newton was presented as a pious Church of England hero, whose personal morality underwrote his intellectual achievements. This image was preserved and shaped by his literary executors and close associates, who concluded that most of Newton's manuscripts, especially those on alchemy and theology, unknown to most of his contemporaries, should not be published (Osler 2006). Coupling intellectual achievement and moral virtue was crucial in Britain in the eighteenth century, as scientific work was presented as supporting religion and was described within a framework of natural theology. Newton's genius was a "divine gift" (Yeo 1988 p259-261).

Changing conceptions of genius in western thought have been bound up with representations of Newton. Genius had been discussed chiefly in writings on literature. After Newton's time, notions of scientific genius were added to this discourse, and were marked by a tension between artistic genius and methodological rigour in the production of pioneering science. His brilliance was explained through his consistent application of the experimental scientific methods that came to be established in the mid seventeenth century, codified in the empirical standards of the Royal Society. However, the persistent use of methodological and philosophical rules was not viewed as sufficient to explain Newton's scientific originality.

Instead, his genius was explained using conceptions of spontaneous creativity emanating from an "exceptional personality". Newton was portrayed as "the archetypal example of a scientific genius, transcending any simple rules and methods to grasp new laws of nature" (Yeo 1988 p278).

This view of genius developed in literary criticism, where there existed a tension within formal poetic composition between classical rules and spontaneous creativity. From this perspective, Newton was a genius because he combined "imagination, reason and intuition" (Yeo 1988 p262). This view has been associated chiefly with themes in literary and artistic work prominent in the romantic tradition that developed in Germany and Britain in the closing decades of the eighteenth century, and went on to influence wider European culture in the nineteenth century. Philosopher Immanuel Kant argued that genius was an innate spirit and was not applicable to science because, unlike pieces of art or literature, works of natural philosophy could be replicated (1951 cited in Schaffer 1990). In contrast, Schelling argued that genius was possible in scientific work, as it was associated with the unexpected results of inquiry, attributed "to the overwhelming power of destiny" (cited in Schaffer 1990 p90). This new explanation of his genius weakened the association between Newton's intellect and character, as exceptional personalities were more likely to socially and morally transgress (Yeo 1988 p278-279, Waller 2004).

Romantic imagery was used to describe Newton's scientific production. The cottage in the village of his birth, Woolsthorpe, Lincolnshire, where he developed some of his major works while in exile from plague-filled Cambridge in 1665-66, was similar to the sites where romantic writers "composed their masterpieces in rural solitude" (Fara 2000 p409). Moreover, Newton's love of solitude and simplicity linked his genius to asceticism, which Lawrence and Shapin (1988) argued has historically been fundamentally related to truth. The producer of knowledge was otherworldly, disengaged from everyday concerns. The mind was not present in the physical body, but was situated in an exclusively intellectual domain where knowledge was found. Newton was described as not sleeping, barely eating, and ignoring his appearance as he was consumed by his studies (Lawrence and Shapin 1988). William Wordsworth wrote in *The Prelude* (1850) about a statue of Newton in the Chapel of Trinity College: "The marble index of a Mind for ever/Voyaging thro' strange seas of Thought, alone" (cited in Waller 2004 p91).

Newton’s morality became further decoupled from notions of genius following the publication of biographical works, in the mid nineteenth century, that described Newton’s breakdown in the early 1690s. Newton’s melancholic disposition was linked to his scholarly work, his genius precariously balanced with madness (Iliffe 1998). Boris Hessen argued in 1931 that, rather than being based on internalist explanations of genius, Newton’s scientific production was embedded in social and economic structures of its time, and that the technical problems of the *Principia* grew out of problems in seventeenth century trade and industry (1931 cited in Graham 1985).

A significant re-evaluation of Newton’s life and work emerged in the middle of the twentieth century when his scientific papers, after approximately 200 years, were eventually allowed to be examined by scholars. The theological and alchemical writings of Newton were emphasised and evaluated, while others reinforced the traditional view of Newton as scientific hero (Westfall 1976). Westfall (1962, 1976, 1979, 1987) in his writings, including his definitive 900-page biography *Never at Rest* (1980), sought to assemble the disparate pieces of Newton’s identity into a coherent image, connecting his scientific, alchemical and theological work, activities that Osler argued were “all part of his project to discover divine activity in the world” (2006 p302). Westfall (1987) concluded that Newton marked a culmination of the scientific revolution, not only because of his scientific achievements, but because he participated prominently in all of its major theological, social and intellectual dimensions.

Newton’s genius has been tied to his nationality. Fara noted that he has been remembered as an “icon of Englishness” (2000 p246). His strong English character was portrayed as contributing to his scientific achievements (Yeo 1988). Newton’s links with national identity were codified in his association with iconic English institutions: his election to parliament, his presidency of the Royal Society, his role as the warden of the Royal Mint, and his burial at Westminster Abbey. Newton’s promotion as a national genius has continued in the commemorations at three English sites that have resonated with associations with him: Cambridge, London and Woolsthorpe. Newton spent 35 years at Trinity College Cambridge, which has continued, since the mid eighteenth century, to “fashion his public image as a scholarly genius, one of Cambridge’s greatest intellectual ancestors” (Fara 2000 p411).

These scientific commemorations and anniversaries, as well as being commercialised events, had an ideological function, displaying the significance of modern activities, recalling

England's scientific heritage and "mythic past" (Fara 2000 p425). Newton himself has come to represent the early modern scholarly persona, his popular status as a genius constructed using discourses of disembodiment, his dominant public image that of "a disembodied mind in communion with natural or divine truth" (Iliffe 1998 p123).

3.2. Charles Darwin: The mass market naturalist

What Newton did for the physical cosmos, naturalist Charles Darwin (1809 – 1882) did for organic life. Called "the Newton of biology" (Fara 2000 p254), he brought the origin of humankind within the sphere of modern science. The ideas of evolution by natural selection described in *Origin of Species* (1859) had a seismic impact on Victorian culture, undermining the prevailing religious orthodoxy about how the world was created. (White and Gribbin 1995, Tarnas 1996).

Darwin's renown rested on *Origin of Species*. Within a decade of its publication, it had been through sixteen different editions in England and America, with translations into German, Dutch, Russian, French, Italian and Swedish (Browne 2001). In the 1870s Darwin was the most famous scientist in England, his name inextricably bound up with the new idea of evolution. The term Darwinism covered all varieties of evolutionary theory, neglecting particularly the work of Wallace (Browne 2003). The creation narrative was replaced with a series of seemingly unrelated facts collated by Darwin into a single narrative of evolution. It was the "supreme scientific story" (Sturrock 1993 p222).

Darwin also helped create the template of the contemporary scientific celebrity (Browne 2003a). He was centrally involved in his fame creation during his lifetime through his precocious understanding of imagery, including the then emerging photography, the rhetorical intimacy of his writing style, his controlled public performances, and his skillful mass market promotion. Darwin was at times a reluctant public figure, struggling against the tension between his public and private selves. Browne has brilliantly analysed Darwin as a nineteenth century celebrity, convincingly showing how he cultivated his public persona around ideas of individuality, intimacy and privacy (Browne 1998, 2001, 2003, 2003a).

Origin of Species contained large autobiographical elements, a style of presentation that Darwin had developed while writing his *Journal of Researches*, which described his voyage on the *Beagle*. Browne argued that this was not a trivial point, as Darwin's scientific renown continued to rest on this book. On this, she is worth quoting at length:

> The *Origin* was highly personalised, one long invitation to believe, to trust in the author, and to accept his findings, however contentious or counter-intuitive they might seem. This personalised style allowed Darwin to demonstrate his respectability, his responsible investigation of the facts, his commitment to verification, his acquaintance with experts, his claim to ownership of the theory (2003a p182-183)

Accepting evolution meant accepting Darwin's credibility. *Origin*'s personalised prose meant readers experienced what Browne (2003a p182-183) called "an impression of intimacy – what has been called intimacy at a distance". Darwin used this style in his subsequent scientific books.

Natural selection became entwined in nineteenth century popular culture, even though the theory was most-often encountered second-hand through popular representations. Victorians were dedicated to the cultivation of national heroes, but there were at the time no conventions about how scientists should be portrayed. Instead Darwin was portrayed in books and pictures in familiar Victorian poses: traveler, collector, and naturalist. He was an explorer, literally and metaphorically, an image that Darwin himself propounded in his autobiography and *Origin of Species*.

Darwin was proactive in the construction of his public image. He distributed souvenirs and mass-produced photographs. He signed autographs and had his signature forged. He collected songs and poems about himself. He met the Prince of Wales. Darwin did not give interviews, except when he supplied biographical details for dictionaries and answered queries about his theories and religious and social views. The Darwin industry flourished: he had pre-printed cards that could be used as a response to letters, along with a *carte de visite* that was put into the envelope with his correspondence, and he also had a rubber stamp of his signature. The early 1880s showed the "interconnections between Darwin's fame, the increasing leverage of his theories, and his shrewd management of personal publicity" (Browne 2003 p383). Darwin moved among his contemporary celebrities. He met with George Eliot. In 1873, he received a copy of *Das Kapital* with the inscription: "Mr. Charles Darwin on the part of his sincere admirer Karl Marx" (Browne 2003 p403). His funeral and burial in Westminister Abbey in April 1882 were attended by philosophers, scientists, naturalists and "a host of lay celebrities" (Browne 2003 p496).

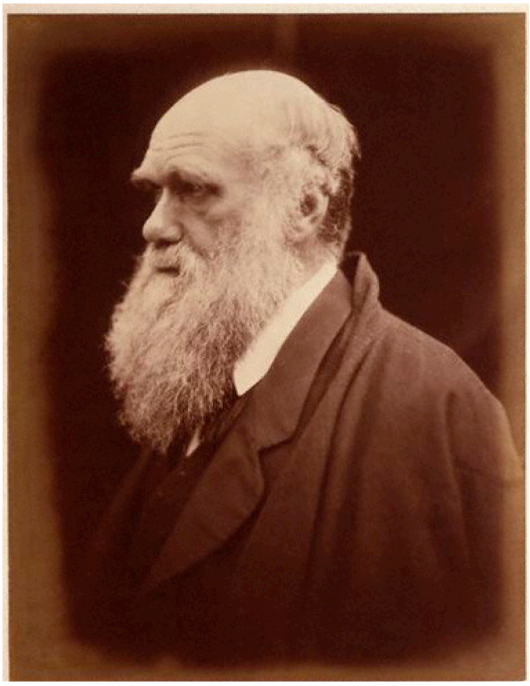
As well as public appearances, he received several weekly visitors to his home, an interplay of public and private that became a ritual of “showing himself” in which Darwin acknowledged his status as being an intellectual (Browne 2003a p179). Victorians also wanted to see their idols, including Darwin, in the flesh and these celebrities organised public showings to satisfy their audience’s wishes. Those who met Darwin in person wrote about it in public. A parade of sightseeers travelled in the 1870s and early 1880s to Darwin’s home, Down House, in Kent. Some he knew, some were introduced by friends, some turned up uninvited. Several visitors regarded the meeting as a “turning point in their lives” (Browne 2003 p383). As he was a celebrity, people also wanted to know what Darwin thought about contemporary issues. Browne noted that Darwin’s

> wife and children became swallowed up in his renown. Deep down, Darwin’s sons and daughters were forced to accept that he was not just their father. He belonged to everybody (2003 p335).

Despite his careful self-promotion, Darwin himself was naturally reticent and was uneasy with the blurring boundaries between public and private that are a constituent of celebrity. He was astonished at being recognised in public. He was relieved that his celebrity occurred mainly in representative contexts where his emotions were not exposed and his presence was not needed: magazines, books, caricatures, and memorabilia (Browne 2003). Privacy was “central to his sense of himself” (Browne 2003a p179) – which also added to his mystique. Avoiding public occasions where he would speak unprepared, he often cited illness as an excuse (Browne 2003, 2003a).

Darwin merged with his theory in representations in Victorian magazines, representations that propelled the theory from learned societies to the more democratic popular press. He was most commonly represented as an ape, especially in caricatures (Browne 2001). Many of the images about evolution drew on established prejudices with the theory meshing “comprehensively with contemporary biases, embracing anti-intellectualism, imperialism, slavery, class, race, colour, and political identity (Browne 2003a p374). These ape-caricatures emphasised Darwin’s familiar facial features, his long beard, bald skull and prominent eyebrows, representations that drew on what Browne called “the acknowledged iconography of intellectuality” (2003a p186). Darwin’s beard was “an eye-catching feature of the commercially reproduced portraits of him” (Browne 2003 p377). Darwin immersed himself in photography, an emerging art form of the time, and an important medium for his evolutionary work, as pictorial representations were then a new way of constructing scientific knowledge. He exchanged portrait photographs with other eminent scientists of the time, and encouraged his sons to take informal pictures at home, although he never allowed himself to be photographed "in his shirtsleeves or at work in his garden or study" (Browne 2003 p363).

A key photograph in the construction of this iconic image of Darwin was a portrait taken of him in 1868 by Julia Margaret Cameron (below) who, through the use of ceiling light, featured the naturalist's head in the centre of the composition. Browne noted that "more than anyone else Cameron created the visual image of Darwin as a great abstract mind" (1998 p274).



Charles Robert Darwin by Julia Margaret Cameron © National Portrait Gallery, London. Reproduced with kind permission of National Portrait Gallery, London.

Darwin's *Autobiography* (1997) was written because it was commissioned by a publisher and was, therefore, "the product of his international fame" (Sturrock 1993 p214). Given the autobiographical structures of his scientific work, he paradoxically tried to erase his personality in his autobiography. He painted himself as dull, unclever, uncultured, unemotional in his work, but having an enormous capacity to collect facts. He portrayed himself as a polite, shy and self-deprecating English gentleman, content in his country home (Browne 2003).

His views on Christianity in *Autobiography* were startlingly harsh. Catholicism represented for Darwin outmoded superstition that should be forcibly removed from culture. After his death, hostile references to religion – including a comment about religious belief being an inherited instinct, “akin to a monkey’s fear of a snake” (Browne 2003 p433) – were removed by his family. Interviewers in his later life most often asked about his religious views. Against his wishes, Darwin was buried, close to Newton, in Westminister Abbey (Fara 2000).

After he heard how a group of Lancashire workmen came together to buy a single copy of *Origin*, Darwin was aware there were new markets to reach. A sixth edition of *Origin of Species* was priced cheaply, as it was intended for mass consumption. This commercial awareness intensified in the “strategic publicity” Darwin used to enhance his reputation and the sales of *The Descent of Man* (1871), which he had translated into several European languages. In a letter, Darwin told how the book had “sold wonderfully” (Browne 2003 p351). Sales were helped by evolution’s enduringly controversial status in Victorian society. For example, *All the Articles of the Darwin Faith* (1875), a response to evolution by the Rev. Rancis Orpen Morries – attractively packed and costing one shilling –attacked Darwin from a religious perspective. Darwin’s best-selling work was *On the Expression of the Emotions in Man and Animals* (1872), which sold 9,000 copies in the first four months. However, Darwin’s last book was his most popular, selling more and selling faster from the day it was published than other titles. The book was *The Formation of Vegetable Mould Through the Action of Worms* (1881).

3.3. Albert Einstein: Newspaper man

The tensions in representing the scientific genius that were manifest in images of Newton disappeared in the portrayal of physicist Albert Einstein (1879-1955), who formulated a theory of the universe that was not mechanical and regular, but one in which time and space were fluid and relative. The dominant representation was one of an exceptional theorist who created a revolution in science from rationalist thought experiments. He became the personification of physics, his name a “synonym for genius,” his face “an icon for wisdom, imagination, creativity and concentrated mental power” (Barrow 2005, p218). Einstein was called the most famous scientist in history and his explanation of the relationship between energy and matter, $E = mc^{2,}$, became “the most famous equation in the history of science” (Galison 2003 p68).

Biographers of Einstein have found it difficult to explain his extraordinary rise to public prominence (Missner 1985). The most recent biography by Walter Isaacson *Einstein: His life and Universe* (2007), in which he called his subject “a scientific celebrity superstar” (2007 p289), devoted a chapter to Einstein’s fame. The timing of his theories, the construction of his image, his socio-political involvement, his understanding of promotion – all contributed to Einstein’s lasting fame, argued Isaacson, but central were his counterintuitive theories of relativity that captured popular imagination.

Missner (1985) and Highfield and Carter (1993) agreed. However, it was those factors that appeared to be a consequence of Einstein’s fame that were among its essential constitutents. It was these promotional forces and deeper symbolic currents in society that meant Einstein gained more attention than other physicists, such as Bohr or Heisenberg, whose work was similarly seismic. Historian of science, and former colleague of Einstein, Abraham Pais (1994 p138) noted that “Einstein, creator of some of the best science of all time, is himself a creation of the media in so far as he is and remains a public figure”. Relativity had a recognisable face. Relativity had an unconventional creator who was portrayed, and presented himself, as being as peculiar as the theory’s central tenets.

Einstein’s rise to prominence had a clear chronology. He had been regarded as a talented theorist since the publication of his four papers – on the photoelectric effect, Brownian motion, special relativity and the relationship between mass and energy, captured in the equation $E=Mc^2$ – in his “miracle year” of 1905 (Isaacson 2007 p54). At that time, Einstein admirers were restricted to a small group of physicists, including the influential Max Planck. Researchers have tried to determine the exact point when Einstein became famous, but the critical consensus was that he emerged on the world stage between the confirmation of general relativity in 1919 and his first visit to the US in 1921 (Missner 1985, Illy 2006, Isaacson 2007).

On 6 November 1919, when the world craved a spectacular human achievement that could transcend a post-war ravaged Europe, the general theory of relativity was presented dramatically as a single momentous discovery. A joint meeting of the Royal Society and the

Royal Astronomical Society heard the results of two expeditions, to Sobral and Principe, that measured the bending of starlight during 1919's solar eclipse, results that were interpreted to conclude that starlight was bent by the amount predicted, not by Newton, but by Einstein. Although presented as a clear confirmation, the results were far from conclusive, and scientific consensus on the controversial topic was agreed socially, with physicist Arthur Eddington particularly influential, an example of public profile being helped by a powerful cultural intermediary (Missner 1985, Collins and Pinch 1998, Waller 2002).

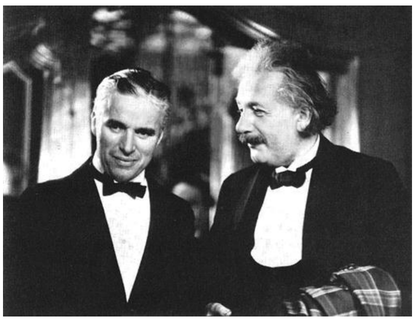
The Times framed the theory as a scientific revolution. Its report of the meeting had the headline: "Revolution in Science. New Theory of the Universe. Newtonian Ideas Overthrown" (cited in Isaacson 2007 p264). The *New York Times* reported that relativity was inspired by seeing a man falling from a neighbouring roof on to a soft pile of rubbish: the headline read: "Inspired as Newton Was, But by the Fall of a Man from a Roof Instead of the Fall of an Apple" (cited in Isaacson 2007 p266). In fact, Einstein had done this thought experiment in the Bern patent office, but demonstrated a sophisticated attitude to journalistic processes of image construction, writing to a friend: "The newspaper drivel about me is pathetic. This kind of exaggeration meets a certain need among the public" (Einstein 1919 cited in Isaacson 2007 p266).

Coverage of Einstein dropped after the initial interest until he visited the US, as part of a Zionist delegation, for two months in 1921. It caused a frenzy of public and media interest (Isaacson 2007), cementing his status as a scientific icon. The American press was "*the* instrument that made Einstein into a celebrity," as his appearance, personality and persona became established in addition to his scientific theory (Missner 1985 p268, Bechwald 2006). Contemporaneous reports called him a scientific genius. The opening paragraph of *The New York Times*'s front-page report of his first visit to the city was representative:

> A man in a faded grey rain coat and a flopping black felt hat that nearly concealed the grey hair that straggled over his ears stood on the boat deck of the steamship Rotterdam yesterday, timidly facing a battery of cameramen. In one hand he clutched a shiny briar pipe and with the other clung to a precious violin. He looked like an artist – a musician. He was. But underneath his shaggy locks was a scientific mind whose deductions have staggered the ablest intellects of Europe (*The New York Times*, 3 April 1921 p1 cited in Friedman and Donley 1985 p18).

Newspaper accounts continued to be framed around the concept of genius (Illy 2006). Journalists did not focus exclusively on his science, with articles often leading on Einstein's views on nationalism, Zionism, science under the Nazis, and science and internationalism. A 1921 report in the *New York Evening Post*, for example, described Einstein's Berlin home, with its busts of Goethe and Schiller, as well as detailing his love of Dostoyevsky, his working methods (lost in intense concentration in his room alone for three or four days), and his fondness for cigars. The interview began with Einstein's condemnation of nationalism, before moving quickly into discussions of internationalism and science. Several reports noted his love of playing the violin and commented on his flirtations with other women. Newspaper reporters liked him. He was funny, modest, informal – and gave quotable copy (Illy 2006).

In the 1920s, Einstein enthusiasts turned him into "a public star" (Friedman and Donley 1985 p12). Invitations to speak arrived from around the world. The London Palladium asked him to put on his own show. A woman fainted when she met him. In Geneva, he was mobbed by young women. One tried to cut off a lock of his hair. Telescopes and towers, children and cigars, were named after him. Letters arrived daily, as they would for the rest of his life (Highfield and Carter 1993). In 1931, he and his wife Elsa accompanied Charlie Chaplin to the premiere of *City of Lights* (Isaacson 2007). Einstein merged in popular consciousness with the representation of $E=mc^2$ (Browne 2001). When he returned to America in 1930 to work at Caltech, such was the interest that he had to hold a press conference. He declined several film roles (Isaacson 2007).



Einstein and Charlie Chaplin at the 1931 premiere of City Lights*. Credit: The Granger Collection, New York. Reproduced under license from TopFoto, UK.*

The relativity industry boomed. Einstein promoted his theory in Europe and America, his "shaggy and rumpled Chaplinesque appearance" endearing him to photographers and cartoonists (Friedman and Donley 1985 p17). In the first six years after the eclipse observations, more than six hundred books and articles on relativity were published, with works by established physicists including Eddington, von Laue, Freundlich, Lorentz, Planck, Born, Pauli, and philosopher Bertrand Russell. Einstein himself described the theory in his own words in *The Times*. His book *The Special and General Relativity*, previously published in German in 1916, became a best-seller when translated into English. The theory's conceptual difficulty was a repeated feature in news reports, as was the claim that only 12 people could understand it. Einstein estimated that its difficulty was part of its mystique, saying:

> I am sure that it is the mystery of non-understanding that appeals to them . . . it impresses them, it has the colour and the appeal of the mysterious (cited in Pais 1994 p148).

Einstein also appealed because of the religious imagery he used to describe his work, once declaring that his aim was "to know how God created the world," saying scientists like him were "the only deeply religious people". He expressed his scepticism over quantum mechanics by saying that "God does not play dice with the world." The secrets of the universe were accessible because "The Lord God is subtle, but not malicious" (cited in Highfield and Carter 1993 p17). However, his views were atheistic, although he used the term "cosmic religion" or "cosmic religious feeling" (Einstein 1977 cited in Pais 1994 p120) for his brand of belief.

As well as having a clear understanding of the means of promotion, Einstein was an astute analyst of his fame. Certainly, he took his public profile seriously and understood its cultural value, something that can be seen not in the joke he made in a letter to a friend – "'with fame I become more and more stupid, which of course is a very common phenomenon'" (Einstein 1919 cited in Isaacson 2007 p272) – but in a more nuanced view he outlined to a reporter:

> The cult of individual personalities is always, in my view, unjustified . . . the contrast between the popular estimate of my achievements and the reality, is simply grotesque. This extraordinary state of affairs would be unbearable but for one great consoling thought: it is a welcome symptom in an age, which is commonly denounced as materialistic, that it makes heroes of men whose ambitions lie wholly in the intellectual and moral sphere (Einstein 1954 cited in Isaacson 2007 p273).

There were other views of Einstein's complex relationship with fame. Essayist CP Snow noted that the physicist revelled in the flashier public aspects of twentieth century celebrity:

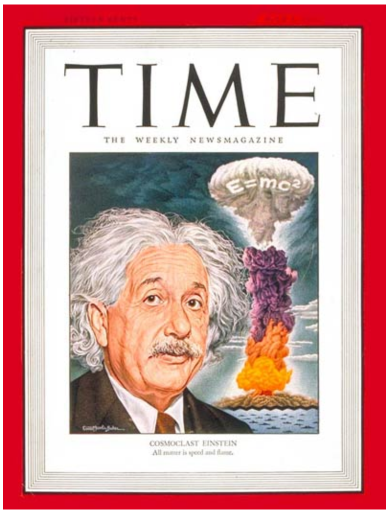
> There was a streak in him that enjoyed the photographers and the crowds. He had an element of the exhibitionist and the ham. If there had not been that element, there would have been no photographers and no crowds. Nothing is easier to avoid than publicity (1966 cited Isaacson p268-9).

Einstein – whose politics were socialist tempered by individualism – understood how his status meant his public utterances had the force of widespread publicity, which he used in the promotion of his causes, especially his anti-nuclear moralism during the cold war (Isaacson 2007). Einstein's non-scientific writings on areas including education, freedom, friends, politics, pacifism, and the Jewish people, have been collected and published (Einstein, 2005.)

Friedman and Donley in their study of cultural representations of the physicist, *Einstein as Myth and Muse* (1985), offered two principal reasons for Einstein's lasting fame and influence. Firstly, his scientific work resonated with contemporaneous revolutions in the arts. In 1922, he won the Nobel Prize for physics, the same year as Joyce published *Ulysses*, Eliot published *The Waste Land*, and Schoenberg developed 12-tone serial music. Around this time, Picasso became associated with Cubism. Einstein was a muse for these artistic revolutions.

A second reason for Einstein's lasting fame was that his "personal image came to represent the power of scientific intellect," his face "a convenient literal image for discussions of genius, rational thought, and abstract notions" (Friedman and Donley 1985 p20). Consequently, mathematical physics became the most prestigious discipline for intellectual achievement. Einstein continued to personify this image, even as his preoccupations moved further in his later career from the field's vital currents in quantum mechanics, which was accepted by physicists at the end of the 1920s (Isaacson 2007).

In his later life, Einstein's image acquired tragic connotations. His explanation of the equivalence of mass and energy contributed to the creation of atomic weaponry. What was the celebrated apex of humanity's creativity became the potential agent of humanity's self-annihilation. As a result, Einstein's image became more nuanced. He came to encode mythically the educational potential and destructive power of twentieth century science, a connotation codified in his image on the cover of *Time* in 1946 where an iconic representation of Einstein, disheveled, haggard, unsmiling, sad-eyed, was foregrounded against an atomic mushroom cloud that contained the equation $E = mc^2$. Einstein was tied indexically to the bomb. Einstein's mythic stature in 1946 gave this image its symbolic force, its signification of society's misuse of knowledge (Friedman and Donley 1985).



Time *magazine cover, July 01, 1946*[13]*. (From* TIME magazine, 7/1/1946 © 1946 Time Inc. Used under License. TIME and Time Inc. are not affiliated with, and do not endorse products or services of, Licensee.)

His public persona altered further as details of his personal life emerged. His reputation was closely guarded by his executors, Helen Dukas and Otto Nathan, who spent their lives ensuring his image remained untarnished. Some of Einstein's writings were "suppressed or censored" (Highfield and Carter 1993 p273). After the death of Dukas and Nathan in the 1980s, the archives were opened, and a more complex image emerged. *The Private Lives of Albert Einstein* (1993) presented documentary evidence of Einstein's regret at the failure of his two marriages, his illegitimate daughter, Leserl, his multiple affairs, elements of misogyny, and his complicated feelings towards his mentally-ill son, Eduard. The unseen private life of Einstein was one of "a man whose combination of intellectual vision and emotional myopia left behind him a series of damaged lives" (Highfield and Carter 1993 p5).

13 This image was downloaded on 26 February 2010 from http://www.time.com/time/covers/0,16641,19460701,00.html

The Einstein industry has continued apace. The Hebrew University of Jerusalem, which owns Einstein's intellectual property rights, has earned $20 million a year from licensing products and advertisements that use Einstein's image. About 40 of the 400 applications it receives annually have been approved. He features in realistic and fictional genres, in television, theatre, music and cinema. New scholarly publications emerged annually (Marrs 2008). 2005 was Einstein year. He was voted *Time*'s man of the century. Physicist Robert Oppenheimer, in a public address to mark Einstein's 60th birthday in 1939, said Einstein was probably the most widely-known scientist of the era, standing in the mind of millions for science itself, and for all that is admired in the scientist. The *New York Times* reported his death on its front page on 19 April 1955. Since 1919, the paper had featured him in its pages at least once a year (Isaacson 2007).

3.4. Robert Oppenheimer: Self-crafted scientific intellectual

It was appropriate for (Julius) Robert Oppenheimer (1904-1967) to be the one to mark Einstein's birthday. The physicists have been linked scientifically, institutionally and figuratively. The relationship between mass and energy described by Einstein was part of the theoretical foundation for the development and assembly of the atomic bomb during the second world war at the Los Alamos Laboratory in the remote New Mexico desert. Oppenheimer was the laboratory's scientific director, his role in the Manhattan Project the basis of his image as a modern scientific icon. After Einstein, he has continued to be regarded as one of the foremost scientific intellectuals and greatest charismatic figures of twentieth century science (Rabi et al 1969 cited in Schweber 2006 p514). "His thin handsome face," wrote Rieff, "replaced Einstein's as the public face of genius" (1970 cited in Thorpe 2006 p4), and he "followed Einstein in being a scientific celebrity" (Thorpe 2006 p17).

He was a "true scientific intellectual" (Coser 1965 cited in Thorpe 2006 p3), but the components of this public image changed and merged throughout his career. A productive theorist in the 1930s, Oppenheimer's brilliant teaching and research abilities, coupled with the devotion he inspired in students, accounted for the creation of the American school of theoretical physics. His former colleagues at Los Alamos credited him with holding together an organisation of enormous bureaucratic complexity, consisting of military, scientific and civilian personnel. After the war, he was director of the Institute for Advanced Study at

Princeton, where his nuclear weapons work and political connections made him a senior government cold war advisor, and an influential public figure. In the late 1940s, his subsequent opposition to the hydrogen bomb made him influential enemies, and at the peak of McCarthysim, evidence from an FBI investigation into his left-wing activities in the 1930s gave his critics a motivation to discredit him. Investigated also was a wartime incident where he temporarily failed to give military intelligence the name of a man whom he claimed approached him for information on atomic energy on behalf of the Soviet Union. After a hearing by the Atomic Energy Commission (AEC) in 1954, he lost his security clearance. Over the next ten years he refashioned himself as a global scientific statesman (Thorpe 2006, Schweber 2006, Hughes 2007).

Positioned at the crucial point of intersection in modern scientific and American history between managerialist science, technocratic authority and military power, Oppenheimer has become a rich subject through whom the meanings of modern science could be explored (Thorpe 2006). Robert Jungk's *Brighter Than a Thousand Suns* (1958), an early account of the development of the atomic bomb, portrayed Oppenheimer as a classic tragic figure, a recurring theme in subsequent biographies, as well as novels, plays and films based on his life. He featured prominently in Richard Rhodes's classic *The Making of the Atomic Bomb* (1988). Bird and Sherwin's expansive and authoritative *American Prometheus: The triumph and tragedy of J. Robert Oppenheimer* (2005) viewed Oppenheimer as an exemplar of American intellectual, scientific and political liberalism. David C. Cassidy's *J. Robert Oppenheimer and the American Century* (2005) situated its subject within the rise of America as global superpower that had at its heart the alliance of science, industry and the military. Bernstein's lyrical *Oppenheimer: Portrait of an enigma* (2004) was framed around the recurring trope of the physicist's complex and contradictory character. Oppenheimer was a pacifist, who oversaw the creation of a devastating instrument of war; a brilliant theorist, who never won a Nobel Prize or made a major signature contribution to science; a patriot, who was publicly humiliated by his government. Commentators have used mythic figures from literature, notably Prometheus, Faust and Hamlet, in the representation of Oppenheimer's life (Strout 2006).

Sociologist of science Charles Thorpe's *Oppenheimer: The tragic intellect* (2006) argued persuasively that the physicist's embodiment of abstract values was crucial to his iconic status as a scientific intellectual who represented the tensions in the role of the scientist in the nuclear age. So well known was his image that he came to symbolise science to the extent that his trademark porkpie hat appeared without its wearer on the May 1948 cover of the first edition of *Physics Today*. He represented science also for *Time, Life and Look* magazines (Thrope 2006). Critics have repeatedly referred to Oppenheimer's charisma. Sociologist Daniel Bell said Oppenheimer exemplified the "messianic role of the scientist" and the "charismatic dimension" of modern science (Bell 1976 cited in Thorpe 2006 p13). This charisma, being used in the Weberian sense of being a form of authority and power (Weber 1948), was based around Oppenheimer's intellect. Tall, thin, cerebral, cultivated, charismatic, Oppenheimer was an aesthetic and ascetic intellectual, with a developed interest in languages, literature, art, spirituality, international affairs, food and drink. These "aesthetic values were central to Oppenheimer's personal appeal and public image" (Thorpe 2006 p11). Oppenheimer "always seemed to be playing a role and thrived on being oracular and 'deep'" (Schweber 2006 p515).

These values were made concrete in Oppenheimer's physical appearance, which was tied to deeper cultural issues of disembodiment. Physicist Leona Libby in her *The Uranium People* (1979) described the "poetic, disembodied, spiritual emanations that were the basis for Oppenheimer's charisma" (Libby 1979 cited in Thorpe and Shapin, 2000, p553). Thorpe noted: "Almost no commentary on the force of Oppenheimer's personal presence failed to remark upon his tall, thin frame and especially upon the color (sic) of his eyes and the intensity of his gaze," and his asceticism has been "constitutive, in very real ways, of Oppenheimer's cultural authority" (Thorpe 2006 p13-15, Thorpe and Shapin 2000).

Oppenheimer's ascetic values were tied to spirituality. The destructive power of atomic weaponry, and its effect on him, was expressed in religious imagery. His now-iconic cited reflections on the burden of the bomb have come to symbolise the changed relationship of science to society. When Oppenheimer viewed the first explosion of an atomic bomb, named Trinity, on 16 July 1945, a passage from the *Bhagavad Gita*, the Hindu scripture that was a major influence on his worldview, passed through his mind, which he later related as: "I am become death, the shatterer of worlds," a statement first published in *Time* magazine in 1948 that has come to represent the potential destructive power of scientific knowledge (Time 1948).

As part of a four-scientist panel that discussed the case for using the weapon on a military target in a populated area, Oppenheimer acquiesced to the use of the atomic bomb on Japanese cities. Within the next two months, bombs were dropped on Hiroshima and

Nagasaki, and Japan surrendered on 10 August 1945. Although he was enthused with his key part in the bomb project, and stated that he never regretted his role, he became haunted by his wartime work. This has become the dominant cultural representation of Oppenheimer: a tragic figure haunted by moral failure, exhibiting the tension in western liberalism between science and humanism (Thorpe 2006).

Biographical accounts of Oppenheimer's life illustrated how this tension was played out in the post-war political sphere, where his concerns over the moral complexities of the bomb emerged during his chairmanship (1947-1952) of the General Advisory Committee of the Atomic Energy Commission (AEC) (Simonis 1999, Daintith et al 1994). Physicist Edward Teller and AEC chairman Admiral Lewis Strauss were among those who then began political manoeuvres to remove Oppenheimer from government duty, manoeuvres that culminated in the AEC's security hearings of 1954, after which the AEC Personnel Security Board stripped Oppenheimer of his security clearance, publishing a 993-page transcript detailing aspects of his personal and early political life and concluded that he had "defects of character" (Thorpe 2002 p379). This decision ended Oppenheimer's influence on government science policy. Oppenheimer's physicality now had a moral meaning with the hearings leaving him, journalists reported, like a ghost. His suffering added to his charisma, however, giving him a moral authority as an "ascetic outsider," a symbol of the tragic fate of the modern intellectual (Thorpe 2006 p244).

Afterwards, Oppenheimer lectured around the world on the philosophy of science and the relationship between science and society, portraying himself as a liberal humanist and public moralist. As director of the Institute for Advanced Study in Princeton, he cultivated carefully his image as the embodiment of pure science and spokesperson for the cultural meaning of science. He viewed science as a vocation and argued that decisions about the use of science should be made by politicians, not scientists. His book of lectures, *The Open Mind* (1955), advocated international control of atomic energy and discussed how technologically-crafted violence had become a central concern of modern science, opposing the Enlightenment ideals of science-driven progress. In November 1953, he delivered the Reith lectures for the BBC, which were published as *Science and the Common Understanding* (1954), and which described science as a manifestation of liberal democratic values. He hoped that science and scientific ideas could contribute to culture. The misunderstandings between scientists and lay audiences were rooted in science's historical constitution as an elite endeavour, its work understandable fully only to its practitioners (Thorpe 2006). Strout (2006 p91) noted that, although the cultural high point of Oppenheimer's iconic status has passed, "no scientist has quite taken his place".

3.5. Carson, Sagan, Gould: Their views of science

Ecologist and writer Rachel Carson (1907-1964) was catapulted to "international fame" (Lear 1993 p25) after the publication of her book *Silent Spring* (1962). It brought the then obscure biological subdiscipline of ecology into public and political consciousness, its warnings of potential future ecocatastrophe crystallising concerns over pollution, its publication a "galvanizing event" in the development of modern environmentalism as a social movement in the 1960s and 1970s (Rothman 1998 cited in Kroll 2001 p404). The book ensured her lasting position as the "most famous of environmental icons" (Barrow Jr 2000 p600). The central argument of *Silent Spring* was that each year about 500 increasingly potent chemicals, many of them insecticides, were introduced to the wild, making the earth ultimately unfit for life. This uncontrolled release of chemicals, particularly DDT (dichloro-diphenyl-trichloroethane, used to combat typhus and malaria, as well as being a synthetic pesticide) poisioned the landscape, destroyed delicate ecosystems and killed biological species. Worms ate the chemically-coated plants and were in turn eaten by birds who died, leading ultimately to the haunting image of Carson's silent spring.

In the 1970s, ecological thought was concerned with a conceptual change in understanding the environment (Brereton 2005). In that decade ecological ideas became more attractive to news media as sources came from authoritative bodies that produced convincing, scientific quantitative findings. In the US, the radical student movements of 1968 saw the global pollution described in *Silent Spring* as the fault of multi-national capitalism. Furthermore, post-second world war prosperity allowed Americans to place a high value on their personal lifestyle, and commodities were purchased, partially, for their aesthetic and amenity values, helping explain the push to address environmental degradation at the local level in order to preserve the beauty of places these families inhabited (Kroll 2001). Moreover, the *Zeitgeist* of the 1970s was a feeling of paranoia, including ecological paranoia, with a culture-wide sense of moving from one era to an uncertain new one (Wheen 2009).

A zoologist who worked with what became the U.S Fish and Wildlife Service, Carson claimed that humans exposed to a combined range of individually-safe chemical products could potentially develop cancer or mental illness. She concluded the book by stating humankind's desire to control nature was misconceived and arrogant, based on the "Neanderthal" view that the environment was a convenience for humankind (Carson 2000 p257). According to Linda Lear, a biographer of Carson, the book changed the course of history as it brought local concerns of environmental degradation to national political prominence, influencing the public, policymakers and the chemical industry (Lear 1993, Love 1999, Matthiessen 1999, Kroll 2001, Gribbin and Gribbin 2009, Lovelock 2009). While others had warned of the dangers of pesticides, Carson formulated the overarching metaphor of the silent spring that symbolised the conflict and resonated widely (Matthiessen 1999). American environmentalist Ralph Nader said her power was her ability to describe "as perhaps nobody has since, the aesthetic dimensions of the scientific crisis" (cited in Lear 1993 p30).

Silent Spring was phenomenally successful. It sold 500,000 copies in its first year, many bought through the US book of the month club. It was serialised in the *New Yorker* and was broadcast on television on *CBS Reports*. Although the book has remained a "pivotal text" in modern environmentalism, an evaluation of the historical impact of such a multi-layered text has meant situating it within these wider media contexts. The book existed within "a sprawling media environment," where its content was reframed and refocused by editors, literary agents, journalists and television producers as it was shaped for different audiences (Kroll 2001 p404, p416). While the book focused on environmental contamination generally, publishers Houghton Mifflin and the book of the month club distributed it to suburban homes, where pesticides were presented as a threat to the home, motherhood and family, which were sanctified within the dominant American cold war domestic ideology (already fearful of the invisible threats of communism and nuclear destruction). The inclusion of the book's section on the potential cancer-danger to humans was, argued Gribbin and Gribbin (2009 p108), in "publicity terms . . . a masterstroke". The *New Yorker* presented extracts, with much of the science removed, to an urban audience concerned with the threat of pesticides to their bodies. CBS presented an anti-progress and anti-science representation of the book within a wider philosophical storyline that challenged science's assumed confidence about its ability to control nature (Kroll 2001). The "visual impact of the quiet, self-assured author . . . was deeply convincing to many viewers" (Lear 1993a p39). These "extended media manifestations" (Kroll 2001 p417) were central to the book's reception.

Carson herself attracted substantial media attention. Narratives and counter-narratives swirled around her, demonstrating that the process of image-making was a constituent in the creation and subsequent reception of *Silent Spring*. Even before the book's publication, elements of the chemical industry tried unsuccessfully to smear Carson, raising her and her book's profile, and making her the "first saint . . . of the infant and innocent Green Movement" (Lovelock 2001 p199, Matthiessen 1999). Carson was portrayed as a recluse, a mystic, a reformer, an anti-establishment, anti-technology, unscientific, emotional polemicist who wanted to write a "recital of doom" (Briggs 1987 p8). Carson herself told how she had been disparagingly labelled "a 'bird lover,' 'a cat lover,' 'a fish lover,' 'a priestess of nature,' and a devotee of a mystical cult" (1962 cited in Briggs 1987 p7), as well as a "hysterical woman" (Matthiessen 1999 no page). Images of Carson have also been read through an understanding of her personal life. *Time* noted that in "most photographs, the pensive face appears a little sad" (Matthiessen 1999 no page). Smith (2001 p743) noted that she was recurringly photographed, not as a professional scientist, but sitting in the woods surrounded by children or as "a sentimental bird watcher". Smith took a disparaging view of this imagery, but they can be taken as representing a distinctive portrayal of ecological science, repositioning the scientist as an integrated part of the natural world, instead of a detached figure isolating elements of nature for analysis in a sterile laboratory. This is the clear reading that emerges from two photographs of her that were published in *Silent Spring Revisted* (1987) – images one and two (from left to right, below) – which reinforced the image of Carson as a sensitive ecologist that emerged in her prose. Images one and two clearly link her indexically with nature, while the third (the image on the right) links her indexically with science.

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Left: Rachel Carson, 1960 © Erich Hartmann/Magnum Photos. Reproduced under license from Magnum Photos. Centre: Rachel Carson, 1962 © Erich Hartmann/Magnum Photos. Reproduced under license from Magnum Photos. Right: Rachel Carson Looking Through a Microscope © Underwood & Underwood/Corbis. Reproduced under license from Corbis.

Her friends argued that she was a meticulous writer and scientist who gave a totalising view of nature. *Silent Spring*'s current significance has been that it ushered in an environmentalism that challenged belief in the control of nature by science (Kroll 2001). Carson's "ethic of interconnectedness," central to environmentalism, has endured as her principal legacy (Lear 1993 p42).

The alternative belief systems classed as pseudoscience and anti-science that had been emerging with greater prominence in the late 1960s did not go unchallenged. Astronomer Carl Sagan (1934 – 1996), a landmark figure in the history of the public scientist and a high point in the history of the celebrity scientist (Bucchi and Trench 2008), was a strident defender of the scientific worldview, one he expounded in his 22 books, which together sold more than 10 million copies globally. His works contained his characteristic tone: championing science's unrivalled cognitive power while conveying an excited wonderment at its findings. Criticised for a blinkered scientism and historical shallowness, Sagan nevertheless became, according to his biographer, after writer Isaac Asimov, "the most effective American popularizer of science during the Cold War era" (Davidson 2006 p24).

Television was the vehicle through which he achieved his fame. Space science was current in the cold war, and the discipline's vivid imagery made it especially suitable for television. Sagan too was uncannily suited to the medium, making an immediate impact in his first television appearance, in 1972, on *The Tonight Show*, with Johnny Carson, himself a keen amateur astronomer. Goodall wrote (1978 p163): "Young (early forties now, lively dark eyes, dark fashionably long hair), ebullient, engaging, and very articulate, he is as natural to television as his topic." After *The Tonight Show*, he became "America's best-known scientist" (Davidson 1999 p263), "a Mr. Science for the hip, disillusioned early 1970s" (Davidson 1999 p264). Sagan's "messianic style" compensated among some of the public for his "icy logic and blunt secularism" (Davidson 1999 p261). He was known for his turtlenecks. He drove an orange Porsche. He was profiled in *Rolling Stone*.

Sagan had been concerned with pseudoscience and antiscience since the late 1960s and viewed television as a potential medium through which to replace these beliefs with a scientific worldview. The television series in which he tried to do this – and in which he cemented his celebrity status – was the 13-part *Cosmos*, an exploration of the universe. Modeled on the bestselling *Ascent of Man* (1974) by Jacob Bronowski, and its accompanying television series, *Cosmos* aimed to put forward a scientific worldview through a unification of the host's vision of philosophy, science and society. Sagan was "the creative and intellectual core" of *Cosmos* (Davidson 1999 p322). *Cosmos* had as its director Adrian Malone, who directed *The Ascent of Man* for television, who said he would 'make Carl a star' (Arden cited in Davidson 1999 p321).

First aired on PBS in 1980, the show was a phenomenal success, watched by more than 500 million viewers. Weeks after the broadcast, *Time* in a headline called Sagan the "Showman of Science" and the article called him "the prince of popularisers, the nation's scientific mentor to the masses" and "America's most effective salesman of science" (cited in Davidson 1999 p330). A *New York Times* review noted that *Cosmos* promoted science *and* Sagan, and the programme could have been subtitled "The Selling of Carl Sagan" (cited in Davidson 1999 p333). On *Cosmos*, Sagan promoted his status in part through using rhetoric more typical of religion than science (Lessl 1985 cited Leane 2007).

The early-to mid-1980s marked the peak of his fame. A book of the series, also titled *Cosmos* (1985), remained on the *New York Times* bestseller list for more than 70 weeks, selling more copies than any English-language science book ever published before then. It sold 900,000 while on the best-seller list. Comparatively, most science books sold between 100,000 and 200,000 hardcover copies. Creationists attacked him. Celebrity made exceptional demands on his time. He received $2m in 1982 for the novel *Contact* (1985), essentially a defence of SETI research, the largest advance ever given to a work not yet in manuscript form. Lewenstein (2009) noted that Sagan typified an increasingly important link between book sales and the scientific star author.

However, this mass media driven popular acclaim created difficulties for the cosmologist's standing within professional astronomy. Sagan had established a sound reputation as a prolific and provocative scientist before his media career, his two notable works being his observations of the high temperatures on Venus and windstorms on Mars. He was an advisor to NASA since the 1950s and was an experimenter on the *Mariner, Viking, Voyager and Galileo* space expeditions, but so popular were his books, "so famous did he become" that his popular status gave rise to a new concept, a "Sagan effect". In this "one's popularity and celebrity with the general public were though to be inversely proportional to the quantity and quality of real science being done" (Shermer 2002 p490). Sagan's biographers noted that this Sagan effect was an influential factor in Harvard's refusal to grant him tenure and why the National Academy of Science rejected his nomination for membership. The Sagan effect, for Sagan himself, was false: his career lasted from 1957 to 1996, during which time he accumulated 500 total career publications, averaging one scientific peer-reviewed paper per month (Shermer 2002).

A different view of science was articulated by Harvard palaeontologist Stephen Jay Gould (1941-2002). Called America's "evolutionist laureate" and "perhaps America's best-known scientist" (Prindle 2009 p15), Gould produced a vast oeuvre – 22 books, 101 book reviews, 479 scientific papers, and 300 natural history essays – that spanned science popularisation, philosophy of science and history of science. Not diverse or eclectic, his works were the unified output of a writer with a coherent worldview. He was a marxist-influenced democratic socialist, whose ideas developed amid the radical science and new left movements in the 1960s U.S. in response to the Vietnam war, environmental problems, nuclear threats and civil rights issues. Gould consistently stressed the interconnectedness of intellectual fields, which were themselves embedded within interconnected spheres of culture, history and politics. Therefore, writing about science meant writing about the history and philosophy of science. His writings on the history of science reinforced his evolutionary theories, and vice versa (Masur 1993, Jumonville 2002, Shermer 2002, Prindle 2009).

He achieved his academic reputation for his fieldwork in the mid 1960s on the Bahamian land snail *Cerion* and his theoretical reflections on the mechanics of evolution. His 1972 paper co-authored with Niels Eldredge on punctuated equilibrium argued that species changed little over time, sometimes millions of years, before new species emerged in dramatic evolutionary bursts (on a geological timescale). The theory made them "disciplinary superstars" (Prindle 2009 p92). This view of evolution, which he articulated in his popular science writing, influenced his public profile, through his decades-long literary rivalry with Richard Dawkins, a dispute examined in detail in a subsequent chapter. Indeed Gould rivaled Dawkins "in his fame" (Ruse 1999 p136).

It was Gould's communication skills, according to his intellectual biographer, that gave him widespread popularity (Prindle 2009). His writing style, on topics including evolution, natural history, palaeontology, history of science, baseball, genetics, race and intelligence, was a combination of "learned Harvard professor and a baseball-loving everyman" (Yoon

2002 p). He wrote a monthly column for *Natural History* and wrote for the *New York Review of Books*, *Discover*, the *New York Times*, and *Sports Illustrated*. He voiced his own character on *The Simpsons*. He wrote an introduction to a collection of *Far Side* cartoons. He testified in court against an Arkansas act that required public schools to provide a balance between teaching evolution and creationism, and was closely associated with litigation over a similar statute adopted by the Louisianan legislature. His writing about science had a moral dimension, something seen most clearly in his arguments against the use of evolutionary theory to justify racial inequality in his *The Mismeasure of Man* (1997).

He saw his popular work as original scientific knowledge production, once asking readers to cite his popular articles in professional publications, but it was noted that there was little interest among his peers in his popular work, judging from citations in the *Science Citation Index*. Comments about punctuated equilibrium from professional biologists have been "acidic" (Ruse 1999 p149). Although Gould has had high professional visibility, the theory of punctuated equilibrium has not been an influential scientific theory, argued Ruse (1999).

The book *Rock of Ages* (1999) demonstrated Gould's status as a symbol of science. It proposed the theory of non-overlapping magisteria (NOMA), where science and religion occupied separate intellectual domains. The book's message jarred, especially as Gould, an atheist, characterised creationists as philistines, engaged in a right-wing evangelical political programme, and he understood that creationism was not only a scientific but a political issue. Prindle (2009) argued persuasively that the book was an attempt by an influential spokesman of science to calm the culture wars, to create social peace among a majority of religious believers who do not want to be anti-science.

A long-running frustration in Gould's life was that he was not taken seriously by historians of science, an example of the Sagan effect in reverse (Shermer 2002). Masur perceptively noted that at the core of Gould's work was a deeply historical perspective concerned with the "fundamental issues of objectivity, interpretation, and causality" (Masur 1993 p114), and it is notable that no historian has found a popular audience for these questions. The reason for this, noted his intellectual biographer, was that Gould did not present the scientific process as something "bloodless and timeless, as a sterile abstraction of method" (Prindle 2009 p216), and these made his arguments more compelling, recontextualising an area that scientists try to decontextualise. That has been the reason for his "spectacular success as an essayist" (Prindle 2009 p216) and, it can be added, as a public scientist.

Newton, Darwin and Einstein were all portrayed as unique individuals who embodied the uninterrupted internalist progression of scientific knowledge, but situating their often changing representations in their socio-historical context has shown that each had repertoires of promotion, commodification and image-management bound up to various degrees with their public status. There was no time when scientific achievement *alone* accounted for the public status of science. The cultural authority of science was always established partially through extra-scientific representation. After the terrifying violence wrought by techno scientific development in world war two, the progressive view of science became considerably more nuanced and contested. Einstein's changed representations through his life encoded this tension, a tension made manifest in Oppenheimer. Through the representation of Oppenheimer, the mythic narrative that equated science with sequential progress was splintered into several stories, which were embedded in different views of science articulated in the burgeoning historical and sociological studies of science.

No one took Oppenheimer's place, because the narratives around science became fractured, making it harder for one individual to embody all the tensions within it. Moreover, science became increasingly specialised, making it difficult to determine individual science-wide accomplishment (Boorstein 1980). From the post-war 1950s through the social and environmental upheavals of the 1960s and 1970s, the various splintered narratives of science were embodied in popular science authors or authors with scientific credentials. As authors and (for Sagan) television personalities, promotion and publicity were essential to their public status, linking science more closely to commercially-driven presentation. Within this context, different views of science emerged, in popular forms. Sagan represented a unreconstructed scientism, Carson a fearful environmentalism, Gould a contingent historicism. Their worldviews, encoded in their representations and self-representations, confirmed and challenged traditional accounts of progressive, ahistorical, rational scientific development, and they have continued to echo in this study's core subjects.

Chapter 4. Methodology and theoretical models

4.1. Science communication, the collective case study and intellectual history

This study is anchored in the modern academic field of science communication, a field that has contained within its broad framework several disciplinary approaches to the analysis of the communication of, and communication about, scientific ideas by different actors through disparate channels to various specialist and non-specialist publics. Science communication has been an inherently multi-disciplinary field, containing approaches from communication studies, political science, cultural studies, literary studies, cognitive psychology, journalism studies, history of science, philosophy of science and sociology of science and technology. This potential plurality of intellectual approaches has simultaneously been a weakness and a strength of the field. It has meant that an interplay of various perspectives has been brought to bear on a complex and multivalent area of expertise. However, the field has perhaps suffered from a lack of agreed-on analytic forms, methodological assumptions and critical vocabulary. Contemporary knowledge has been gathered chiefly in collected volumes[14] and in two scholarly journals devoted to the field[15].

In addition, the field features contributions, not only from academic researchers, but also from science communication practitioners, including public information officers, science journalists, science educators, science policymakers and scientists involved in communication. Attempts to reconcile the disparate approaches and methods within a unified research programme have been restrictive and programmatic[16] and have often, as in the UK, been driven by political imperatives to foster support and trust in science. Consequently, researchers in this interdisciplinary field have frequently combined approaches in mapping the territory of their studies.

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14 The most recent examples are: Bucchi and Trench (2008); Cheng, Claessens, Gascoigne et al (2008); Bauer and Bucchi (2008); and Holliman, Thomas, Smidt et al (2008a and 2008b).

15 *Science Communication* and *Public Understanding of Science*. Science communication content also appears in journals including *Science, Technology and Human Values*, *Science in Context,* as well as in professional science journals including *Science* and *Nature*, and in journals devoted to particular sub-fields of sociology, philosophy and history that are focused on science. The field also has a bi-annual international Public Communication of Science and Technology (PCST) conference.

16 For example, Burns, O'Connor and Stocklmayer's (2003 p184) definition of science communication was underpinned by the aim of creating more effective outreach from scientific institutions. As a result, the "outcomes and responses" of science communication could be something evaluated effectively.

This study uses combined approaches from biography, celebrity studies, science studies, intellectual history and historiography of science. It gathers data that has been analysed through the study's overarching theoretical framework that combines the concepts of celebrity, the public intellectual and the public scientist. It has traced these ideas historically, arguing that celebrity and self-promotion have been bound up with prominent science figures since what became known as the scientific revolution. It has used practices central to the discipline of intellectual history in its simultaneous description, analysis and interpretation of the phenomena of the celebrity scientists. The study is a panoramic piece of contemporary cultural historical analysis, similar to a re-emerging type of historiography, where micro studies have been incorporated into large-scale analyses, often unified by a single theme or concept.

Fara used this approach in her *Newton: The Making of Genius* (2000). It was a means of synthesising the multitude of micro-studies that had come to dominate the field, a continuing trend within the sociology of science, one lamented by Sheehan (2007) because of its weakly conceptualised intellectual history. Historian of science John Waller in his books, *Fabulous Science: Fact and fiction in the history of scientific discovery* (2002)[17] and *Leaps in the Dark: The making of scientific reputations* (2004), looked wider, demonstrating how core SSK ideas could have wider explanatory power when mapped against a wider historical canvas. Waller linked the historical case studies in the two books using the central idea that science created foundational myths about itself – about "Eureka moments, farseeing geniuses, jealous rivals, and bigoted clerics" (2004 pxi) – that were historically unreliable, often obscuring the complex interaction of forces that influenced scientific discovery. Crucial experiments were found to be flawed. Results were modified to support conclusions. Political influence was used to settle disputes. Scientific enquiry has often been haphazard. Waller (2002, 2004) made manifest these conceptual issues in compelling narratives. Biologist Louis Pasteur, for example, suppressed negative data and refused to replicate experiments about his celebrated germ theory of disease. Joseph Lister's hospital wards, rather than being models of his renowned antiseptic practice, were extremely dirty. Alexander Fleming misled the public about his part in the discovery of penicillin (Waller 2002). Crucially, Waller argued that these observations did not undercut his belief that science was "the best way of increasing our understanding of the physical world" (Waller 2002 p7).

[17] Waller (2004) acknowledged that his work aimed to make more accessible the work of historians of science, but his distillations of specialists' writings stand as models of coherence and clarity.

Big picture histories in science, which examined large scale, macro, themes and trends, have been out of fashion, viewed by those committed to specialist research as simplistic, lacking nuance and complexity, while postmodernists viewed them as impossible. Big pictures have provided the contours to specialist studies, generating meaning and understanding (Cunningham and Williams 1993). Big picture analyses could replace internalist, essentialist stories of scientific advance – linked to a universalist ahistoric rationalism that embodied values of freedom and progress (Cunningham and Williams 1993) – with a more proportionate focus on "questions, debates and contests for authority" (Secord 1993 p389). Celebrity, as has already been shown in the examples of historical scientists, has been a feature of science's cultural authority (see also Miller 2000). The approach in this study has been to use the idea of scientific fame as a theme through which to examine the history of science in public until the present day.

Against this historical background, the current study has zeroed in on contemporary scientific celebrity, taking the form of a multiple case study in which Stephen Hawking, Richard Dawkins, James Lovelock and Susan Greenfield have been the subjects of case studies that have been analysed to illustrate the phenomenon of the celebrity scientist. The study's overall analytic approach has been historicist and holistic, situating the four scientists in their social, cultural, historical, institutional and intellectual backgrounds. The case study has been chosen as a particularly suitable research method because of its ability to combine simultaneously description, analysis and interpretation. Influential case study researcher Robert K. Yin (1984) defined a case study as

> an empirical enquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (1984 p23).

As it is an emergent academic field, much work within celebrity studies to date has been devoted to theory-building, with several books attempting to map the terrain, describing in broad terms the phenomenon of celebrity (Rojek 2001, Turner 2004, Evans and Hesmondhalgh 2005). More specific studies have usually used approaches from political economy, cultural studies, media production and semiotic analysis to analyse fame in various fields. Generally, these studies shared a weakness that critics have identified as being common to much cultural studies in that their analysis has been methodologically eclectic, theoretically ununified, and stubbornly ahistorical (Bal 1999, Collini 1999, Fish

1995). Many studies have illuminated particular aspects of celebrity, such as the links between various forms of celebrity and capitalist ideology (Marshall 1997), the manufacture of fame by cultural intermediaries (Turner, Bonner and Marshall 2000), the characteristics of fame found in specific fields, including music, television, cinema (Marshall 1997, Dyer 1998), sport (Andrews and Jackson 2001, Whannel 2002), academia and literature (Moran 1998, 2000), as well as studies of particular celebrities (Cashmore 2004).

These studies have as their strength the close analysis of particular varieties of fame, but the cultural function of fame, a crucial element of celebrity, has remained poorly or narrowly conceptualised, as it has not been analysed in great historical depth. Mass media portrayal of individuals have used structural approaches, rather than being explored against a wider and deeper historical canvas. Celebrity has been chiefly concerned as a phenomenon of modernity. Consequently, this study's cultural-historical (Burke 2004, Chartier 1988) examination of celebrity has not been used frequently as a research approach within contemporary celebrity studies, with the main exceptions being Gamson's *Claims to Fame* (1994) and Braudy's *The Frenzy of Renown* (1986).

The versatility of the case study method has allowed a variety of analytic approaches to be used within its broad holistic framework[18]. As the cases are individuals, the case study researcher was similar to the biographer. Like celebrity studies, biography has analysed almost exclusively prominent individuals within a rich context. Like celebrity, biography has had individualism as its underlying philosophical principle, but it has been able to filter new theories and methods into "a personality-orientated cultural mainstream" (Schlaeger 1995 p63). As in biography, the cases' lives as public scientists have been presented in narratives. The study has shared particular features with the type of biography called the contextual biography, in which lives were placed within social, historical and cultural

[18] Case studies have been particularly unsuited to the traditional research report structure that begins with a statement of the problem, before setting out the research design, gathering data, presenting results and conclusions. This is because the case was not a problem or hypothesis (Stake 1995). The case study as a research method has been intensively discussed in the literature on research methodology. Gerring (2007 p20) called it a "definitional morass," as it has been defined variously in the fields of, among others, ethnography, life history, political science, anthropology, education studies. There have been further disagreements over the function of case studies in research. Gomm and Hammersley (2000) described how some theorists argued that cases must be generalisable to other cases, while others argued that the cases should refer only to their naturalistic setting. Still others, in a view that most accords with the current study, argued that cases should be capable of being transferred from one setting to another because they are a good fit, as can be seen in how the type of fame produced in the academic, sports, and, particularly, literary fields might be particularly good fits for the composition of scientific celebrity.

contexts, and which focused on critical moments and periods of change (Gerring 2007). As in contextual biographies, the cases have been described in their contemporaneous milieu and placed against a stream of historical events. The individual case studies have been used instrumentally, to illustrate a larger idea, rather than to provide a comprehensive description of their lives. Stake (1995 p96) developed this point, saying the case study researcher has also acted as a biographer in which the "chronology of a life" has been explored "against a thematic network (i.e. a set of issues). The individual case studies were, therefore, like contextual biographies, linked to wider disciplines, which in this case are celebrity studies, science studies and intellectual history, that provide the necessary rich theoretical framework through which the cases are analysed (Nadal 1984, Yin 1984, Stake 1995, 2003).

This dissertation takes the form of a collective case study, where several individual cases have been used instrumentally to illustrate an issue or phenomenon (Creswell 1998). Stake (2003 p138) formulated a more elaborate definition of the collective case study:

> A researcher may jointly study a number of cases in order to investigate a phenomenon, population, or general condition. I call this collective case study. It is instrumental study extended to several cases. Individual cases in the collection may or may not be known in advance to manifest some common characteristic. They may be similar or dissimilar, redundancy and variety each important.

Stake (1995) argued elsewhere that each case in the collective case study must be constructed from multiple information sources, and be situated in a specific context or contexts. Creswell (1998) noted that the cases can be studied holistically, creating a detailed description of the case, drawing out patterns and themes, and featuring interpretations by the researcher. Collective case studies that analysed a series of individuals were similar to collective biographies where lives were grouped together "thematically or topically" (Nadel 1984 p19).

Approaches from celebrity studies have been used to categorise the texts that constitute the construction of the star image. The most persuasive and coherent approach emerged from Dyer's work on the creation of the filmic celebrity. In *Stars* (1998), he described how the film star's images were constructed from the portrayal in four categories of media text: promotion, publicity, films, and criticism and commentary. Promotion was the deliberate manufacture of an image or context for an image for a star, and was the most easily-recognised, and intentional, text that constructed a star image. Publicity, by contrast, usually consisted of mass media profiles, interviews and reports, and has not as been self-consciously concerned with image-making as promotion. Criticism and commentary have been works of interpretation found in reviews, biographies and extended profiles in collected books, as well as fictional portrayals. Filmic celebrities' images were analysed also in their films, but for this study films have been replaced with a comparable category: the scientists' popularisation works, including books, broadcasts, speeches, articles, reviews and commentary. Dyer noted that the construction of the star image had a chronological aspect, as in biography, but was not just a series of moments from a star's career, nor was it solely the culmination of combined images. Instead the star image consisted of the analysis of the combination of these images as "a complex totality" (1998 p63)[19]. For each of the subjects, this study has broadly begun its description of their development as celebrities from specific historical points.

These various categories of texts have been analysed to uncover common patterns, narratives, themes and trends "to the extent that with enough repetition" it becomes possible "to talk about the representation of that subject" (Bonner 2005 p65). Representation in this study refers to how the case studies as individuals in the material world have been given meaning across the mass media texts categorised as promotion, publicity, popular works and criticism and commentary. Influential cultural studies theorist Stuart Hall (1980, 1997) noted that culture consisted of shared meanings and values. In culture, language was the privileged system in which meaning was produced. Analysing how meaning was produced has meant focusing on discourses and "*discursive formations*," which have been defined as

> ways of referring to or constructing knowledge about a particular topic or practice: a cluster . . . of ideas, images and practices, which provide ways of talking about . . . a particular topic, social activity or institutional site in society . . . 'Discursive' has become the general term used to refer to any approach in which meaning, representation and culture are considered to be constitutive (Hall 1997 p6, emphais in original).

The discursive approach has been concerned with the effects and consequences of representation, which has, furthermore, a historical specifity. Putting concepts and ideas in a symbolic form, which for this study have principally been written language or visual

[19] The work on the images of the historical high-profile scientists, Newton, Darwin, Einstein, Oppenheimer, Hoyle, Sagan, and Gould, has been constructed largely from these diverse sources to present their subject's complex totality (see Browne 2001, 2003, 2003a, Fara 2003, Gregory 2005, Highfield and Carter 1993, Iliffe 1998, Illy 2006, Isaacson 2007, Masur 1993, Missner 1985, Overbye 2000, Pais 1994, Thorpe and Shapin 2000, Thorpe 2006, White and Gribbin 1995, Yeo 1988).

imagery, that can be transmitted and interpreted meaningfully, was called "the practices of representation" (Hall 1997 p10). Representation has operated intertextually, with texts conveying meaning by referring implicitly and explictly to other texts and genres (Collini 1999, Hall 1980, Horgan, O'Connor and Sheehan 2007).

Hall (1980) described how producers of cultural products have encoded meaning into their texts which readers or viewers have then decoded. Hall's analytic tools of connotation and denotation has been used to distinguish the ideological dimensions to texts, and textual analysis has looked for shared rather than idiosyncratic readings, looking for what Hall called the preferred or dominant meaning encouraged by the text, its context and its medium. Dominant, in Hall's usage, referred to ideological positions – embedded frameworks for understanding the world (Hall 1980). Celebrity has been defined as a genre of representation, in which an intensely personalised portrayal of a figure as a unique individual was presented. Therefore, a significant portion of this research investigates the patterns of representation that portray each of the case studies as unique individuals, ones in which the private and public, the writer and the written, the real and the represented, cease to be meaningfully distinct categories.

However, this study is not concerned with the content of these texts alone. It situates these texts in their contexts of production, an approach that necessitates the interrogation of not only the representation of the texts themselves, but also the context of the world represented in those texts. It examines how these texts, like all texts, have been created in specific socio-historic contexts. This context has been described in detail using approaches from intellectual history. Rather than existing only in texts, the case studies have been living and working and writing in a distinct historical era, itself occurring in the stream of history. Intellectual history has linked an individual's ideas with their cultural milieu, analysing the continuities, causes, comparisions, traditions, typologies and influences in the historical development of ideas. This study adopts an approach to intellectual history that is broadly externalist, situating ideas in the social and cultural and historical conditions of their production, as opposed to the traditional internalist approach that for many decades characterised the historical study of science, where scientific ideas were unchanging, universalist, unaffected by social factors. Celebrities embody individualism, but no individual can stand outside society or history. Individuals act in context. This approach allows the patterns of representation in the case studies to be linked to wider historical patterns of representation of scientists and scientific ideas throughout history, aiming at creating Dyer's complex totality (Gilbert 1971, Chartier 1988, Carr 1990). This approach combines the many micro-studies in several areas into a big picture, and it also combines the conclusions of those studies conceptually, making connections between them and providing fresh interpretations on their findings.

Gerring (2007) said researchers could use a comparative historical method in examining over time multiple case studies. For this study, this comparative historical method has been informed by two classic works on the historian's craft, E.H. Carr's *What is History?* (1990) R.G. Collingwood's *The Idea of History* (1994). The past and the historian's interpretation of the past, noted Collingwood, have co-existed. The historian has reconstituted the past, based on empirical evidence, through writing, but the historian's account was not merely the recital of facts. This writing selected and arranged facts, presenting them from a definite perspective, applying what Carr (1990 p85) called "the right standards of significance" by rising above the "limited vision" of their own place in society and history, while examining their involvement in that situation, aiming at creating a durable study, which aimed at creating an understanding of an emerging future. The historical techniques applied in this study have included the close interrogation of the production of source texts and the perspective of their author, the continual linking of text and context and the constant interplay between data-gathering and interpretation, the continuous process of moulding facts to interpretation and interpretation to facts by the subjective researcher, who does not deal in absolutes (Carr 1990, Collingwood 1994).

This study has used extensively newspapers, as well as biographies, biographical essays and autobiographical accounts, as data for constructing the case studies. These sources have had advantages and disadvantages as research material. Newspapers were valuable resources, because they captured careers in progression. However, they also frequently preserved falsehoods or myths, but this preservation was itself useful for the analysis of fame, as the conflation of fact, falsehood, gossip and myth were inherent features of the subjects' representation as celebrities. Autobiographical writing offered "introspective insight" (Barnes 1988 p33). The circumstances of the production of autobiographical texts was examined, as the subject may have magnified their own historical role. The reviews of biographies and autobiographies were consulted, to gather more evidence on which to build a proportionate appraisal of the subjects under study (Nadel 1984, Hennessy 1988, Barnes 1988, Holmes 1995, Peters 1995, Stallworthy 1995).

The narrative presentation of the subjects as case studies, with their fame a consequence of multiple causes, has meant that case study research has shared techniques with historiography (Gomm and Hammersley 2000). This study analyses the process of how the case studies became celebrities, but this is a process with several related causes, some more ultimately influential than others. Celebrity, like other social phenomena, has causes (Carr 1990). Describing the case studies in narrative form involves creating original examples of the historiography of science, which themselves offer critiques of how similar stories about the case studies have been told, often by the protagonists themselves. Carr (1994 p124) noted that history can only be seen through the eyes of the present and historiography was progressive in that it was "constantly expanding and deepening insights". Within the historiography of science, the current study can be classed as a contemporary example of the growing field of reputational studies, in which reputations have often been involved in the legitimation of scientific authority (Higgitt 2003, Miller 2000). The second chapter of this dissertation traces chronologically the development of the celebrity science throughout history[20]. The four case studies offer a description of how the celebrity scientist is structured in contemporary society.

This approach from intellectual history is particularly suited to explaining the social function of celebrity, which can be best understood through the historical investigation of how particular ideas and perspectives came to be viewed as having such social influence and impact. In this study, the roots of the subjects' social functions, with sometimes different, and sometimes similar functions, present to varying degrees in each case, have been explored by merging the work of other scholars with this study's original empirical analysis of the case studies' representations. Stephen Hawking's social function can be most effectively analysed when situated against historical ideas of disembodiment and scientific ideas, as well as within the history of popular physics publishing. Richard Dawkins can best be understood against the background of the social and scientific controversies over evolutionary biology and the British philosophical tradition of empiricism. James Lovelock's celebrity portrayal can be best understood when situated in the history of ecology, while Susan Greenfield's rise to public prominence has occurred within the rise of

[20] Discussing the idea of celebrity historically necessitates a discussion of historiographical anachronism. Collini (2006) and Braudy (1997), especially, have noted that celebrity as an idea can be constructed historically, having traditions and precedents. Philosopher Nick Tosh (2003 p649) argued that history was a "present-centered discipline," one that could inevitably only view the past with knowledge unavailable to past actors, and historians focused on aspects of science ancestral to contemporary science.

committed British political advocacy to the public understanding of science, as well as historical representations of women in science. Underlying this approach is one of the basic tenets concerning the function of the historian: to understand the past as a means of understanding the present (Carr 1990).

Historian of ideas Anna Bramwell in her *Ecology in the 20th Century: A history* (1989) had a similar methodological dilemma while tracing the history and characteristics of the concept of ecology. Bramwell (1989 p15) asked:

> How and when did ecologism manifest itself? A theory about this is not provable in the scientific sense. The method I propose to follow is to describe, explain and analyse together. I start from the position that we are aware that something exists which is to be examined . . . The form of examination will help to define the phenomenon.

This study gathers data not just from what Denzin (1989 p7) called the traditional "documents of life" of biographers – which can include biographies, autobiographies, personal papers, letters – but also their mass media representations. The approach here is similar to the contextual biography in that it finds beginnings, turning points and historical dates, anchoring the subject in socio-historical context. It merges the lives of the subjects with the world of ideas, ideas that have a presence in the world, and in order to write about the subjects, the researcher writes about these ideas and their material expression in the world. There are other ways to write about the subjects' lives. This has meant that quantitative explanations of social reality, focused on issues of validity, reliability and generalisability, must be replaced with a concern with meaning and interpretation. It must address literary interpretation and so involves situating the study against structuralism, poststructuralism, hermeneutics, semiotics, marxism, deconstructionism and approaches from cultural studies. Structuralist, semiotic and deconstructionist approaches do not provide the necessary historical mode of explanation that this study contends is essential in the explanation of celebrity and science. Cultural studies too has been marked frequently by programmatic and often ahistorical research approaches. Hermeneutic approaches do not address larger contextual issues outside the interpretation of the text. In its discussion of interconnectedness and strong historical contextualisation, the study is close in ways to a marxist conception of history, except it has viewed ideas and culture, rather than the mode of production in historical materialism, as the force of historical developments, and is not aimed at social transformation. Collini (2006) noted that the lack of a focused disciplinary perspective, often characteristic of reactions to specialism, can drift into a vapid assertion that everything is connected to everything else. This study is not an objection to specialisation, but acknowledges that lives are open to multiple interpretations, and celebrity is a multifactorial phenomenon, one that can be examined holistically by combining distinct approaches, under a unified framework, with a coherent philosophical approach.

The answer to criticisms of methodological eclectism, wrote Collini (1999) elsewhere, has been the creation of thickly textured studies. Each of the following four chapters presents a narrative that simultaneously describes, analyses and explains its case studies with the aim of providing what anthropologist Clifford Geertz in his classic *The Interpretation of Cultures* (1993 p28) called "thick description". This descriptive approach describes in detail the features of a particular case, including worldview, ethos and ideology[21] from "densely textured facts," from which larger conclusions about scientific celebrity can eventually be drawn. This thick description is needed to analyse the multifactorial issue of an individual's celebrity.

The case studies have been purposefully chosen. The study focused on the modern contemporary British experience, because the individual cases could be situated within the historical currents of a single national context, keeping the cases bounded in time and place[22]. Science, however, has been an international endeavour historically and referring to examples from outside Britain – as in the chapter that analysed the development of scientific fame, for example – has been necessary to prevent the study from becoming too restrictive, especially as several of the case studies, including Dawkins, Hawking and Lovelock, have had their personas formed through international representations. Moreover, science is global (Gregory 2008) and is not shaped by national contexts alone. At the beginning of the research, a range of books by different scientist-authors, and the newspaper representations of those authors, were read to provide a provisional set of potential case studies. Scientists with public roles whose work and publicity was read initially included fertility expert Robert Winston, astronomer Patrick Moore, biologist Lewis Wolpert, biologist Colin Tudge, neurologist Steven Rose, physicist Kathy Sykes and geneticist Steve Jones.

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21 Ideology has been defined in this study, not as false consciousness or propaganda, but as "a set of interconnected views and values systematically generated by specific socio-historical conditions." Furthermore, an "ideology provides the matrix of thought through which the world is perceived and conceived". Overall, the "concept of ideology is meant to shed light on the way a person's view of the world is shaped by the vantage point from which s/he perceives it" (Sheehan 1987).

22 For a full description of bounded systems, see Creswell (1998), Stake (2003) and Yin (1984).

An initial interpretation was made as to whether or not these examples exhibited some features of celebrity as was defined. The more books and articles read, the more the criteria for selection became clearer. The cases chosen have been representative, to various degrees, of the types of public scientists and scientists-authors that have communicated science, for different reasons, in various forums outside the professional communication channels of their scientific disciplines, in a political culture that has emphasised, since the mid 1980s, the public understanding of science[23]. The chosen case studies are all British, working currently or previously as scientists, and have all been popularisers of science. The scientists have come from a variety of scientific disciplines. There has been a variation in gender. They were chosen as they were expected to manifest, to different degrees, the phenomenon of the celebrity scientist,[24] as the variations and differences are important in describing the phenomenon.

Furthermore, as in Greenblatt's (1984 p6) selection of Renaissance authors to analyse, they were chosen because an intense and individual analysis promised "access to larger cultural patterns". In turn, the use of approaches from intellectual history can access those larger cultural patterns. Moreover, all of the cases have been described using discourses of celebrity and have been described as prominent famous scientists. Richard Dawkins, the first Oxford professor of the public understanding of science, has been called, among other labels, "scientific atheism's heavyweight champion" (Henderson 2006 p11) and "the famous atheist" (Parris 2006 p17). James Lovelock has been called "a celebrity" (Ryle 1991 p3) and "one of the most famous scientists on the planet" (Irvine 2005 p44). Susan Greenfield has been called "science's most famous woman" (Marsh 2007 p10), "Britain's most famous living female scientist" (Connor 2004 p19). Stephen Hawking has been called the most

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[23] Discussing representativeness, Gerring (2007 p141, emphasis in original) noted that "cases are *more* or *less* representative of some broader phenomenon and, on that score, may be considered better or worse subjects for intensive analysis".

[24] Flyvbjerg (2004 p426) described purposeful sampling as "information orientated selection," involved choosing cases because they were paradigmatic cases, or critical cases, or a combination of both. Paradigmatic cases highlighted general characteristics of a phenomenon, operating as a reference point, having metaphorical and prototypical value. Critical cases were important strategically to understand the phenomenon. To these two strategies, Creswell (1998) added cases sampled because they were expected to manifest the phenomenon intensely, because they were politically-important, and because they exhibited variation (in this case, variation across specialisms, gender and ideology). For the current study, Hawking has been a paradigmatic case, who has manifested the phenomenon intensely; Dawkins has been a critical and politically-important case; Lovelock has been politically important; Greenfield has been a critical case for examining potential gendered differences in the representation of scientific celebrity.

famous scientist in the world" (Warren 2004 p33) and "the world's best-known living scientist" (Connor and Castle 2006 p3).

To be sure, other scientists could have been selected for in-depth analysis, but were not chosen because they were not expected to yield substantially different patterns of representation than the chosen studies, although they could be examined in other studies. Furthermore, many of these potential candidates for in-depth study touch tangentially on the chosen case studies. For example, Rose and Sykes appear in the discussion of Dawkins and Greenfield respectively. Discussing them in these contexts adds to the thick description overall and the richness of individual cases (Gerring 2007). Fundamentally, it was estimated that the chosen case studies, as Stake (1995) argued, would be the best opportunities to study the phenomenon.

The constituents of the celebrity image have been gathered for this study from readings of all the subjects' books aimed at popular audiences; reviews and criticial commentary on those books; biographies, autobiographies and biographical portraits in other publications; the subjects' critical writing; profiles, interviews and reports in newspapers, principally British publications, including *The Times, The Guardian, Daily Telegraph, The Independent, Daily Mail, The Sun,* and *The Daily Mirror,* because these texts are entwined with British culture[25]. There was a particular focus on the extended interview or profile article, as there has usually been an emphasis on personality and character in these journalism genres (Adams, Hicks and Gilbert 1999). Coverage of the subjects was also examined in the two professional publications, *Science* and *Nature*, which were expected to offer a more specialist scientific perspective on the subjects, as was *New Scientist*, which occupies a middle-ground between the specialist and the non-specialist. Reviews were also collected from *The New York Review of Books* because of its international influence and *The London Review of Books*. Representations in television programmes[26], magazines[27], author blurbs, CVs and personal

[25] Comprehensive archives of these newspapers were available on the LexisUK database, dating back to the early 1980s. Each of the British newspapers was searched systematically in this database, using the case studies' full names and also only their surnames, to ensure that a comprehensive collection of retrievable articles was included.

[26] While a comprehensive archive of published newspaper articles that featured the case studies can be viewed on the LexisNexis database, television programmes were sampled pragmatically, and were based on availability and accessibility. Where television programmes could not be viewed, contemporaneous reviews were consulted from various newspaper critics to create an evaluation of the material.

[27] As there is not a comparably comprehensive archive for magazine articles as for newspapers, the magazines were sampled based on reasons of pragmatism and accessibility.

websites were examined. Artistic and photographic representations were examined, especially what might be called their formal, canonical representation, as determined by their appearance in the UK National Portrait Gallery, promotional material in their author blurbs, CVs, personal websites, and, where possible, in discussions of them in new media. As Prindle (2009) noted in his study of Gould, it was not possible to gather every single media mention, but he tried as far as possible to use a collection of sources that was representative and proportional.

To analyse whether the scientists were public intellectuals, the subjects were analysed against the scheme outlined by Collini (2006). Their professional backgrounds and institutional affiliations were examined, as were the means of communication with various audiences, the forums in which these communications occurred, the publishers of their books, the publications for which they wrote, the television channels on which they broadcast, as well as the contents of the communications that were analysed. The critical reception that their work received was also analysed. In the current study, to analyse whether the subjects participated in public science, a close reading of their popularisation work in which they addressed the nature of science was undertaken.

Visual images of the subjects have been analysed also. Images were interpreted using the categorisation developed by American philosopher C.S. Peirce, who analysed how communication, including visual imagery, generated meaning. Central was the sign: "something which stands to somebody for something in some respect or capacity . . . the sign stands for something, *its object*" (Peirce cited in Fiske 1990 p42, emphasis in original). Peirce divided signs into three types: icons, which bear a resemblance to their subject; an index, which has a direct existential connection with its object; and symbols, whose connection with with their objects was due to convention, which determined how symbolic signs generated meaning, grounded in our experience of the sign. This experience, this study argues, was historically constituted.

At the beginning of the project, it was envisaged that the subjects would be approached for interview, but through the collection of data from various sources, it emerged that the subjects had all effectively addressed what would have been the central aim of the interview: to gather their reflexive comments on their own fame and public status. The data collection was driven primary by the belief that textual representation has been central to celebrity because it in texts that the “evidence of celebrity activity” has chiefly been found (Bonner 2005 p58).

The varied, but complementary, analytic approaches and methods of data collection and presentation have been underpinned by a single philosophical perspective, critical realism[28]. Critical realism has offered a coherent means of negotiating the tension between the materially real subject and the represented image that is an inherent feature of celebrity. It offers a coherent way of analysing the representation of scientists, and scientific ideas, within their cultural and socio-historical context, while affirming the cognitive achievements of science. Critical realism has insisted that knowledge is culturally and historically situated and the process of producing knowledge is a social process in which language is embedded, yet knowledge cannot be reduced to the social features of its production (López, J and Potter 2001, Potter 2001, Dear 1995, Joseph and Roberts 2004). The critical realistic perspective conforms with the overall case study method, which Gomm and Hammersley (2000 p5) called a “distinct research paradigm,” contrasted with positivism, naturalism, interpretivism and constructionism.

Critical realism as used in this study takes the position that there is an external reality, independent of the human mind. The scientific method, identified as the hypothetico-deductive model[29], based on evidence, reason and increasingly sophisticated methodology, is the means by which successively more correct understandings of this external reality can be found. At the same time, it acknowledged that some areas are uncertain and ambiguous and scientific methods cannot deliver a definitive conclusion. However, the knowledge of this natural world is obtained by human scientists whose means of theorising and investigating the world are affected by personal, social and cultural factors. Scientific findings have potential consequences for economics and culture and personal relationships, and these factors can influence scientists’ choice of research topics, interpretation and evaluation of results[30]. The critical position is opposed to postmodernism’s sceptical relativism and eclectic epistemology. It is opposed to extreme social constructionist conceptions of science and to the paradoxically ahistorical historicism of Focaultian archaeology (Foucault 1980).

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[28] Critical realism has been associated most recently with philosopher Roy Bhaskar (2008), but its roots lie with traditional conceptions of realism. It has been influenced by philosopher of science Karl Popper, especially the idea of science progressing as increasingly better approximations to the truth, or verisimilitude, as he called it. For a more detailed description, see Chalmers (1995 p146-160).

[29] Formulated by philosopher Carl Hempel, this model details how science operates through the interaction between theory and evidence. For a full explanation, see Dunbar (1995 p25).

[30] The position advocated here is close to the stance taken by Prindle (2009) in his analysis of Gould.

The critical realist perspective provides a philosophical coherence to the analysis of various texts from different disciplines. Although the celebrity image is constructed from various mass media texts, all refer to a material-world referent. Although scientist-authors are writing about scientific facts and theories, these theories and facts exist independently of their representation in writing, even though the texts are themselves representing science. Although historical facts can be contested, they refer ultimately to a historical material reality, one that has been previously interpreted by other scholars[31]. This position is consistent with what Hall (1997) called the constructionist approach to representation, where the material world existed, but was made meaningful by the practices of representation. Peirce was chosen as his approach to visual analysis was rooted in the American pragmatist tradition, rather than the other influential semiotic theorists, Barthes (1977, 2000) and Saussure (see Fiske 1990), who used structuralist approaches. The critical realist perspective allows the data gathered from these areas to be analysed collectively from a single coherent position. Without such a unifying and coherent perspective, large-scale studies would end up as a mass of unsustainable epistemological contradictions.

4.2. Theoretical models

The current study has used as theoretical models *The Visible Scientists* (1975), by Rae Goodall, *The Visible College*, first published in 1978, by Gary Werskey, and *Absent Minds* (2006), by Stefan Collini. These books have used, to varying degrees, the research methods, analytic approaches and structural styles that have been incorporated into the current study's research design as a collective case study. Werskey's book was a collective biography, as his subjects were united in the broad philosophical and politically leftist aim of producing a socially responsible science. Less collective as a group, Goodall's chosen scientists were persuasively analysed as being united around the concept of visibility, sharing characteristics that enhanced and facilitated that mass media visibility. Collini's book featured an extended examination of four twentieth century British writers and historians, embedded in their era's contexts, who illustrated his thesis on the paradox of denial. All the books used individuals as cases to be analysed. The *Visible Scientists* and *Absent Minds* were not biographies, but used individuals instrumentally to illustrate larger ideas.

[31] There have been strong tensions in contemporary academic history over issues of objectivity, interpretation and the nature and reliability of historical knowledge. For an example of the debates, see Novick (1998) and Lichtenberg (1998).

The structure of Goodall's book has been mirrored in the current study, as it the one that has followed most clearly the pattern of analysing collectively several individual case studies. Goodall's book began with the definition and elaboration on the visible scientist concept, before proceeding to analyse each scientist case-by-case, chapter-by-chapter, ending with a chapter discussing what she termed the visibility system, an analysis that created new theoretical insights. The structure closely followed guidelines suggested by Creswell (1988), Merriman (1998) and Gerring (2007), where a detailed description of each case, and its context, has been given, in which patterns and themes have been observed, featuring interpretations by the researcher. Each case has ended with a within-case analysis that has summarised how the case has illustrated the phenomenon of the celebrity scientist. Goodall chose Sagan, Mead, Skinner, Commoner, Pauling, Shockley and Ehrlich as her case studies based on an initial quantitative survey to determine the most high-profile US scientists in the 1960s and 1979s. Her data was gathered predominantly from interviews with the case studies themselves, as well as commentators and journalists that covered the scientists' careers.

However, in Goodall's study there were areas of significant theoretical weakness. There was no systematic discussion of how the scientists were represented – no sustained analysis was made of the characteristics of the publicity received by her scientists, an essential element of contemporary celebrity. Her concept of celebrity was not sufficiently differentiated from visibility: she used the terms as synonyms. Furthermore, her subjects' rise to visibility was not placed against a contextual backdrop. Goodall also did not address in detail how the promotional industry contributed to her subjects' visibility. Written more than three decades ago, *The Visible Scientists* was not able to account for the accelerated celebrification of professions and aspects of public life since its publication (Turner 2004, Evans 2005, 2005b). Goodall made little attempt to situate scientific visibility among the visibility of other professions or experts, and did not contextualise sufficiently the scientists' place in wider society at the time, nor did she elaborate on the links between her visible scientists and the social order. Nevertheless, Goodall's work provided a valuable piece of research for discussing prominent scientists in their public role, going beyond the scope of most of the science popularisation literature, and her concept of visibility shared characteristics with celebrity.

The Visible College featured more detailed social-historical contextualisation. Werskey outlined his subjects' biographical history, before situating their scientific careers inside the wider political, social, intelletual, institutional and philosophical currents of the time. The book, which was well received critically (Searle 1980), was one of the few volumes that addressed the twentieth century British intellectual from outside the literary world, moving beyond narrow histories of science to comment on the wider intellectual and political aspects of the case studies' lives (Searle 1988). A thick contextual backdrop was needed, wrote Werskey, because the discussion of his atypical scientists' lives needed to be integrated with a discussion of how the scientific vocation was organised at the time they worked. Werskey (1988) wrote that he wanted the book to mix biography and social history.

Werskey collected his data by interviewing the five scientists, consulting their published writings and critical commentaries written about them, as well as researching writers and scientific publications of the time to realise fully their socio-historical context. The lives of his protagonists were thickly embedded in the book in the complex web of social relations of the time, showing how his subjects' fortunes interacted with other contemporary radicalised scientists. A structural weakness in the book that was pointed out by critics (Searle 1980) was the mixture of presentation styles. The first part of book used a biographical approach, sketching the backgrounds and family circumstances of the five scientists, showing how this influenced their political evolution into socialists, but this presentation style moved, in the book's second part, to a broader account of the wider social responsibility of science movement.

Absent Minds has also influenced the structure and style of analysis of the current study. It described the historical development in the twentieth century of Collini's theory of the paradox of denial, most prominently in Britain, but with some comparable historical analysis with intellectuals in France, Germany and the U.S., before illustrating his thesis with a close analysis of five case studies: writers T.S. Eliot and George Orwell, historians R.G. Collingwood and A.J.P. Taylor, and philosopher A.J. Ayer. These were all purposefully chosen as they manifested the absence thesis of his book. Collini's rich contextualisation, use of varied sources, original interpretation of primary sources, and use of diverse figures as examples illustrating a unified argument have been instructive for the current study.

These studies have gone some way towards addressing an ongoing tension in the historiography of science, one that has reflected the tensions in distinguishing between nature and culture (Dear 1995) that has characterised different conceptions of the scientific method. Compared with the written lives of actors and artists, politicians and writers, biographies and autobiographies of scientists have presented unique epistemological problems, ones related to the ideological conception of science. Do scientists create knowledge about the natural world on their own? Is knowledge about nature shaped by their human biases, prejudices, viewpoints and language?

These questions have been addressed in biographical accounts of scientists, which also engaged with the personality of scientists, their religious, moral and philosophical views, as well as the process of the creation of their science, and the extent that they were embedded in social and political contexts. Shortland and Yeo (1996) noted that these biographical approaches have contrasted with the powerful ethos of western science since the seventeenth century that argued that scientific thought has progressed collectively, with individual contributions only added to the general store of scientific knowledge when it has been tested by others. For example, Einstein described science as the "application of a method which transcends the 'merely' personal" (Shortland and Yeo 1996 p11). In biographies, the representation of the causal process of scientific discovery has been contentious, especially in the

> way conceptions of genius, deployed in biographies, have competed with explanations in terms of abstract, social and historical factors ranging from material conditions to political ideology (Shortland and Yeo 1996 p36-37).

Histories of science written in the early twentieth century were informed by the biographical approach that took an internalist view of scientific development, with Philip Lenard's *Great Men of Science: A History of Scientific Progress* (1933) being an example. After about 1940, as the history and philosophy of science rose to academic prominence, individuality was dislodged by other frameworks. Mertonian sociology of science moved the focus of understanding science from individuals to institutions. There have been persuasive counter-views, however. As eminent historian H.W. Carr, a biographer of German mathematician and philosopher Gottfried Leibniz, noted:

> The history of philosophy is essentially biographical. We cannot dissociate the philosopher from his system in the same way that we are able to dissociate the scientific discoverer's discovery from the scientific discoverer himself (Carr 1929 p203 cited in Hankinds 1979 p9 cited in Shortland and Yeo 1996 p5).

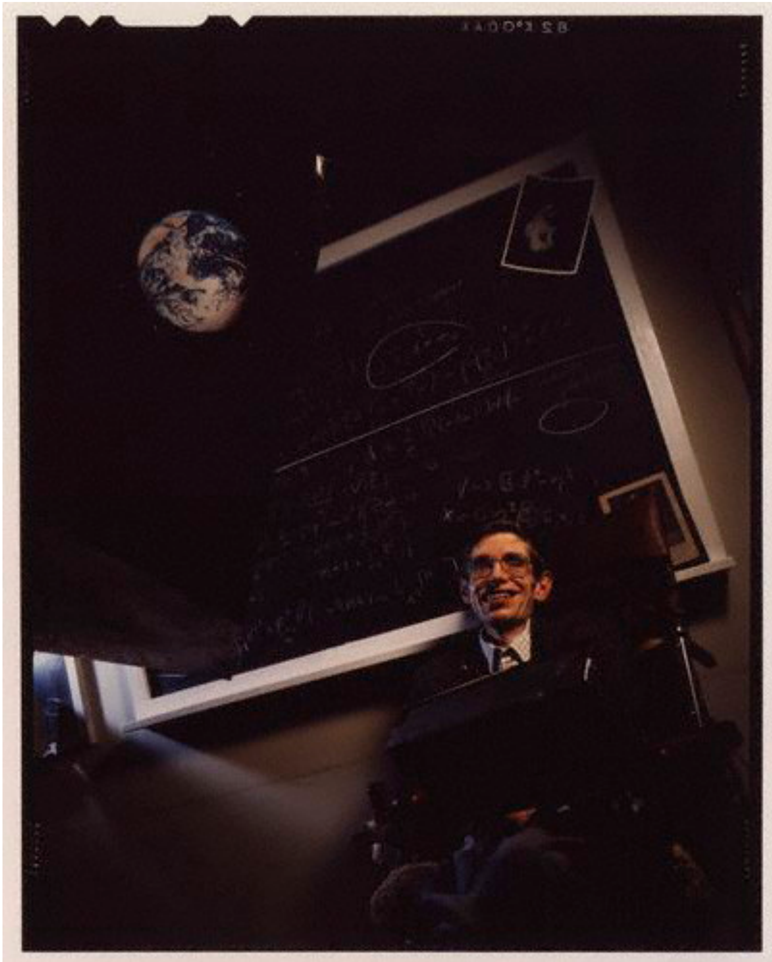
Shortland and Yeo (1996 p14) noted that, in its historical context, "the celebration of the work of individual practitioners has been fundamental to the practice of science, or, at least, to the rhetoric of that practice". The same authors noted that recent science studies scholarship has bridged the divide between individual and collective accounts of scientific practice. Stephen Shapin's biographical focus on Robert Boyle in *A Social History of Truth: Civility and Science in the Seventeenth-Century* (1994), for example, presented an analysis of historical social norms in science. Likewise, Shortland and Yeo (1996 p37) made the case for "the importance of personal identities and life histories in the cultural history of science".

This study's style of presentation has been informed by Shapin's critique of what he termed "hyperprofessionalism" in his, and other, academic fields, that has been characterised by self-referentiality, self-absorption and, crucially, "a narrowing of intellectual focus" (Shapin 2005 p238). As this study's critique has been written from a position largely sympathetic to claims of science's cognitive powers and unequalled epistemological validity in determining ever more correct facts about the natural world, the analysis cannot be treated as an attack on science. It is aimed, rather, at showing that science is part of culture and society and that social and cultural factors have, throughout history, been constituents of scientific work.

In summary, this collective case study, informed by critical realism, has been chosen as a research design as it can combine coherently the related research methods of biography, celebrity studies, science studies, intellectual history and historiography of science to present a holistic explanation of the historical development of the four case studies as scientific celebrities. Their celebrity is linked to figures from the history of science, to wider promotional patterns in contemporary society, to continuities between their scientific ideas and other ideas, and other representations, in the history of ideas. It looks at persistent patterns of representation across a range of texts, seeking patterns, continuities, themes, trends. It is this approach that can reveal most clearly the social function of celebrity and the cultural predisposition to accept the pronouncements of some scientific public intellectuals. The texts are related to more than just the texts themselves. They are related to the material reality of the subjects, and the texts are put in context, to examine the totality of connections that have operated socio-historically to shape the construction of celebrity. It looks at celebrity systemically across several spheres of professional practice in contemporary society, linking scientific fame to external influences, scientific fame being a complex, messy, rich, multifactorial phenomenon. As Gould noted: "What is wrong with messy richness, so long as we can construct an equally rich texture of satisfying explanation?” (Gould 1997).

SECTION 2. CASE STUDIES

Chapter 5. Stephen Hawking: Science incarnate



Photograph: Stephen William Hawking by David Gamble © David Gamble. Reproduced under license from TopFoto, UK.

5.1. *"The Hawking phenomenon"*[32]

Cosmologist Stephen Hawking (1942 -) has been portrayed uniformly in biographies and journalistic accounts as the most famous scientist of the contemporary era (Gribben and White 2003, Radford 2005). The Lucasian Professor of Mathematics at Cambridge University, a post once held by Isaac Newton, has been represented as "the most famous scientist in the world" (Warren 2004 p33), "the world's best-known living scientist" (Connor and Castle 2006 p3), the "most famous, and glamorous, man of science" (Elliott 2000 p12), "the greatest scientist of our day" (Boslough 1989 blurb), "a celebrity, a part of popular culture . . . the most visible scientist alive today" (Leane 2007 p132, p138), "the world's most celebrated cosmologist . . . a man who is famous for saying he can think in 11 dimensions" (Fernand 2007 p5). Hawking has come to occupy a point of intersection between theoretical physics, popular publishing, public conceptions of genius and the public image of the scientist. Hawking has become a figure through which several interrelated themes concerning celebrity and science can be productively explored, including the historically-influenced conceptions and representations of genius, the eclipse of scientific renown by public fame, and the breakdown of the border between public and private selves in celebrity.

Hawking's fame and status as a "global cultural icon" has rested on the publication, in 1988, of his popular physics book *A Brief History of Time* (Radford 2005 p14), which had a "pivotal" role in the late twentieth century popular science boom (Leane 2007 p35). The 175-page cosmological guide for non-experts described the history of physics and the evolution of the universe, covering concepts including space, time, relativity, gravity and, Hawking's research speciality, black holes. The book predicted that science was perhaps half a century away from developing a grand unified theory that would reconcile the two revolutions in twentieth century physics, relativity and quantum mechanics, joining the probability of the sub-atomic world with the curvature in spacetime first described by Einstein (Hawking 1988).

Overtaking Carl Sagan's *Cosmos* (1985), the book has remained the most commercially successful popular science book ever published. It was first printed in June 1998 and within five months it had sold 150,000 in hardback. The first printing of 40,000 in the American edition sold out so quickly that publishers were unprepared for the demand. Reprinted ten

[32] Rodgers 1992 p234.

times in 1988, the book remained in the *Sunday Times* bestseller list for more than four and a half years. The book, translated into 40 languages, became so popular that it was estimated that by 1998, one copy existed for every 750 people on Earth (Rogers 1992, Vines 1997, Shermer 2002, Radford 2005)[33]. The influence of the book's unparalleled success on the publishing industry has been called variously the Hawking effect and the Hawking phenomenon. Publishers realised that if one popular science book on an esoteric topic can become a bestseller, then surely others can replicate its success (Coles 2000, Gribben and White 2003, Rodgers 1992, Radford 2005).

Scholarly writing on Hawking has focused to date on the reasons for the book's unexpected success, discussions of his science, analysis of its literary style, and the effect of the book's popularity on its author's scientific standing (Raymo 1990, Rodgers 1992, Dunning-Davis 2003, Turney 1999, Leane 2007). Biographies have remained largely hagiographical and tended to mix repetitive accounts of his life – including the motor neurone disease he has lived with since he was 21 – with a popular explanation of his contributions to theoretical physics (Boslough 1985, Ferguson 1992, McDaniel 1994, White and Gribbin 2003, Larsen 2007).

Hawking has been presented in these popular, rather than critical, biographies as an exemplar for students who aspire to become professional physicists (Ryan 2005) and as a celebrated example of great achievement by someone with a debilitating condition (McDaniel 1994). The first of these biographical studies, Boslough's *Stephen Hawking's Universe* (1985) presented an intellectual biography of Hawking that hinted at, but left unexplored, the deeper cultural associations between mind, body, science, and discovery that have been bound up in Hawking's popular image. In general, the accounts have fitted into the tradition of biographies that appeared in the nineteenth century of Galileo, Kepler and Newton that were presented as "examples of achievement and virtue" (Yeo 1988 p266). These works presented a consistent public persona of Hawking. They did not present a complex portrait of their subject and the tensions within scientific culture that he has come to embody.

These book-length biographies all placed Hawking within a context of contemporary stardom. His celebrity has been portrayed as a result of his scientific and popularisation

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[33] As a comparison, a paperback book by Gould would have sold, in its first year, between 20,000 and 30,000 (Vines 1997).

achievements, rather than as active process of image-creation, occurring occasionally *within* those popularisation texts. The processes of his celebrity creation have not been analysed with sufficient, sometimes without any, analytic depth – even as fame has been used as a framing device to structure a biographical study of his life. The chapters in White and Gribbin's (2003) biography alternated between discussions of theoretical physics and chronological descriptions of Hawking's life and career. The biographical narrative was arranged through the framework of Hawking's ever-increasing fame, the chapter titles including: The Breakthrough Years, The Foothills of Fame, Science Celebrity, Hollywood, Fame and Fortune, Stephen Hawking: Superstar. There are alternative readings of Hawking's celebrity in journalistic writing, but this has been fragmented and necessarily constrained by its genre (Adair 1997, Appleyard 2006a).

The framework advanced in the current study offers a useful means of analysing the cultural and social processes involved in the construction of Hawking's fame and lasting status as a popular icon. This analytic framework can draw together the promotion, publicity, critical writing and core popularisation texts that circulate the Hawking persona. The framework can emcompass the multiple and sometimes contradictory discourses surrounding the promotional strategies involved in the writing and marketing of *A Brief History of Time*, the subsequent publicity surrounding the book and Hawking himself, the focus on his private life, the deeper socio-historical values he embodies, and the symbolic function of his fame.

The former science editor of *The Guardian* newspaper, Tim Radford, called 1988 "year zero for Stephen Hawking the bestseller" (1998 p10) and it is here that an analysis of the cosmologist's fame must first concentrate. Hawking's continued fame has been tied up with the book: all the causes of his celebrity are tied to the book's production, marketing and reception. The under-explored scientific context to the book's development is crucial in understanding the conditions of its production. At the time of publication, Hawking was established as a precociously successful professional physicist. He was made Lucasian Professor in 1979 after having occupied several positions in Cambridge including Reader in Gravitational Physics, Research Assistant in the Department of Applied Maths and Theoretical Physics, a Fellow for distinction in science since 1969, and had been a Fairchild Distinguished Scholar at the California Institute of Technology (Who's Who 2008). Aged just 32, he was inducted into the Royal Society, when he was already, according to Carl Sagan, "a legend" (1988 px, Boslough 1989).

Hawking had been publishing refereed academic papers since 1965 and had established a publication record, before *A Brief History of Time*, as the co-author of several explanatory works in physics aimed primarily at an academic audience. All published by Cambridge University Press, these books included the co-authored *The Large Scale Structure of Space-Time* (1973), *General Relativity: an Einstein centenary survey* (1979), *Superspace and Supergravity* (1981), *The Very Early Universe*, as co-editor, (1983), *Quantum Cosmology*: *300 Years of Gravitation* (1987). In 1984, Hawking first wrote, about spacetime, for the popular science magazines *American Scientific* and *New Scientist* (Hawking 2002). Since the early 1980s, his biographers noted, he was being profiled in newspapers and magazines including *Newsweek* and *Vanity Fair* (White and Gribbin 2002).

The intellectual climate of science at the time of *A Brief History of Time*'s publication contributed to its favourable reception. Cosmology was what Goodall (1975) called a hot topic in the 1970s and 1980s. Hawking's career as a physicist advanced at a juncture when the professional community agreed on the previously contested idea of the Big Bang: the explosion of energy that gave birth to space, time and our universe. Hawking was a pioneer in the study of the celestial phenomenon of black holes, which he had been examining since he was a graduate student, and had contributed to the professional understanding of the big bang. Moreover, black holes were a 1970s cultural phenomenon, typified by the release in 1979 of the science-fiction film *The Black Hole*. Hawking had contributed to popular discussions of these areas, featuring in press reports and appearing prominently in the BBC programme and book *The Key to the Universe* (1977). *A Brief History of Time*, with its subtitle *From the Big Bang to Black Holes*, captured and crystallised this research area (Radford 2005, Leane 2007).

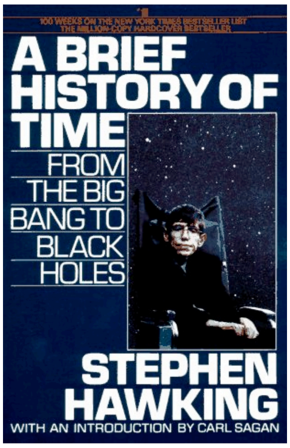
Like other cosmological titles, the book also appealed to the imagination (Rodgers 1992). The book promised the sought-after grand unified theory of science at a time when the genre, as a whole, offered solutions the meaning of the universe (Turney 2007), a perspective that culminated in science writer John Horgan's merging of the grand narratives of cosmology, biology, physics, philosophy, neuroscience and social science in *The End of Science* (1996). The possibility of achieving a grand unified theory of physics was not first described by Hawking in popular media, as Fred Hoyle did for some of his more controversial theories (Gregory 2005). Following accepted scientific norms for the dissemination of new ideas, he first presented it to his scientific peers in his inaugural lecture as Lucasian Professor, "Is the End in Sight for Theoretical Physics?" (1980) and subsequently as an entry titled ‘The Unification of Physics” in *Great Ideas Today* (1984) (Hawking 2002).

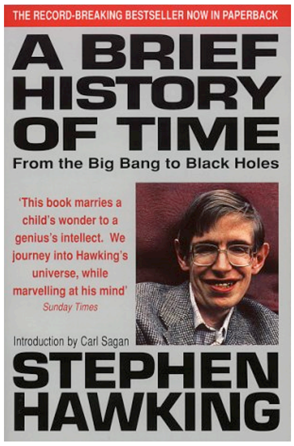
Once aimed explicitly at a mass market, these ideas had to be tailored to a non-specialised readership in *A Brief History of Time*. The production of the book’s text was tied inextricably to repertoires of promotion. Various aspects of this sustained promotional effort have been discussed, but they have not been synthesised to show its centrality from the early stage of production to its eventual marketing. Hawking was an active agent in the book’s commercial positioning and promotion. Originally writing the book to earn money for his family, he wanted the book sold at “airport book stalls” (Hawking 1994 p30). He hired literary agent Al Zuckerman after rejecting Cambridge University Press because he felt they were not geared to the mass market. Six New York publishers put in six-figure offers and Zuckerman eventually sold the book in a telephone auction to Bantam Books, which offered a $250,000 advance and generous royalties. On meeting Bantam Books editor Peter Guzzardi for the first time, in 1985, Hawking’s first words, as translated by his graduate assistant, were: “Where’s the contract?’ (cited in Bachrach 2004). Precise figures vary, but it has been estimated that the book has earned Hawking at least six million dollars (Bachrach 2004).

Bantam was in a position to give the book the promotion Hawking wanted. Since its foundation in 1945, it developed into one of the world’s major publishing firms based, in part, on its corporate culture of aggressive sales and marketing and its emphasis on appealing book cover art. A commercial strategy in the 1980s and 1990s, a period of intense growth for the company, was publishing in hardback “blockbuster nonfiction” (Greco 2005 p81). Promotional concerns influenced the book’s writing style and narrative arrangement. Hawking initially found the title flippant and a senior editor at Bantam eventually convinced him it was the right one (Ryan 2005). The book’s text was tailored to enhance readability and sales. An equation-filled initial draft was drained of scientific formulae, apart from Einstein’s $E = mc^2$, as Hawking was advised that each equation would “halve the sales” (1988 pvii). Commercial considerations prevented Hawking from deleting, in draft stage, the book’s controversial last line where he said discovering a unifying theory of science would be “the ultimate triumph of human reason – for then we would know the mind of God” (Hawking 1988 p175). In an autobiographical essay, Hawking later noted: “Had I done so, the sales might have halved” (1994 p33).

The influence of promotion was implicit in the production of the book and the writing of the text – but moved to being explicit in the book's marketing. If celebrity occurs when mass media interest moves from public to private life, then Hawking has been famous since *A Brief History of Time*'s publication, a point where public and private ceased to be meaningfully distinct categories. In promotion and publicity material surrounding the book, the focus was almost uniformly on Hawking, his public and private selves merging immediately into a single persona when he emerged as a popular author. This is understandable. Hawking, like other celebrities, is unique and the promotion focused on his uniqueness. Bantam used Hawking's persona in their marketing of the book in the US, featuring him on the cover. Apparently, this was too much for Hawking, who accused the publishers of exploiting his condition to increase sales. He later wrote that he had no contractual control of the cover, and the photo on the front of the American edition is the one readers there identify (Hawking 1994).

Hawking was being, at worst, disingenuous here as he cannot have been completely naïve as to these promotional strategies, having been used to exercising editorial control over aspects of his work. Previously, he had threatened to withdraw his book *Superspace and Supergravity* (1981) unless the cover featured a full-colour picture of a drawing that was on the blackboard of his office. Cambridge University Press feared the printing costs would not be recouped in sales, which turned out to be true, even though Hawking got his way (Ryan 2005). Nevertheless, this is the first example of a sometimes fractious relationship with fame for Hawking – and, later, for his family. Popularisers have almost never appeared on the cover of their books, noted Leane (2007 p132), except for Hawking, who "dominates most editions of *A Brief History of Time*," where he has been "pictured against a blackboard of equations or the starry cosmos". All biographies of Hawking, except Boslough's intellectual biography, featured a picture of Hawking on their covers. In the editions of *A Brief History of Time*, included below, the photographs are iconic. The cover on the left, below, featured a starry sky as a background, linking Hawking indexically to his subject of study. The cover on the right contains a strongly personalised focus on Hawking.





The Bantam Books cover art of the 1988 hardcover edition of A Brief History of Time[34], *left, and, right, the cover art of the 1995 new paperback edition from Bantam Books*[35]. *Covers used by permission of The Random House Group Ltd.*

It was not the first popular physics bestseller of the twentieth century. In the twenties and thirties, Einstein and also Oliver Lodge, who continued to promote ether theory in books and on radio long after relativity made it redundant, sparked a marked increase in post-relativity popular physics. Writers segued from physics into philosophical speculation. The most accessible of these popularisations, Arthur Eddington's *The Nature of the Physical World* (1928) and James Jeans's *The Mysterious Universe* (1930), which sold 70,000 in its first year, merged science and mysticism in their anti-materialist discussions of cosmology. Jeans said the universe's great architect was a mathematician. Eddington concluded his book with a chapter on science and mysticism. *The Mysterious Universe,* like *A Brief History of Time*, were united, argued Leane (2007 p25), because their "high sales were apparently due as much to their role as status-symbols as their actual content" (Leane 2007 p26). The jacket of the book's 1937 edition described it as "the famous book which upset tradition by making Science a bestseller" (cited in Leane 2007 p25)[36].

Various critics have linked the purchase of the book with the creation through consumption of cultural identity. Simon Jenkins (1988), writing in *The Times*, said the book benefited

[34] This Bantam Books cover art was downloaded from http://en.wikipedia.org/wiki/File:BriefHistoryTime.jpg on 16 February 2010.

[35] This Bantam Books cover art was downloaded from http://www.amazon.co.uk/gp/product/images/0553175211/sr=8-1/qid=1273752237/ref=dp_otherviews_0?ie=UTF8&s=books&img=0&qid=1273752237&sr=8-1 on 16 February 2010.

[36] Jeans and Eddington also included quantum mechanics in their books, but these theories did not spread through the general culture as dramatically as relativity, even though Max Born, Werner Heisenberg and Niels Bohr published popular and semi-popular discussions of their fields (Friedman and Donley 1985, Leane 2007).

from "wisdom by association," as its appearance "on the coffee table or by the loo" was "the intellectual equivalent of a spare Gucci label stitched on a handbag or an alligator on a T-shirt". Krauthammer (1988) said the book, like literary critic Allan Bloom's *The Closing of the American Mind* (1988) and historian Paul Kennedy's *The Rise and Fall of the Great Powers* (1989), was bought because it was viewed as a intellectual heavyweight title that readers felt should be purchased, although it often remained unread. Indeed, Leane (2007 p48) noted that it has become "a cliché that *A Brief History of Time* is the bestseller that nobody has read".

Scholars and journalists who tried to explain *A Brief History of Time*'s success agreed that it was not due to the clarity or aesthetic value of its prose. A near constant feature of reviews and commentary was a reference to the impenetrability of the title ostensibely aimed at lay readers, its expository prose failing to anticipate and answer reader questions, despite Hawking's repeated re-writes (Krauthammer 1988, Maccallum 1988, Hawking 1994, Turney 1999, Radford 2005). Science studies scholar Jon Turney argued that Hawking's explanatory writing in a chapter of *A Brief History of Time* titled 'Elementary particles and the forces of nature' gave a poor explanation of the four fundamental forces, gravity, electromagnetism and strong and weak nuclear forces, that it set out to describe. Turney wrote:

> Almost the whole chapter, highly compressed to match the rest of the book, is written in this very spare descriptive style, with virtually no analogies, or even adjectives . . . What the naïve reader might make of it is hard to tell . . . If good expository writing tries to anticipate questions arising in the reader's mind, and answer them before they create unease or incomprehension, there are surely many questions here left unanswered (1999 p129)[37].

Bantam officials said the book's popularity was due to public admiration of Hawking. For popular science publisher Michael Rodgers (1992 p231) the three factors in its success were: its "brilliant title," its promise to explain the universe in under 200 pages, and its author being an insider. The Hawking effect has had implications for the popular science publishing industry, Rodgers noted, with more titles likely to be commissioned, and their authors to be given higher advances. *A Brief History of Time*¸ like its author, has now become a cultural reference point, and has been used to promote other products. Rodgers (1992 p233) gave the

[37] Turney (1999) said the task of writing an adequate popular explanation of particle physics was perhaps impossible and there was an argument to be made for the book's effectiveness as a popular science text, in that it gave an impressionistic account of cosmological research.

example of a Harvard University Press publicist's explanation of the target market for Alan Lightman's *Ancient Light: Our changing view of the universe* (1991): it was aimed at "people willing to admit they didn't quite understand" Hawking's book. However, other critics moved from discussions of Hawking's persona to what they believed were more convincing cultural reasons for the book's success. Graham Farmelo, a biographer of eminent physicist Paul Dirac, felt that it was not enough to attribute Hawking's sales alone to "a sympathy vote for his disability, even if many are astounded by his tremendous courage in overcoming it" (cited in Radford 2005 p14).

The novelist Gilbert Adair (1997 p14) said Hawking's physical presence – the "bulging intellect in a useless body" – was the crucial factor in the success of the book, which would have failed commercially if it had been written by another physicist. Similarly, the *Daily Express* noted that "it is difficult to believe his celebrity profile and the success of that book . . . are due in large part to anything other than his disability" (Warren 2004 p33). *A Brief History of Time*'s reviews have supported this view. The introduction to this book review by an Australian critic is broadly representative of initial critical reactions:

> I'm going to resist the almost unbearable temptation to tell you first about the author. He is certainly unique, tragic and triumphant (Williams 1988 p74).

The New York Times wanted more insights into Hawking's compelling authorial personality to enliven the scholarly lecture-style prose. The book came to life, the reviewer found, when its author allowed "a peek at his impish humour, inner motivations, theoretical goofs and scientific prejudices" that revealed the scientific process as a human endeavour, and:

> Although this book was clearly not intended to be an autobiography, it is still disappointing that Mr. Hawking keeps such revelations to a minimum (Bartusiak 1988 p10).

The emerging ambiguity to his representation in promotion continued with Hawking's reflexive writing on the critical reception of *A Brief History of Time*. He acknowledged that his physical appearance had a definite effect on the book's sales and critical reception. He found initial reviews of "rather unilluminating (1994 p32) as they almost invariably focused on his physical form, and generally followed the formula of saying that he suffered from motor neurone disease, was in a wheelchair, could not speak, could only move his fingers, yet has written a popular book on one of the fundamental mysteries of the universe: its formation. He noted:

> Undoubtedly, the human interest story of how I have managed to be a theoretical physicist despite my disability has helped. But those who bought the book from a human interest angle might be disappointed because it contains only a couple of references to my condition. The book was intended as a history of the universe, not of me (1994 p33).

His understanding of his public persona developed over time. In a questions and answers section on his website, he responded to a query that asked why he believed he has he been given "celebrity status" and whether his disability contributed to this status by saying:

> I'm sure my disability has a bearing on why I'm well known. People are fascinated by the contrast between my very limited physical powers, and the vast nature of the universe I deal with. I'm the archetype of a disabled genius, or should I say a physically challenged genius, to be politically correct. At least I'm obviously physically challenged. Whether I'm a genius is more open to doubt (Hawking 2009).

5.2. "Who knew where his mind was?"[38]

These interpretations, from Hawking and critics, show that, similar to other celebrities, Hawking's physical appearance has been central to his fame, central to his "mediated presence," central to the way he is represented and how he communicates (Bonner 2005 p63, Holmes and Redmond 2006). Representations of Hawking have always been bound up with his body and the neurological condition of amyotrophic lateral sclerosis, a form of motor neurone disease, that he has lived with since he was diagnosed as an undergraduate. Now in his late sixties, he is completely paralysed and can only move a few muscles in his face. He moves around in a customised motorised wheelchair, communicating through a speech synthesiser connected to a computer on which he types his words. That he has lived so long is testament to his undoubted courage and resilience, as doctors predicted he would die from the condition within two years (Cooke 2008, Fernand 2007).

Whereas some writings have described Hawking becoming famous despite his disability, other newspaper profiles and other critical writings were more astute when they noted that "his fame is as much a function of his illness as his science" (Brockes 2005). Hawking's illness and his physical condition have been essential elements of how he was promoted,

[38] Rees cited in Overbye 1993 p109

how he became so famous, how his physical appearance has resonated as an intellectual symbol. A review of an early intellectual biography in the *Washington Post* criticised the author for not developing the promising notion that Hawking's physical condition might "account for his achievement and celebrity" (Tirman 1984 pC3). As one commentator noted, Hawking's "fame and his disease seem to progress in tandem, his body ever more wasted as his celebrity increases" (Smith 1999 p11).

Hawking's physical appearances have featured continually in journalistic profiles and interviews. The disease that has wasted his body has led to an enhanced focus on his mind as the centre of Hawking's being. His principal image was that of a brilliant mind in a damaged body: as one journalist noted "the romance of Hawking's image as a butterfly mind trapped in a diving bell body overrides all others" (Brockes 2005). This romantic contrast between his body and mind has helped turn him into "a global icon of genius" (Warren 2004 p33). It is the romance of this image, and the "unspeakably cruel twist of fate" (Hammond 1988) endured by Hawking, that contributed to his fame. Among his professional and social circle, the pervasive image of Hawking was that of the "crippled genius" (Gribben and White 2003 p131).

This repeated characterisation of Hawking as essentially cerebral was echoed in the constant description of him as a genius, a term used uncritically in secondary literature and journalistic accounts and promotional material. With each new achievement in the physicist's life, his image as "the purely cerebral creature trapped inside an inoperative body, has grown" (White and Gribbin 2003 p131). Boslough wrote that Hawking's mind was:

> his work, his plaything, his recreation, his joy – his life . . . A totally cerebral man, he demonstrates the power of the human intellect to fathom the universe when the restless mind is set free (1985 p3).

The centuries-old mystery of disembodiment was central to Hawking's fame. This concept of disembodiment and its links with knowledge throughout western intellectual history has been conceptualised clearly in *Science Incarnate* (1998). Asceticism has been linked throughout western cultural history to the image of the solitary philosopher, with "the rhetoric of solitude" implicated in portrayals of empirical scientific knowledge. The solitary scientist and the solitary artist expresses symbolically "direct engagement with the sources of knowledge – divine and transcendent or natural and empirical" (Shapin 1991 p191).

Knowledge's link with asceticism, with its associations of truth seeking and corporal denial, was traced by Shapin through classical civilisation and early Christianity. Natural philosophers in the seventeenth and eighteenth centuries were identified by their countenance and way of life, as dedication to truth was "physically inscribed" upon the body, emerging from traditions associated with earlier spiritual intellectuals (Shapin 1998 p37). Conceptions of creativity, corporality, nationalism, asceticism and romanticism, essential to the construction of Newton's image, have continued to influence ideas of scientific genius (Yeo 1988, Shapin 1991, Iliffe, 1998, Lawrence and Shapin 1998), most clearly in Hawking. Rene Descartes in the seventeenth century argued that the mental and material were distinct, but reciprocal, entities. The corporal conditions of thinking were not tied to the intellectual products of that thinking. This Cartesian mind-body dualism can be seen in expressions such as 'knowledge itself,' 'free-floating concepts,' 'disembodied ideas,' and 'truth'. What Shapin called the "mystery of disembodiment" occurred somewhere between "corporal process and intellectual product". Intellectuals placed knowledge, not in paper or in corporally-rooted processes, but "in the transcendental and disembodied domain that knowledge itself was understood to inhabit (Lawrence and Shapin 1998 p1-2). If knowledge was to be portrayed as transcendent, then one way of representing it was to present

> the *knower* as other-worldly and disengaged, that is, the embodied public display of a disembodied mind, of a mind which was not *there* in its own body because it was understood to be somewhere else, in the domain where genuine knowledge was to be had (Shapin and Lawrence 1998 p10, emphasis in original).

The disembodied image has recurred in representations of Hawking. Physicist Martin Rees remembered opening a quantum mechanics textbook on a stand for Hawking to read. Rees recalled that Hawking "would sit there for hours motionless, staring. Who knew where his mind was?" (cited in Overbye 1993 p109). Carl Sagan valued *A Brief History of Time* chiefly for its insights into Hawking's mind where cosmology and courage were combined (1988). Mialet (2003) said the dominant image of Hawking was that his intellectual achievements have been removed from his physical being; they have been disincorporated. For her, he has come to embody Cartesian duality, the iconic "figure grasping the ultimate laws of the universe with nothing but the strength of his reasoning" (Mialet 2003 p573). Wertheim (cited Leane 2007 p132) said Hawking's charismatic aura was based on the startling disjunction between his mind and body, which has meant he has come to embody the archetype found in many cultures, "the lame or crippled seer". His physical immobilisation has meant that he has become in a sense “an extreme version of the priest or mystic who eschews material, bodily existence in order to achieve transcendence in another realm” (Leane 2007 p152).

Acclaimed documentary film maker Errol Morris, who has a background in the philosophy of science, made a non-fiction film version of *A Brief History of Time* (1992) that portrayed Hawking as disembodied genius. He arranged the film artistically, drawing out the book’s themes, particularly that of a purely cerebral search for the origins of the universe. Critic Rosenheim (1995 p15) said Morris designed a “world built on metaphoric connections” between Hawking’s science and his life. Throughout the film, black holes were linked with death and also symbolised zones of knowledge, “modern analogies to the South Poles of Romantic writers like Mary Shelley or Edgar Allan Poe” (Rosenheim 1995 p16). The choice of shot continually drew attention to Hawking’s body, his reflection in the screen of his computer monitor, his voice graphically represented by lists of words scrolling down his screen. At the end of the film it was as if Hawking had disappeared into his sustaining technologies. In making his film, Morris filmed Hawking in front of a blue screen so his image could be projected against any background, which meant, said Morris: “I can place Stephen Hawking where he belongs – in a mental landscape rather than a real one (cited in Ryan 2005 p74). Hawking disliked the documentary, feeling like Morris had “manipulated and filmed him as if he were a sofa” (Rosenheim 1995 p16).

Publicity about Hawking has regularly zeroed in on the mystery of disembodiment, focusing on the unknown area between corporality and intellectuality. An *Observer* interview, in its magazine-cover blurb, promised to go “inside the mind” of Stephen Hawking (Cooke 2008). The interviewing journalist noted that “the real difficulty” in reporting on Hawking

> lies in the stuff that you cannot understanding, that you cannot . . . REACH. Mystery swirls about him like mist over a bottomless quarry (Cooke 2008 p14)

The mystery is not only in his obtruse physics, but determining “what lies in his heart” (Cooke 2008 p14). In this, his image, has been tied to romantic conceptions of literary genius (Knight 1990, Schaffer 1990).

Hawking was among the many scientists who has explictly linked his science with his physicality and its wider connotations of disembodiment. He linked explicitly, in his writings, his physical condition with his science, creating the image of theoretical physics as a super-rational, disembodied, intellectual enterprise. Physics has been viewed, through Hawking's representations, through his confessional writing, as a non-corporal and non-temporal field of endeavour. Theoretical cosmology was presented in his writings as a predominantly mental pursuit existing independently of empirical verification or validation by instrumentation. The creation of this type of theoretically-driven scientific knowledge was not constrained by a damaged body. Hawking wrote that theoretical physics was a fortunate career choice because it was "all in the mind" (Hawking 1988 pvii) and the liberation from life's routine chores has meant perhaps that he has made greater progress than he might have if he had been fully able bodied (White and Gribbin 2003). The slowness of his daily actions has given him time to think, and he once wrote of how a breakthrough in his work on black holes came during the lengthy process of his getting into bed (1988).

He described how his scientific work in the abstract and theoretical realms of mathematical physics and string theory flourished as his body's condition deteriorated. This has had an implicit ideological dimension too: meanings encoded in Hawking's physical condition have pointed to the elevated position of science, particularly theoretical physics, as the apex of scientific achievement[39]. In this way, in yet another version among the multiplicity of ways to read Hawking, he was a metaphor for his own work (White and Gribbon 2003 p145). This is a theme Hawking returns to himself in a question and answer page on his website where he said:

> physics can take one beyond one's limitations, like any other mental activity. The human race is so puny compared to the universe that being disabled is not of much cosmic significance (Hawking 2009).

Time said he could do calculations without writing them down, "a feat that his colleague Werner Israel says is equivalent to Mozart's having composed an entire symphony in his head" (cited in Larsen 2007 p77). Kip Thorne, physicist and collaborator with Hawking, said that the British physicist:

> has gradually trained his mind to think in a manner different from the minds of other physicists: He thinks in new types of intuitive mental pictures and mental equations

[39] Stretching back to Auguste Comte's nineteenth century positivist hierarchy of the sciences, physics has been viewed as pre-eminent among the sciences because of its mathematical nature and its focus on fundamental natural phenomena, such as space, time and matter (Leane 2007).

> that, for him, have replaced paper-and-pen drawings and written equations (cited in Larsen 2007 p65).

New Scientist said that it was a “poetic irony that Hawking can mentally roam the immensities of space and time in liberation from his physical limitations” (cited in Larsen 2007 p77). A scientist quoted in a profile of Hawking in *Time* magazine compared him to iconic basketball player Michael Jordan: “No one can tell Jordan what moves to make. It’s intuition. It’s feeling. Hawking has a remarkable amount of intuition” (cited in Larsen 2007 p109). This view became so accepted and commonplace that it was made explicit, yet unexamined. For example, Robin McKee noted in *The Observer* that Hawking’s image of “pure, disembodied intellect . . . turned his every pronouncement into a front page story” (2001 cited in Larsen 2007 p133)

The discourses surrounding celebrity are sometimes contradictory, and representations of Hawking have occasionally contended with, and subverted, the idea of the disembodied genius. The portrayal that Hawking’s workplace was, essentially, inside his skull was contested. Instead of being portrayed as a disembodied intellect, Hawking’s knowledge has been produced physically in a social setting. Journalists and researchers who have interviewed Hawking in person described his detailed support system of nurses, colleagues, and graduate students who ensured the physicist was able to work, live and present at conferences (Mialet 2003, Brockes 2005, Franks 2007). The sustaining technologies of his body have also been sites for signification. His “famous” (Franks 2007 p29) robotic voice has become part of Hawking’s physical presence, its “unique metallic timbre has become one of the most distinctive voices in the world” (*Sunday Times* 1995). He refused an offer to upgrade it to a more natural sounding voice as he feared his children would not understand him and he would “become a different person” (1994, p24), and he is “known by it worldwide” (Brockes 2005). His wheelchair has been as identifiable a symbol of Hawking as his face, and is a device used to indicate his state of mind. It is “an appendage to his paralyzed body, a device for the physical expression of his personality” used by Hawking to express intense disagreement or anger with people by running over their toes (White and Gribbin 2003 p175).

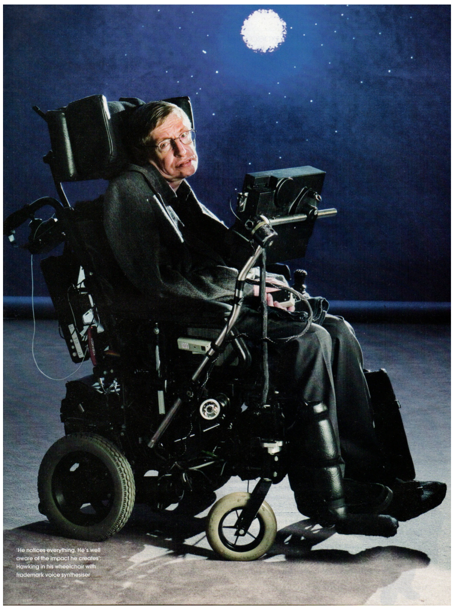
The centrality of Hawking’s physical presence to his celebrity could be seen in responses from others to his physical presence. Hawking “lent an unmistakable presence to any gathering” and his lectures drew huge crowds “unheard of for a theoretical physicist since

Einstein” (Larsen 2007 p8, p134). Seeing a Hawking lecture where the physicist’s “procession on stage by motorised wheelchair [was] a moment for ovation verging on the reverent” (Radford 1988). A 1998 lecture by Hawking at Caltech had 1,100 in attendence inside the lecture theatre, 400 people watching by video feed, and hundreds more sitting outside listening over speakers. Queues for the 8 p.m. lecture began before 3 p.m., and Hawking received a standing ovation when he arrived (Shermer 2002a). A graduate student described the adulatory treatment Hawking received on speaking tours or at conferences.

> When we went to the US, it was extraordinary. People would want to touch him like he was Jesus, restaurants would want photographs (Technology Ireland 2007 p17).

Chinese tourists in Cambridge who saw him “started gesturing in wild excitement” and when he lectured in Hong Kong, crowds met him at the airport, singing "Stephen Hawking we accuse you of love" (Franks 2007 p29). After reading *A Brief History of Time*, a science fan tatooed Hawking’s face on his leg (Daily Mail 2008). Hollywood actors including Jim Carrey, Richard Dreyfuss and Kevin Costner met him, and undoubtedly enjoyed their association with him (Warren 2004). These varied but similar responses indicate that knowledge was viewed as originating within Hawking, as rituals of fandom that surround other celebrities focus no differently on his body.

This disembodiment and its links with cosmology is codified in imagery. The picture from the London’s National Portrait Gallery that opened this chapter can be taken as representative. It mixes iconic and symbolic images. It shows Hawking in his wheelchair in front of an equation-filled blackboard. It is carefully composed. There is an upside-down picture of Einstein, tagged to the top right hand corner of the image, while what appears to be a window blind featuring an image of the earth surrounded by stars and space covers a window, letting in some light. The image is decentred. The blackboard appears slanted, the Einstein picture is inverted, Hawking is positioned off-centre – all these elements combine to create an image, consistent with ideas of relativity, of space slightly out of kilter. Morever, the portrait is deliberately shown as a photographic image, positioned inside a wider frame, with its number visible, self-consciously drawing attention to itself as a representation of reality. The iconic image of Einstein is also symbolic, linking his and Hawking’s work. Other typical images are more generic, photographing him against the night sky or cosmos (a recurring shot in Morris’s film also), similar to images of cosmologists historically. For example, see the obvious parallels in terms in subject positioning within the shot against a similar background in these two images, below, created almost two centuries apart. Again, starry skies are linked indexically to astrophysicists.



Hawking, left, photographed by Murdo Macleod in The Observer Magazine *on 2 March, 2008, p.15 © Murdo Macleod and reproduced with kind permission of Murdo Macleod. Right, Sir William Herschel by James Godby, 1814 © National Portrait Gallery, London. Reproduced with kind permission of National Portrait Gallery, London.*

5.3. A "worthy successor to Galileo, Newton and Einstein"[40]

A Brief History of Time was not only a narrative about the history of the universe, as its author intended. It was an intellectual autobiography in which the history of the universe was conflated with a history of Hawking (Raymo 1990, Turney 1999, Leane 2007). Autobiography was a genre that allowed Hawking to justify his genius internally within the text rather than relying on extra-textual judgements (Anderson 2001). In *A Brief History of Time,* Hawking dramatically wrote himself into a prominent position in the history of physics. Hawking carefully positioned himself, through language, in the book's narrative as a direct successor to Galileo, Newton and Einstein, each of whom is featured in a mini-biography in *A Brief History of Time*'s appendix, an addition for which there was "no clear

[40] Sunday Times 1995

reason" except for the implication "that Hawking himself should be the next name on the list" (Leane 2007 p133). The Lucasian professorship was once held by Newton, he reminded readers, and he has stressed his affinity with Galileo, with whom he felt "a strong sense of identity, partly because of the coincidence of having been born exactly 300 years after his death" (Hawking 1988 p116). Sagan called him a "worthy successor" to Newton (1988 px). Clearly, Hawking consciously placed himself prominently in the grand narrative of scientific progress, as he mixed his autobiography with a biography of the universe into an intellectual biography (Raymo 1990, Turney 2004). Clearly, he saw himself as the next in line in the illustrious history of cosmology (White and Gribbin 2002). Biographers reinforced rather than questioned this interpretation, with Larsen (2007 p21), for example, writing that, like Galileo, Hawking "was destined" to change our understanding of the workings of the universe.

The book's structure also emphasised Hawking's view of his own professional stature. Leane (2007) argued persuasively, from a literary critic's perspective, that the book was structured as a mythic narrative, reflecting a deeper truth about the foundational stories of science. The book creates a mythic vision of Hawking's position in the history of science. Leane acknowledged the influence of Mary Midgley's *Science as Salvation* (1992), which argued that some popular cosmology titles gave science a teleological function for which it was unsuited, the books arguing that the universe has been evolving towards science as its ultimate purpose. What Hawking has presented in his book was "the cosmic lineage of the scientific project" (Leane 2007 p131). Moreover, he wrote himself dramatically into this lineage. The book contains a series of histories about core ideas in physics, including time, space, matter, black holes and the expansion of the universe in which the major theorists were outlined. His discussion of space time, for example, was described as the uninterrupted progression from Galileo, Newton, Maxwell and Einstein to Hawking and his colleague Roger Penrose. The book proposes his vision of the universe as having no beginning and no end. The history of physics was presented as a seamless intellectual evolution to the point where, the book promised, Hawking emerged to offer a potential grand unifying theory (Bartusiak 1983). Like his explanation of science as the ultimate aim of the universe, Hawking "effectively places himself as the pinnacle of this cosmic evolution" (Leane 2007 p134).

This implict presentation by Hawking of his stature in physics was made explict in the promotion, publicity and critical commentary that followed the publication of *A Brief*

History of Time. Cosmology and biography, promotion and critical commentary, were merged in the the first book-length analysis of Hawking. Titled *Stephen Hawking's Universe: An introduction to the most remarkable scientist of our time* (1989), the book's blurb promised "an intimate glimpse of the greatest scientist of our day" and a quote on the book's back cover, from the *Chicago Tribune*, called it "the story of a remarkable man, destined to rank with Galileo, Newton and Einstein" (1989). The blurb on the back of White and Gribbin's biography described Hawking as an "indefatigable genius" (2003) and read:

> Stephen Hawking is no ordinary scientist. Across a career that began over thirty years ago at Cambridge University, he has managed to do more than perhaps any other physicist to broaden our basic understanding of the universe.

He has been labelled a genius in conjunction with his portrayal as "a latter-day Einstein", "the new Einstein" (Gribben and White 2003 p145 and p131), and a "worthy successor to Galileo, Newton and Einstein" (*Sunday Times* 1995). These comparisons were not only made from outside the physics community. In the late 1970s and 1980s, Hawking's work was also praised as revolutionary and as a work of genius by his doctoral supervisor at Cambridge Dr Dennis Sciama (McCain 2005). Kip Thorne, a physicist colleague, noted in the *Washington Post*, that "I would rank him [Hawking], besides Einstein, as the best in our field" (1988 cited in McCain 2005 p42). Hawking also appeared – "at his own request" (Leane 2007 p134) – as himself in a 1993 episode of *Star Trek: The Next Generation* where, aboard the starship Enterprise, he played poker with Isaac Newton and Albert Einstein (McCain 2005). He "replays the scene on major publicity occasions, including his visit to the US President" (Fara 2003 p254). A television documentary was titled *Stephen Hawking and the theory of everything* (2007), supporting the claims in *A Brief History of Time* that he was involved in a research programme to find science's omega point.

Comparisons with Einstein and references to his genius are descriptions that Hawking said he disregarded, even though they are generated by his supporting promotional apparatus. Speaking about fame and press interest, Hawking said: "It would be hypocritical to complain. I can generally ignore it by going off to think in eleven dimensions" (cited in Larsen 2007). In another example of his occasionally contentious relationship with fame he said:

> I don't pay much attention to how journalists describe me. I know it is media hype. They need an Einstein like figure to appeal to. But for them to compare me to

> Einstein is ridiculous. They don't understand either Einstein's work, or mine (Hawking 2009).

Counter narratives about Hawking's stature have emerged from within the scientific community. *Physics World* polled some of the world's leading physicists in 1999 to name the five physicists who had made the most important contributions to the subject. Einstein was top with 119 votes, followed by Newton with 96. Maxwell (67), Bohr (47), Heisenberg (30), Galileo (27), Feynman (23), Dirac (22) and Schrodinger (22) all appeared in the top ten. Only one of the 130 respondents put Hawking anywhere on the list (Physics World 1999). After Hawking received the Royal Society's Copley Medal in 2006, an unnamed eminent scientist said Hawking was "a great embarrassment to us" (cited in Appleyard 2006a p6) because of his promotion of grandiose theories. His physicist peers largely disagreed with his estimation that there was a 50/50 chance of a grand unified theory being found before approximately 2020. Asked about this likelihood, Princeton University's Phil Anderson told *Physics World*, a prominent publication for professional physicists, said:

> The question is an insult to me and to all those who call themselves theoretical physicists. A unified theory is unlikely to tell us much at all, though it may simplify a few questions about cosmology. Theoretical physics has plenty of problems on the frontier of complexity to keep us busy for quite a while (cited in Physics World 1999).

Nobel-prize winning physicist Steven Weinberg said:

> 20 years is possible, but unlikely. I would guess 100 years for a 'complete unified theory'. But a 'complete unified theory' would not be the end of theoretical physics (cited in Physics World 1999)

In 2004 while in Dublin at the GR17 physics conference, Hawking admitted his theory on black holes was incorrect: they do not destroy completely the matter they dissolve – some of the information returns. "Because of his fame," Hawking's paper received more attention from mainstream media than any other paper at the physicists' conference (Guardian 2004). While Hawking "kept the television crews and journalists happy by conceding," his peers were unimpressed with his explanation, which contained concepts rather than mathematical calculations (*New Scientist* 2004 p4). He has also revised his predictions on time travel and the closeness of science to developing a grand unified theory – pronouncements tied to the promotion of popular science publishing in the 1980s and 1990s.

Larsen (2007) judged Hawking's discovery of black hole radiation to be his major contribution to physics. An 1988 scientific paper co-authored by Hawking was accepted for publication in three days (Larsen 2007). His public status has also influenced the reception of scientific work. Mathematician Jeremy Dunning-Davis offered a particularly astute criticism when he said the image of Hawking as a "super-physicist" has been perpetuated by sections of the media and, implictly, by his publishers, a publicity campaign that fuelled greatly the success of *A Brief History of Time*. Dunning-Davis argued that this public profile has seeped into the decision-making processes for peer-reviewed physics. Some of Hawking's theories, unlike those of Newton or Einstein, have not been verified, yet criticism of them has been stifled. Physicists have had papers rejected simply because the end result disagreed with Hawking. One reason for this was that Hawking's status in popular culture has influenced his status in scientific culture – that his scientific standing has been inflated by his public renown. "Because of this," wrote Dunning-Davis, "papers which challenge Hawking on purely scientific grounds are not successful because his reputation has in some sense gone beyond the purely scientific" (2003 p86).

Eminent physicist Peter Higgs, who created the concept of the Higgs particle, was reported in 2002 as saying that it has been

> very difficult to engage him [Hawking] in discussion, so he has got away with pronouncements in a way that other people would not. His celebrity status gives him instant credibility that others do not have (cited in Larsen 2007 p150)[41].

Another anonymous physicist said: "To criticise Hawking is a bit like criticizing Princess Diana – you just don't do it in public" (Connors 2002 cited in Larsen 2007 p150). Peter Coles, an astronomy professor at the University of Nottingham, said:

> Coffee-time talks in physics departments often come up with the same topic: it's very difficult to get anybody to say anything critical of him. But to have people like that in an establishment that runs on peer review isn't healthy. The trouble is, people fear that they will be thought of as jealous (cited in Larsen 2007 p141).

41 In response to Higgs, Hawking said he was surprised, but scientific disputes should be settled without personal attacks (Larsen 2007).

5.4. A home "turned into a circus by his fame"[42]

Counter-narratives to the construction of Hawking as a disembodied intellect have occurred in the voluminious writings on his private life. His bare biographical details are easily summarised. Hawking and his first wife Jane married in 1965 and the couple had three children, Robert, Lucy and Tim. They divorced in 1995 and, the same year, he married his former nurse Elaine Wilde. They too divorced in 2007 (Who's Who 2008). Within this narrative, in common with other celebrities, fact, fiction, myth, claim and counter-claims have swirled around these sparse biographical facts. Subsequent writing by Hawking and others have sought to excavate deeper this persona, describing details of his two marriages, two divorces, visits to lapdancing clubs, hospitalisations with unexplained injuries, and his challenges of living with motor neurone disease (for example, see Hawking 1994, Brooks 1999, Smith 1999, Hawking 2000, Atkinson 2003, Doyle 2004, Sommerlad and Prince 2004, Fernand 2007).

The most intimate revelations have come, not from biographers or journalists, but from Hawking and his family. Hawking's essay collection *Black Holes and Baby Universes* (1994) mixed essays on theoretical physics with autobiographical articles that acted as revealing celebrity confessionals in which he wrote reflexively about his background and childhood, his time at university, his honeymoon and marriage, and his experience of living with motor neurone disease. In common with other forms of celebrity confessional writing, Hawking emphasised his ordinariness despite his severe disability and his myriad achievements. More explictly than *A Brief History of Time*, it gave a sense of the theorist behind the theories, demonstrating how Hawking proactively personalised his own public persona.

Hawking also stressed his uncomfortable relationship with public exposure, a theme common to writing on celebrity. Fame was "a nuisance" (Overbye 1993 p119) and his family would have no self-respect if they allowed themselves to be portrayed by actors – nor did he want anyone to help write his life (Hawking 1994), despite having had nothing damaging, or sharply critical, written so far by his celebratory and adulatory biographers.

The most revealing text was the autobiography by his first wife Jane Hawking, *Music to Move the Stars* (2000), written nine years after her divorce from Stephen, since revised and

[42] Jane Hawking cited in Grice 2006 p23.

updated as *Travelling to Infinity: My life with Stephen* (2008). The books contained an extraordinary amount of intimate detail about their relationship. In the books, the smallest details of her relationship were recalled and revealed. It was the more controversial portrait of the physicist that jarred with readers and reviewers (Adams 2004). Jane described Hawking as "'the all-powerful emperor', with "the body of a Holocaust victim and the needs of an infant". She described how she disliked sex with Hawking. These entries outraged "those who consider Hawking a modern icon and inspiration" (Brooks 1999 p2) and insulted "an adoring public [who] did not like its superstar scientist . . . portrayed as an egocentric despot" (Fernand 2007 p5). He merged with his theory further in representations of his private life, with one headline reading: "What it was like being married to a black hole" (Walter 1999 p4).

Interviewed extensively after the publication of the first edition of her book, Jane Hawking said she wanted to describe what she called her "often denigrated" role in her ex-husband's life, leaving documentary evidence for future biographers, especially since Hawking said he never read biographies about himself (Brooks 1999 p2). The book, one critic noted, moved from "frankness so prized by our culture . . . into exhibitionism" (Walter 1999 p4), particularly in the uninvited descriptions of their sexual life, descriptions another commentator found "very moving" (Brooks 1999 p2).

Reviews of the book were mixed. One reviewer placed it within the celebrity kiss and tell genre by a woman who was married to the famous and "glamorous" Hawking (Elliott 2000 p12). The author found disclosures in the book were so distasteful that she described the work as a "mortifying, undignified and amazingly tedious book" that was an obvious "plea for recognition" (Elliott 2000 p12). An *Independent* journalist noted that Jane, before her marriage ended, told a reporter "her role no longer consists of promoting his success but of "telling him that he was not God" (Smith 1999 p11).

Commentating on the particular difficulties and pressures of living with Hawking, one *Daily Telegraph* writer described how Jane contemplated suicide while the couple's daughter Lucy began to drink heavily. The journalist had interviewed both women and found they were "scarred, tested and sometimes inspired by the experience - and both of them knew that they were never likely to escape his influence". Hawking's daughter Lucy wrote a novel but still sought to escape her father's orbit, once – before they wrote a book together – asking the same interviewer: "Am I going to be trapped in another chapter of the Stephen Hawking story when I am trying to do something different?" (cited in Grice 2006 p23).

In the same interview, Jane Hawking also commented reflexively on what she described as the corrosive influence of her former husband's increased celebrity on their marriage, as she said she felt "metaphorically crushed under the wheels of her husband's motorised wheelchair as he powered forward into the sunshine of public acclaim" (Grice 2006 p23). Fame has been blamed for the disintegration of Hawking's first marriage. Jane Hawking said: "Fame and fortune muddied the waters and really took him [Stephen] way out of the orbit of our family" (Adams 2004 p4). A journalist noted that fame had "skewed the family dynamic" until Hawking's family seemed inconsequential in a home

> turned into a circus by his fame, strange phone calls, brigades of nurses, unannounced personal callers . . . and always the film crews (Grice 2006 p23).

A *Sunday Times* profile of Hawking quoted Professor David Schramm of the University of Chicago as saying that Stephen was:

> a party animal who enjoys being the centre of attention. If you ask me, it was his transition from academic to world celebrity and superstar that led in the end to him and Jane going in separate directions (Sunday Times 1995).

Darker narratives and claims of cruelty swirled around his relationship with former nurse Elaine Mason. A *Daily Telegraph* writer discussed how the story of the Hawkings habitually unfolded in "sinister, incomprehensible ways . . . There is always a dark undertow (Grice 2006 p23). Further bizarre reported claims occurred during an inquiry in 2001 into alleged assaults on Hawking. In 2004, fresh allegations were made when nurses that had looked after Hawking at home reported to police their suspicions that his wife was physically abusing him. Under the headline "Elaine cut his throat, broke his wrist and nurses watch them having sex – ex carer's claims yesterday," the *Daily Mirror* reported that "gashes, broken bones and bruises" were among the "shocking injuries" the nurse claimed Elaine inflicted on her husband (Sommerlad and Prince 2004).

The paper reported that the 2004 inquiry was launched after Hawking's nursing staff reported that he suffered severe heatstroke and sunburn because he was "left stranded in his wheelchair in the garden of his Cambridge home on the hottest day of the year" (Sommerlad and Prince 2004 p4). Hawking denied the claims. Hawking's younger son, Tim, told the paper that he believed the nurse's claims (McGurran and Sommerlad 2004). Cambridge police did not arrest or charge anyone in connection with the claims, stating that there was no evidence to substantiate them (McGurran and Sommerlad 2004a). Hawking, in hospital at the time with pneumonia, issued a statement saying the allegations were false (Sapsted 2006). There have also been reports on Hawking's visits to lapdancing clubs in London and Dublin, an activity that was a "common denominator between himself and "hell-raising Hollywood hunk Colin Farrell" (Atkinson 2003 p36, Doyle 2004).

5.5. "Science's unofficial public spokesman"[43]

Despite the published evidence that Hawking has a complicated domestic life, his romanticism influenced image as the embodiment of rationality has continued to dominate. Ten years after the publication of *A Brief History*, he "seemed poised to take over the role of science's unofficial public spokesman from the late Carl Sagan" (Larsen 2007 p126). In 2002, Hawking was awarded the Aventis Book Prize for excellence in popular science writing (Larsen 2007). Hawking said he did not think he would win:

> After all, my previous book didn't win any prizes, despite selling millions . . . science writing really can have an impact on how we live. Wherever I go all around the world, people want to know more. This has helped raise the profile of science (cited in Larsen 2007 p146).

The climate change documentary *The 11th Hour* (2007), produced by actor Leonardo diCaprio, featured long, oracular monologues by Hawking – a cosmologist not a climatologist, remember – that warned of the potential catastrophic consequences of global warming, with the earth potentially becoming like a boiling hot Venus[44]. He was speaking as the representation of science, on behalf of science.

It was one example of how Hawking's position as a symbolic public face of science has given him significant cultural authority to speak in public on behalf of science as a professional body and area of expertise. A reason for his continuing interest to the media has

[43] Larsen 2007 p126

[44] Dr Benny Peiser, senior lecturer in Social Anthropology at John Moores University, Liverpool said Hawking's "predictions of terrestrial doom" were "increasingly wide-ranging and unreasonable" (cited in Larsen 2007 p140).

been his symbolic function as an icon and public representative of science. For example, he criticised former U.S. President George Bush and European governments for their restrictions on stem cell research, and he cited his own condition as one that could be potentially cured (Connor and Castle 2006). He has been, according to a biographer, anti-nuclear, pro-genetically modified crops, and paid a tribute to then U.S. presidential candiate Al Gore in 2000 (Larsen 2007).

As well as appearing on *The 11th Hour*, Hawking has appeared in various factual and fictional representations in different television formats and genres: non-fiction films, television series, documentaries, dramatisations, advertisements, talk shows and cartoons. There were references to him and his work in *Lost*. He has appeared on *Late Night on Conan O'Brien*. His voice was featured on Pink Floyd's *The Division Bell* album. A play *God and Stephen Hawking* was found by him to be embarrassing, offensive and invasive, but was produced to mixed reviews (Larsen 2007). He was interviewed in *Playboy*. He appeared on *Futurama* and *The Simpsons* (Larsen 2007). A debate between a Byron scholar and a mathematician in Tom Stoppard's play *Arcadia* on the relative merits of the humanities and the sciences refers to "the one in the wheelchair" (1993 p61). Writer and critic Clive James recalled sitting in his study in Cambridge, confused over his own writings, when he looked up and "Stephen Hawking hummed past outside with equations for the birth of the universe spinning in his head" (2006 p239).

These intertextual representations have not deepened significantly Hawking's persona. They have been other intertextual locations where his established image of the disembodied scientific genius have been reproduced. The signification of his image has been consistent across texts, their nuance being perhaps their ability to reveal some superficial aspects of Hawking's inner life, such as his liking for jokes and apparent ability to gently mock himself (stealing Homer Simpson's idea for a doughnut-shaped universe, for example). The only representation that challenged this image to any degree was the BBC's *Hawking* broadcast in April 2004 that focused on Hawking's time as a university student when he began to establish his reputation in physics at a time when his condition began to impact on his body. Even though he said his family would not allow themselves to be portrayed by actors, the film had an input from Hawking and was partially based on Jane Hawking's biography (Larsen 2007). Hawking rejected the first draft because it was a "soap opera" that did not engage sufficiently with scientific issues. The BBC denied the rewrite was hagiography

(Burrell 2003). Of all the representations of Hawking, it came closest to stripping away the repetitive symbolism that subsequent came to dominate his portrayals. It re-embodied him.

Hawking has been an effective figurehead for attracting publicity to issues with which he is associated or has an interest. Public science-lobbying argumentation such as this has given Hawking some value as a public intellectual. Outside his symbolic influence, however, his activities as a public intellectual have not been viewed as serious scholarship. While his popular science writing, as demonstrated, has disputed explanatory power, his writings on religion and philosophy, have been characterised as confused, contradictory and muddled (Sachs 1993, Lane Craig 1990).

This level of confusion reduces the impact of his writings as philosophical monographs: there is no solid line taken as a public intellectual on the metaphysical dimensions of his work. Hawking passed up the opportunity to offer a coherent argument on his position on religion in an essay titled "My Position" in which, instead, he set out his philosophy of science in an ill-tempered critique of contemporary philosophers of science. *A Brief History of Time* caused a surge of interest in contemporary theoretical physics and cosmology among historians and philosophers of science (Sachs 1993). Hawking did not engage with any sophistication with the philosophical arguments that he himself introduced in his work (Lane Craig 1990). Called "naïve", "simple-minded", "a nominalist, an instrumentalist, a positivist, a realist and several other ists" by his critics, Hawking's alarmingly sharp response was to criticise many philosophers of science as "failed physicists" out of touch with contemporary cosmology (1994 35)[45].

He has characterised himself philosophically as a realist, but also potentially as an instrumentalist or a positivist ("a curiously old-fashioned philosophy of science" (Turney 2001 p8)). In response to criticisms that his philosophical standpoint has been confused, Hawking said: "Maybe I am being a bit harsh on the philosophers, but they have not been very kind to me" (1994 p35). This study argues that Hawking's view is not as coherent as it believes itself to be, a result of its poorly-grounded conceptualisation of philosophical

[45] Hawking is close here to Einstein, who considered epistemology to be crucial to science, but warned scientists against adhering too closely to one epistemological system. He once wrote that, to a professional epistemologist, a scientist must seem like an "unscrupulous opportunist", appearing variously as a realist, an idealist, a positivist, a Platonist or a Pythagorean (Einstein 1949 cited in Pais p122).

concepts, itself a manifestation of a disregard for the intellectual integrity of disciplines outside the sciences.

This confusion, it seemed, has resulted from the motivation for the inclusion of God in the narrative, especially the closing lines. God was used chiefly in *A Brief History of Time* to add a frisson of sales-generating religious controversy. Hawking's discussion of God demonstrated his limitations as a public intellectual, his discussion of whether or not there was divine influence in the universe was confused and contradictory, coming to no closely-argued position. Hawking's co-opted Einstein's famous phrase about God not playing dice with the universe by saying that "God not only plays dice but also sometimes throws them where they cannot be seen" (into a black hole)" (Larsen 2007 p64).

Physicists seem unable to resist the lure of philosophy (Lane Craig 1990), but popular cosmologists seem irresistibly drawn to religion. In his introduction, Sagan (1988) noted that God, or the absence of a God, filled the pages of *A Brief History of Time*. God in Hawking's writings can be viewed variously as a metaphor for the natural world, underlining the romantic theme in his main popular book and his life, as a convenient euphemism for anchoring complex philosophical concepts about creation (Brockes 2005), as a religious conception of a supreme being that created the universe (Sagan 1998). An analysis would equally be able to draw any of these conclusions. Hawking has never seemed sure, or else he was, once again, being disingenuous. Stating that space time had no beginning made him ask: "What place, then, for a creator?" (1988 cited in Lane Craig 1990 p473). Asked in 1992 on *Desert Island Disks* if he had gotten rid of God, Hawking said:

> All that my work has shown is that you don't have to say that the way the universe began was the personal whim of God. But you still have the question: why does the universe bother to exist? If you like, you can define God to be the answer to that question (1994 p159).

Asked by actress Shirley MacLaine[46] if he believed in a God that created the universe, he said "no" (White and Gribbin 1993 p3). Replying to a letter from in *American Scientist* in which he was accused of being afraid to admit the existence of God, Hawking replied:

[46] "Actress-metaphysician" Shirley MacLaine, as she was described (Ryan 2005 p103) approached Hawking in a Cambridge restaurant to ask him about his views on the meaning of life (White and Gribbin 2003).

> I thought I had left the question of the existence of a Supreme Being completely open . . . It would be perfectly consistent with all we know to say that there was a Being who was responsible for the laws of physics. (Hawking S. 1985 cited in Craig 1990, p474).

His first wife, Jane Hawking (2000) wrote that he was not an atheist, but was unable to absorb faith into his idea of the universe. White and Gribbin (2003 p180) noted that "his outlook is not unlike that of Einstein".

This confusion is also symptomatic of Hawking's limited success as a public intellectual: he fulfilled the initial criteria for occupying this role, achieving success in a specialised domain before connected with a wider public through the channel of popular publishing (Collini 2006). Here it breaks down, however. Except for cases where Hawking was symbolising a wider constituency, he expressed few views that chime with public concerns, and he in many ways fails in the demand of the public intellectual to have interesting things to say to different publics.

His popular work has not had the necessary newness or renewal for him to be classed a public intellectual. Since *Black Holes and Baby Universes*, his popular science writing projects have been variations on his major work. There was *The Illustrated Brief History of Time* (1996), *The Universe in a Nutshell* (2001), the co-authored *A Briefer History of Time* (2005) the children's book written with his daughter Lucy, *George's Secret Key to the Universe* (2007). An argument can be made that this was not just science popularisation but the intense mining of an authorial persona for continued commercial rewards. *The Universe in a Nutshell*, for example, told readers nothing new about cosmology than what had already been described in *A Brief History of Time* (Turney 2001). This has been an example of the ongoing commercial value of an initially lucrative publishing venture.

When Bryan Appleyard (2006 p8) interviewed Hawking before the publication of *A Brief History of Time*, he wrote that Hawking believed that physicists would soon explain the history of matter in a theory of everything, and the scientist "would not listen to me when I said he had simplified the thought of Wittgenstein to the point of rank inaccuracy. It was, in retrospect, the most shocking interview I have ever conducted".

5.6. The "bizarre re-enactment of a mythical event"[47]

These multiple interpretations of Hawking have shown that he has been caught in a contradiction. Even though he has been celebrated as a scientific hero, there has been an obvious mismatch between his level of public acclaim and his scientific status. While a prodigious and prolific physicist, comparisons with Newton and Einstein or Bohr or Heisenberg or Dirac, judged exclusively on scientific merit, have not been valid. Clearly, it has not been his contributions to his field that alone accounted for his celebrity, even as his scientific stature has been a feature in his career-long publicity. At the same time, his physics work has been a constituent in his fame, his work on black holes occurring at a time when the topic was scientifically and culturally current. Clearly, his popular status has not been caused by the explanatory clarity of his prose, as the revised and updated versions of *A Brief History* have continued to endeavour to make it more comprehensible.

Instead, Hawking's popular status – and the social function of his celebrity – has been his unique ability to symbolise. His physical presence, perhaps uniquely in the history of science, has illustrated most strikingly the abstract ideas of disembodiment and knowledge that have been a recurring feature of scientific knowledge in western history. Hawking's image, contrary to part of Dunning-Davis's conclusion (2003) has not gone beyond the scientific. It has represented the scientific, in its description of theoretical physics, the apex of scientific knowledge, as a disembodied endeavour that is best suited to uncover the mysteries of the cosmos. Science in our modern culture "counts as Truth," wrote Shapin and Lawrence (1998 p13), and how science has been "interpreted counts as a story about Truth". The representations of Hawking's working methods and common features of his representation indicated that knowledge was transcendent, found outside the body, in the endless empty ocean of the cosmos against which Hawking has frequently been photographed. Disembodied scientific rationality has been uniquely positioned to access this truth. Hawking, represented as the purely cerebral scientific genius, has embodied this rationality. This is what science writer Dennis Overbye noted when he wrote about Hawking: "On some level that I didn't understand I felt that I had always known about him." This is what Hawking understood himself when he said (cited in Bachrach 2004): "No one can resist the idea of a crippled genius". He has come to paradoxically embody the mystery of disembodied knowledge. He has become science incarnate.

[47] Fara 2000 p269.

A Brief History of Time was a cultural product around which these ideas were manifested. Shapin (1998 p44) noted that disembodiment has been "losing its sense and force in late modern culture," but *A Brief History of Time*'s sales have demonstrated the concept's continued currency, especially when allied with promotion. The Hawking phenomenon was the commercialisation of a historical concept, a concept that has demonstrated its lasting cultural energy.

Hawking's popular status as disembodied scientific genius has, in a further paradox, been constructed around Einstein and Newton, themselves constructed in part around the same ideas of disembodiment. Hawking has been described frequently as the new Einstein, but Newton has been a crucial point of historical comparision. They have both been prominent figures in eminent British cultural institutions (both having an Oxbridge education, both holding the Lucasian chair at Cambridge, both fellows of the Royal Society). Beyond these institutional links, Hawking has deliberately constructed his public persona as Newton's scientific successor, through explicit and implicit associations and allusions in a variety of popular communication forms and genres. He played poker with Newton on *Star Trek.* He positioned himself as the scientist who would build on Newton's theories in *A Brief History of Time*. An overview of physics and astronomy he introduced and wrote the commentary about was called, in reference to Newton's phrase, *On the Shoulders of Giants* (2002). He was photographed in the Woolsthorpe garden, under the descendant of the supposed apple tree that may have inspired Newton. Describing this mix of intertextuality and myth, Fara (2000 p269) said it a "bizarre re-enactment of a mythical event".

The concept of disembodiment and the associations with Newton have been appropriated by Hawking and his publishers for promotional purposes. There has been a deliberative, commodification-driven self-fashioning from the beginning of Hawking's phenomenally successful popularisation career. The intensive self-representation in *A Brief History of Time* pushed Hawking into the scientific canon. This presentation of him as successor to Galileo, Newton and Einstein was used in promotional material for his work, commodifying Hawking and cosmological history to advertise a book that made the, ultimately unfulfilled, promise of explaining the secret of the universe. His celebrity has been characterised by the commodification of disembodiment through intense promotion and personalisation.

Celebrity's merging of the public and the private has meant that, compared with the posthumous disclosures of Einstein's personal life, Hawking's domestic life has been reported contemporaneously. These have presented powerful counter-narratives to his dominant portrayal involving discourses of disembodiment and cerebral abstraction, creating complex, often subversive, images of Hawking. Like other contemporary celebrities, he has been subject to various counter readings. He has been painted as the genius scientist of his generation *and* a domestic despot, a controlling egoist *and* an inspirational example of the human spirit. He has written about his living with motor neurone disease *and* was pictured happily with lapdancers.

Despite his self-representation in prose and his complicity in his fame-generation, Hawking has exhibited ambiguities about fame, reflexively examining his celebrity. He has disliked attempts at biography, but the most revealing insights about his personality and character have come from his family. Fame was explored too as a corrosive influence on Hawking's family life yet it meant their reflections on his life were easily commodified for their publicity and payment. Fame was a burden, but one he used for status and profit. The philosophical and theological questions inevitably raised by *A Brief History*, included, to a degree, as a controversy and sales-generating metaphor, put him in a position as a physicist-philosopher to which he was manifestly unsuited, as shown by his repetitively unoriginal popularisation works. Overbye (1991 p380) wrote of an interview with Hawking:

> In the end what I wanted to know from Hawking is what I have always wanted to know from Hawking: Where we go when we die.

It has been an implicitly promised hope that arguably will never be fulfilled. However, these counter readings have not dispelled the dominant image of the disembodied genius, indicating the continued cultural power, unchanged since Newton in the seventeenth century, of associations of science with romanticism, corporality, nationalism, scientific creativity and asceticism. The social function of Hawking's celebrity has been the perpetuation of these deep-rooted cultural conceptions of scientific creation. These associations have recurred in almost every representation of Hawking, including the coverage, in 2007, of his experience of weightlessness in a zero gravity spaceflight aboard an adapted Boeing 727 that took off from Cape Canaveral, Florida. It was the first time in 43 years that Hawking moved without his wheelchair (Vanity Fair 2007). Publicity was present: photographs and images were relayed back to earth during the eight 25 second spells of zero gravity at altitudes of up to 32,000ft over the Altantic (Goddard 2007). Hawking smiled. His assistants floated an apple alongside him.

Chapter 6. Richard Dawkins: The self-fashioned rationalist

Photograph: (Clinton) Richard Dawkins by Carolyn Djanogly © Carolyn Djanogly. All rights reserved. Reproduced under license.

6.1. The Selfish Gene *or The Immortal Gene or The Cooperative Gene*

The Selfish Gene, first published in 1976, propelled its author, Clinton Richard Dawkins (1941-), to international fame (Gaften and Ridley 2006). It put forward the still-original argument for the gene's eye view of evolution: that animals and humans have existed merely as survival machines for their genes. Even seemingly altruistic behaviour in certain circumstances was aimed at increasing the likelihood of a gene's survival. The survival of the group or species was not the essential element in evolution. Crucial was the survival of the gene (Dawkins 1989). The book was a product of neo-Darwinism, also called the modern synthesis, the combination of Mendelian genetics and Darwinism that occurred in the first half of the twentieth century, in which several disciplines within evolutionary biology were rewritten in the language of mathematical population genetics (Segerstråle 2000). Dawkins drew on the work of neo-Darwinian thinkers including R.A. Fisher, William Hamilton, George Williams, Robert Trivers and John Maynard Smith, synthesising their theories, expressing them clearly as pointed arguments that instantly established his reputation as an accomplished prose stylist (Turney 1999).

The book has been praised as one of the unchallengeable pieces of expository prose in twentieth century popular science writing. It was expanded into a second edition in 1989, republished as a 30th anniversary edition in 2006 along with a companion volume of essays titled *Richard Dawkins: How a Scientist Changed the Way We Think* (2007). The 1989 second edition's back-cover synopsis called it "still his most famous" work. Turney (2008) said its continued prominence has been exceptional. Orr (2007) called it the best work of science popularisation ever. Dennett (2006) argued that it was a philosophical work as it expounded an original way of conceiving the natural world. Coyne (2006) called it one of the founding texts of evolutionary biology, noting that it was not just the public that accounted for the million-plus sales: it affected all contemporary scientific discussion on evolution.

When it was published, Dawkins was a successful professional zoologist at Oxford, where he had already taken his undergraduate degree and doctorate, for which he specialised in ethology, the evolutionary study of animal behaviour outside laboratory conditions, working under Nobel prize-winning ethologist Niko Tinbergen. Dawkins was a Research Assistant in Oxford, Assistant Professor of Zoology at University of California, Berkeley, Senior Research Officer and University Lecturer in Zoology and Fellow of New College, Oxford.

He was European Editor of *Animal Behaviour Monographs* and *Animal Behaviour*, and had been publishing in peer-reviewed scholarly journals since 1968[48].

Even though Dawkins said his three imaginary readers were the layperson, the expert and the student, he intended *The Selfish Gene* to be original scientific knowledge, saying:

> Rather than propose a new theory or unearth a new fact, often the most important contribution a scientist can make is to discover a new way of seeing old theories or facts . . . it is for this kind of reason that I prefer not to make a clear separation between science and its 'popularisation' . . . a new way of seeing . . . can in its own right make an original contribution to science (1989 ix).

Essentially an exposition on a particular view of methods of adaptation for natural selection, the book had an immediate influence on professional education and research in evolutionary biology. It was a silent revolution, however, as it was not always academically acceptable to cite *The Selfish Gene*, because its lack of mathematics meant it did not align with the dominant position of mathematical population genetics within biology. Nevertheless, its creation of a unified conceptual framework for contemporary Darwinian biology was praised by critics as an impressive piece of scientific creativity (Dawkins 1989, Graften 2006, Read 2006, Segerstråle 2006, Krebs 2006).

The Selfish Gene became entwined with the nature-versus-nuture controversy of the 1970s and 1980s that followed the publication of Harvard zoologist EO Wilson's *Sociobiology: The New Synthesis* (1975). Wilson examined the biological basis of the social behaviour of animals, including humans, arguing that aggressiveness, morality, religious beliefs and sex roles were connected to our evolutionary past. Soon after its publication, controversy came, as it was challenged by a collective of left-wing and marxist-influenced critics that comprised the Sociobiology Study Group (SSG), founded in Boston, with Richard Lewontin, a population geneticist, and Stephen Jay Gould its most visible members. They argued that *Sociobiology* – published after two decades of profound civil rights action and radical debate in the US, and during the post-world war two taboo on biological explanations for behaviour – justified unequal distributions of power in society, provided scientific legitimacy to the status quo and discouraged social reform. Gould labelled sociobiologists biological determinists (Segerstråle 2000, 2006, Jumonville 2002).

48 Dawkins's career details can be found on his curriculum vitae, downloaded from http://www.simonyi.ox.ac.uk/dawkins/CV.shtml on July 9 2009.

Sociologist of science Ullica Segerstråle wrote in her *Defenders of the Truth* (2000) that the conflict was more complex than the received interpretation that viewed it as a politically-driven clash between hereditarians and environmentalists over influences on human action. Instead it was a wider debate in which scientists argued over the essence of their work, how science related to society and what constituted socially-acceptable knowledge. The debate had a metaphysical element that constituted part of its appeal: discussions of human nature, free will and individual determinism. Segerstråle noted that sociobiology had the constituent elements of a literary and academic controversy. There were opponents of the book's central message, a general cultural climate that was sympathetic to that opposition, qualified critics who had the same status as the author, a portrayal of the book as offensive to right-thinking society, and attacks that occurred over a long period of time. The nature of the science itself meant that there was room for personal interpretation to shape and maintain the controversy, as evolutionary biology relied heavily on argumentation (Segerstråle 2000).

Dawkins said he was not influenced by Wilson, but their books were grouped together as essentially arguing for genetic explanations for human actions. The sociobiological paradigm came to be defined by the gene's eye view. Criticisms focused on Dawkins's vivid explanatory tactic of anthropomorphising genes – their comparisons with gunslinging Chicago gangsters, for example, shocking American reviewers (Segerstråle 2006).

In Britain, the book was well received, but some commentators attacked it on moral grounds. Criticised as a form of genetic determinism, the selfish gene theory was linked to the dominant neoliberal ideology at the end of the twentieth century, connecting Dawkins and former Conservative British Prime Minister Margaret Thatcher. Her preaching of individual selfishness in the absence of society mirrored his discussions of selfishness at the genetic level (Kohn 2006). Dawkins said much of the initial hostility might have been because of its title. A potential alternative from his publisher was *The Immortal Gene* and he himself noted that *The Cooperative Gene* was equally accurate (Dawkins 2006a).

Extrapolating contentious social or moral implications from sections of the book were what Segerstråle (2006 p85) called "moral readings". The aggressive attack in *Not in Our Genes* (1984), by marxist neurobiologist Steven Rose, Richard Lewontin and Leon Kamin, which interpreted elements of Dawkins's writing as criticisms of the welfare state, made Dawkins defend himself as a sociobiologist, much as he disliked the label (Dawkins 1981, Kohn

2006, Segerstråle 2006). Moral readings underpinned the criticisms of John Searle (1985, 1992) and philosopher Mary Midgely (1979), whose review of *The Selfish Gene* in the journal *Philosophy* was startling for its degree of personal hostility. Dawkins was an "uncritical philosophical egoist" who merely fed "the egoist assumption into his *a priori* biological speculations". His typical readers were "people with vaguely egoist leanings about individual human psychology". Telling readers they were essentially gangsters was "monstrously irresponsible". Dawkins's "crude, cheap, blurred genetics . . . is the kingpin of his crude, cheap, blurred psychology". (Midgley 1979 p439-458). Dawkins's reply to Midgley described how he was "taken aback by the inexplicable hostility" of Midgley's "rude" "assault", motivated by "transparent spite" and "venomous tone". He said he used terms like selfishness and altruism not metaphorically but behaviouristically, as animal biologists generally did (1981 p556-572).

Outside academia, the book drew occasional bleak responses from readers distressed by their moral interpretations of the selfish gene concept. Nesse (2006 p204) referred to personal reviews by readers on online bookseller amazon.com where they described the book inducing a "psychic trauma" that "turned their moral worlds upside down" causing "persisting depression". This anecdotally bleak reception was because of the book's "virtually irrefutable" conclusions that jarred with other views humankind had of itself (Evans 1979 cited in Dawkins 1981 p573).

After *The Selfish Gene*, Dawkins became more academically prominent. His CV listed his principal invited and keynote lectures as beginning in 1979, including a lecture at the University of Washington, Seattle, where he appeared alongside luminaries of evolutionary biology, R.L. Trivers, R.D. Alexander and W.D. Hamilton. Further commissions from publishers followed. Dawkins now began to publish his major works in the popular science genre aimed primarily at the educated general reader, although he continued to be published, with declining frequency, in his field's professional literature, mainly in review articles.

The personal has been a feature of his work since *The Selfish Gene*. Novelist Phillip Pullman (2006 p272) named one of Dawkins's three writing gifts, alongside precise phrase-making and skillful storytelling, as the "revelation of a personality". This authorial personality was conveyed in a serious and passionate tone of voice commensurate with the importance of the biological subject. The tone chimed with the truth-value of its science, a tone of voice essential in the creation of what rhetoricians would call Dawkins's *logos* or authority

(Corbett and Connors 1999). While *The Selfish Gene* contained almost no explicit references to his personal life, Dawkins did reveal a crucial aspect of his personal morality. While Wilson coupled science and morality, Dawkins explicitly separated them, ending *The Selfish Gene* (1989) with the optimistic humanistic sentiment that, unlike other animals, humans were unique in their ability to be guided, not just by the biological drives of the selfish gene, but by morality and ethics.

His status as a public scientist established by the book, Dawkins became identified with his selfish gene theory. The early merging between Dawkins and his theory was commodified by his publishers. A French edition of *The Selfish Gene* had pictures of small men with bowler hats with clockwork winding-up keys sticking from their backs, while a German edition featured on its cover a puppet suspended from strings descending from the word 'gene'. He used the examples in lectures to demonstrate erroneous interpretations of the book (Dawkins 1999). The promotion of the book emphasised its revolutionary claims, Oxford Universiy Press calling the 30th anniversary edition an "imaginative, powerful, and stylistically brilliant work not only brought the insights of Neo-Darwinism to a wide audience, but galvanized the biology community, generating much debate and stimulating whole new areas of research" (Oxford University Press 2009).

The concept and its criticisms, however interpreted, have merged in the representation of Dawkins. The photograph from the National Portrait Gallery that opened this chapter showed Dawkins as a part of an elaborate tableau composed of flowers, plants trees, a statue of a woman, and two decorative horses from a fairground carousel. He is not prominent in the photograph's composition. It is an iconic image, but the elements, when combined, become indexical of his writings. The image can be read through the framework of his biological theories: biological organisms – trees, plants, horses, humans – were merely, to use one of Dawkins's most criticised metaphors, lumbering robots that existed only to aid the survival of the individual gene.

The genre-mixing continued in Dawkins's next commercial book, *The Extended Phenotype*, first published in 1982. Consciously aimed at the specialist in biology, it extended his original concept of the selfish gene into something more subtle and speculative: the idea that a gene can reach far outside its own molecular walls, sometimes into other organisms, to increase its chances of evolutionary survival. This phenotypic power meant genes influenced their environment to increase their chances of replication. The book was a reassertion in a popular format of his scholarly credentials within ethology and an assertion of his authority within professional biology. Dawkins viewed it as his capital piece of original research (1999). As in *The Selfish Gene*, the lines between scholarship, personalisation and popularisation continued to blur. Dawkins said it was a work of “unashamed advocacy” for a particular view of evolution: his own (1999 p1).

6.2. The Darwin wars and academic celebrity

Dawkins and Gould replaced Wilson and Lewontin as sociobiology’s public protagonists. The political underpinnings remained, but the controversy increasingly focused on theoretical issues in evolutionary theory (Segerstråle 2006). The decades-long dispute between Dawkins and Gould has been one of the most high-profile clashes in modern science. It was played out in public, becoming a popular publishing phenomenon, appealing to the imagination of the general public, attracting the lucrative interest of publishers. Journalist Andrew Brown called his account of the dispute *The Darwin Wars* (1999) and characterised the conflict as a cultural and political dispute over the scope of Darwinian explanations in the world. It also concerned personal disputes and academic rivalries, embedded in different intellectual and national traditions, as well as the institutional status of various disciplines within biology. Philosopher of biology Kim Sterelny in *Dawkins vs. Gould* (2007) viewed the dispute as being centrally concerned with issues internal to evolutionary theory[49].

The two scientists came to personify contrasting schools of evolutionary thinking. Gould and Dawkins disagreed over the mechanics of evolution and the importance of natural selection. Dawkins argued that natural selection operated on the gene and that evolution occurred gradually through the complex adaptation of gene lineages over long time periods. He and his colleagues have been called gradualists or adaptationists. They believed that evolution could be examined through competition and adaptation between genes. Gould has looked at the large-scale history of the evolution of life on a palaeontological timeline, believing natural selection also acted on the levels of organisms, groups and species. Rather than gradual adaption, the theory of punctuated equilibrium explained the operation of evolution. Gould said natural selection was important, but argued that there were other agents that influenced evolution, including mass extinctions. These differing views were

[49] Sterelny’s book was the best-selling title in the Icon Books ‘Revolutions in Science’ series, of which it was a part (Fyfe and Smith 2003).

grounded also in opposing positions in philosophy and sociology of science. The discussion of these perspectives in popular books has allowed non-specialists to view internal knowledge-creation in modern science (Brown, 1999, Sterelny 2007, Thomas 1999, Horgan 1996, Coyne 1999, Segerstråle 2000).

Brown (1999) divided modern Darwinians into the mutually exclusive categories of Dawkinsians and Gouldians (although the groupings have been disorganised, fuzzy and have shifted over time). The clash between Dawkinsians and Gouldians made evolutionary biology “the sexiest place in science” (Coyne 1999). Like the central conflict in sociobiology where Wilson and Lewontin were “in a kind of symbiosis,” so too have been Dawkins and Gould. They might not have wanted their issues to be resolved, as their recurring claims and counter-claims have been played out in best-selling titles that their audiences expected and have continually received. “Controversy pays,” noted Segerstråle, “and it takes two to tango” (2000 p324).

Dawkins’s continued prominence in the intellectual marketplace was at least partially commercially driven. Darwinism has sold books and has captured public imagination. Successful publishers knew that readers who bought books about genetics and evolution were really seeking knowledge about people. Added to this has been the commercial milieu in which agent Brockman obtained huge advances for his clients, including Dawkins and Dennett, meaning publishers needed extensive publicity campaigns to guarantee returns (Brown 1999, Thomas 1999, Mitton 1987) The commercial discourses can be seen in the promotional language used to market and introduce the titles that described the debate. Sterelny’s book (2007) was advertised as covering a “savage” debate, “notorious for its intensity,” and its title *Dawkins vs. Gould: survival of the fittest* illustrated its intellectual and commercial appeal. According to its blurb, Brown’s book (1999) was about a “holy war, conducted with an extraordinary fury that reverberates far outside the walls of academe”. The promotion was also evident in the technical literature. The journal *Evolution* had each scientist reviewing the other’s newly-published works simultaneously, printing them side by side (Dawkins 1997, Gould 1997).

Dawkins wrote that this was a minor controversy within evolutionary theory that has been granted undue prominence by “media hype” (1991 p225). He characterised Gould and his punctualist colleagues as self-publicists who exaggerated their revolutionary credentials. Their “highly advertised school of thought” enjoyed massive publicity among an uninformed public who erroneously believed that the theories were different from those of Darwin, which was how they "later came to be sold" (1991 p236).

The writing from theories aligned with Dawkins and Gould advanced a particular scientific perspective, making problematic the characterisations of popular science as the mere translation of accepted scientific truth. Their books were rhetorical, designed to persuade the reader that their view of the history of life was correct. The tone varied frequently between scientific exposition and personal attack. Thomas (1999 p349-350) argued the prose slided occasionally towards "vulgar Darwinism," where supposedly popular science texts were used to assert particular academic perspectives or to correct previous perceived critical slights: this was "private warfare, that risks being fought against public bewilderment". Strident opinions were essential to making sense of a complex field. The scientific issues were personal to the authors and so, in their prose, social values and scientific facts mixed. Popular Darwinism writings were "especially fertile fields for private meanings and personal reconstructions".

The clash of philosophies, the disagreements over the histories of life, the fact that so much discourse has been tied up with the representations of both scientists – together these meant that writing about Darwinism became "a particularly personal and bad-tempered activity" (Thomas 1999 p349). Disagreements were not just about theories or data: there were "enmities" and "personal animosities" and an "undercurrent of hostility" and "mutual animosity" between Dawkinsians and Gouldians (Brown 1999 p2, p56, Sterelny 2007 p157, Ridley 1995). Claim and counter-claim came in full length books and pieces in the *New York Review of Books* (see Gould 1997, for example).

This mix of the personal and the scientific that emerged in their writing reflected their alternative philosophies of science. Gould's marxist-influenced philosophy saw the production of scientific knowledge as being contingent on its historical context. Dawkins has been a positivist, accepting also Popperian falsification that new ideas and data could lead to scientific theory being revised. He has embraced the Enlightenment ideal of rationality. Science was the one intellectual activity that could produce objective knowledge. It was not socially constructed. It did not have an equal epistemological status to other fields. Scientific knowledge inspired wonder and liberates humankind (Dawkins 2004, 2006, Sterelny 2007). He emerged from the English tradition of evolutionary biology, which conceptualised the history of evolution as gradual and adaptationist (Kohn 2005). Dusek

(1999) argued that Dawkins's writing hid its ideological implications behind a veneer of scientific impartiality. EO Wilson's sociobiology attracted such vehement criticism partly because he advocated science-influenced policy positions, but Dawkins avoided making these judgements, allowing him to present himself as a scientist. His ideology was implicit. Segerstråle (2006 p90) said Gould and his colleagues wanted science to answer "why?" questions while Dawkinsians believed scientists should restrict themselves to "how?" questions.

Before Gould's death, he and Dawkins had been drafting a joint letter encouraging other evolutionary biologists not to engage in a debate with creationists, to deny them the unmerited scholarly platform they craved. Gould and Dawkins's prominence was underlined by Dawkins's (2004) description of how Phillip Johnson, influential in the intelligent design movement, wanted to debate only either him or Gould as they were the significant public visible representatives of Darwinism, a role that Dawkins had carefully crafted himself.

6.3. Darwin's bulldog: Challenging creationism, pseudo-science and anti-science

This representation of Dawkins as a contemporary emissary of Darwinism first began to be intensively self-created in his third book *The Blind Watchmaker*, originally published in 1986. Its critical reception and public sales marked it as an exemplar of expository popular biological prose. An extended explanation of how evolution has created the beautiful biological complexity of the natural world, the book was a direct challenge to creationists and a deliberate piece of advocacy for the capacity of science to induce wonder. It had an enormous scientific sweep in amassing its diverse range of unassailable proofs for evolution (Dawkins 1991).

The Blind Watchmaker detailed how gradual evolution shaped all life on earth. Dawkins used examples as varied as the sonar of bats, the arrangement of stones on a beach, the velocity of planets in the solar system, the evolution of the human eye, and the chances of a monkey actually writing a line from *Hamlet*, to illustrate that cumulative natural selection, over time, was nonrandom, with chance (or mutations) being a minor aspect, and that evolution had no long-term aim, no final destination, its goal only short-term survival or reproductive success. Through these examples, the book composed a deliberate defence of rationalism and empirical science (1991). The choice of reviewers reflected its author's increased status. Its blurb contained admiring comments from novelist Martin Amis, E.O. Wilson, the Archbishop of York, Steven Rose, and science fiction writer Isaac Asimov,

As his self-fashioning progressed, and his authorial persona became increasingly commodified, the revelation of personality in his work increased. *The Blind Watchmaker* contained for the first time explicit examples of aspects of Dawkins's life and inner life. These personal dimensions to the authorial personality became part of the terrain of his books, adding *pathos* to *logos* and *ethos* in his range of persuasive devices (Corbett and Connors 1999). His daily cycle to work, his view of the Oxford canal from the foot of his garden, his passionate belief in the honest advocacy for truth, his personal observations of the behaviour of species, including ants, his correspondence from clergymen, his view that it would be an honour to be fossilised – all occurred amid the closely-reasoned scientific arguments.

Along with *The Selfish Gene*, the book has remained the most impressive manifestation of his career leitmotif: the exploration of the almost limitless power of Darwinism (Dawkins 1995). This theme continued as the prominent feature of his next two books, *River Out of Eden* (1995) and *Climbing Mount Improbable* (1996). Rather than being explicit denunciations of creationism, they were instead extended persuasive tracts on how evolution created life on earth. *The Ancestor's Tale* (2004a) returned to this theme in its presentation of a scientific proof to the creationist demand that evolutionists produce one fossil that showed an evolutionary transition. A history of life on earth, it was a "kind of textbook in disguise, containing all the elements of systematic zoology" (Turney 2007 p89). These four books crafted his intellectual persona as an anti-creationist evolutionary biologist. Dawkins self-fashioned this role for himself, creating a personality that became the embodiment of abstract ideas.

This self-fashioning had substantial commercial backing from his literary agent John Brockman, whose support Dawkins acknowledged in his later works. In the 1990s Dawkins was firmly part of the third culture of scientist-intellectuals envisaged by Brockman (1999). The links between science, writing, and public intellectual work were codified in promotional material for his work at this time. A new edition of *The Extended Phenotype* advertised him as a spokesman for science and rationality. It said: "Richard Dawkins's bestselling books have played a significant role in the renaissance of science book publishing for a general audience" (1999).

His next work, *Unweaving the Rainbow*, first published in 1998, marked a significant expansion in his self-fashioned role. The anti-scientific other against which he fashioned himself grew from muddled creationists to various anti-rationalists: astrologers, new age mystics, psychics, postmodernists, romantic poets. The book marked a change of tone from the confident empirical exposition of his early work: it was more aggressively strident, more combatively argumentative, more impatiently hostile to confused thinking.

This tone shift occurred amid a significant change in Dawkins's academic career. In 1995, he was appointed the inaugural Charles Simonyi Professor of Public Understanding of Science at Oxford. The first of its kind in the UK, the chair was created with an endowment from former Microsoft executive Charles Simonyi, who, in his manifesto for the role, viewed the public understanding of science as the communication of scientifically valid information to bolster science's cultural standing. The role was to be held by a scholar rather than a populariser, a group that he argued was prone to voguish attempts to seduce undiscerning audiences with needless exaggeration. According to the official Simonyi internet pages, the main criterion for communication was "scientific validity" unaffected by social, religious and political forces that necessarily interacted with science. The chair had to explain science's limits and speculate responsibly to convey the excitement of doing "true science" (Simonyi 2008). Philosopher AC Grayling noted that the position was effectively as an "*ex cathedra* spokesman for science" (2006 p234).

The appointment consolidated Dawkins's role as advocate of science's role as a cultural force (Davidson 2000) and his performance in this role can be best understood as an academically-validated continuation of his self-fashioning project. *Unweaving the Rainbow*, first published in 1997, was his acknowledged first articulation, in the long book form, of the central rhetorical aim of his subsequent work: the replacement of a malignant faith in anti-rationalist supernatural mysticism with a rational aesthetic appreciation of the natural world. Dawkins's pro-science arguments, against perceived anti-science, pseudoscience, postmodernism, social constructivism and relativism, continued the line of argument made from the scientific perspective during the science wars in the early-to mid-1990s.

Unweaving the Rainbow renewed the arguments made in this tradition[50]. The claims of astrologers and psychics were challenged using the science of statistics and probability. The wonder of science was evoked with arguments in favour of an aesthetic appreciation of science's achievements: the beauty of the explanations of rainbows and relativity. Good poetic science was Dawkins's ultimate aim, where scientists and poets in their work challenged irrational delusion and found awe in the face of nature. Appreciating the cultural and beauty value of science was a higher aesthetic (Dawkins 2004, 2006).

The book's philosophical stance was positivism, equated with scientism as an ideology. Part of scientism's power was its denial of its ideological nature. Arguments against scientism, therefore, were viewed as anti-scientific (Davidson 2000). A scientist's credentials were based on how factual knowledge was systematically amassed: the scientific method (Dawkins 2004). Dawkins's mode of argument moved in this book from the logic based on dense empirical proofs, evident in his earlier works, to anecdotes gathered from scattered cultural sources. Davidson (2000) argued that the book was an expression of cultural anxiety. Dawkins characterised criticism of science as emerging from writers who were "personally anguished, almost threatened, beleaguered, fearful of humiliation because science is seen as too difficult to master" (Dawkins 2006 pp34-35).

The evidence for anti-scientific attitudes in society was taken from isolated pieces of journalism. Critical remarks by Fay Weldon about science's inability to deal with a variable world were a "hymn of hate" and an example of "naked hostility" (Dawkins 2006 p33-4). A television review by *Sunday Times* critic A.A Gill, in which he said science was constrained by tedious experimentation, was an example of anti-science. Cultural relativism was for Dawkins a locus of anti-science. Continuing from an argument made briefly in *River out of Eden* (1995), Dawkins conceptualised cultural relativism in its most extreme form, where western science was reduced to the epistemological equivalent of tribal myth. Compared to the claims of other cultures or tribes, scientific truth was the only one to have regularly persuaded converts of its epistemological superiority (2004 p18).

Cultural relativism was a "fashionable salon philosophy" (Dawkins 1995 p35). Literary critics who found a political message in Blake's anti-scientific poetry were "fashionable commentators" (2006 p17). Academic work hostile to science was written invariably by

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[50] Segerstråle (2000) argued that the sociobiology debate was a prelude to the science wars, whereas Wilson saw attacks on sociobiology and behavioural genetics as attacks on science.

“academics sophisticated in fashionable disciplines” (2006 p18). Philosophies of science were similarly dismissed without sophisticated analysis. Popper or “more fashionably” Kuhn were a “different type of truth-heckler” (2004 p19) to cultural relativists, because of what he interpreted to be their arguments against absolute truth. Clearly, fashionable was used metonymically. Clearly, fashionable meant pretentious and ephemeral, while science meant proven and durable. He later admitted in a footnote that some cultural relativists had “perfectly sensible” views, but should distance themselves from the “fatuous kind” (1995 p36), although who he meant was not explained fully, but was most likely to be extreme constructionist accounts.

Continuing his critical evaluation of humanities disciplines, he said verbose specialist academic language was invented to give the appearance of difficulty to a simple subject. Physicists always tried to explain their findings as simply as they could, but compared to the advances of physics, “the low-grade intellectual poodling of pseudo-philosophical poseurs seems unworthy of adult attention” (2004 p22). His stated intellectual influences in this area were the books *Higher Superstition* (1994) and *Intellectual Impostures* (1998), which he reviewed for *Nature* (Dawkins 1998). Each book was a measured evisceration of the pretensions of postmodernism. In this criticism of French-influenced postmodernist writing that has “all but taken over large sections of American academic life” (2006 p57), Dawkins denounced ‘cultural studies’ and ‘science studies’ (the quotation marks are his) as being epistemologically equivalent and qualitatively uniform (2006 p61). The harmful misuse of scientific language appropriated by new age thinkers, especially quantum uncertainty and chaos theory, has had “deplorable effects upon popular culture” (2006 p188).

Literary studies has been worthwhile historically, but have been debased by cultural studies, which he reduced to “deconstructing soap operas, tabloid princesses and Tellytubbies” (2006 p23). Likewise, the *X Files* television programme, in which two FBI agents investigated paranormal aspects to crimes, was harmful to the general population, because of the repetition of anti-rational conclusions to the mysteries. Personal reflections littered *Unweaving the Rainbow* (2006), which began with a response to a publisher who asked how Dawkins could bear to get up each morning, such was the pessimism of his selfish gene theory.

Despite being the first expression of his new prominent academic role, Dawkins discussed the wider public understanding of science movement briefly and superficially. Clearly he did not see himself as part of the wider movement in the UK, which he characterised as an undignified dumbing down of scientific work to increase applications for university courses, the decline of which drove the wider PUS movement at the end of the twentieth century. The field was reduced to scientists in funny hats and silly voices acting desperately to persuade children that science was fun. Instead of real science, this was a condescending debasement of genuine scientific work, which should, in his view, be portrayed honestly as being a rewardingly demanding discipline (Dawkins 2006).

Dawkins's work was perhaps "the most visible example of an unreconstructed deficit model" (Trench 2008 p121). Despite his putatively public role, Dawkins has not addressed fundamental concepts in communications studies, rarely reflecting "on the diversity of publics for science, and even less on the diversity of possible approaches to communication with those publics" (Trench 2008 p121). For Dawkins, scientists have discovered "what is true about the world and the universe" and Dawkins argued that this "objective truth" should be granted legal rights to protect its reputation, similar to libel laws. Science journalism was "too important to be left to journalists" and he hoped "true scientists" would be better at it than reporters (Dawkins 2004 p284, p41, p222).

Davidson (2000) argued that Dawkins's weakness was a lack of empathy for general audiences and the social and economic conditions that contributed to their beliefs.

The prose in *Unweaving the Rainbow* could easily be interpreted, even by his admirers, as "evangelical" and "hectoring" and self-righteous, a tone of voice that can impact on the public understanding of science. It could positively introduce readers to the achievements of science and the subtleties of Darwinism, but it could also give a negative impression of public understanding of science work (Thomas 1999 346).

A Devil's Chaplain, a collection of his essays and journalism, was published in 2004. Coming at a time when his academic and popular intellectual credentials were critically and commercially established, it was his most personal book to date. Its editor Latha Menon said Dawkins was an "academic scientist" (2004 p3) and the book contained a strong autobiographical element. Alongside his criticisms of postmodernism and pseudoscience, and his specialist interpretations of new works of evolutionary theory, there were autobiographical reflections on his love of the Africa of his birthplace, touching eulogies for his friends writer Douglas Adams and biologist W.D. Hamilton, and a letter to his daughter on the value of evidence-supported claims, in which he hinted at the emotional pain of being separated from her for long periods of time. He referred repeatedly in the preface to his later works to his wife, actress Lalla Ward, who helped him with the polishing of his prose through speaking the text aloud. She also worked with him on readings of *The God Delusion* (2007).

In the essay collection, Dawkins continued with the same tone of voice, advocating a positivist science, purged from subjective or ideological interference, where clear exposition granted access to the aesthetic quality of science. This view was codified in a memo he sent to Tony Blair, when he was Prime Minister. Dawkins wrote:

> If I am asked for a single phrase to characterise my role as Professor of Public Understanding of Science, I think I would choose Advocate for Disinterested Truth (2004 p43).

A lasting intellectual influence on Dawkins – and his brand of science communication – has been Carl Sagan, whom he referenced continually (2006, 2007), and whose prose style evoked the wonder of nature that Dawkins has tried to emulate. Robert Park of the American Institute of Physics said "Dawkins is for biologists what Sagan was for physical scientists (cited in Gwynne 1997). This stance was made more concrete in the establishment of the Richard Dawkins Foundation for Reason and Science. On the homepage of this foundation, Dawkins wrote:

> The enlightenment is under threat. So is reason. So is truth. So is science, especially in the schools of America. I am one of those scientists who feels that it is no longer enough just to get on and do science. We have to devote a significant proportion of our time and resources to defending it from deliberate attack from organized ignorance. We even have to go out and attack ourselves, for the sake of reason and sanity . . . Promoting science as poetry was one of the things that Carl Sagan did so well, and I aspire to continue his tradition (Richard Dawkins Foundation for Reason and Science 2007).

6.4. The "Dirty Harry of science"[51]

Throughout this self-fashioning process, as his commentary moved further from his core area of evolutionary biology, Dawkins has been a prominent public intellectual, fulfilling the four criteria outlined by Collini – but with one caveat. He attained a high level of scholarly achievement within zoology, but established his reputation in the discipline with the publication of *The Selfish Gene*. High academic achievement and popular status occurred not sequentially, but almost simultaneously. He has comfortably conformed to the other criteria for public intellectual status. He has reached non-specialist publics through a variety of channels, engaging with their concerns, and developing a reputation for saying interesting things to those publics. He regularly featured as a leading public intellectual in magazine polls (see for example, *Prospect* 2005, *Foreign Policy* 2008). He was elected a fellow of the Royal Society in 2001 and the Royal Society of Literature in 1997.

An articulate and capable media performer, he has written widely for British publications, featured as a commentator in various media, and has presented several broadcasts, including episodes of BBC's flagship science programme *Horizon.* He edited the 2003 edition of The *Best American Science and Nature Writing* and *The Oxford Book of Modern Science Writing* (2008), as well as contributing invited forwards to several books. He holds honorary doctorates in literature and science. Among the several awards he has received are the Royal Society's Michael Faraday Award for advancing the public understanding of science, and the Shakespeare Prize for contribution to British culture[52].

His intellectual heritage has come from two British traditions, one philosophical and one scientific. His positivist view of science places him in the tradition of British empiricism that includes Locke, Berkeley, Hume, Russell and Ayer. His unwavering public championing of adaptationism places him in that school of evolutionary thought, which has had its most ardent advocates at Oxford University, where its Zoology Department became, by the 1960s, the theory's intellectual powerhouse. Kohn's *A Reason for Everything* (2005) described how the concept of adaptation by natural selection originated in Britain, where it flourished through the writings of evolutionists, even though it failed to take hold elsewhere. Dawkins was moulded in the intellectual atmosphere of adaptationism, where he was influenced

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[51] McKie 2004

[52] Dawkins's career details can be found on his curriculum vitae, downloaded from http://www.simonyi.ox.ac.uk/dawkins/CV.shtml on July 9 2009.

heavily by the work of Hamilton and Fisher (Kohn 2005). Their views shaped his scientific taste. Their theories were among those synthesised in *The Selfish Gene*.

His unique intellectual position as a scientist-author validated academically with the Simonyi chair, Dawkins's public intellectual work has been characterised by what Kohn (2005 p320) called "a powerful two-hander – of logical certainty and moral conviction" with his science and morality underwritten by an adherence to principles. However, his moral viewpoints have not been placed in any philosophical tradition: he has adopted, instead, "a practical utilitarianism, assessing actions on the basis of the sum of good or harm that they were likely to do" (Kohn 2005 p320). This was a manifestation of Dawkins's inability to articulate clearly humanistic or philosphical traditions, unlike the scientific traditions from which he emerged.

Dawkins's status among his peers has had a "degree of uncertainty" and he has not been seen as "an evolutionist's evolutionist" because he has not published much solely for peer evaluation. It was not until 2001 that he was elected to the Royal Society (Kohn 2005 p318), and then it was for his popularisation work. Dawkins was "painfully aware" of the hostile charge from biologists that he practised armchair science (Kohn 2005 p316). Matt Ridley noted that many scientists see Dawkins, not as a practitioner, but a populariser, the author of "mere bestsellers" (1995). Nobel Laureate Baruch Blumberg said he was "a zealot, so to speak, dedicated to the notion of evolution" (cited in Gwynne 1997). Historian of science Fern Elsdon-Baker in her *The Selfish Genius* (2009 p233) said some of his peers do not regard him as a scientist and it was "generally accepted in some research communities that he does not speak for the discipline". Elsdon-Baker argued Dawkins has portrayed a self-servingly one-sided view of evolution, which he has articulated from his dominant position as the chief public spokesman on Darwinism and evolution. Elsdon-Baker (2009 p67) argued that Dawkins represented the history and philosophy of science "from within a narrow perspective on current debates in evolutionary biology".

Dawkins has "hijacked" and "distorted" Darwin's legacy (Elsdon-Baker 2009 p2) to present the gene-centred view as central to contemporary evolutionary theory when the discipline has not completely conformed to this perspective. Many scientists would contend, she argued, that selfish gene theory was contested within other fields of evolutionary biology. There have been challenges to the neo-Darwinian orthodoxy, especially through the study of the genetics of bacteria and micro-organisms, where horizontal gene transfer, the movement of genes between non-related organisms, have made more complex the view of genes flowing down through generations. Dawkins's discussions of Darwin have been largely ahistorical, neglecting a fuller account of the context of the naturalist's publication of *Origin of Species*, and not addressing the fact that the terms 'evolution' and 'Darwinism' have had different interpretations at different historical points. He has problematically equated Darwinism with atheism. His arguments have been based more in strident rhetoric than even-handed explanation and his occasional intemperate language – he called one journalist "an ignoramus" for example – was not language becoming of "someone who promotes himself as a spokesman for science" (Dawkins cited in Elsdon-Baker 2009 p152). Elsdon-Baker (2009 p154) noted that Dawkins's "arguments by extremes" were "wholly inappropriate in a scientist". An early review in the journal *Evolution* criticised Dawkins for denying selection at any level other than the gene and, because of this, would not help the reader understand evolution by natural selection (Wade 1978).

Ridley (1995a) noted that "almost everybody" has been jealous of Dawkins's popular success. Critics have noted that his lasting contribution to science has been his synthesis in *The Selfish Gene.* His concept of replicators, early ancestors of DNA molecules in the primordial soup that acted as templates for their own copying, have been viewed as a singular contribution to science (Aunger 2006). Dawkins viewed the final four chapters of *The Extended Phenotype* as his novel contribution to evolutionary theory, but the theory has not developed into a research theme in any scientific institution: he has not expanded its research agenda because he has been preoccupied with writing books (Dawkins 2004c).

Dawkins's work on cultural history and the spread of ideas – memes and memetic theory – has not been favourably received by cultural theorists and other scientists. Dawkins in *The Selfish Gene* attempted to explain the spread of ideas through history and society using his concept of memes: replicating units of cultural transmission, analogous to genes as biological units of reproduction. Songs, theories, beliefs, values were all examples of memes, but the most prominent example, one elaborated on in his subsequent work, was religion.

The idea had been elaborated theoretically in works by other researchers. Memes were the central concept in Peter Richerson and Robert Boyd's *Not by Genes Alone* (2006), Stephen Shennan's *Genes, Memes and Human History* (2002), Robert Aunger's *The Electric Meme* (2002), Kate Distin's *The Selfish Meme* (2004), Richard Brodie's *Virus of the Mind: The* *new science of the meme (2009*), *The Meme Machine* (2000), by Susan Blackmore, and *Consciousness Explained* (1993) and *Darwin's Dangerous Idea* (1996) by Daniel Dennett, books that Dawkins (2005) identified as turning points in the development of the idea, as Dennett used them as a foundation for his theories of the evolution of the mind. Dawkins and Dennett, whom Brown (2004) called a "virulent public controversialist," have continually mentioned each other's work. Memes helped make Dawkins "a celebrity," but the theory has been "a scientific flop," unaccepted by most scientists (Coyne 2006, Orr, 2007, Aunger 2006, Wolpert 2007). It has not led to a mass of empirical research. It has not generated original observational or experimental data. Lacking intellectual substance for its central claim, it does not have a future as an academic science because of the continuously vague way in which it has been defined and explained. As Aunger (2006 p186) explained, memetic theory has been devoted to analysis of previous writings and internecine antagonisms: typically the sign of a science in search of a subject matter.

Aside from creating memetics, Dawkins has carried more traditional public intellectual functions. While professor of the public understanding of science, he regularly wrote letters and articles for newspapers, especially the left-liberal *Guardian* and *Observer* in the U.K. In yet more reflexivity over his public role, the style of his public intellectual work has been commented on. The science editor with the *Observer*, Robin McKie, said Dawkins was

> above all, an intellectual pugilist perpetually looking for logical inconsistencies he can quash . . . we should maybe think of him as the Dirty Harry of science. You don't assign him. You just let him loose (2004).

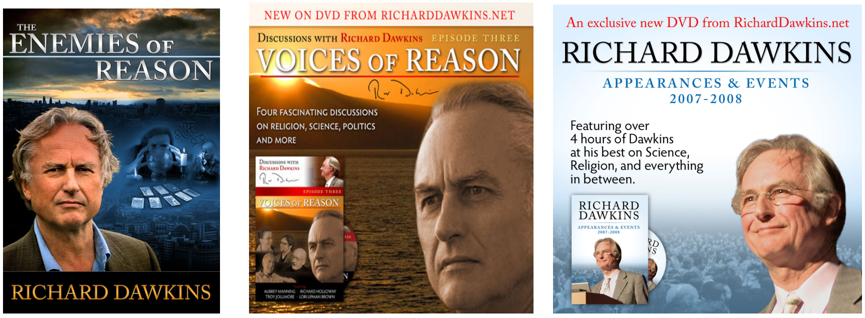
Dawkins himself quoted a review in *The Spectator* which said that his critiques were notable for their viciousness:

> to be Dawkinsed is not just to be dressed down or duffed up: it is to be squelched, pulverised, annihilated, rendered into suitably primordial paste (cited in McKie 2004)

Politically, he is left-liberal, a Labour Party supporter, an admission he disclosed partly to counteract accusations of right-wing affiliations made around the sociobiology debate. He is tied to the liberal idea of progress, scientifically and politically. His opposition to the Iraq war demonstrated his "anti-imperialist indignation" (Kohn 2005 p329). He criticised Prince Charles over his stance on genetically-modified foods, as well as criticising Greenpeace for its protests against GM crop trials. He wrote a memo to Tony Blair on science, genetics, risk and ethics, as well as criticising, satirically, Blair's writings about the faith-promoting Tony Blair Faith Foundation (Dawkins 2000a, Dawkins 2000b, Dawkins 2004, Dawkins 2009a). His intellectual work has taken place in public. He has appeared, for example, at the Hay literary festival (Randarson 2007) and a literary festival in Brighton (Radford 1996). He sold out Westminster Central Hall in London in a 1999 debate with Steven Pinker titled "Is science killing the soul?"(Brockman 1999).

In his television work, the focus has firmly been on Dawkins as icon. The way author-presenters are marketed underlines their authoritative claims. *The Richard Dawkins Collection* DVD set contains three programmes, each introduced with the words "Richard Dawkins presents," stating in its blurb: "Reasoned, researched and authoritative, Professor Richard Dawkins provides a rational person's guide to the world". *Root of All Evil?* (2006) presented religion as a malignant force in the world. *The Enemies of Reason* (2007) highlighted the threats to reason from anti-science and pseudoscience. *The Genius of Charles Darwin* (2008) described the naturalist's life and theories. The productions were personality-driven, similar to some contemporary genres of dynamic, presenter-led wildlife programmes (Dingwall and Aldridge 2006), and history documentaries, which relied on the charisma of its presenter who had to entertain and engage, demonstrate showmanship and exhibit charisma by communicating intensely their personal beliefs. They communicated through the force of personality (Bell and Gray 2007).

Dawkins's charismatic authority in these programmes has been built up through his existing public profile. The programmes' authority relied on Dawkins's prestige, in which he has drawn his authority from the regular stating of his scientific credentials and his adherence to evidence ("as a scientist" . . . Reason and a respect for evidence are a source of our progress, our safeguard against fundamentalists and those who profit from obscuring the truth" (*Enemies of Reason* 2006)). He was therefore presented as knowledgeable, as an expert, speaking fluently and enthusiastically. In many shots, he dominated the screen: on location, giving narration, or interviewing subjects. His personality came through in the narration ("I believe . . ."). In shots he was framed heroically against the sky. In *The Enemies of Reason* he had his chakras energised by illuminated crystals, had his aura photographed, had a tarot card reading. The two-part programme ended with him, dressed in a white coat, in a laboratory. The cover of the DVD of the series, below[53], available from Dawkins's official site, demonstrated how his persona as presenter was central to its marketing. Other DVDs on sale, *Richard Dawkins Appearances and Events 2007-2008*, and *Voices of Reason*, emphasised him as the programme's focus, as can be seen, below.



DVD covers reproduced with kind permission of The Richard Dawkins Foundation for Reason and Science.

The representation of Dawkins has operated intextually. He appeared in an episode of science fiction television show *Dr Who* (2008) as himself, where he was interviewed, and his first words were "it is an empirical fact". He was caricatured in the satirical cartoon *South Park* in an episode entitled 'Go God Go' (2006) where he was the new teacher of evolution in the town's high school. Intertextual allusions occured in the way he is described by journalists. He has been called with "monotonous regularity . . the 'Tom Stoppard of science' . . . (Dougary 1996) and the "Indiana Jones of natural selection" (Billen 2004 p8), "a veritable Tom Paine of evolution" (Schrage 1995).

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Dawkins as he appeared in the South Park *episode "Go God Go"*[54].

[53] These images were downloaded on 9 July 2009 from http://richarddawkins.net/store/index.php?main_page=index&cPath=3&zenid=d1ab096b42d161aba0a87fc072be6ea9

[54] This episode was broadcast on Comedy Central and was produced by South Park Studios. This image has been downloaded on 9 July 2009 from http://en.wikipedia.org/wiki/File:Dawkinssouthpark.jpg

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Dawkins as he appeared as himself the Dr Who *episode "The Stolen Earth"*[55].

6.5. "The most public and private of scientists"[56]

Writers and journalists have reported on Dawkins's appearance and physical surroundings, often making the interplay between public and private, image and reality, a dramatic tension in their descriptions. Tim Radford called Dawkins, in the *Guardian*, charismatic and messianic with the "fierce, hawkish good looks of a forties film star" (1996 pT2). Andrew Brown called him "a neat, handsome, rather bird-like man, who pays attention to his plumage," but said he had a shyness at odds with his being a pin-up for *Wired* (1999 p26). Marek Kohn (2005) described his manner as courteous, using custom to compensate for social awkardness caused by his shyness and described how Dawkins's "widely noted good looks [were] set off to best effect by grooming and trimmings chosen with a stylish eye" (2005 p319). Letts called him "soft-spoken, unconventionally handsome" (1996). Shermer also called him "somewhat shy and quiet", despite "his reputation as a tough-minded egotist" (2006 p228). Marek Kohn noted that Dawkins "is both the most public and the most private of scientists" (2005 p5).

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55 This episode was first broadcast on BBC1 on 28 June 2008, according to the Internet Movie Database (http://www.imdb.com/title/tt1205437/). The screenshot was downloaded on 9 July 2009 from:
http://images.google.ie/imgres?imgurl=http://images3.wikia.nocookie.net/tardis/images/thumb/d/de/RichardDawkins.jpg/300px-RichardDawkins.jpg&imgrefurl=http://tardis.wikia.com/wiki/Richard_Dawkins&usg=__a5XKemeRmVAiQTWPD0hvuf8R1mM=&h=179&w=300&sz=12&hl=en&start=5&tbnid=NlQTfGcfnnPdRM:&tbnh=69&tbnw=116&prev=/images%3Fq%3Drichard%2Bdawkins%2Bdr%2Bwho%26gbv%3D2%26hl%3Den%26sa%3DG. The Dr Who programme is produced by the BBC.
56 Kohn 2005 p5

Journalist Robin McKie referred to his handsome, fresh-faced appearance" (McKie 2004). Reporter Simon Hattenstone said he was a "slight, attractive man" (2003). Philosopher AC Grayling found him "unsmiling and distant," someone who did not interact with crew or guests when they were co-panellists on a television programme (2006 p243). He met interviewer Bryan Appleyard looking "as dapper as ever" (Appleyard 2004b p5). Appleyard, who has known Dawkins, he said, for a long time, has offered the most public insights into Dawkins's character.

> He is one of the strangest men I've ever known . . . he is a highly strung, frequently petulant man. I've seen him storm out of an amiable dinner because he didn't like the music. And I've heard of him muttering to his companion, when a lady cleric entered the room, that dog collars are always a sign of low IQ. But when relaxed, he is charming, deferring politely to opinion with which he disagrees and displaying a conscientious desire to understand (Appleyard 2004b p5).

Commentators who do not know Dawkins personally have reflected on his image in their reports. McKie said there was "no hiding Dawkins's inability to make small talk or suffer fools gladly" (2004). Nugent said Dawkins was reputed to take himself "somewhat seriously" (2009 p10). Hattenstone said he felt "uneasy" before the interview because, although he agreed with almost all of his writings in *A Devil's Chaplain*, he wanted to "smack [Dawkins] for his intolerance". The reporter said a letter, printed in the collection, that Dawkins wrote to his daughter Juliet highlighted "his own complex, often contrary, nature – it is intimate and coldly impersonal, humble and pompous, innocent and calculated, chummy and authoritarian". Yet the reporter referred to Dawkins's "easy charm – a way of making you feel good about yourself" (Hattenstone 2003). There have been reflections by journalists on other coverage: "Dawkins is rarely written about without some mention of his good looks" (Dougary 1996). Interviewing Dawkins, journalist Ruth Gledhill (2007 p4) with *The Times* wrote that she found something "faintly transcedent" about Dawkins in the flesh.

Dawkins's surroundings have been described and linked to his professional success. Interviewers described his beautiful Oxford home. Kohn called him "an authentic celebrity" who enjoyed "the luxury that comes with celebrity, in the splendid house . . . which he shares with his third wife, actress Lalla Ward (2005 p319). Ward has recurred in many accounts: she once played a character called Romana, "who, let's be honest, was by far the hottest of all Doctor Who's time-travelling companions" (Rutherford 2008). This link is also used intertextually in describing Dawkins: one *Observer* headline called him "Dr Zoo" (McKie 2004). The house's lounge looks more like a "playful library" where there are “walls of books, masks, model rabbits, birds’ nests and wooden horses rescued from an ancient carousel” (the same horses pictured in his National Portrait Gallery photograph). The downstairs bathroom contains framed doctorates, awards and a certification from the Universal Life Church, which Dawkins downloaded from the internet (Hattenstone 2003).

Dawkins has commented reflexively on the public and private tensions in his representation. He said he does not “feel particularly aggressive” as a person but admires Darwin's “gentleness and humility, and . . . maybe I should imitate it more" (Hattenstone 2003). Gledhill (2007 p4) said that Dawkins “in the flesh bears no resemblance to the angry, hate-filled anti-religionist he is portrayed as”.

The perhaps trivial details of his life have been written about in reports and profiles. He likes walking the dog but dislikes “back-to-front baseball caps, gratuitous noise” (Crace 2006). He is a long-time devotee of Apple computers (Dawkins 2004b). He described a week in his life (Dawkins 2007b). His favourite film moments were when a lawyer was eaten in *Jurassic Park* (1993), the reimagined end of Baz Luhrmann’s *Romeo + Juliet* (1996) and a scene in *Bedazzled* (1967) when Dudley Moore bounces on a trampoline dressed as a nun (Dawkins 2000). Among his top ten books of the century are: *The Jeeves Omnibus* (1989) by PG Wodehouse, *Collected Poems* (2000) by WB Yeats, *Red Strangers* (1939) by Elspeth Huxley, and *Possession* (1990) by AS Byatt (Guardian 2008). Impostors have imitated him on fake Twitter and Facebook posts (Dawkins 2008a).

The change in Dawkins’s self-fashioned public persona can be found in the changing labels used by journalists to describe him. Taking the coverage in *The Times* over twenty years as an example, descriptions of Dawkins have moved from ‘The Zoology Man” (Duncan 1986) and “lecturer in zoology at Oxford” (Girling 1994) to “a biologist whom people love to hate” (Ridley 1995a) to “geneticist . . . the first Oxford professor of the public understanding of science” (Maddox 1996) to “Darwinist proselytiser” (Letts 1996) to “Britain’s best-known Darwinist” (Billen 2004 p8) to “Britain’s best-known atheist” (McGrath 2005 p77) to “one of the great atheists of our time” (Sacks 2006 p80), “the famous atheist” (Parris 2006 p17), “scientific atheism’s heavyweight champion” (Henderson 2006 p11) to a secular fundamentalist (Gledhill 2006) to “England’s grumpiest atheist” (McGrath 2007 p83) to “Britain’s angriest atheist and self-appointed Devil’s chaplain” (Gledhill 2007 p4) to “the media village's number one atheist” (Billen 2007a p23) to “biologist and arch atheist” (Ahuja 2009 p4).

Religious language has been used to describe him, Dougary (1996) referring to his “austere” features “with a slightly Augustan set which sometimes give him the air, ironically enough, of an eighteenth century cleric. There is a joke among some of his Oxford confreres that he resembles a puritan minister”. Elsewhere, he has been described by Uri Geller (1998) as “Darwin’s best-known evangelist,” an “evangelical” atheist (Gray 2007 p23) and his worldview has been described using religious tropes – there are references to his “missionary zeal” and “faith in science” and “[H]is God is Darwin: his Bible is Origin of Species (Dougary 1996). Sometimes the references are combined: militant atheists like Richard Dawkins, “the hot gospeller of neo-Darwinism” (Appleyard 2005b p6). It is this contemporary public image as an atheist that has formed the latest stage in his self-fashioning.

6.6. “The famous atheist”[57]

Dawkins said he lost his Anglican faith gradually, but was finally convinced when he came to believe that Darwinism conceptualised the world’s complexity (Dawkins 2008). As his career as a public intellectual and public scientist progressed, his writings have increasingly narrowed to critiques of religion. His rationalist “crusade” has not been linked to efforts by scientific communities, programmes or movements, but has been tied instead to the advocacy work of atheists, rationalists and sceptics (Trench 2008 p122). As his writing moved from measured refutations of creationism to hostile denunciations of faith, his self-fashioned persona changed, his image hardening as a scientist-atheist-rationalist. He has been described as being at least as well known now as a public advocate for atheism as for his earlier popular science works: he is “famously and fundamentally” an atheist, the nearest thing Britain has had since Bertrand Russell to “a professional atheist” (Brown 1999, Liddle 2006, Kohn 2005 p22, Eagleton 2006a).

Dawkins – and a wave of other biological scientists including Harris (2004) and Wolpert (2007) and Winston (2005) – have been part of a renewed interest among scientists in religion. This genre of writing flourished after *Origin of Species*, again in the 1930s and 1940s, when quantum mechanics disrupted traditional physical theories of the universe. Creationism, and its threat to the teaching of evolution in schools, sparked the current literary wave (Orr 2007). Although the American creationist movement dates from the

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[57] Parris 2006 p17

Protestant emergence in the early twentieth century, creationist ideas in modern American history have been tied inextricably to the rise of the religious right within the ideologically conservative Republican Party. Creationism came to prominence as a major modern political issue in the late 1970s and 1980s, when business and religious conservatives merged under a remolded Republican Party led by Ronald Reagan. The religious right believed that scientific naturalism led to cultural relativism (Mooney 2006, Slack 2008).

Antievolutionism has had two modern political incarnations. The first was scientific creationism, which emerged as a style of argument and presentation among creationists in the 1960s and 1970s. Its advocates aimed to demonstrate scientifically the biblical literalism that the world was between six thousand and ten thousand years old. Antievolutionism's second incarnation was intelligent design (ID), which modernised the creation science movement. Its proponents argued that living organisms showed signs of being designed by a rational higher agent or designer. Advocates have used unresolved issues within evolutionary theory as arguments for evolution's supposed theoretical weakness, lobbying for US public schools to teach the controversy over evolution. IDers distance themselves publicly from creationists. They hold positions at major universities in disciplines including chemistry, biochemistry, law and philosophy, and advance their cause, not through traditional peer-reviewed scientific data, but through a political and public relations agenda. The claims of the creationism and ID movements have been denied and discredited by the scientific establishment (Mooney 2006, Palevitz 2002).

Against this background, Dawkins's assumed authority to comment on religion is based on his scientific credentials as an evolutionary biologist (Orr 2007). Dawkins's religious critiques have been based on the evolutionary theory-influenced meme concept: in *The Selfish Gene* (1989) he wrote that the belief in God was an example of a meme that had an exceptional survival value because of the psychological appeal in its superficially persuasive answer to questions of existence. After the book's publication, he told an interviewer in *Isis* that religion was

> a major force for evil in the world, not only because it offers a bogus substitute for truth, but also because it can be used as an unanswerable justification for anything (cited in Dawkins 2007c).

His essay 'Viruses of the Mind,' reprinted[58] in *A Devil's Chaplain*, developed this argument significantly, characterising faiths as mind parasites that spread from generation to generation in a pattern analogous to the transmission of computer viruses. A section in *A Devil's Chaplain* presented rationalist arguments against religion, advocating the superiority of scientific over religious reasoning.

The war on terror witnessed a concomitant rise in liberal rationalism. Dawkins's writing on religion intensified after 9/11, as part of a culture-wide increase in religion stimulated also by 7/7, the religious convictions of George W. Bush and Tony Blair, and the religious aspect of the ongoing Middle East crisis. Dawkins said his last "vestige of 'hands off religion' respect disappeared in the smoke and choking dust of September 11 2001" (2004a p185). Four days after the attacks, he wrote that religious-inspired faith in the afterlife motivated the al-Qaeda airline hijackers. "To fill a world with religion, or religions of the Abrahamic kind, is like littering the streets with loaded guns," he wrote. "Do not be surprised if they are used" (Dawkins 2001).

Dawkins's emerging anti-religious writings climaxed in *The God Delusion*, first published in 2006, a time that featured some public unease in the US because of the influence of religion on policy in the two Bush administrations (Shermer 2007, Levitt 2007). The book featured a binary opposition of naturalism versus supernaturalism, science versus faith, independence versus indoctrination. It aimed to cut through the protective wall of respect that protected religious sensitivities to challenge. It was a call-to-arms for atheism, seeking to convert believers and agnostics to atheism, listing in an appendix atheist support groups (Dawkins 2007). The book argued that the reasons for believing in religion were logically flawed, probabilistically impossible, constrained self development and halted progressive public life. Theology was not an academic discipline. Morality could be decoupled from faith. Scientists who argued for an interventionist God committed acts of "intellectual high treason" (Dawkins 2007 p41). God's existence was "a scientific hypothesis like any other," depending on evidential proof (Dawkins 2007 p72). He did not write in a conciliatory tone to seduce readers to rationalist thinking. After its publication, he told a *Guardian* journalist: "I seem – I seem to have lost patience" (Aitkenhead 2008).

[58] The essay was first published in: Dahlbom, B (ed). 1993. *Dennett and his critics: Demystifying mind.* Oxford: Blackwell.

Dawkins dominated the narrative: Eagleton (2006a) said the book might have been better had its author avoided being "the second most frequently mentioned individual in his book – if you count God as an individual". The discussions of religion were interwoven with personal anecdotes and recollections, such as the fact that he was unaware his daughter was being given weekly religious instruction from a Catholic nun. The book ended with Dawkins recounting extracts from the volumes of hate mail he received, along with testimonies from readers who questioned and renounced their faith after reading the book. There were also recollections of his school friends.

The God Delusion and *Root of All Evil?* received mixed critical reception. The chief weakness, noted by reviewers, was the inability to give a fair account of the intellectual and theological positions he challenged, something that drew the more scathing reviews. Terry Eagleton in *London Review of Books* pointed to Dawkins's lack of theological training (2006a), a point he expanded on in a book-length reflection on science and religion (2009). Thomas Nagel (2006) in *New Republic* dismissed Dawkins's philosophical work as amateurish. Sheehan (2009) noted that the work, like that of Christopher Hitchens (2007), was not grounded adequately in historical and philosophical argument. In the *New York Review of Books*, Orr (2007) said Dawkins, whom he once labelled a professional atheist, was "actually more an amateur". Writer A.N. Wilson (2007a) criticised Dawkins for his weak understanding of interpretations of God and for his methods of argument.

Midgley (2006) argued that biblical fundamentalism was worthy of attack from Dawkins, but this could not be done precisely while simultaneously targeting all forms of religion. For writer on religion John Cornwell (2007a, 2007b), the book was harmful to pluralism as it reinforced the belief among religious fundamentalists that secularism was hostile to their faith. Orr (2007) noted that the detailed exposition and attention to nuance in Dawkins's early writing on science had disappeared and, referring to religion, he was "a blunt instrument, one that has a hard time distinguishing Unitarians from abortion clinic bombers". Anecdotes replaced arguments. His intellectual referents were writer Douglas Adams and Carl Sagan, who were arguably not as deeply philosophical as William James and Ludwig Wittgenstein. Despite his description of himself as a scientist, *The God Delusion* was not a work of science or evolutionary biology: "None of Dawkins's loud pronouncements on God follows from any experiment or piece of data," argued Orr (2007). "It's just Dawkins talking."

Dawkins had his defenders. Dennett (2007) argued that the book was a consciousness-raiser for the general reader, not a contribution to philosophical theology. Weinberg (2007) said the attacks on Dawkins for his lack of philosophical or theological training were unfair, as it was unreasonable to expect only experts to comment on matters of public concern. In a preface to the paperback edition, Dawkins (2007) responded to criticisms, castigating what he called the weak liberalism of atheist reviewers who believed in belief. He argued that the book's targets – Jerry Falwell, Pat Robertson, Osama bin Laden, the Ayatollah Khomeini – were not unrepresentative caricatures, but influential and persuasive presences. He said he was not dogmatic (2007a). Writer Ian McEwan (2006) applauded Dawkins's unequivocal intellectual honesty.

Around Dawkins and *The God Delusion* emerged a wider science-centred cultural movment: new atheism. Writers who have been allied to this movement included Daniel Dennett, Sam Harris, Christopher Hitchens, Jerry Coyne, American physicist Robert L. Park and, on their blogs, biologists P.Z. Myers and Larry Moran. They attacked religion directly and aimed to persuade non-believes to declare themselves atheists. The doctrines of the new atheism were that faith was unjustified belief unsupported by evidence, that science could cure faith, that science was the only means of knowing, that science was the opposite of faith and would lead people to rational enlightenment, that religion was doomed, that religion exists as a social phenomenon and was characterised as American fundamentalist protestantism or Islam, and that faith was a dangerous contemporary force (Brown 2008). In a reply to online comments on his article that offered this definition, Brown said he believed the term arose among American publishers in the mid-1990s.

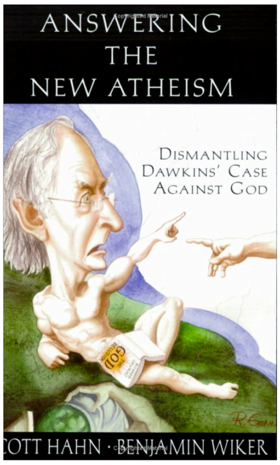
As well as sharing a naturalistic worldview, all have been media-savvy with an instinct for controversy. *Wired* magazine called Dawkins the movement's "leading light" and said Oxford was "the capital of reason, its Jerusalem" (Wolf 2006 p184). *Time* mentioned him on its cover as one side of a science versus religion battle (Cray 2006). A *Guardian* commentary piece called Dawkins and Hitchens "superstar nonbelievers" (Allen 2009). The "A-list A-theists" were Dennett, Hitchens and Dawkins (Melville 2007). New atheism was viewed by its writers as a social and political endeavour, aimed at consciousness-raising, similar to the feminist and gay rights movements.

Criticisms of Dawkins and new atheism came from religion. Roman Catholicism's Cardinal Christoph Schönborn called the faith-challenging scientists devotees of "scientism" or "evolutionism," who hoped that science could replace religion as a worldview (Cray 2006). *The God Delusion* has sold more than one and a half million copies and prompted book-length counter arguments including writer John Cornwell's *Darwin's Angel: An Angelic Riposte to 'The God Delusion'* (2007) and Oxford theologian Alister McGrath's co-authored *The Dawkins Delusion?: Atheist Fundamentalism and the Denial of the Divine* (2007). Among the anti-Dawkins books have been: *God is No Delusion: A refutation of Richard Dawkins* (2007), *Challenging Richard Dawkins: why Richard Dawkins is wrong About God* (2007), *God and the New Atheism: A critical response to Dawkins, Harris and Hitchens* (2008), *The Devil's Delusion: Atheism and its scientific pretensions* (2009), *Atheism Remix: A Christian confronts the new atheists* (2009), *Answering the New Atheism: Dismantling Dawkins' case against God* (2008), *Atheist Delusions: The Christian revolution and its fashionable enemies* (2009)[59].

A section of Dawkins's official website is devoted to 'fleas': authors critical of Dawkins, described as "parasitic authors [who] have released books which use Richard's name or titles to sell their own books" (http://richarddawkins.net/fleas)[60]. There is some merit in this view, as this cover image of *Answering the New Atheism* (2008), below, has shown, focusing as it does on a clearly-identifiable caricature of Dawkins[61]. Dawkins responded to an article by theologian McGrath, noting that he had published two books with his name in the title (the other was *Dawkins' God: Genes, Memes and the Meaning of Life* (2005) and could it be that "a professor of theology is building a career riding on my back. It is tempting to quote Yeats ("Was there ever dog that praised his fleas?") and leave it at that" (Dawkins 2007a).

59 These titles offer a potential historical parallel to evangelical publishing in mid-nineteenth century Britain that sought to challenge the message of Victorian popular science titles that were perceived to oppose religious faith (Fyfe 2004).

61 This image was downloaded from http://richarddawkins.net/fleas on 9 July 2009.



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New atheism has also been criticised from within sociology, science, philosophy and science communication, most prominently for its intellectual narrow-mindedness in pursuing a perspective in which there was no room for knowledge or wisdom not rooted in scientific or experimental methodology (Nugent 2009 p10). Lynch (2007), professor in the sociology of religion, at Birbeck College, noted that Dawkins was one of a number of new religious commentators who are unaware of religious studies, whose writings could distort policy and public perceptions of religions for a generation. Francis Collins, head of the Human Genome Project, and author of *The Language of God: A scientist presents evidence for belief* (2006), defended faith among scientists. Robert Winston said Dawkins, Dennett and Hitchens' arguments were "dangerous," "irresponsible" and "very divisive" as their bombastic arguments made science-religion dialogue difficult. Dawkins suffered from a "science delusion," argued Winston, in the unproblematic link between science and truth and unchanging factual correctness. Winston said it was misplaced scientific certainty (cited in Randerson 2008). E.O. Wilson's *The Creation: An appeal to save life on earth* (2006) urged an alliance on conservation between believers and non-believers. British philosopher Anthony Kenny (2007) said it was difficult to dissent from McGrath's conclusion that Dawkins had no mandate from the wider scientific community. Dawkins's absolutist position has made him a symbol against which religious figures could argue. Nisbet (2009) characterised some of their arguments as unethical in their drawing on scientific authority to denigrate publics with alternative beliefs.

The God Delusion was part of Dawkins's continued self-fashioning. Lynch (2007a) noted how Dawkins's means of self-representation as a public advocate of atheism has come to mirror the media-aware contemporary religion, particularly evangelism. Lynch attributed evangelism's contemporary flourishing in part to its clever use of publishing and its use of old and new media through which adherents could develop religious identities and networks. Compared to other branches of Christianity, evangelism has survived more successfully secularising trends, because it has developed into a subculture, where individuals support and sustain their group world view. And every subculture, including evangelism or atheism, "throws up its own celebrities" (Lynch 2007a). Harvard Divinity Professor Harvey Cox called Dawkins the Jerry Falwell of science (cited in Maher 2006). New atheism has been part of an emerging cultural identity based on anti-religious feeling that is expressed through cultural artefacts, such as books, television productions, and consumer products, such as the 'A for atheism' t-shirts sold through Dawkins's website, a site[62] that has thousands of users of its social networking facilities. Like the symbolic role of evangelists, Dawkins has increasingly become a focus and role model for atheist identities, his book having a stronger cultural role than merely the transmission of ideas, becoming a text that was bought as part of atheist identity-construction. Atheism was being validated through media representations and consumerism (Lynch 2007a).

On Richarddawkins.net, which contains articles and discussion about him and his work, there is an online shop where users can buy books, dvds, audiobooks, tote bags, 'A' lapel pin, mugs, bumper stickers, *God Delusion* T-Shirt, hooded tops (all profits go to the Richard Dawkins Foundation for Reason and Science). It has an events section with links to atheist events, not all affiliated with Dawkins. It describes the Out campaign that urges non-religious believers to declare their atheism publicly. Fliers can be printed and handed out. There are website banners. There are links to atheist groups. Pictured below, as advertised on Dawkins's offical site, is a t-shirt printed with an extract from *The God Delusion* (2007)[63] and a hooded top with the logo from the Richard Dawkins Foundation[64].

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62 www.richarddawkins.net. This is separate from the site of the Richard Dawkins Foundation for Science and Reason, a non-profit charity, found at http://www.richarddawkinsfoundation.org/

63 "The God of the Old Testament is arguably the most unpleasant character in all fiction: jealous and proud of it; a petty, unjust, unforgiving control-freak; a vindictive, bloodthirsty ethnic cleanser; a misogynistic, homophobic, racist, infanticidal, genocidal, filicidal, pestilential, megalomaniacal, sado-masochistic, capriciously malevolent bully" (Dawkins 2007 p51)

64 These images were downloaded on 9 July 2009 from http://richarddawkins.net/store/

Dawkins-related merchandise available from richarddawkins.net. Reproduced with kind permission of The Richard Dawkins Foundation for Reason and Science.

In an example of a cross media promotional tie-in, the same arguments were presented in the television documentary *Root of All Evil?*, broadcast on Britain's Channel 4 in the same period as the book's publication, around Christmas, careful commercial timing that British satirical magazine *Private Eye* commented on in this cartoon[65].

Snipcock & Tweed cartoon reproduced by kind permission of PRIVATE EYE magazine/Nick Newman.

Along with being able to construct identities through consumerism, users on the site can leave comments and messages for Dawkins, which he regularly answers. Comments are consistent with the characteristics of fandom around other celebrities. Among the comments viewed on July 3rd 2009 on the official YouTube channel[66] of Dawkins's site, were: "Mr Dawkins you are amazing. I wish more people would see your point of view and maybe then we could all make a better world" (from bloodlover); "Long live Richard Dawkins. I love Dawkins to bits. ... Thank you for fighting the good fight sir. Thank you for bringing

65 This cartoon was downloaded on 9 July 2009 from http://richarddawkins.net/article,393,The-God-Delusion-in-Private-Eye,Private-Eye-Dec-2006

66 http://www.youtube.com/user/richarddawkinsdotnet

Atheism out in the open and making it more accessible to the common man" (from reytrue); "Dawkins himself is a God. God of the Athiests" [sic] (spartanses); "If I ever shake hands with Dawkie, I assure you, I will NEVER wash it again! I'd have genius DNA on my hand! To me, it would be like meeting Plato or Einstein..." (from silviafarfallina).

After the publication of *The God Delusion*, Dawkins embarked on a lecture tour of 2,000 seater-halls in the Bible Belt and midwest regions of the US. The tropes of marketing were part of the tour. He has collaborated with Robin Wight, the chairman and co-founder of advertising agency WCRS, to make it respectable to be an atheist (Chittenden and Waite 2007). He has funded an atheist summer camp for children in the UK (Rogers and Connolly 2009).

The God Delusion fulfilled its aim as a consciousness-raising work, a totemic text for atheism, the aspect of the book that drew enthusiastic reviews. Philosopher and psychoanalyst Carlo Strenger argued that Dawkins and Hitchens's books aimed primarily to raise the spirits of liberal atheists "who had been made to feel that they had no right to fight for their views" (2009). This variation in the reviews drew attention to the gap between academic appraisal of Dawkins's engagement with religion and the best-selling popularity of his views, with the high-profile and high-sales of the new atheist writers suggesting an increased definition among publics as non-religious (Lynch 2007a). Dawkins has become a totem for a disenfranchised collective of atheists. Shermer (2007) noted *The God Delusion*'s success showed a

> market testimony to the hunger many people – far more, I now think, than polls reveal – have for someone in a position of prestige and power to speak for them in such an eloquent voice.

6.7. The social function of Richard Dawkins

Before Dawkins's writing on religion entered its hyper-critical phase, Appleyard noted that the scientist-author's popularity rested on what he represented, his social function. Appleyard wrote:

> Dawkins is the supreme meta-establishment thinker, the eloquent defender of the dominant but seldom expressed worldview of our time – aggressive atheism and secularity, soft leftism, scientism and faith in progress. To his fans, he is reason incarnate (2004b p5).

This has remained a sound analysis. The process by which he came to embody this abstract worldview has been occurring since his first book. Dawkins's career as a public scientist and public intellectual has been an uninterrupted progression from evolutionary theorist to Darwinian emissary to spokesman for science to advocate for anti-religious rationalism. The earlier roles have been incorporated and integrated seamlessly into his developing public persona. These various roles have always been part of his intellectual worldview but they have emerged sequentially and cumulatively in his public persona: his current position as the most visible advocate of atheistic scientific rationalism encompasses his earlier roles.

This development can be illuminated using theories of boundary work and self-fashioning. Dawkins has crafted an image of science that fulfils the ideological function of boundary work. Science has been autonomous, objective, rational and truthful. It has been associated with progress. It has been essentially different from religion. Science has been the primary source of contemporary knowledge. His boundary work has also been problematic, however. *The Selfish Gene* (1980) and *The Extended Phenotype* (1999) demonstrated that the popular form was for Dawkins more liberating than inhibiting as he was allowed to establish within it his scientific status. As well as continually defending the boundaries of science, he has redefined those boundaries through his popular science work that contributed original knowledge to evolutionary biology and other fields that drew on evolutionary models.

Dawkins has also consciously self-fashioned his public persona. He has submitted to science, a power outside himself. His self-fashioning occurred in relation to the alien, unreason (manifested variously as creationism and intelligent design, pseudoscience and religion), which he had to destroy, aliens that were a distorted image of science. He self-fashioned in language in which writing and social life combined (Greenblatt 1984).

His self-fashioning has not occurred in a vacuum. His persona has been shaped by its association with wider scientific and socio-cultural controversies, his advocacy and articulation of the gene's eye view during the paradigm shift in evolutionary biology, his role in the sociobiology debate, his counter-Gould writings during the Darwin wars, his pro-evolution writings that countered creationism, his defence of science in the science wars and his science-grounded anti-religious writings. Dawkins has been embedded in, as well as contributing to, these contested terrains, terrains that have shaped his image even as he moulded his image within them. Being part of these controversies meant that Dawkins has been continually able to fulfil his role as a public intellectual by addressing various publics on different issues.

All of the controversies have occurred in public, outside the publication and dissemination norms of the scientific community. *The Selfish Gene* (1989) consolidated his scientific reputation and simultaneously established his public profile. The ideological and moral interpretations of his selfish gene theory helped move him into general cultural consciousness. This wider social and cultural implications of his work were essential to his creation as a scientific celebrity. but since then he has left ethological fieldwork behind, his intellectual life played out instead in mass media, largely for mass consumption.

Expressing his scientific theories in popular books has meant that repertoires of publicity, promotion and commodification have been tied up with his image and intellectual work since *The Selfish Gene*. If, as has been argued, the book had a profound impact on the field, it means that celebrity has been bound up with the development of scientific knowledge – adding another contentious dimension to boundary work as traditionally defined.

Controversy has been a main driver of his public intellectual career. Dawkins has shown an uncanny awareness of its literary and academic value. His popular works have all featured often ill-tempered long-running disagreement with comparably influential thinkers: Midgely, Rose, Gould, A.N. Wilson, McGrath, Eagleton, Winston. The selfish gene theory and the concept of the god delusion were (easily) portrayed by critics as an affront to civic society. Dawkins too has had his high-profile advocates: Dennett, Pinker, Harris, Hitchens. Although undoubtedly motivated by intellectual concerns, Dawkins has benefited from the sales and profile that tended to result from prominent controversies. The commercial value of his literary brand name has been evident in the publishing sub-industries that formed around him on the topics of memes, new atheism and the refutation of *The God Delusion*'s arguments.

Dawkins's success as a popular science writer has given him the platform to comment on the scholarly value of other disciplines, despite holding no qualifications in these areas. That he can do this is testament to the social power granted by his self-created *ethos* as a spokesman for science, a role that grew as his career progressed. Crucially, his public intellectual work has been underpinned by his background in evolutionary theory. For Dawkins, Darwinism was, in Daniel Dennett's memorable phrase (1995), a universal acid that cut through and reshaped any intellectual discipline it touched.

Dawkins's attempted serious engagement with other intellectual traditions has been a significant weakness in his public intellectual work. Criticising others for lacking the critical apparatus to engage systematically with evolutionary theory, his books demonstrate a lack of historical and cultural contextualisation needed for rudimentary forms of cultural criticism. He dismissed most writing on science from a sociological or humanistic perspective as being close to charlatanism, demonstrating a disappointing lack of engagement in the discipline of science communication in which he held a professorship. Meme theory was a natural end to Dawkins's positivist criticisms of aspects of culture, replacing fields with a scientific-sounding substitute, turning centuries-old humanities fields into proto-sciences. It was cultural history for those who did not read cultural history. It has not yet cohered into an identifiable academic discipline. Dawkins's credentials as a meta-establishment thinker, as he was described by Appleyard, were weakened significantly by his unsophisticated appraisal of non-scientific bodies of knowledge and his failure to integrate socio-historical factors into his scientific-rational worldview. Nevertheless, there is an obvious humanism behind his work, although it is best expressed, not in the weak humanistic criticism in *Unweaving the Rainbow*, but the wonder-filled interpretation in that book of the genetic history of humankind.

This small philosophical and cultural frame of reference was most evident in his writings and broadcasts on religion. Yet while the sharpest criticisms of *The God Delusion* (2007) were undoubtedly valid intellectually, the book's central claims were an obvious extension of arguments made in his self-fashioning process, pitting scientific rationality against its most obvious (from his perspective) opposite. He explicitly sought to convert readers to atheism, offering his work as a text through which atheist identities could be created. His social function has extended beyond reason and secularism, becoming an icon for atheism, a philosophical position that could be further expressed through consumption and community-building via his personal websites.

As well as his willingness to generate and partake in public controversies, Dawkins's endurance as a public intellectual can be due to his relentlessly coherent worldview, unchanged since his undergraduate philosophical tastes were moulded and shaped in the Oxford's Zoology department, moulded itself within the deeper traditions of British empiricism. Kohn (2005), in the best evaluation of Dawkins's thought, noted that his scientific and moral stances were entwined, his moral order mirroring the order underpinning his writings on evolution and science. Even though his writings on culture and religion have been criticised for their lack of sufficient grounding in their disciplinary traditions, the pronouncements have cohered with his positivistic and secular humanist worldview. His representations and his public self-fashioning have presented unproblematically these positions in public. That is why his public image has come so sharply and so easily into focus. He stands *for* his beliefs. He embodies *his* genuine viewpoints. He is "Professor of Atheism" (Dougary 1996), 'Mr Public Science himself' (Eagleton 2006a), "Professor Evolution" and "Professor Science" (Elsdon-Baker 2009 p2). There is no significant ambiguity or obfuscation or qualification. There is a pro-active willingness to express these positions strongly. Part of the effectiveness of Dawkins's social function has been his integrated worldview, making his intellectual position clear in his public pronouncements.

The prose of his early works was rightly praised for its clarity, prose that appealed also because it revealed his authorial personality, and continued the already-popular style of Carl Sagan, ensuring it fed into wider science communication traditions. Dawkins embodied reason for his fans, yet his celebrity was constituted by more than just embodiment. It has involved commodification, bound up with Dawkins for all of his public career. It has involved a type of representation that described his appearance, political allegiances, home, family, personality, personal morality, tastes, all of which have become entwined with commentary on his intellectual positions. Not only are public and private, image and reality, entwined in publicity and promotion, the efforts by reporters and commentators to distinguish the private Dawkins from the public Dawkins have become a feature of reporting and critical commentary, as have commentators' reflections on the 'real' Dawkins, and as Dawkins's own reflections on his own media image and commodification. These blurred boundaries and self-conscious reflections on Dawkins's image have constituted further proof of his celebrity status. Furthermore, there has been the uncertainty about his professional status from his peers, and the view that he does not represent accurately the state of his discipline and that he does not – contrary to his public profile – speak for science at all. Narratives and counter-narratives swirled around his celebrity.

Philosopher A.C. Grayling noted that Dawkins was "necessary to our culture" (2006 p243). There has been a place in British cultural life for intellectuals that advocate his views.

Among the historical precursors to Dawkins cited by critics have been Bernal and Haldane, because of their twin status as popular writers and established scientists. Haldane has been viewed as a particularly close historical parallel because of his acknowledged reputation as a pioneering British evolutionary theorist (Collini 2006, Kohn 2006, Ridley 2006). Norman Levitt (2007) compared Dawkins to Bertrand Russell, because of shared anti-religious viewpoints and phrase-making skills. T.H. Huxley, Darwin's bulldog, recurred, because of the obvious parallel with his strident promotion of Darwinism (Graften and Ridley 2006, McKie 2004, Hattenstone 2003, Orr 2007). However, in his anti-religious positivism, clear prose style and gift for publicity, Dawkins has had as his closest British public intellectual antecedent, philosopher A.J. Ayer, who also had these skills and characteristics (Macdonald and Wright 1986).

Dawkins's public career has involved promotion, publicity, commercialism and controversy, where the English school of evolutionary theory, the British tradition of pragmatism, and rationalist atheism have been distilled and personalised and marketed through him. Just how fixed his image as the scientist-atheist has become was symbolised by an appearance Dawkins made on Ireland's popular *The Late Late Show*, to promote his most recent book *The Greatest Show on Earth* (2009), a presentation of the evidence for evolution that marked a return to his earlier popularisation work. However, the questioning focused heavily on his views on religion, prompting Dawkins to ask: "By the way, this has nothing to do with the new book. You're asking me questions about the previous book" (Dawkins 2009b). The host pressed on with questions about religion.

Chapter 7. Susan Greenfield: Fame and the female scientist

Photograph: Susan Adele Greenfield, Baroness Greenfield by Norman McBeath, 1997 © Norman McBeath/National Portrait Gallery, London. Reproduced with kind permission of National Portrait Gallery, London.

7.1. "A Groucho Club for scientists'[67]

The Royal Institution of Great Britain, once called science's "equivalent of the theatre" (Royal Society of London 1985 p10), is situated on Albemarle Street in London's upmarket Mayfair. It has been devoted, since its foundation in 1799, to the dual aims of undertaking scientific research and spreading scientific knowledge. Fourteen Nobel laureates were resident there when they received the prize. Ten chemical elements were discovered in its laboratories. Chemists Sir Humphrey Davy and Michael Faraday were former directors.

It was in Faraday's original apartments that a drinks reception was held on a Friday evening in 2004 ahead of a lecture by Nobel prize-winning Caltech chemist Professor Ahmed Zewail. He had been invited to speak by the Royal Institution's former Director, Professor Susan Greenfield (1950-), who lived while in London in an apartment in the institution, "a stone's throw from Gucci and Prada in Bond Street, where [she] is known to shop for her designer wardrobe" (White 2004 p20). Covering the event, *The Sunday Times* described how Greenfield's "jumble of beautifying lotions and lipsticks [were] spilling over Faraday's elegant dressing table" (White 2004 p20). Greenfield was described as looking "slight and young with her thick blond plait" and the reported noted how she greeted her guests

> with kisses and champagne . . . [and] is in floating black chiffon with draped neckline by Whistles, and the sexiest teetering ankle straps you have seen outside clubland (White 2004 p20).

Greenfield and the Royal Institution have been entwined since she was appointed its first female director in 1998 in a move that *Nature* reported under the headline: "Highbrow 'club' seeks the common touch" (Masood 1998 p103). Since then, she has been credited with changing its "stuffy image" (Franks 2004 p23), overseeing a 22 million pounds redesign by architect Sir Terry Farrell. Listed historic rooms were restored. Scientific objects and implements were brought out of storage. The Faraday Lecture Theatre was refitted. Exhibition spaces were created, as was a bar, café and restaurant, as well as a new apartment for the director. The ladies' bathrooms featured lights for make-up and cubicle doors on which were written chemical formulae for items including lipstick (Kennedy 2008). Couples could get married there. A journalist recalled climbing the stairs to her office

[67] Greenfield cited in Durrant 2000 p4

passing an endless parade of paintings of venerable, bearded scientists. Then, at the top of this masculine hierarchy, you are met by an elegant . . . woman concerned as much with the state of her hair and her Armani jacket as she is about the nation's research budget (McKie 2000 p29).

Greenfield envisioned the Royal Society becoming somewhere where “people go to discuss quantum physics over a latte” (Moreton 2008 p30), seeing it as a “salon for science” (Kingsley 1999 p107) or “a Groucho Club for scientists” (cited in Durrant 2000 p4), in reference to the London club frequented by artists, writers, musicians and creatives, which developed a reputation for bad behaviour throughout the 1990s. This idea of a modernised and glamorised location was represented visually in the image, below, of Greenfield pictured in the RI.

Susan Greenfield, pictured at the modernised Royal Institution, as portrayed on the cover of the April 2009 edition of Mayfair Times[68] *by Adam Parker © Photographer – AdamParker.co.uk . Reproduced with kind permission from Adam Parker.* Mayfair Times *cover image reproduced with kind permission of Erik Brown,* Mayfair Times.

In her inaugural lecture as director, she stressed the need for visible scientists in society, saying she wanted the institution to

> speak with authority on scientific matters . . . to help promote science and to encourage a proper, responsible and informed approach to scientific issues . . . We need to seek new audiences, reach new readership. The survival of science, and our success as a nation, depends on it (Greenfield 1998d p4).

[68] This is a cropped image of the front cover of the magazine, downloaded on 11 January 2010 from http://www.mayfairtimes.co.uk/pdf/MT_Apr09_LoRes.pdf

Visibility was conceptualised commercially. In the same speech, she said:

> We have a product. Our product, which we should go out and sell, is science as a concept, scientific knowledge as an integral part of our modern way of life. We are going to be looking at ways of promoting this product to a market which I know from my own experience of publishing, radio and television is crying out for it (Greenfield 1998d p4).

The experience Greenfield referred to was the large degree of original mass media work she had undertaken since she gave the Christmas lectures in 1994. Greenfield has been called a "self-styled celebrity scientist . . . England's most famous neuroscientist . . . arguably Britain's most well known, not to mention most glamorous, boffin" (O'Hagan 2003 p5), "science's most famous woman" (Marsh 2007 p10), "Britain's most famous living female scientist" (Connor 2004 p19), "Britain's leading female scientist" (Thorpe 1999 p6), "Britain's best-known female scientist" (Fara 2004 p14), a "star media boffin" (Vines 2003), "a media don" (Hunt 2001 p8), a "mini-skirted media celebrity" (Kelly 2000 p11). She was described, in the same single sentence, as an Oxford professor and a "dolly-bird boffin of tabloid fame" (White 2004 p19). *Nature* called her a "celebrity neuroscientist (Nature 2004 p9). *Science* called her a "science rock star" who came "alive in the spotlight" (Bohannon 2005 p962).

Being director of the Royal Institution has been one of Greenfield's many professional roles, several of which are ensconced within the British scientific-political establishment. Since 1996 she has been Professor of Pharmacology at Oxford University, where her research has concentrated on understanding the functions of the brain, researching neurodegenerative disorders including Parkinson's and Alzheimer's, as well as studying the physical basis of consciousness. Her research work has led to the establishment of four spin-off companies. She is Director of the Oxford Centre for the Science of the Mind. At Lincoln College, Oxford, she was a Fellow since 1985 and Senior Research Fellow, since 1999. She was Professor of Physic, Gresham College, 1995-1999. She was awarded a CBE in 2000, Chevalier, Légion d'Honneur in 2003 and Honorary Australian of the Year in 2006. In 2001, she was appointed to a life peerage at the UK House of Lords, where she is Baroness of Ot Moor in the County of Oxfordshire. She holds 28 honorary degrees, presented the BBC television series *Brain Story* and has authored, co-authored or edited nine books (Who's Who 2008).

Greenfield combined these seemingly separate domains, as credentialed scientist and celebrated populariser, in her directorship of the Royal Society. Her self-stated conception of science communication as promotion of science is central to understanding Greenfield's career as a celebrity scientist. As Jordanova (2000 p123) wrote, Greenfield epitomised "broader trends in the public presentation of both science and scientists". For years, her modernisation efforts at the RI have been criticised, with anonymous members telling *The Guardian* in 2007 that the institution's research was being neglected as public outreach was prioritised (Shepherd 2007). The financial challenge facing the RI in the global recession in 2009 was reported as having as its cause the "rush to embrace the world of brand, image, marketing and revenue-chasing" (Richards 2009). In January 2010, her post was made redundant[69], with Greenfield taking legal action against the institution.

To trace Greenfield's development as a celebrity scientist is to trace the wider British establishment's changing official policy position on science communication. If the scientific establishment has been the seller, one of its main outlets has been the Royal Institution. If science has been the product, then it has been marketed around Susan Greenfield.

7.2. "When they said 'Stand by for cameras' I felt I had come home"[70]

Greenfield's explicit selling of science-as-product reflected wider trends within the British scientific establishment concerning the communication of science. Sir Walter Bodmer, who was the chairman of the Royal Society's PUS report in 1985, noted that science should use professional social marketing techniques to identify methods of reaching target audiences with the scientific information in which they are interested (Bodmer and Wilkins 1992). This approach was indicative of the promotional culture within the PUS paradigm that aimed to "seduce the public" where there was little difference between "science, a car and washing powder" (Bauer, Allum and Miller 2007 p83).

Greenfield came to prominence within the PUS paradigm when she became the first woman to give the Royal Institution's "famous" annual Christmas lectures for children (Nature 1998 p9). Previous speakers included Richard Dawkins, David Attenborough and Carl Sagan. Greenfield said she had never consciously aimed to take her work into the public sphere. She had already a demonstrated interest in wider dimensions of scientific work, co-editing

69 See press statement from the Royal Institution, published online on 8 January 2010, at http://www.rigb.org/contentControl?action=displayContent&id=00000003906

70 Greenfield 1998e p24

Mindwaves: Thoughts on intelligence, identity and consciousness (1987), a scholarly, specialised and interestingly interdisciplinary collection of 32 essays on consciousness by neurobiologists, philosophers, linguists, physicians and computer scientists (Blakemore and Greenfield 1987). She had also reviewed books on the mind for *Nature* (Greenfield 1993, 1993a). When she was invited to give the Christmas lectures, she had little public communication experience, but was asked to appear on a late-night BBC science discussion programme. Months after this, she auditioned for the Royal Institution lectures. As well as her scientific credentials, her

> infectious enthusiasm, the striking outfits she favours, her brown eyes, blonde hair and wide smile will not have gone unnoticed (Ferry 1994 p13).

Greenfield's topic for the televised lectures was the journey to the centre of the brain and, although she gave it in the timeframe of the science and society paradigm, she delivered it according to the standard deficit model approach. Her lectures described the physical brain, how it has been studied, how its parts functioned, how it developed and how it remembered. The lectures were united in their aim to excite her audience: "then if people get excited, they can go further and find out more" (cited in Hawkes 1994). The lectures ignited her career as a public scientist. Comfortable from the start with communicating on television, Greenfield said her appearance led to a rapid and dramatic increase in her science mass communication activities:

> When they said: 'Stand by for cameras' I felt I had come home. My mum was on the stage, a dancer, and that might have given me my love of standing up in front of people. By the end of the year I was getting all sorts of invitations, writing for the papers and doing local radio interviews. I've been on *Tomorrow's World*, *Question Time*, *Any Questions*, *Desert Island Discs* and *Start The Week* (Greenfield 1998e p24).

Shachar (2000 p349) examined female scientists in the media using the concept of tokenism, "the process by which a privileged group allows an individual or an excluded group to share its advantages". Cloud (1996 cited in Shachar 2000) in her analysis of the rhetorical elements of tokenism noted that the language of tokenism had two elements: "the *glorification of the exception*," where an individual or a group was "exalted by the dominant cluster; and *overcoming hardship in the course of the token life or career*," where an individual's achievements were perceived to be unique and virtually peerless. Cloud argued that tokens not only had organisational roles but were often “cultural heroes” (Shachar 2000 p350).

Interviews and critical commentary published when the Christmas lectures were broadcast on the BBC contain the descriptions of exceptionality that are characteristic of the language of tokenism, descriptions that have proven to be a consistent feature of Greenfield’s media coverage. An interview with Greenfield in *The Independent* (Ferry 1994) introduced themes that have recurred through virtually all her subsequent interviews and profiles: her passionate interest in brain science and its philosophical implications, her reflection on being a woman in the male-dominated science profession, her liking for fashion and travel, and her marriage to her husband, Oxford chemist and popular science writer Peter Atkins[71]. They met when he was part of a committee that interviewed her for her Oxford post and their courtship took place in part at the dining halls of Lincoln College[72]. The article discussed her upbringing in Hammersmith, London, her A level classes in Latin and Greek, her undergraduate degree in psychology with philosophy at the all-women St Hilda’s College in Oxford. About the RI lectures, she said: “even though I don’t want to be judged as the first woman, I know that I will be, and so I want to make a really good show of it” (Ferry 1994 p13). An interview in *The Times* was similar, describing her “unusual” route into the sciences from the classics and described her scientific research, as well as her classics-derived interest in consciousness. The journalist noted that “she was one of the brightest of her generation” (Hawkes 1994).

Critical commentary about her lectures was framed in terms of her breaking with tradition, one reviewer in *The Times* expressing this through a description of her clothing, noting that she wore “a blush pink silk blouse and leggings to bring a ridiculously long tradition of bow-ties and tweed-jackets to its overdue end” (Bond 1994). The same reviewer portrayed her appearance in gender terms, writing about the lectures in the same review as a programme about an interview with Hugh Hefner, founder of *Playboy*. He introduced the discussion of Greenfield with: “Dr Susan Greenfield may not have been wearing a Bunny costume, but she might as well have had for all the fuss that has surrounded the first woman in almost 170

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[71] Atkins, as well as being an Oxford chemistry professor, has been a prolific populariser of science. In his books, which include *Galileo’s Finger* (2003) and *Atkins’ Molecules* (2003), he has articulated and defended, more clearly than Greenfield, an integrated positivistic philosophy of science. His writing has been underpinned by humanism and he, like Dawkins, is a pugnacious atheist. Philosophically, he is also close to scientist and populariser Lewis Wolpert.
[72] Later, she said that, unlike her previous suitors, he was a man who came with what she called “value added” (Kelly 2000 p11).

years" to give the lectures. Greenfield's credentials were also singled out in the review, where she was called "Renaissance Woman personified".

The lectures, published as a guide for children called *Journey to the Centres of the Brain* (1994), were followed a year later by *Journey to the Centres of the Mind: Towards a science of consciousness* (1995), a substantially more technical book that described a theory of consciousness rooted in the corporal reality of the physical brain, containing ideas that were more fully worked out in her later work, starting with *The Human Brain: A guided tour*, first published in 1997[73]. While it drew on the Christmas lectures, the book was aimed at adults, and reads like a series of lectures that offer an unproblematic popularisation of her field, a primer for beginners, one that never strayed far from standard textbooks. It described the historical development of the science of the brain. It was a model of clear expository prose, but has the tone and arrangement of an interesting lecture rather than book-length narrative or thematic analysis. She wrote the book as an introduction for "not just non-biologists but non-students" (Greenfield 1998 pxiv).

In addition, she focused also on the more philosophical implications of studying the brain, including speculations about how the mind might arise from the physical brain, foreshadowing the thematic concerns of her later popularisation work in which the form was used to articulate theories of consciousness. She wrote that

> These ideas are not intended to be taken as hard facts but rather to excite readers into an active line of questioning and thought of their own (Greenfield 1998 pxiv).

The public understanding of brain science was of social importance too, she noted, as the pressures of contemporary life have led to an increase in mental illnesses, including depression and anxiety and mood-altering drug dependence, as well as brain disorders among the elderly (Greenfield 1998). *The Human Brain* was well-received critically, chiefly because of its clear explanation (Bannister 1997, Clarke 1998).

Greenfield regularly reviewed popular science titles for *The Times*, in which she offered thoughtful and informed critiques on psychology, neurology, consciousness and emotion, placing the works in a wider scientific context (see for example Greenfield 2000b,

[73] *The Human Mind Explained* (1996), which she edited, was a straightforward reference book.

Greenfield 1999). Works by high-stature authors, including philosopher Daniel Dennett (Greenfield 1998b) and neurologist Oliver Sacks (Greenfield 1996i), were among those she reviewed. In her role as Professor of Physic, she regularly gave public lectures on science.

In the period 1996-2001, Greenfield was a columnist and contributor to the *Independent on Sunday* and also contributed columns to *The Independent*'s education section, as well as general comment pieces for the title. She has written on topics concerning the professional lives of contemporary scientists, including the lack of defined career structures (Greenfield 1996b), the public and private systems of funding in the UK (Greenfield 1996c), the competitive ethos of scientific publishing that has meant that a piecemeal outlining of stand-alone pieces of data made it difficult to see the larger picture (Greenfield 1996d), the precarious balance of teaching and research for scientists in public institutions (Greenfield 1996g), and the implications of the auditing of scientific funding for staff recruitment, the type of work published and the nature of research undertaken (Greenfield 2000a). She has written in favour of private science funding, characterising herself as conforming to the idea of the "entrepreneurial scientist," comfortable in taking private money in a culture of dwindling public finances to take private research funding (Greenfield 2001a). "In my experience", she wrote, "mould-breaking, paradigm-shifting ideas stand no chance with the cautious public sector grandees." (Greenfield 1997a p45). She argued that there has developed within funding institutions a mind-set that favoured the funding of what she called "safe-science" with an outcome that was assured, which she called a paradox in science. The private sector, by contrast, has had to invest in originality (Greenfield 1998a). Her strongly pro-commercial ethos merged with her public profile when she advertised and promoted MindFit, a computer game marketed at keeping the brain active. A report at the launch of the product in the House of Lords noted Greenfield's backing and said about some of the other people present: "It's clear that they need her, these men, to sell their research and their institutions. But does she need them?" (Marsh 2007 p10).

Greenfield has argued in her writings (for example, Greenfield 2000c) against recreational drug use among young adults as it altered fundamentally their physical brains. She has also written frequently about communicating science, stressing the need for debate on controversial science and the need to communicate with publics that were occasionally uneasy with scientific advances. Scientists can be both active researchers and skilled popularisers, she argued, criticising the distinction between researchers who were "ivory-tower purists who never communicate with the taxpayer and the "the handful of very talented, full-time professional publicists" (Greenfield 1997a pE3). Note the term, publicist. While she has not viewed popularisation as a second-order activity, her approach has been underlined by a deficit approach, which can be seen in her preference for the word "simplify" rather than "trivialisation" (Greenfield 1997a pE3) to describe popularisation, and her use of the word *then* when she elaborated on the use of simplification to conceptualise science communication:

> If we can help people see the wood for the trees – we scientists as well as helping ourselves come to a comprehensive view of our particular subject, are giving people that most valuable tool, knowledge: they can *then* enter the debate and reach their own conclusions on all the complex and vital issues facing us with the new millennium (Greenfield 1998c, emphasis added).

In another example, she asked:

> How are they [people] supposed to have opinions on all the ethical issues like BSE or cloning if they know nothing about science? (Aitkenhead 1998 p4).

This deficit model philosophy was evident also in the establishment in the UK in 2002 of the Science Media Centre (SMC). It aimed to improve media coverage of science, providing journalists with rapid-response accurate scientific data and opinion. It was praised in an editorial in *Nature* (Nature 2005) for its aims and emphasis on accurate coverage.

Yet her approach to science communication has been criticised for adopting unproblematically and uncritically the deficit model approach. Science writer Jon Turney (2003a p8), then of University College London, wrote that Greenfield has been part of a line of "well-intentioned but not very well-informed scientists," because, although willing to speak about science and having a talent for explaining science clearly, she paid no attention to research on science and the public, yet was allowed pronounce on it. Greenfield would later be called variously a "promoter extraordinaire of science" and "the motormouth publicist of science," an "academic glamourpuss" (Cornwell 2008 p23) and "a globetrotting science evangelist" (White 2004 p21).

Her writings on cultural and philosophical dimensions of science at times veered from deficit model approaches. She noted that no two scientists approached a problem the same way and, despite the passive prose style of scientific papers, "personal predispositions will inevitably leak in" (Greenfield 1996d p46), the phrase *leak in* presupposing a positivist view of science, which has been contained implicitly within deficit approaches. Even though all scientific research shared comparable methodological techniques and evaluation criteria, science was "as creative as writing a novel or a symphony," and the final data after the rigours of interpretation and testing has become "highly personalised" (Greenfield 2002 p14).

7.3. "The public face of gender issues in science"[74]

A recurring theme in her writings and interviews has been the under-representation of women in science and technology[75]. Because of her high academic and public profile, she has become "a poster girl for science in the UK" (Chimba and Kitzinger p12) and "the public face of gender issues in science" (O'Hagan 2003 p5). This status was underlined when Greenfield investigated on behalf of the U.K. government the state of women in science. She found that women scientists felt they were disadvantaged by "informal practices including rumour, gossip, sarcasm, humour, throw- away remarks and alliance building" by male colleagues" (Cassidy 2002 p10). Greenfield has discussed her own life in the context of female scientists' career development and noted that the issue of women in science was multifactorial, involving structural elements such as attracting schoolgirls to science, glass ceilings in science and having children at a time, usually in their mid-30s, when scientists gained an established academic post, and also larger issues relating to gender in science, including

> whether a woman's traits are not suited to science, or whether they do science in a different way, or whether they should or should not adopt a more man-like persona (Greenfield 1996a p50).

Feminism has indirectly affected science, she said, as men searched for clear answers whereas women enjoyed complexity (Guardian 1999). Commenting on gender and science, her most controversial statement was saying that having children was incompatible with advanced achievement in science. She said:

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[74] O'Hagan 2003 p5

[75] Drawing on other studies and surveys, Chimba and Kitzinger noted that girls and women are under-represented in science, engineering and technology (SET); less likely than men to study SET at school and university (Roberts 2002); and less likely to develop careers in SET after graduation and face barries to promotion (European Commission, 2006).

> I don't buy the idea that you can keep your finger on the work pulse and be a mother, not as far as science is concerned. It's too fast moving, too competitive (cited in McKie 2000 p29).

Greenfield said the historical female scientists who had influenced her included Marie Curie, Rosalind Franklin and Dorothy Hodgkins (Greenfield 2002). Curie, who twice won the Nobel prize, has remained "probably the most famous woman scientist" (Jordanova 2000 p125). Many portraits stressed her scientific vocation. Jordanova analysed one portrait that appeared in a French periodical in 1911, when she was a candidate for election to the Académie des Sciences, a position she never gained. It showed Curie in her laboratory, but its extended caption discussed her character, deportment, demeanour and described her femininity. Biographical accounts stressed Curie's self-discipline and devotion to science. Her austere character became part of her image. She had a status also as a devoted mother, and was a controversial figure whose position within French academia was never fully secure. Her affair with another scientist after her husband Pierre died scandalised France. Polish-born, she was vilified also for being a foreigner in France. Jordanova discussed Curie and Greenfield in the same section of her book (2000).

Jordanova also analysed the portaits that have helped maintain the memory of Nobel prize-winning chemist Dorothy Hodgkin, an important figure in twentieth century British science. The portrait of Hodgkin that reached the largest audience was painted by Maggi Hambling in 1985, when the scientist was 75. It featured Hodgkin working at her desk, on which was placed a large molecular model. The distinctive part of the portrait is that Hodgkin was portrayed as having four hands, suggesting an image of movement. Her hands were essential to the practice of her science and were strikingly gnarled, since she had suffered with rheumatoid arthritis since she was 28. Despite Hodgkin's scientific accomplishments, there was a focus on her appearance in representations of her. Jordanova noted:

> Over her life, Hodgkin received a great deal of visual attention. Commentators often noted her personal charms; her recent biography similarly emphasizes how attractive she was – an old trope in writing about women who distinguish themselves in areas strongly coded as masculine (Jordanova 2000 p158).

These historical representations seem to conform with the observation by Donna Haraway in her seminal book on gender and science, *Primate Visions* (1989), that the concept of the women scientist was "an oxymoronic social subject" (1989 p281) that had only recently begun to change. In the similarly influential *Reflections on Gender and Science* (1985), Evelyn Fox Keller wrote that within intellectual labour, women have been concerned with the personal, the particular and the emotional, while science has been a masculine preserve, associated with science, rationality and the impersonal. Haraway argued for women to enter debate as authorities on the nature of scientific knowledge. Fox Keller called for the reconstruction, from within science, of science as not just a masculine, but a human endeavour.

For Leane (2007 p160, emphasis in original),

> a “scientist who is a woman is then always a *woman* scientist, not simply a scientist; and as a woman scientist she cannot be disembodied”.

Female scientists have been portrayed in mass media in gendered terms. Women scientists featured in U.S. magazines from 1919 to 1955 were expected to be not only successful professionally, but also perfect wives and mothers (LaFollette 1988 cited in Chimba and Kitzinger 2009). The presence of females in science was problematic, as scientific research was portrayed as requiring supposedly masculine characteristics. The representations were interpreted to mean that women were “usually at one of two extreme positions: either subordinate assistants or ‘superscientists’” (LaFollette 1990 cited in Shachar 2000 p348). Dr Maria Mayer, a physicist who shared the 1963 Nobel prize in physics, was treated by the media as a grandmother and a wife (Nelkin 1995). In another paper, Steinke argued for more television programmes with women scientists as role models to reduce gender stereotyping and to increase female participation in science (Steinke 1998 cited in Shachar 2000 p349). Shacher (2000) found that female researchers were described using tokenistic language in profiles in the *New York Times*. Although described as being as competitive as their male counterparts, women scientists were portrayed with an emphasis on their personal and domestic, as well as professional, lives. Male researchers were represented chiefly through their public role. Shachar (2000 p356) concluded by calling for “a different distribution or packaging, one that does not rely on an entrenched set of concepts of being female in the realm of males”.

In the U.K. press, a study of the representation of female scientists found that half of the profiles of women scientists referred to their appearance, clothing, physique or hairstyle (compared to one fifth for men). Some portrayals also emphasised the female’s sexual attractiveness to men in an effort to “sex up” science, amid concern about the low take-up of science in universities and perceived public unpopularity of science (Chimba and Kitzinger

2009 p1). While such representations may seem innocuous, they were part of a pattern of larger representations. Women were asked by photographers to adopt particular poses (sitting with legs crossed on a lab bench) and by producers to dress in a certain way. They concluded that women scientists were represented as exceptional.

The recurring focus on appearance and attractiveness has been used to market other female scientists involved in science communication, a specialism that Chimba and Kitzinger (2009) argued has become a feminised field. It has been used to market contemporary female presenters of popular science programmes. *The Sunday Times Magazine* published an interview with physicist Dr Laura Grant, based at Liverpool University, who presented *The Big Experiment* on the Discovery Channel. Under the headline, "The Nigella of Science," the article referred intertextually to Nigella Lawson, "the famously sensual chef" (Chimba and Kitzinger 2009 p7). In the article, Grant was called a "femme fatale of physics" with "killer heels" who is getting "teenagers all steamed up over science" (Brewis 2008 p14). "She looks like an off-duty Bond girl, but she's actually a physicist . . . Given the chance, plenty of viewers would happily experiment with" (Brewis 2008 p16). She was photographed in a dress and lab coat, sitting on a lab bench.

Chimba and Kitzinger interviewed Grant, who said she was "taken aback" by the article, which she found to be "bordering on the inappropriate" as it sexualised her interaction with schoolchildren, although the coverage was good publicity for the programme (Chimba and Kitzinger 2009 p9). The study also interviewed the journalist who wrote the story, and found this sexualised framing of the story was created by a public relations company, working for the television series (Chimba and Kitzinger 2009).

Similarily, a degree of celebrification is evidently inherent in contemporary female science mass communication. Some media organisations place a value on having a young female guest or presenter for engaging audiences (Chimba and Kitzinger 2009). A feature in *The Sunday Times Magazine* on female wildlife television presenters noted that "it takes more than a pretty face to follow in the footsteps of Sir David Attenborough" (Hunt-Grubbe 2008 p12). The article photographed primatologist Dr Charlotte Uhlenbroek in a dress in her garden and described her "auburn hair tumbling over her green safari shirt". The magazine described her as having the look of "'an eco-friendly Lara Croft'" (Hunt-Grubbe 2008 p15). Male journalists referred to her "athletic, almost innocent sexiness" and "tight sleeveless tops" (Hunt-Grubbe 2008 p15). The same article discussed biologist Miranda Krestovnikoff, who has presented *World Gone Wild* for Fox Television, and, for the BBC, *Nature of Britain* and *Coast*, and who said that "'it has been mentioned that I have to glam up a bit'" (Hunt-Grubbe 2008 p15). The article also profiled anthropologist Saba Douglas-Hamilton, who has presented for BBC the *The Secret Life of Elephants*. The article mentioned her "intense hazel eyes" and a previous labelling of her as having the "effortless sex appeal of a young Anna Ford" [a British newsreader] (Hunt-Grubbe 2008 p15).

Chimba and Kitzinger (2009 p13) concluded that the representation of women scientists occurred in an interplay between wider societal structures in science and technology, choices made by women, and the the mediated representations selected by communication professionals. There has seemingly been a change in the representation of women scientists, where they were no longer judged, as they were between the 1920s and 1980s, on their baking or sewing skills, but "they may now be judged on beauty, fashion and sexiness". Jordanova (2000) noted that female scientists have often been cast into these new roles, fitting with broader cultural shifts which have increased the emphasis on glamour. See, for example, Greenfield's complicit pose on the front of the *Sunday Times* magazine, below, emphasising her femininity and fashion-sense, as well as her intellectualism.

Baroness Susan Greenfield photographed by John Reardon © John Reardon. Reproduced with kind permission of John Reardon. Cover © The Sunday Times Magazine 23 May 2004.

7.4. "Britain's most glamorous, flamboyant and fashion-conscious scientist"[76]

This intensified focus on glamour was evident in the progression of Greenfield's career as a public scientist. After her appointment as director of the Royal Institution in 1998, coverage increasingly focused on her appearance and frequently sexualised femininity. Her public and private selves fused solidly. Correspondingly, there was an intensified use of tokenistic rhetoric by commentators and by Greenfield herself. This intensification in tokenistic language occurred as her career developed within a changing science communication policy environment that had moved to the science and society paradigm.

The same year as Greenfield was made Royal Institution director, she was awarded the Royal Society Faraday award for her popularisation work. Her willingness to communicate science and her modernisation of an iconic institution in British science can be seen as indicative of a wider movement to reposition science more deeply within wider society, with Greenfield as its figurehead. Her elevation into the British scientific-political establishment was copper fastened in 2001 when she was appointed a non-political life peer in the UK House of Lords. She was made one of the so-called people's peers, an idea proposed by the influential New Labour think-tank Demos, an idea that impressed then UK prime minister Tony Blair (although the Independent Appointments Commission, who appoint the peers, did not agree with the term). *The Independent* gave Greenfield an establishment rating of five stars out of five, indicating not very subtly the alleged cronyism involved (Woolf 2001 p3), one of the paper's writers noting that these peers

> represent the liberal establishment. For what we are witnessing is the replacement of an old establishment of tweedy, grouse-moor Tory peers with a new meritocracy of quango-based New Labour peers (Seddon 2001 p3).

Greenfield said she resented being called a Labour crony, insisting that she had voted for both major parties and sometimes did not vote at all, stating that her background in lower middle-class suburbia was not privileged (Crampton 2001). Greenfield had become friends with Blair and his wife Cherie, spending a "much-publicised" holiday at the prime ministerial retreat Chequers (O'Hagan 2003 p5), and giving the Blair-organised millennium seminar on science, which she felt was "an acknowledgment of my abilities both in research

[76] Weathers 2003 p46

and in the public sphere" (Milnes 2000 p14). *The Observer* viewed her career as emblematic of the media-centric core of Blairist political ideology[77]:

> Greenfield is the epitome of a New Labour success story, not just in her rebranding of herself, and in her spinning of events wherein the private and the public merge uncomfortably, but in the managing of her creativity (O'Hagan 2003 p5).

Greenfield has been aware of how her public-private merging had symbolic power. She told one interviewer: "I aim to be a role model for young women . . . They can look at me and see that to be a scientist you don't have to be a middle-aged white male in a grey suit.' (Kelly 2000 p11). She has been described as a strong candidate for the status of "alpha female" as "she is top of her field and still makes time to look good" (Longrigg 2003 p8). Greenfield defined the alpha female using tokenistic language, saying that such a female would be in a minority, perhaps the sole woman in a group of men:

> She would be a leader, but not masculine in her virtues. Elizabeth I, my great heroine, was a leader, but not as a man might have been: she was feminine, stylish and very able (cited in Longrigg 2003 p8).

From the time of her appointment as Director of the RI, Greenfield increasingly became the subject of profiles and interviews in a variety of publications. She posed with her then husband Peter Atkins for *Hello!* magazine. This article, across four pages, showed her posing in a red poloneck and beige skirt beside a bust of Faraday, sitting on a desk in a lecture theatre wearing black boots, in an evening dress in one of the RI's rooms, and sitting on a couch with Atkins. "We're close without being sentimental," she told the magazine, "best friends and soulmates (Kingsley 1999 p109). This media appearance was mentioned regularly in journalism about Greenfield, but it was not usually noted that that the personal information came after publicity about the RI. In the article, she described how she intended to open its doors to a wider audience in an attempt to rekindle the aims of Faraday and Davy to foster science for the public good (Kingsley 1999). The article was framed overall as a discussion about balancing career and family. It noted that

> despite her packed office agenda, which sees her swap between sharp-cut designer suits for corporate meetings and funky silver anoraks and leggings in the lab, Susan stresses that a balance must be struck between work and pleasure in order to be

[77] For full accounts of the centrality of mass media and public presentation in new Labour ideology, see Campbell' (2007) and Price (2005).

> healthy and fulfilled – which in her case means taking time out for dancing, eating out, and early-morning haircuts (Kingsley 1999 p106).

The *Hello!* article came to be a significant point of reference for subsequent writing on Greenfield. Almost every interview or profile, across publications, mentions her looks, appearances in *Hello!* and *Vogue* and what she was wearing during each particular interview. A reporter in *The Guardian* noted that she looked good in academic robes, but would "look drop-dead gorgeous in a velour shell-suit" (Crace 2000 p4). Another writer for the same paper described her as "a large mouth on thin legs, somewhere between a tabloid columnist and an American intellectual . . .She is wearing a sexy, fitted, red jacket and high, stacked heels. She is 50 this year, and looks 40" (Durrant 2000 p4). A writer for *The Independent on Sunday* described Greenfield's "black knee-length boots with stack heels, a black dress and a cerise crop-top cardigan" (Moreton 2008 p30). *The Independent* described her in a headline with the phrase "lab fab" (Stanford 2000 p6). *The Observer*'s science and technology editor wrote that, at lab meetings, "she makes a striking figure in her mini-skirt and pink Guerlain lipstick. (McKie 2000 p29). An article in the *Daily Mail* noted that she was putting "sex into science". It noted that

> . . . she looks immaculate in pale pink gilet, fine lilac twinset from Whistles, black pelmet skirt by Giorgio Armani, black tights and clumpy block wedges from an exclusive shop in London's Sloane Street" (Kelly 2000 p11).

Her different professional environments and her professional identity are represented through her different wardrobes. At one function, *The Times* reported that

> she works the room in patent black Russell & Bromley dominatrix heels. "They're strictly car to bar," she says impatiently. The footwear, like her opinions, are deliberately provocative . . . Two weeks later, in Oxford – where she is professor of synaptic pharmacology – she's wearing tight jeans, a tight stripy pink T-shirt, and matching pink lipstick painted on a mouth containing a set of magnificent jutting teeth (Marsh 2007 p10).

Similarly, she was described, in *The Times*, as

> wearing shoes of teetering altitude, a miniskirt of dizzying brevity and flicks her blonde tresses in a manner that must make kneecaps quiver among livelier male peers in the House of Lords (Naish 2006 p6)

Another *Daily Mail* article called her "Britain's sexiest scientist" and noted that she was wearing “a skimpy T-shirt, skin-hugging jeans and toeless platform shoes”. The reporter noted that Greenfield “kicked up a shapely ankle to show me her new Miu-Miu platform shoes. (Churcher 2003 p22). This last description is revealing as it shows that Greenfield has not been passive in this process of gendered and sexualised representation. Marsh alluded to a “makeover” in 2002 when Greenfield was “still in pearls and ash-blonde layered haircuts,” leading to the reporter to comment that “unaccessorised, a sparkling intellect does not get you on to the pages of *Vogue* (Marsh 2007 p10). *Science* called her a “commandingly tall woman with leonine features” (Bohannon 2005 p962).

She has discussed her own appearance and body in sexualised language. Greenfield said she and her mother shared a love of glamour (Greenfield 2000d). When she was photographed by *The Sunday Times Magazine* in the Royal Institution in 2004, she wore a red evening gown, and the magazine had as its front-page headline, “The Prof Wears Prada” (White 2004). In 2000, she was reported as saying that she and Atkins shared “a respect for writing, reading and talking, and, of course, sex” (Kelly 2000 p11). Referring to her *Hello!* appearance, she said she was disappointed with the photographs, as she did not look like model Naomi Campbell, but instead “like a dumpy middle-aged female scientist” (Durrant 2000 p4). She commented on her own appearance by saying that that she has been described as attractive, not beautiful, yet she usually had boyfriends and said that her “face is not my fortune, but my brains appear to be so” and she continued:

> I look in the mirror all the time. I'm vain in the sense that if I could look better in the morning and I don't, then I get depressed . . . Of my features, I like my lips best. They're quite full, and lips can't age too much . . . In terms of dislikes, it has to be my nose. It's too beaky (Stanford 2000 p6).

She once asked a journalist before an interview: “Am I all right like this? I'm not wearing any make-up." (Wark 2009 p5). She has described her fashion style as “funky” and “slightly grungy,” tying her dress sense to her work: “It’s the same with science. I’ve always enjoyed shifting paradigms” (Stanford 2000 p6). On a scale of one to ten, she rated her attractiveness as four (Lawrence 2003 p10). In a question and answer interview with *The Times* to promote one of her books, she named her favourite designers (Vivienne Westwood, Versace Jeans, Celine), described her preferred make-up items (Guerlain's Liplift, BeneFit's Lip Plump, Boots eye-drops), said where she got her hair styled, and, when asked what part of her body she would change, she said, “My bum. I want one like Kylie’s” [pop singer Kylie Minogue] (Lawrence 2003 p10). Although she later said it was a flippant quote, she was surprised the quote caused controversy, with scientists telling her it was an unwise thing to do, even though she asked: “Does it make me any less of a scientist because I think Kylie has a great bum? That's ludicrous” (O’Hagan 2003 p5).

She has answered questions about her favourite holiday destination (Mustique), her *Desert Island Discs* (including Brown Sugar and Je Ne Regrette Rien) (Grove 1998), the vitamins she takes (Calcium, Omega 3 and a combination Vitamin C and B (de Peyer 2004), the beauty products she never travels without (Guardian 2000), her favourite joke (Ravilious 2005), her childhood in London where she was the daughter of a Jewish father and a Protestant mother (Greenfield 2001). She has discussed her relationship with her brother (Rix 2006). She has appeared in journalism genres focused on the personal. For example, she described elements of her personality and worldview in the I Am What I Am column in *The Sunday Times Style* magazine, which included the comment: “I wish long life to my enemies so they live to see all my successes” (Greenfield 2006 p5). She has discussed the most she has spent on a pair of shoes (300 pounds) and that she has gone to The Body Shop since she was at university (Staples 2000), where she had her first drink as an undergraduate in the Trout pub (Cook 2000) and has described one of her favourite restaurants in Oxford (Greenfield 1996h). She said she cannot swim, cycle or cook (Observer 2002). The details that she described in media interviews meant, for one journalist, that Greenfield’s image could be constructed from the dripfeed of these lifestyle tidbits (Brockes 2004). In 2007, she told a journalist that she did not discuss her private life, saying: “I don't answer questions like that." (Marsh 2007 p10).

The focus on her appearance and clothing has been so relentless and so customary a feature of her coverage that journalists and commentators have reflexively mentioned it when discussing Greenfield. Historian of science Patricia Fara noted “Lady Greenfield – whose press mentions invariably mention her fondness for miniskirts” (Fara 2004 p14). Sean O’Hagan in *The Observer* wondered where was her “fabled black Armani miniskirt” that she supposedly wore in the *Hello!* shoot. He wanted to see this “emblematic item of clothing, this sartorial signature” referred to more frequently in her press reports than her research on the brain or Alzheimer’s (O’Hagan 2003 p5). Greenfield *herself* complains about the common features of her representation, noting her frustration with the fixation on “her Armani mini-skirts, bright red lipstick and striking looks” (Judge 2004 p5). To another reporter, she said: “Yes, I wear mini-skirts and spend money on clothes because that's who I am. But it's neither here nor there.” (Ford 2008). Elsewhere, she said: “I don’t ever see anyone commenting on how Robert Winston dresses . . ." (cited in Chimba and Kitzinger p10).

After *Brain Story*, Greenfield received an increasing amount of attention from a peculiar form of fandom, her secretary Viv Pearson telling how

> there have been at least two or three calls a day from people who have had something wrong with their brains, or in some cases are terminally ill. They offer to come up to the labs and be used as guinea pigs, or they think Susan is a medic and can cure them (Smith 2000 p7).

The choice of comparisons by journalists to describe Greenfield's public status has not drawn on historical or contemporary female scientists, but instead have used famous real and fictional women to construct her image intertextually. She has been described as "neuroscience's answer to Emma Peel" [the spy from the programme *The Avengers*] (Stanford 2000 p6), the "the Janet Street-Porter [journalist] of neuroscience" (O'Hagan 2003 p5), the Charlie Dimmock [gardener] of the laboratory, the Anne Robinson [TV presenter] of science, Maureen Lipman [actress] in a white coat (McKie 2000 p29), and Esther Rantzen [TV presenter] of science (Kelly 2000 p11). She has been constructed in relation to other well known popularisers, one journalist calling her "the female Richard Dawkins" (Miles 1997 p2). In 2000, she presented the six-part BBC television series *Brain Story*. Respected cultural commentator Mark Lawson, in a further example of the exceptionalism characteristic of tokenism, noted that just with her appearance as a presenter, Greenfield has become "as significant a pioneer as Margaret Thatcher and Betty Boothroyd in politics, although a less frightening TV presence than either" (Lawson 2000 p17). She has been discussed in the context of female actresses, again with an emphasis on her looks, her hairstyle with its "glossy, teenage locks" (Armstrong 2006 p10) similar in style to actresses Susan Sarandon, Goldie Hawn, Diane Keaton, Sissy Spacek, Kathleen Turner, Renee Russo and Honor Blackman.

Her private life became open to public scrutiny after the ending of her marriage to Atkins. They had been described as the "science world's golden couple" (Weathers 2003 p46) and "science's most glamorous couple" (Sears 2003 p7). Their divorce "scandalised not only him but the entire scientific and political establishments" (Churcher 2003 p22). Her marriage break-up was reported in 2003 in the gossip and diary section of the *Daily Mail* (Hardcastle 2003), the publication in which Atkins later discussed in detail the marriage's end in an article headlined ‘Love, sex and our marriage split – by Britain’s brainiest couple . . .” (Weathers 2003 p46). The paper framed their separation as being related to her increasing fame that meant she outgrew her marriage (Weathers 2003 p46). Atkins said:

> as she became more famous and started to move in different circles in London, at the Royal Institute and in the House of Lords, she could sense her power. I wouldn't say that it went to her head, but I was perhaps the only person who had the courage to criticise her, and she didn't like it (cited in Weathers 2003 p47).

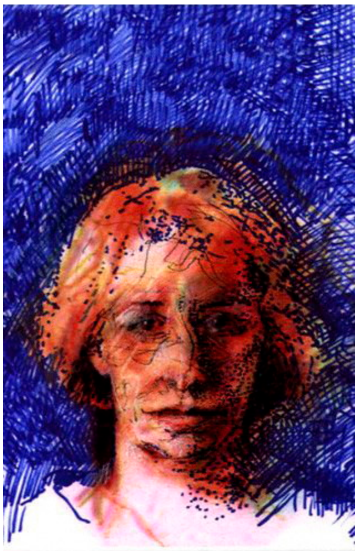
The paper said Atkins believes that the split had its cause in her “burgeoning fame” as she exchanged quickly “the rather insular world of Oxford for the glittering echelons of London where she was feted” (Weathers 2003 p47). Atkins also said in the same article that he provided the “launching pad for her – and she's done all the rest using her own rockets” (Weathers 2003 p47). Three days after that article was printed, Greenfield was interviewed also by the *Daily Mail* – in an article with the headline “Peter's brain was a real aphrodisiac, but now I can wear short skirts without being nagged” – and she noted that Atkins hated some of her clothes, especially platform shoes, and that she had been attracted by his intellect. She said they drifted apart and that she did not want to be “committed to one man, to have my freedom constrained” and that “when I thought about how busy I am with my public life, marriage to Peter no longer seemed the best way to spend any free time I had” (Churcher 2003 p22). The *Daily Mail*, the publication that drove coverage of the couple’s separation, speculated that the timing of the announcement coincided with the publication of her book *Tomorrow’s People* (2004) in which she discussed marriage in the future (Churcher 2003). Columnist Sarah Sands noted that the public discussion of Greenfield’s private life was a consequence of the mainstreaming and celebrification of science. For her, what jarred was that the lay public was “equipped to take an interest in the marriage breakdown” (Sands 2003 p22).

Nevertheless, Greenfield continued to open her private life to publicity. In an article that described how she had her lunch cooked at home by high-profile chefs Rick Stein and Heston Blumenthal, *The Observer Food Magazine* reported from her “Bond-style penthouse apartment” (Diski 2005 p56). The reporter described Greenfield’s lifestyle. “She happily lives on M&S meals and restaurant food, her fridge is stocked with Cristal champagne ('a present') and, if she feels like giving a dinner party, the only ingredient she needs is a telephone”. There was an exhaustive description of her apartment:

> Enter the flat and you find yourself in a hall covered in blue sky and clouds. The result is a heavenly vision that disappears once you've walked upstairs into an expanse of black furniture, silver wallpaper and flashes of red. A contestant on Through the Keyhole would be stunned to learn that this wasn't the flat of a 30-something bachelor (Diski 2005 p56).

Fara said Greenfield showed that “science and sexiness are compatible for women as well as for men” (Fara 2004 p14). Chimba and Kitzinger (2009 p3-10) focused on Greenfield and Kathy Sykes, of Bristol University, as “the two most high-profile female scientists in the UK”. Both have been discussed in terms of their sexual attractiveness to men. Their representation could be interpreted positively, showing women as “fashion-conscious” instead of “frumpy” or “masculine” However, the representation-shift from focusing on the scientist’s professionalism to her physicality has the potential for “the implicit accusation that she is being manipulative and using her sexuality to attract attention”. They argued that the risk in popularisation of successfully managing the tension between public understanding of science and self promotion was especially significant for women, concluding that “the idea that everyone has to be brilliant *and* gorgeous can be seen as deeply unhelpful” to promoting women and science and can discriminate against women who do not conform to this image.

Greenfield has also been depicted in official portraiture. The National Portrait Gallery image that opened this chapter had no scientific accoutrements, no indexical or symbolic indication that the subject was a scientist. She was in the centre of the shot, looking straight at the camera, her long hair and earring stressing her femininity, her science linked through the focus on the face and, behind it, the brain. Historian Lisa Jardine, in a review for *Nature* of Jordanova’s book, described Greenfield as “that most celebrated of women ambassadors for the scientific profession” who was usually portrayed “with emphasis on her good looks rather than her scientific expertise” (Jardine 2000 p398). Greenfield’s black and white portrait, this study argues, challenges the historical portrayal of represented women scientists who have negotiated the acute tension “between scientific achievement and the conventions of female virtue – passivity, docility and acquiescence, represented by demure dress and downcast eyes” (Jardine 2000 p398). Jardine analysed a second, most unusual, image of Greenfield that hangs in the National Portrait Gallery. The artist, Tom Phillips, constructed a constantly-changing multimedia image of her, below, based on drawings, graphics and video sequences, creating what the *Nature* review called “a scientist whose gender is irrelevant, but whose intellectual curiosity is captured in the semi-abstract, constantly changing representation" (Jardine 2000 p398).



Susan Adele Greenfield by Tom Phillips © National Portrait Gallery, London. Reproduced with kind permission of National Portrait Gallery, London.

7.5. "The 'Greenfield problem'"[78]

Greenfield continued to write popular science books after her RI appointment. She edited another straightforward educational popularisation, *Brain Power: Working Out The Human Mind* (2000). Her next book, *The Private Life of the Brain* (2001), first published in 2000, aimed to incorporate empirical analysis of brain chemistry into an overall view of brain functioning that addressed feelings and emotions. Her theory of the mind was based on the physical brain in which nurture shaped nature to create the individual. Central was the concept of brain plasticity: where the connections between neurons in the physical brain changed through injury or experience. While the amount of neurons did not change over a lifetime, the connections between the neurons could change. The physical structure of the brain, therefore, was personalised over decades through experience, forming a unique pattern of brain cell connections that can be called a mind. For Greenfield,

> *mind* [was] the seething morass of cell circuitry that has been configured by personal experiences and is constantly being updated as we live out each moment (Greenfield 2001 p13, emphasis in original).

[78] Parry 2004 p8

This theory that the “mind might well be the personalization of the physical brain” (Greenfield 2001 p14) has meant that memories, mind and self are closely-related concepts. Consciousness was not solely rational and was entwined with emotion. Brain regions did not operate as disconnected mini-brains. Instead the brain operated holistically, different regions contributing collectively to overall function, “as instruments do in a symphony” (Greenfield 2001 p37). The mind and the emotions were part of a continuum in which the greater the emotion, the lesser the consciousness and vice versa. Behaviours that swept away the sense of self included those of emotional children, ravers high on ecstasy, and the terror and rage of schizophrenics. The greater their emotion, the less their conscious action and, consequently, their individual identity was reduced, leaving them ultimately trapped in the present (Greenfield 2001). *The Private Life of the Brain* was a footnote-laden popular book, featuring a more specialised scholarly appendix, indicating that she wanted to maintain her professional credibility for her expert readers. It was well-received by reviewers, among them prominent historian of medicine Roy Porter, who praised her evaluation of competing theories of consciousness and the “enviable clarity” of her prose and her “assured personal narrative voice” (Porter 2000).

This theory of mind as the uniquely personalised physical brain has underpinned her subsequent popularisation work. As her profile grew, her writing explored more expansive terrains, her interest in consciousness being mapped on to imagined future societies and hypothesised future identities. *Tomorrow’s People*, first published in 2003, was a speculative description of an imagined future shaped by genetics, information technology and nanotechnology, where the eponymous tomorrow’s people merged with technology in their daily lives: fridges recommend meals, lavatories could indicate physical health, and clothes cleaned themselves through fabric-embedded bacteria. Illness and disability have been banished through advances in embryology, gene therapy and cyber prostheses. Inner intellectual and emotional lives have been altered by a technology that offered the intense sensation of cyber escapism or designer drugs. The traditional family has gone, along with current gender and sexual orientation: tomorrow’s people can switch and combine genders and experiment with various forms of sexuality. The constantly-wired society shaped the personalised brain, leading to collective consciousness and loss of individual identity, liberty, creativity and originality.

Tomorrow’s People has remained Greenfield’s weakest work. *The Observer* said that once the book moved from the neuroscience of the brain, “her arguments are infuriatingly unsubstantiated and one-sided, peppered with dangerously unqualified statements and reductiones ad absurdum" which ignored "the influence of essential human nature" (Zaltman 2004 p18), which her classics education might have inculcated. *The Daily Telegraph* found the lack of cited sources in *Tomorrow's People* detracted from its credibility, noting that usually-sceptical and narrowly-focused scientists were not particularly suited to being expansive futurologists (Bywater 2003). This study agrees. *Tomorrow's People* reads as a recycled collection of ideas from futurism and science fiction and science promise arranged into broad thematic categories. There was no narrative energy. She used a variety of secondary sources, mostly from futurists and a range of potential future scenarios were laid out, without a guiding underlying thesis. The writing was uneven throughout, strong on brain science and weak on cultural analysis, containing no reflection on the vast literature on technological determinism, for example, its imagined futures informed heavily by Huxley's *Brave New World* (1932) The book was "packaged like a futuristic novel" that touched on "terrain that, at one time, would have been the exclusive domain of sci-fi conceptualists such as J.G. Ballard or William Gibson" (O'Hagan 2003 p5).

Greenfield said the book "should have been a novel" and was originally conceived as one with "a brilliant and beautiful heroine, a female neuroscientist . . ." (Greenfield 2004 px). She began to write it while on a Christmas break in the Caribbean, but abandoned it days later, frustrated by her weak literary efforts. The book provided a forum for her to explore imaginatively the future without needing to conform to her peer community's standards of evidence. She wrote:

> As a research scientist I get to speculate from time to time, planning a new set of experiments or tying to interpret a puzzling finding. But speculation unsubstantiated by published data holds no currency (Greenfield 2004 px).

Comments from critics about Greenfield's scientific currency and scientific status have been a constant in her career, but increased in severity after her Royal Institution appointment, almost all the criticism being made anonymously, centring on her claimed "shameless courting of the limelight" (O'Hagan 2003 p5). In 1998, she told a journalist that none of her colleagues commented on her newspaper columns, which she has framed as an indifference to public communication. She said:

> They never mention it, never mention any of my activities. From which I interpret a lot of bitching goes on behind my back. It doesn't bother me – though I'd much

> rather they came up to me and said we think you're an old tart for doing it – but I do find it sad that people don't support public understanding (Aitkenhead 1998 p4).

In 2002, a journalist for *The Guardian* said a scientist he spoke to before meeting Greenfield "wondered tartly whether 'she had ever really produced anything of any importance'." (Durrant 2000 p4). Her research has been called "very ordinary" (Henderson 2004 p1). A scientific contemporary of hers summarised succinctly the objections against her when he said:

> With fame, she has become detached from all the processes of scrutiny and quality control that scientists use when they communicate with each other though papers or whatever . . . A lot of what she says does not pass muster academically. Britain is very strong on neuroscience and compared to the leaders in the field, she is simply not in the same league. She is never cited in research papers (cited in O'Hagan 2003 p5).

In the same article, another neuroscientist speaking anonymously spoke of "her absolute lack of the kind of decorum that befits a scientist in the public sphere" (cited in O'Hagan 2005 p5). This anti-Greenfield sentiment was illustrated most sharply in the coverage surrounding the rejection in 2004 of her nomination to become a Fellow of the Royal Society (F.R.S), the world's oldest scientific society (Highfield 2004). Most scientists have been elected because of their scientific achievements, but some, including Richard Dawkins, have been made fellows because of their science communication efforts. In 1998, Greenfield received the society's Faraday medal, awarded for contributions to the public understanding of science. Greenfield had been nominated for membership by secret ballot in December 2003, a nomination that caused a degree of controversy when it was publicly revealed in February 2004, and received yet more coverage when her nomination was rejected in May 2004. *Nature* said "popularizer Greenfield" had been "blackballed" (Nature 2004 p9). The Royal Society countered by saying she had not been blackballed and was a candidate for admission because of "her substantial contribution to science" (Enderby and Read 2004 p699). The disparaging off-the-record comments included one scientist saying that, if she was elected, Sir Isaac Newton "would turn in his grave" (Highfield 2004a p4).

Another comment hinted that her communications work was not of the required quality to qualify for membership. The source told *The Independent* there had been a "groundswell of opinion" against awarding Greenfield an F.R.S. because this "would be an insult to the world-class scientists who are still on the waiting list and to the legions of modest, hard-working genuine promoters of public dialogue on science" (Connor 2004 p19). Another said fellows would resign if she were to have been given an F.R.S. because it "would be an unjust reward for self-promotion," and several female fellows opposed her nomination (Henderson 2004 p1).

Greenfield responded through her solicitors, saying it was "a great pity that those who do not have the courage to identify themselves can make unsubstantiated criticisms of my science and my activities in public communication" (cited in Connor 2004 p19). The objections to Greenfield's nomination and her stature generally have been based around the idea that, although acknowledged as a strong populariser, she has been more skilled at marketing and self promotion than science. Greenfield once told a reporter: "I wear what I wear. It is predicated on a curious assumption about scientists. If I was an advertising executive, would that be an issue?" (Radford 2004 p15). *The Sunday Times* wrote that her "bitchier colleagues suggest that the reason she looks more like an advertising executive than a don is because she is one and the brand she is promoting is herself" (Bowditch 2006 p3). A Royal Society member complained anonymously to *The Independent*: "She doesn't promote science. She promotes Susan Greenfield" (Connor 2004 p19).

Her rejection as an F.R.S. has revealed a schism within the scientific community towards the public understanding of science. This was what one reporter (Parry 2004 p8) referred to as the crux of the "Greenfield problem": it was laudable for a scientist to publicly discuss their speciality, because the research is the star, but confident communicators of science generally were publicity-hungry, "as if the ability to speak well and intellectual rigour are mutually exclusive" Journalist Parry (2004 p8) concluded: "Greenfield has paid the price of media success". Indeed a dominant theme in the coverage of Greenfield's rejection by, in her words, "those spiteful anonymous people at the Royal Society" (cited in Keating 2005 p4), has been the juxtaposition between the seeming incompatibility of her public fame and her scientific credentials. *The Times* asked in a headline if she was "too famous to be a Fellow?" (Henderson 2004 p1). Joan Smith in a column in *The Independent on Sunday* said the rejection was based more on grounds of style rather than substance, and the column had the headline: "Sort the hair, Susan, and you're in . . ." (Smith 2004 p21). Journalist Lynn Franks said that Greenfield's feminine image contributed to her rejection by an organisation, leading her to wonder if a similar rejection would have happened to a white, middle-class man (Franks 2004). Greenfield herself has also interpreted her career-long criticisms as being gender-driven, asking:

> What have I actually done to deserve these comments? . . . I suspect the detractors are male, just because of their sheer numbers in the Establishment (O'Hagan 2003 p5).

She said elsewhere that

> people feel disquieted by those who challenge dogma, make a difference and break the mould. When a woman does it, it is strange, disturbing. When a woman in a mini-skirt does it, it is even more challenging (Highfield 2003 p4).

Greenfield's scientific record has been evaluated in public. *Science* said her research focused on what it called "a workhorse molecule of the nervous system called acetylcholinesterase (AChE)". The journal said her early scientific reputation was based on the "bold thesis" that this enzyme might link several neurodegenerative diseases, including Alzheimer's and Parkinson's, by performing roles not typical to an enzyme, which ordinarily catalyses a chemical reaction. The *Science* article quoted a neuroscientist as saying this hypothesis had not been proven (Bohannon 2005). *Science* characterised her scientific critics as arguing that "she appears to have left real science behind without delivering on the promise of her early ideas" (Bohannon 2005 p962). *The Sunday Times*, bizarrely, called AChE a "famous enzyme" (White 2004 p20) and noted that Greenfield fulfilled the normative criteria of being a significant scientist. She has an impressive publication record, often co-authoring with leaders in the field; she has concentrated, since her twenties, on researching AChE; and this research, on AChE, is itself a significant and important area of study. Furthermore, it is the age of the biological sciences and "neuroscience is the next frontier" (White 2004 23). Interviews and profiles repetedly refer to her schedule, rising at 5 a.m, dividing her time between the RI and her Oxford laboratory, where she plans experiments, applies for grants, analyses and writes papers, and weekends spent writing books and speeches, a schedule that her detractors view as distracting her from bench work. Greenfield answered that she publishes three or four papers a year in peer-reviewed journals, and fits everyting else in by "not doing what other people do: gardening, watching television, sleeping in late" (cited in Moreton 2008 p30).

Science wrote also of a speech on her idea of consciousness at the annual meeting of the Association for the Scientific Study of Consciousness held at Caltech in June 2005. She said it went well, but *Science* reported that some of her audiences were less impressed, one of the conference organisers saying attendees complained that the lecture was insubstantial and was an example of the type of talk that lowered the image of consciousness as a field of scientific study, as it focused on metaphors rather than testable hypotheses. Researchers who made claims about solving consciousness without their ideas being backed up with data and going through peer review "are generally ignored". In response, Greenfield said she was being held to a different standard because she was a neuroscientist instead of a cognitive scientist (Bohannon 2005 p963). *Science* said that judging her on her research overall might be "missing the point" (in Bohannon 2005 p963), as she was an inspirational figure to younger, especially female, scientists.

7.6. "A mind that is essentially and rigorously conservative"[79]

After her Royal Society rejection, Greenfield continued to produce popular science work. Her next book, *ID: The quest for meaning in the twenty-first century*, first published in 2008, used her theory of the mind as the personalised brain as a foundation for an exploration of identity in the future, for a generation that spends, she cited, more than six hours a day using electronic media. The changes to malleable neuronal connections caused by these new interactive technologies were unknown, but she hypothesised that the constant short-termist pleasure seeking that characterised online social networking and computer gaming might lead to emotional detachment, a reduction in an ability to imagine, analyse and think in abstraction, as children came to lack the conceptual frameworks for making sense of the world that were gained in traditional education. The sensation-saturated screen culture, driven by instant gratification, needed constant rapid stimulation, leading to reduced empathy and sense of self. She wrote.

> So, if the old world of the book aided and abetted the development of a 'mind', the world of the screen, taken to extremes, might threaten that mind altogether, and with it the essence of you the individual (Greenfield 2009 p203).

Greenfield postulated that the insatiable learned desire for immediate stimulation was linked to gambling, anti-social behaviour, obesity and surges in demand for medicine for attention deficit hyperactive disorder (ADHD), Ritalin. She acknowledged that theology, philosophy, psychology and anthropology have made contributions to the understanding of human identity and belief, but these served as a foundation for contemporary neuroscience's exploration of the self. She criticised Dawkins because, although he railed against the lack of evidence for religion, the more interesting question was how belief systems were part of the

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[79] O'Hagan 2003 p5

human mentality. Yet her own historical and cultural criticism was equally weak, based largely on interpretations of other popular books, including Oliver James's *Affluenza* (2007), Steven Johnson's *Everything That is Bad is Good for You* (2006), Alain de Botton's *Status Anxiety* (2004) and Sue Palmer's *Toxic Childhood* (2006). For example, there is an absence of historical context in the sweepingly unsophisticated macro-summary of the last century:

> From the Russian Revolution to the Nazis to the Cold War to Al Qaeda, the passage of the twentieth century was dominated by the tension between self-centred consumerism on the one hand and collective fundamentalist doctrines on the other (Greenfield 2009 p278)

Critics viewed *ID* similarly to *Tomorrow's People*. Reviewers praised her neuroscience writing, but strongly critiqued her social commentary. *The Daily Mail* said "she can't really back up her alarmist instincts . . . and this attempt to combine neuroscience and social comment results in a bit of an unpersuasive hotchpotch" (Ritchie 2009). *The Times* argued that it was convincing when discussing Alzheimer's disease, but its social commentary was a "hypothesis in search of evidence" (Hawkes 2008 p10). Her imagined futures were essentially dystopian. *The Mail on Sunday*, in a review titled "It's all in her mind," concluded that Greenfield came up with a succession of

> saloon-bar truisms such as, the whole point of minds is surely that they are diverse and individual or music is found throughout human culture and has a powerful role in personal, social, cultural and religious experience. The book has a makeshift, undigested quality, veering to and fro between the obscure and the bleeding obvious (Brown, C 2008 p11).

Respected science journalist John Cornwell noted that *ID*

> digresses all over the place in little flash floods of maddening provisos and second thoughts. It's as if she dictated it while bouncing on a trampoline, fixing an errant eyelash and sorting her fraught schedule on a BlackBerry (Cornwell 2008 p23).

This intense time-pressure has been a feature of her career. The crew on the television programme *Brain Story* "had a tightly fixed time to get things right, they found, and after that no more" (McKie 2000 p29). Nevertheless, the central thesis of *ID* provoked predictable controversy with its overwhelmingly dystopian view of personalities radically altered by posting on Facebook and playing *Worlds of Witchcraft*. This controversy accelerated when she gave a speech, outlining her thesis, to the House of Lords early in 2009, as well as in newspaper articles. The *Daily Mail* ran a first-person article under the headline: "God help us all when generation text are running the country" (Greenfield 2009b) and "How facebook addiction is damaging your child's brain" in which she said "As an expert on the human brain, I am speaking out as I feel we need to protect the young" (Greenfield 2009a). Her concerns over the potential impact of technology on children's brains were publicised when her name was on a letter to *The Daily Telegraph*, signed by 110 teachers, psychologists and novelists, saying that childhood was being harmed by a culture of junk food, marketing, video games and school targets (Abbs et al 2006). These interventions offered evidence for Greenfield's underlying aim in writing the book. This study argues that the book was neither an example of science popularisation nor socio-cultural futurism, but was a scientifically-based position paper on education. It called for public engagement in twentieth century education, where future childhood schooling and civic identity were shaped fundamentally by neurological processes. Its argument contained an implicit scientism.

These concerns have been consistent with her political areas of interest, her parliamentary questions in the House of Lords have included: interdisciplinary research in neuroscience and education, the side effects of anti-depressants; the prescription of Ritalin for ADHD. She established the All Party Group on Scientific Research in Learning and Education, which will be scientifically informed by the Oxford Institute for the Future of the Mind, an institution that she directs (Naish 2006). Against these developments, *ID* can be interpreted as a policy manifesto.

Columnist for *The Guardian*, Ben Goldacre, whose Bad Science column and website approach issues from an unreconstructed deficit model perspective, criticised her interventions on social networking and children's brains, which were articulated in lectures, articles and *ID*, without supporting evidence or placement within a research programme. He argued that communicating her hypotheses was irresponsible.

> [W]ith her repeated experience of being the engine behind such scare stories over many years, she should be able to predict that her "speculations" and "hypotheses" will inevitably result in scare stories in the press (Goldacre 2009 p16).

Goldacre has been a strong recent critic of Greenfield, arguing that it was inappropriate for her, in her position, to be discussing ideas unsubstantiated by evidence and promoting the MindFit commercial product (Goldacre 2010).

Similarly, columnist in *The Observer* Catherine Bennett criticised Greenfield's comments about social networking being the “latest, astonishingly unscientific outburst” (Bennett 2009 p31), motivated in part by “needing recognition in order to confirm that she exists” (Bennett 2009 p31). However, a writer for *The Times* supported Greenfield’s stated aim of provoking debate, arguing that “there is logic in using her self-styled position as chief populariser of science to hypothesise, which she justifies as a staple of the scientific process” (Wark 2009 p5). Incidentally, following such criticism, Greenfield told one magazine:

> It’s more in sorrow than in anger that I read the misrepresentation . . . But it’s what happens. It’s not as if I seek publicity or want it or stress too much over it . . . I’m asking questions rather than giving answers and that I think is very hard for [the media] to grasp. I’m saying I’m concerned about the rise in autism. I’m concerned about the rise in ADHD, so why aren’t we talking about it (cited in Brown 2009 p20).

However much Greenfield has been constructed in public around her appearance, her books and journalistic writing have been largely free of personal detail and revelation. Her columns gave glimpses of her global travel that formed part of her scientific work (“I have just returned from Mexico City” (Greenfield 1997b p45); at “Sydney airport a magazine caught my eye” (Greenfield 1996f p45)). Aside from her already analysed statements on voting in British general elections, she has written on her opposition to the boycott of Israeli academics (Akbar 2009) and her opposition to the softening of anti-cannabis legislation (Ahuja 2000). Her books have unwaveringly focused on science and on science-and-society, the most notable personal revelation, however, was her description of her father’s stroke in *The Private Life of the Brain*. Greenfield contended that she had a holistic view of brain science, concerned not only with the components of the physical brain, but also their connection to wider issues of consciousness and identity. Her general world view has been difficult to discern, appearing implicitly, encoded in the text, hidden in generality. Perhaps the most private revelations in her oeuvre came in *Tomorrow’s People* where she wrote:

> Rightly or wrongly work defines you. It can give you status, encapsulate in a word your skills and knowledge, and even hint strongly about your predispositions and emotional make-up . . . A sense of fulfillment can be gained through work as much as, or perhaps even more than, through leisure activities. Moreover, being busy carries high status” (Greenfield 2004 p80 and p102).

An interviewer in *The Independent* uncovered hints of Greenfield’s world view in *Tomorrow’s People*’s structuring of reality into “stark dualities”: good vs bad; private vs public; active vs passive; and something vs hedonism, though I'm not clear what. "Achievement", says Greenfield, in a flash” (Vines 2003).

Sean O’Hagan in *The Observer* said hers was “a mind that is essentially and rigorously conservative – what would at one time have been called 'square' (O’Hagan 2003 p5). An interviewer in *The Times* tied Greenfield’s opinions to her sense of self, quoting her as saying:

> if it was a choice between everyone saying I was fantastic and not saying anything controversial, or saying controversial things and being myself, I would go for the latter. How else can you look yourself in the mirror?’ Which, moments later, she does (Wark 2009 p5).

7.7. “Susan who?”[80]

Writer Elaine Showalter (2001 p8) said that “the modern feminist heroine cannot deny fame or flee from it; she has to understand and use it”. Certainly, Greenfield has understood the value of publicity, using the mechanics of representation to sell science, becoming a marketeer for a rebranded image of science that was unashamedly fashionable, ostensibly inclusive, personality-focused and politically-engaged. The promotion of science and the promotion of Greenfield have been inextricably entwined and mutually reinforced within wider institutional discourses about science and society at the end of twentieth century Britain. Her popularisation work has moved from the PUS-driven Royal Institution lectures to the science-in-society theorising that, despite the book’s many substantive weaknesses, was evident in *ID*. This popularisation work has been promoted consistently over time around her image as an exceptional female scientist, simultaneously glamorous and accomplished, intellectually serious and socially competent. This image has been reflected institutionally in the modernisation of the Royal Institution that she has overseen. As O’Hagan (2003) so astutely recognised, Greenfield, rising to prominence and power during Blair’s tenure as prime minister, managed her image into one that merged the private and the public, the personal and the emblematic into an integrated public persona, one that symbolised what has become Greenfield’s social function: representing the face of successful women in science.

Greenfield has been complicit in this image-creation, choosing initially to present herself as a mediated subject, and participating in created media representations through posing for

[80] Marsh 2007 p10

photographs and disclosing personal information in a varity of media interviews. Commodification has featured in the sale of her books and the sale of science. Greenfield's image has been problematic and contradictory, embedded within historical representations of female scientists. Greenfield has simultaneously challenged and embraced the move towards the emphasis on female glamour. The relentless focus on her appearance and frequently sexualised femininity has placed her in more traditional representations of the female scientist.

At the same time she has argued against gender discrimination in science, and symbolised the success of women in science. In managing and mixing these representations, she has been portrayed in the extreme position of the superscientist, now judged also by their appearance instead of their domestic skills. The glorification of her exceptional status and the virtually peerlessness of her achievements, described in promotion, publicity, her own writings (to a lesser degree) and critical commentary, have meant that the rhetoric of tokenism has remained a persuasive means of explaining Greenfield's popular status. Her status as cultural hero, whose work ethic meant she overcame hardships, chiefly the consistent criticism of some of her peers, has been encased within these tokenistic discourses. Essential to tokenism is peerless uniqueness, and represented uniqueness is essential to celebrity.

The representation of Greenfield, informed by historical and comtemporary representations of women scientists, has raised wider questions about gender and science communication. Is the perceived sexual attractiveness of women an essential factor for their development as mass media science communicators? Have certain women been judged to be effective communicators of science, at least in part, because their appearance allows them to be represented, through their own choice and those of media organisations producing these images, as overtly feminised and sexualised? Are debates about gender and science overcome merely by having a spokesperson for science who loves lipstick and wears Prada?

Greenfield does not come close to addressing these deeper issues. She has emerged from her writings as a liberal, rather than a radical, feminist. Although she has written about women and science for newspapers and for policymakers, she has never produced a systematic intellectual critique of gender and science or the social organisation of knowledge. Her source of scientific inspiration from classical studies has been often repeated, but this humanistic education has informed her approaches to consciousness, rather than equipping her for a sustained analysis, in terms of gender, of society and culture. Moreover, throughout her career she has been embedded within traditional power structures in Britain, a system in which she has earned a succession of establishment positions – the Oxford professorship, the Royal Institution directorship, the life peerage – making her a career-long insider. Consequently, her engagement with gender issues occurred pragmatically, through established channels of policy discussion and policy debate, rather on a wider conceptual terrain. Sharing the advantages of the privileged scientific elite, as the most prominent female scientist in Britain, she symbolises what other female researchers can achieve, given a more supportive employment policy framework than the one in which she rose to prominence where she, in the language of tokenism, overcame hardships by working extraordinarily hard and choosing not to have children. Greenfield has neither broken free of being an example of Haraway's (1989) oxymoronic social subject nor has avoided what Shacher (2000) called being packaged as a female in a male world. The deeper, subterranean debates about gender and science can be sidestepped by having a female in a prominent tokenistic role.

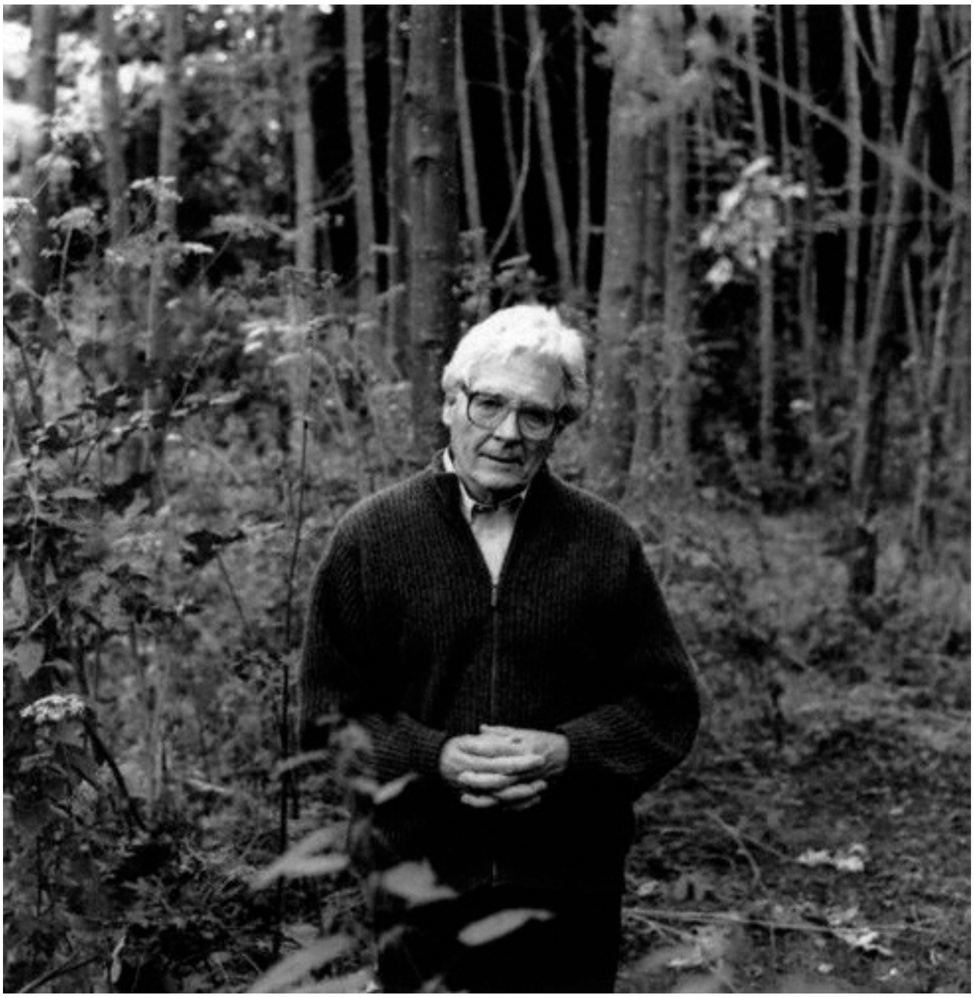
The extensive anonymous peer criticism she received was not made in terms of gender. Indeed Greenfield has been difficult to categorise clearly into the traditional gendered division of personality. She has proved herself, in her research work, to be rational and scientific and, in the House of Lords, as political, while being portrayed as personal and experiential. She has written on emotion as being as crucial to consciousness as rationality. The criticisms of her have focused on the argued gulf between her professional status and public profile. The commodification of the self that has occurred in her manufactured public image has, in turn, become part of her fashioned public image. This mediated image has become central to discussions of Greenfield and her professional status.

Greenfield, as her career progressed, became increasingly described through discourses of celebrity. Fame meant she outgrew her marriage. Fame meant she left behind scientific standards. Fame meant she was denied a fellowship of the Royal Society. The unusually sharp personal criticism she received in public after the rejection of her F.R.S. nomination indicated perhaps an ambivalence about popularisation work, despite her elevation into the highest echelons of British society, an elevation based, to a large degree, on her establishment-encouraged popularisation career. Her critics have viewed fame as incompatible with serious scientific work, dismissing her embodiment of changing values in the public presentation of science as self-serving self-promotion. A potent symbol of this anti-Greenfield view remains that of her lipsticks spilling over Faraday's desk.

While the visibility has undoubtedly helped her career (holidaying with the Blairs, writing speculative work that would be hard to see published by a novice author), the promotion of science has been a constant in her career. The private life of Susan Greenfield has been a means of marketing her characterisation of science-as-product. The world view that has emerged from her writing, the centrality of work, the value of accomplishment, also helps explain her attitude to popularisation in general. Her career has been marked by a drive for consistent and constant achievement, the continuous reaching of new goals, a perpetual ticking off of items on a never-ending to-do list. Writing popular science titles has, especially as her career progressed, been just one part of her portfolio of popularisation work, all occurring in a context of extreme time-constraint. This interpretation helps explain why her most speculative works, *Tomorrow's People* and *ID*, were not fully coherent and integrated books. They were two more items on the checklist, rather than being carefully crafted cultural products. A speculative discussion of the idea of the human in the future? Tick. A debate-provoking study on children and new technology? Tick. A reviewer of *Brain Story* noted that she was sucessful at raising science and society issues, but evasive in answering them (Hanks 2000), a criticism she has not answered thorugh her subsequent work. Certainly her collected works as a public intellectual have not cohered into a single sustained ideology or perspective. Central has been promoting science. Central has been getting things done. Central has been the advancement of herself and science in public.

Nevertheless, it has remained difficult to reconcile the serious, curious, interested-in-ideas scientist-author of her books with the woman telling journalists about her hair or best physical features, difficult to integrate conceptually the glamorous and extroverted dresser with the conservative thinker of her books – unless she is reviewed through the framework of celebrity, with its twin drives of promotion and publicity. Entwined from the beginning of her public career, representation, promotion and symbolism have been characteristic features of her celebrity, shaped also by the rhetoric of tokenism in her representation. O'Hagan (2003 p5) said she courted political controversy and media attention yet wondered why there was interest in her private life or criticism from her peers. As with all varieties of fame, promotion has met personal psychology. Celebrity for Greenfield can be viewed as a deserved consequence of her own relentless ambition and devotion to self-improvement, another index of her formidable professional achievements, awarded and recognised within traditional power structures. A interviewer (Marsh 2007 p10) in *The Times* once wrote that Greenfield says she is scared of loneliness, but what might irk her more is the prospect of dwindling into the background. Susan who?

Chapter 8. James Lovelock: The ecological maverick



Photograph: James Ephraim Lovelock by Nick Sinclair. Photograph © Nick Sinclair, 2010.
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8.1. *"A British maverick"*[81]

The central image of Carson's *Silent Spring* was based in part on scientific data gathered using the electron capture detector, a small device that measured with acute sensitivity traces of chemicals, including DDT, in the air. The device was created, in "the great tradition of English ingenuity" (Bate 2009 p39), by James Ephraim Lovelock (1919-) who called his invention "without doubt the midwife to the infant environmental movement" (Lovelock 2001 p191). It proved empirically that toxic chemicals were globally present. A chemist by training, Lovelock worked for more than twenty years with the UK's National Institute for Medical Research on topics including the common cold, the monitoring of cattle movements and the protection of cells and animals through freezing. Lovelock's varied fields of expertise encompassed atmospheric chemistry, engineering and elements of medicine. He was elected a Fellow of the Royal Society in 1974. Since the early 1960s he has worked as one of the world's few independent scientists, and has had laboratories in his rural English homes, first in Bowerchalke, Wiltshire, and later in Coombe Mill, Devon, where he has undertaken consultancy work for NASA, the British government and companies including Shell and Hewlett Packard.

He achieved public recognition for the Gaia theory he formulated in the 1960s, which said that the earth's living matter, atmosphere, ocean and land formed a complex interconnected system that has, for the past four billion years, maintained stable conditions for life on Earth. The theory argued that the entire surface of the Earth behaved in ways similar to a superorganism, a single physiological system that was unified, interdependent and self-regulating, where the evolution of organisms was tied to the evolution of their surrounding environments. Living components, such as tropical forests, and components traditionally regarded as non-living, such as the cycle of rock weathering, have been involved in constant self-regulating processes that have ensured constancy in, among other phenomena, surface temperature, ocean salinity and atmospheric composition, which contributed to the maintenance of suitable conditions for life, even as the Sun steadily warmed.

The fundamental principles of the Gaia hypothesis were described in Lovelock's first book *Gaia: A new look at life*, first published in 1979. *The Ages of Gaia*, first published in 1988, developed the theory's scientific arguments and allowed Lovelock to respond to scientific

[81] Joseph 1991 p48

criticisms of his first book. *Gaia: The practical science of planetary medicine*, published in 1991, described the Earth as a feverish patient that needed planetary medicine. His last two books, *The Revenge of Gaia* (2006) and *The Vanishing Face of Gaia* (2009), argued that climate change had pushed Gaia, his name for self-regulating earth, to a crisis point where global temperatures, instead of gradually increasing as other scientists predicted, would accelerate uncontrollably, leading to drought, famine and natural disasters that would cause the deaths of billions. In these two books, Lovelock advocated sustainable retreat as the only realistic strategy to ensure the survival of a future population of approximately 500 million humans.

Gaia theory has gone through several subtle alterations in the past five decades as it developed from its initial formulation as the Gaia hypothesis into the more established Gaia theory. As the theory gained respectability and influence within science, it has been labeled geophysiology and, most recently, earth systems science (ESS) (Lovelock 1991, 1995, 2000, 2007, 2009). The theory was his "chief claim to fame" (McKie 2009 p21), making him "world famous" (McCarthy 2006 p3), turning him "into a celebrity" (Ryle 1991 p3) and "one of the most famous scientists on the planet" (Irvine 2005 p44).

Lovelock described in his autobiography, *Homage to Gaia*, first published in 2000, how his unique background and varied scientific competencies coalesced in the creation of Gaia. The autobiography, and his other books, have tended to portray Lovelock as a visionary maverick whose once discredited theory has now come to be accepted within the scientific mainstream, a critical orthodoxy that was repeated in most long journalistic interviews and profiles (for example, see Connor 2006, Aitkenhead 2008, Farndale 2009, Ferguson 2009).

This viewpoint was less pronounced in his authorised biography, *He Knew He Was Right: The irrepressible life of James Lovelock and Gaia* (2009), which interwove his life story with a narrative about the scientific development of systemic approaches to Earth science. Crucially, it placed Lovelock's rise to prominence against the rise of climate change as a topic of increased scientific and socio-political concern. There have also been two book-length critical commentaries on Lovelock's work. Lawrence E. Joseph's *Gaia: The Growth of an Idea* (1991) traced convincingly the concept's spread through society and culture, while Jon Turney's *Lovelock and Gaia: Signs of Life* (2003) offered a lucid account of the theory's scientific development. Lovelock himself has been interviewed and profiled by publications as diverse as the *Daily Telegraph* and *Rolling Stone*.

Lovelock called himself, and he has been called, a "maverick" scientist (Lovelock 2001 p295), "a British maverick" (Joseph 1991 p48), a "maverick researcher" (Joseph 1991 p154), a "maverick research chemist" (Ryle 1991 p3), a "climate change maverick" (Aitkenhead 2008). *Science* noted he was an "unorthodox British chemist and inventor" (Mann 1991 p378). The concept of the maverick has a specific meaning within science and society studies, and it is crucial for explaining Lovelock's celebrification. Communications scholar James Dearing (1995 p344) defined a maverick scientist as "an outspoken proponent of unorthodox scientific theory". The reporting of the maverick's views in non-specialist communication channels was important as the maverick has often been oppressed, within science, through "the denial of research funding, rejection of publication, and intellectual ostracism" (Dearing 1995 p356). The channel of communication chosen by the maverick influenced how seriously the scientific community considered the maverick theory. Seeking publication in scientific journals meant that the maverick could "interest their peers *while being perceived as legitimate*" (Dearing 1995 p356, emphasis in original).

Journalists often wrote about maverick theories even when they did not regard the scientific work as credible, and their reporting told audiences "*which way to think about*" particular controversies (1995 p355, emphasis in original). Dearing argued that mavericks had an important role in the history of science because the gradual acceptance of their views by their scientific peers, if such a situation occurred, sometimes represented the beginning of a Kuhnian paradigm shift (Kuhn 1996). This study has explored how Lovelock's maverick status has been tied to promotion, commodification and his representation as a celebrity. Lovelock was a well-regarded establishment scientist in his early career, publishing regularly in journals including *Nature* and *The Lancet*, but his maverick status began after he became an independent, when he first created the Gaia hypothesis.

8.2. "If you intend to put forward so large an idea you must give it a proper name"[82]

From its conception, Gaia has been bound up with promotion and appeals to non-scientific audiences. It was named in 1969 by his friend and then neighbour, novelist William Golding, who felt such an expansive idea needed a clear and simple term to ensure it received attention. He told Lovelock: "'If you intend to put forward so large an idea you

[82] Golding cited in Lovelock 2007 p188

must give it a proper name, and I suggest that you call it Gaia'" (Lovelock 2007 p188). Lovelock wrote:

> In spite of my ignorance of the classics, the suitability of this choice was obvious. It was a real four-lettered word and would thus forestall the creation of barbarous acronyms, such as Biocybernetic Universal System Tendency/Homoeostasis. I felt also that in the days of Ancient Greece the concept itself was probably a familiar aspect of life, even if not formally expressed (Lovelock 1995 p10).

Lovelock (2009 p106) later acknowledged that had he not met Golding, his ideas might have been called the "dull and uninspiring 'Earth system hypothesis'". This is an often-repeated story (it is told in all Lovelock's books), but he viewed the naming as an add-on to the theory's content, instead of its name being central to its conceputalisation and ongoing rhetorical force. Lovelock, though, it can be argued, was being excessively modest here: he immediately saw the value of the name Gaia as he was attuned to the value of public presentation. A psychological profile carried out as part of an early-career job application for pharmaceutical firm Thomas Hedley concluded that he was best suited to a career in marketing (Lovelock 2001).

Lovelock introduced his initial Gaia hypothesis through formal scientific channels, first at a conference talk, then in academic papers: a one-page statement in *Atmospheric Environment* in 1972 and, after several rejections from other journals, in Carl Sagan's journal *Icarus* and in a Swedish environmental science journal *Tellus*, neither of which impacted significantly on public opinion (Turney 2003). The scientific community was indifferent to the theory. Geologists believed geochemistry explained planetary forces. Biologists explained the development of life through natural selection. His chief scientific ally was American microbiologist Lynn Margulis, an ex-wife of Carl Sagan, who was interested in outsider theories and who also had a "quasi outsider status" (Turney 2003 p26). She also had a media presence and was called the "Wizard of Ooze" (Joseph 1991 p7). The interconnectedness Lovelock argued for on a global scale, she had found at the cellular level.

With avenues of professional communication closed off, Lovelock sought to present his work directly in a popular channel, to a combined audience of scientists and interested non-specialists. Along with his Shell colleague Sydney Epton, Lovelock co-authored an article, titled 'The Quest for Gaia' in 1975 for *New Scientist*. It received mass media attention almost immediately, followed by twenty approaches from publishers to write a book.

Scientists were often sceptical of a new big idea, but publishers quickly saw its value as a concept that could be packaged and sold (Turney 2003). Lovelock eventually chose Oxford University Press because of its scholarly credentials and the personable representative who came to see him (Lovelock 2007).

Gaia: A New Look At Life was first published in 1979 and has remained in print since. Like *Silent Spring*, Lovelock's first book had a carefully chosen title, synthesised work from a variety of fields, and was a paen to a balanced and harmonious nature. *Gaia* provided an encompassing metaphor for understanding the interconnected Earth, a metaphor whose central idea was instinctively grasped, even by audiences who did not fully understand the science (Lovelock 2007, Midgley 2001a). His biographers wrote that he aimed the book at a non-specialist audience because he had given up on the scientific community taking any interest in his work. Considering its respected academic publisher and its detailed description of a scientific hypothesis, Lovelock's stated aim in writing the book was somewhat confused, saying that its aim was "primarily to stimulate and entertain" (Lovelock 1995 p11) and that he wrote it as a "story-teller and gave poetry and myth their place along with science" (Lovelock 1995 pviii). The book was "more a love letter than an textbook," "a long love letter to a woman I had never met . . . someone intelligent, lively, and full of fun, but not a scientist . . . (Lovelock 2001 p309-310).

Although there were generally favourable reviews in *New Scientist, Nature* and *Scientific American* (Turney 2003), the book found its core audience among non-specialist publics. Lovelock wrote:

> To my astonishment, the main interest in Gaia came from the general public, from philosophers and from the religious. Only a third of the letters [received] were from scientists. I never intended the book as a science text for specialists, but I did expect them to read it (Lovelock 2001 p264).

The book merged a mystic appreciation of the natural world with scientific explanation, the two strands frequently mixing to such an extent that it was difficult to pick apart the science from Lovelock's own viewpoint. As Turney (2003) noted, although presented as a hypothesis, large elements of the text made it cohere in a way that was similar to a world view. The book created a semblance of religious feeling in a secular age, expressing new concerns for environmentalism in phrases that were close to religious language (Turney 2003). It led to the image of Lovelock as "part string-and-sealing-wax inventor, part New

Age visionary" and he was portrayed as "the man who accidentally invented modern ideas about the environment, and who in Gaia gave them an almost theological framework" (Pearce 1997 p48). After its publication, Lovelock corresponded with religious leaders and "developed his own gentle brand of agnostic nature worship" (Turney 2003 p72-73).

Lovelock acknowledged that the book was published in a climate of new age[83] feeling, but he insisted that he used Gaia metaphorically. This has helped and harmed Gaia scientifically. The use of Gaia as metaphor led to criticisms from science and left it "vulnerable to co-option from the so-called new-age wing of the environmental movement" (Wyatt 2004 p248). At the same time, metaphors have had a realistic function in scientific creativity, helping researchers move from descriptions of unknown phenomena to literal descriptions of the natural world, as described in scientific theories (Miller 1996). Moreover, the metaphors have had a normative function, shaping the "cognitive framework" within which scientists operated, where they could be used "to help the imaginary become real or true" (Wyatt 2004 p244). For Turney (2003), a particularly interesting feature of the history of Gaia has been how a core idea that was at least partially metaphorical developed into a research programme.

The new age connotations of Gaia were crucial in its ongoing popularity and its continued cultural acceptance, although Lovelock has downplayed this in his writings. The idea of the living earth was found by many to be spiritually compelling and aesthetically beautiful. Scholarly and scientific lectures have been mirrored in festivals or workshops celebrating the Earth goddess. Joseph (1991 p14) called this phenomenon "colourful and eclectic," although he noted, but failed to elaborate, that this view of Gaia had deep cultural roots. This pattern was consistent with the dissemination of maverick theories, as the adoption of the theory by non-scientists, in this case, new agers, helped keep it prominent among non-specialist audiences.

Turney (2003) noted how interpretations of Gaia informed the writings of Fritjof Capra and his *The Tao of Physics* (1992) and *The Turning Point* (1982) in which he championed the rise of a new framework for grand unified thinking, into which Gaia moved seamlessly. Gaia also influenced the writings of biologist Rupert Sheldrake who described Gaia in *The Rebirth of Nature: The Greening of Science and God* (1990) as part of the rise of a new

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83 New age, as described by Bramwell (1989 p10), was the "new culture that would be born when men [sic] realised their place in nature".

animism. Lovelock has disassociated himself from Sheldrake (Ryle 1997), although one journalist noted that Lovelock made an "explicit link" between paganism and environmentalism in *Gaia* (Moreton 2009 p6).

As chosen channels of communication were essential to the credibility of a maverick theory, Lovelock presented Gaia in scientific and popular channels – and it was challenged in both. In popular channels, the criticism came from perspectives anchored in evolutionary biology. Geologist W. Ford Doolittle viciously critiqued Gaia in *Co-Evolution Quarterly* as presenting an "unquestionably false" view of natural selection (1981 cited in Turney 2003 p68). More damagingly, Richard Dawkins characterised Gaia in *The Extended Phenotype* as "pop-ecology literature" (1999 p235), arguing that if Gaia theory was compatible with evolutionary biology, there would have to be a process of interplanetary natural selection. The universe would have to be full of dead planets unable to sustain life, but would contain planets, such as the Earth, that successfully adapted to regulate life.

Gould and Dawkins ridiculed Gaia as "pseudoscience, poetry posing as theory" (Horgan 1998 p131), Gould calling it "warm and fuzzy and it [struck] a chord," "a pretty metaphor, and not much more" (cited in Mann 1991 p378-p380). The book's popular success might have motivated such a hostile reponse from scientific researchers, argued Gribbin and Gribbin (2009)[84]. Lovelock (2009) said that Dawkin's critique was so well-phrased and so well-regarded that Gaia was viewed by scientists as closed. Lovelock's theories had first been ignored by denying him access to the professional literature and then discredited through the boundary work of popular science writing.

Scientific critics also found in the first formulation of Gaia elements of teleology, a "great error of intentionality" that discredited it as serious science, a trait, however, that heightened its poetic value. (Joseph 1991 p30). Lovelock subsequently denied that he believed the Earth was literally alive, but it was an interpretation seized upon during the first major scientific forum that discussed Gaia, the 1988 Geological Union of America conference. The most persuasive presentation at the conference – the one that contributed to the dominant tone of *Nature*'s report of the meeting – was made by a young physicist, James Kirchner. Analysing Lovelock's writings, he outlined two forms of Gaia. The weak form, which argued that life

84 Lovelock subsequently reconciled Gaia and natural selection in *The Ages of Gaia* with the formulation that biological and geological evolution were not separate: organisms and their environment evolved in an inseparable process. Lovelock classed himself as an advocate of punctuated equilibrium (2000).

influenced the environment, was so obviously correct that it did not merit the name of hypothesis, while the strong form attributed teleological characteristics to Gaia and was untestable. Lovelock (2000) felt that the conference severely damaged the theory's credibility.

The Gaia hypothesis attracted other strongly-worded critiques from within science. Well-known British microbiologist John Postgate called Gaia "pseudoscientific myth-making" equal to

> astrology, fringe medicine, faith healing, nutritional eccentricities, religious mysticism and a thousand other fads and cults which now plague developed societies (cited in Turney 2003 p79).

Despite its being discredited significantly, Gaia nevertheless continued to be commodified, its name becoming a brand. In 1982 Joss Pearson established Gaia Books, which published texts on science, environmentalism and spirituality, the three elements of "the Gaian life-style" (Joseph 1991 p67). There was a Japanese natural history television programme called *The Gaia Symphony* and a Japanese car called *Gaia*. The computer game programmer who created the SimCity series of games, where players designed and created viable virtual cities, collaborated with Lovelock on SimEarth (Lovelock 2001).

The theory's cultural influence also continued. Gaia Books published *The Gaia Peace Atlas* (1988), which featured world leaders writing on global interdependence, including Mikhail Gorbachev, Pope John Paul II, Ronald Reagan and Desmond Tutu. The "nerve center of Gaian philosophy was the Lindisfarne Association," an international group that aimed to translate Gaian ideas into political and cultural policy. There was also the Lichenstein-based Foundation for Gaia that Lovelock dismissed as inane, and the Gaia Institute at the Cathedral of St John the Divine in New York (Joseph 1991 p10).

Concerned that the continued used of what he called a metaphor would ruin any its chances of achieving scientific respectability, Lovelock at one stage considered replacing Gaia with "global geophysiology" (Pearce 1994 p43). He said he was persuaded not to at a conference in the mid 1990s. Environmental journalist Fred Pearce, who has closely followed Lovelock's career, wrote that the conference heard that the value of Gaia was tied up with its variety of interpretations and the versatility of its meanings. It was liberating for environmentalists and young natural scientists. Pearce wrote (and note the personalised ‘Jim’):

> Gaia as metaphor; Gaia as a catalyst for scientific enquiry; Gaia as literal truth; Gaia as Earth Goddess. Whoever she is, let’s keep her. If science cannot find room for the grand vision, if Gaia dare not speak her name in Nature, then shame on science. To recant now would be a terrible thing, Jim. Don’t do it (Pearce 1994 p43)

Lovelock added:

> The extraordinary range of its power to inspire confirms the importance of this larger influence Gaia has provided for artists, writers, poets, painters, sculptors and musicians. Few other theories have inspired the composition of a Mass (Lovelock 2001 p275).

The tension between Gaia as an original paradigmatic scientific idea and its supporting empirical evidence has emerged in how Lovelock represented Gaia. For celebrated science writer Dennis Flanagan, Gaia was caught in the “fugue between facts and big ideas” and Lovelock was:

> a man torn. His big idea is stated with much grandiloquence and little qualification, but his arguments in favor of it are modest, qualified, plausible and above all illuminating . . . Although his own approach is not mystical, he appears to be sympathetic to such people because they share his reverential attitude toward the earth as a living system (Flanagan 1988 p13).

As well as advancing his theory in popular publishing channels, Lovelock used the mass media for some of his interventions. As a further example of his promotional skills, Lovelock appeared to have a close relationship with the London *Independent*, a paper praised by the director of Friends of the Earth for consistently highlighting climate change (Juniper 2006). Lovelock has twice answered readers’ queries directly in the paper (Lovelock 2006c, 2009a). The newspaper has called him a “green guru” (McCarthy 2006a p2) and the “intellectual guru of the environmental movement” (Connor 2005 p29). The *Independent*’s science editor, Steve Connor (2008 p46) noted that “Jim is a bit of a hero of mine, being a maverick scientist who eschewed convention”. Two of his most important recent interventions in the climate change debate occurred in articles in the newspaper. In May 2004, he wrote about nuclear power being the only viable alternative energy source (Lovelock 2004), an article later described as a “bombshell” (Irvine 2005 p44). In January 2006, he wrote that a tipping point for the Earth in climate change had been reached

(Lovelock 2006). The article served also as a means of promoting *The Revenge of Gaia*, which was published two weeks later.

Lovelock's taste and talent for publicity has also been remarked upon by reviewers, suggesting at least a degree of calculation in the promotion of his theories. Journalist Stuart Jeffries called him an "esteemed – if controversial – environmentalist" (Jeffries 2007 p20). Aitkenhead (2008) said there was "more than a hint of the controversialist in his work" and asked him if his theories were "at least partly driven by a fondness for heresy?" He answered: "Not a bit! Not a bit! All I want is a quiet life!"

8.3. "The abominable no-men of the peer-review system"[85]

Commensurate with his status as a maverick and controversialist, Lovelock has represented himself and been represented in various media as unique and different from scientists generally. He has been portrayed as an independent scientist with an ambivalent relationship to scientific orthodoxy and the mainstream research establishment. Lovelock was described by his biographers as a "most unusual scientist" (Gribbin and Gribbin 2009 pxiv). *The Independent* called him the rarest of academics – "a truly independent researcher" (Connor 2006 p27).

Lovelock has explicitly linked his independence to his self-presented image as an exemplar of the concept of the lone voice of truth. He asked in *The Vanishing Face of Gaia* why readers should believe the pessimistic predictions of future climate catastrophe from a "lone scientist," compared with the milder consensus disseminated by the International Panel on Climate Change (IPCC). The reason was because:

> I work independently and I am not accountable to some human agency – a religion, political party, commercial or government agency. Independence allows me to consider the health of the Earth without the constraint that the welfare of humankind comes first (Lovelock 2009 p23).

Although a respected scientist, a pioneer in chromatography and cryogenics, Lovelock had "a withering contempt for the scientific establishment" (Pearce 1997 p48). Continually referring to himself as a scientist in his books, Lovelock has presented himself as following a creative vocation, conceptualising his independent scientific career as comparable to

[85] Lovelock 2001 p249

composers or writers or artists where sponsors were needed, but the relationship was rarely possessive (1995)[86]. A remark by one scientist that Lovelock was "not a scientist, merely an inventor who makes amateur equipment in his garage" was comparable, he argued, to those who dismissed John Singer Sargent as

> not an artist, merely a painter. It must take a belly full of bile to hate and envy the creative so strongly (Lovelock 2001 p188).

Lovelock has represented his scientific thinking as being different from other scientists' in its stress on holism, irrationality and intuition[87]. For example, working on what happened to cells during freezing, he wrote: "I used my usual technique of empathy; that is, imagining myself to be a cell and wondering what would happen as I froze" (Lovelock 2001 p107). He said he had an intuition of Gaia long before he could describe it in scientific terms (Lovelock 2000). Gaia could only have been imagined intuitively by someone who ranged comfortably across disciplines, who was not constrained like "'institutional thinkers'" (Rees 2009 pxii). Biologist Stephen Schneider (2001) noted in a *Science* review that the Gaia hypothesis was not likely to have been revealed by the disciplinary study of the Earth alone.

Lovelock has consistently claimed that his holistic view of science was antagonistic to the philosophical foundation of contemporary science. His creation of Gaia theory was inspired by seeing the earth photographed from space. This altered fundamentally his scientific worldview, causing him to embrace holistic explanations, rather than the pervasive reductionist perspective of a scientific enterprise splintered since Descartes into disciplinary specialisms. The failure to adopt a systemic approach to biology was rooted, for him, in this disciplinary sub-division (Lovelock 1995). Large ideas were "an anathema" to specialised scientists and Gaia, like religion, was "a metascience" to be rejected from their materialistic beliefs (Lovelock 1995 pxi).

He contended that humans were not evolved to act rationally, and operated through intuition and unconscious motives. Science was too cold and rational and counter-intuitive to be reconciled entirely with human drives (Lovelock 2001). Lovelock has said that "sensible theories" about the complex and enormous Earth did "not arise from rational thinking"

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86 Lovelock (1995) said his patronage from private companies never corrupted his research work. Indeed Shell was the only one to fund his Gaia research.

87 Describing Lovelock's technique as an inventor, Turney (2003 p17) wrote: "Bear in mind a few basic principles and parameters, then follow your nose, was Lovelock's method".

(Lovelock 1995 pxiii). Margulis has been uncomfortable, historically, with the strong version of Gaia as a living organism: she told an interviewer "it's just getting the scientists mad at you because you're encouraging irrationality" (cited in Horgan 1998 p130).

Furthermore, Lovelock called himself an "unusual scientist" because of his "capacious and immediately accessible memory" which meant he did not need computer databases as he tried to "keep it all in my head" (Lovelock 2001 p223). In addition, Lovelock's independence granted him a unique institutional status in science, working in a laboratory beside his house: "Coombe Mill Experimental Station." He watched science from the outside, noting its divisions of power and characterised himself as "not much more than a wasp that had flown in through an open window, large enough to be noticed but not greatly affecting the conduct of business" (Lovelock 2009 p43).

He has also criticised the lack of rigour in training undergraduate chemists, the health and safety-driven constraints on laboratory work and the long doctoral research process that robbed the labour market of talented workers (Lovelock 2001). The perceived decline in quality of British science was not solely due to increased bureaucratic involvement and funding shortages, but the "perverse anti-elitism of our present culture," which does not adhere to his belief that the core group of creative scientists that advanced knowledge significantly might have been born (like him), not made through higher education (Lovelock 2001 p298).

Turney (2003) correctly noted that the conservative process of peer review was not likely to recommend publication for Gaia as the theory, combining ecology, systems theory, cybernetics and climatology, interrogated disciplinary boundaries and crossed fields. Moreover, Lovelock's opposition to the division of scientific disciplines did not endear him to researchers. Indeed Lovelock again and again attacked peer review. It was a forum for those "who wanted a chance to vent their anger anonymously" (Lovelock 2001 p205). His first paper as an independent was rejected immediately by *Nature* because it came from a private address. A co-authored paper that examined the implications that Mars's atmospheric composition had for the search for life on the planet was submitted to the *Proceedings* of the Royal Society.

> Predictably, the abominable no-men of the peer-review system rejected [the] submission just as disdainfully as they have most papers on Gaian topics. Those

> who rejected our paper took no trouble to read or understand it. They merely gave their own narrow views with that discourtesy typical of academics allowed to write as anonymous critics (Lovelock 2001 p249).

He has also been sharply critical of the practice of contemporary science. Like Greenfield, he ridiculed the idea that researchers were able to predict their project's outcome before they started – a condition insisted upon by funders that has contributed to what he called the "pedestrian" level of current scientific research: such predicted outcomes rarely occurred in pioneering research (Lovelock 2001 p112). Lovelock argued that Gaia was "too revolutionary" to be accepted when first formulated and he described his critics within biology and geology variously as conservative, closed-minded or too serious-minded to evaluate the theory proportionately. In his books after *Gaia*, he acknowledged that there had been previous scientific work that took a similarly holistic view of the Earth as an interconnected system[88].

Promotional material emphasised Lovelock's uniqueness. *Homage to Gaia*'s back-cover blurb called him "truly one of the most outstanding and creative thinkers of the twentieth century," whose "work has led to the founding of the Green Movement and his famous Gaia theory has changed the way we think about the Earth" (Lovelock 2000). *He Knew He was Right* noted in its inside-cover blurb that Lovelock was "visionary, inventor, radical, free thinker" (Gribbin and Gribbin 2009).

This uniqueness has been reinforced in photographs of Lovelock. In images included in his autobiography and authorised biography, he has drawn on typical images of science – using technical equipment in his home laboratories in Bowerchalke and Coombe Mill – as well as imagery of him undertaking empirical research – on board the *Shakleton*, barechested, and on a dinghy exploring nature first hand, images that mix his portrayal as a unique scientist

[88] Lovelock (2000) admitted that when he first wrote Gaia he was unaware of many of the historical and contemporary writers on the topic, and he has since acknowleged the work of scientists who had advocated various ideas that discussed the living earth, including Jesuit palaeontologist Teilhard de Chardin; systems theorist Gregory Bateson; Scottish geologist James Hutton; naturalist Alexander von Humboldt; geologist Eduard Suess; mineralist Vladimir Ivanovitch Vernadsky (or Vernadskii); oceanographer Alfred Redfield; biologist JZ Young; ecologist Eugene Odum; population biologist Alfred Lotka; limnologist Evelyn Hutchinson; and chemist Lars Sillén. Lovelock also singled out the works of philosopher Stephen Zivadin, who expressed similar ideas. Detailed evaluations of their contributions can be found in *The Ages of Gaia* (2000), in Gribbin and Gribbin (2009) and in Turney (2003).

and an ecologist. He simultanously drew on the authority of some scientific imagery, but placed himself as unique in relation to those images.

Lovelock photographed in his laboratory in Coombe Mill, left; after taking air samples while at sea with the Meteor*, centre; and, right, collecting air samples on board the* Shackleton[89]. *Photographs reproduced with kind permission of James Lovelock.*

However, the representation of Lovelock as an independent outsider has been contested. Historian of biology Adolfo Olea-Franco (2002 p601) wrote that calling Lovelock an independent scientist gives the impression that he was

> a sort of radical scholar, when he was not, either in theoretical or political matters. On the contrary, most of the excellent work he did as an inventor was done since the 1960s under contract with corporations (Shell, Hewlett Packard), the military (the Jet Propulsion Laboratory, NASA, the Pentagon), and even intelligence agencies such as the CIA.

In addition, Lovelock has been represented in promotional material as an independent outsider and a credentialed insider. The blurb from *The Revenge of Gaia* can be seen as representative. It said Lovelock was:

> the author of more than 200 scientific papers and the originator of the Gaia Hypothesis (now Gaia theory) . . . Since 1961 he has worked as a wholly independent scientist but retained links with universities in the UK and USA, and since 1994 has been an Honorary Visiting Fellow of Green College, University of Oxford.

While Lovelock continually stressed his independence in his writings, there has also been, throughout his works, an undisguised desire for scientific respectability. His second book

[89] These three images have been reproduced from images in Lovelock's biography, *He Knew He Was Right: The Irrepressible Life of James Lovelock and Gaia (2009)*.

The Ages of Gaia (2000), although aimed at the interested non-specialist, contained a high level of technical detail and appeared to be written primarily to persuade a scientific audience that Gaia was not merely a hypothesis, but a testable theory. Commissioned by the American Commonwealth Fund Book Programme, it was refereed by scientists (one of whom made 250 comments). Lovelock said it was the book he would like his fellow scientists to read. *Ages of Gaia*, as Lovelock was at pains to stress, was peer-reviewed "as thoroughly as a paper in a science journal" (Lovelock 2000 pxv). The book answered scientific criticisms of his first book, chiefly Gaia theory's argued incompatibility with natural selection, using the computer model he, again showing an engaging turn of phrase, called Daisyworld[90]. Stripping out some aspects of the first edition to satisfy scientists, he noted that his first book was still there, as "a unifying influence for non-scientists," which he did not need to "disenchant" (Lovelock 2000 pxvi). Later, confusingly, he said that most of the book was "for entertainment, yours and mine" (Lovelock 2000 p14). He made mistakes in the first edition of Gaia, which were addressed in his subsequent work, as would happen in the scientific review process, a channel that he felt was denied to him.

This tension between Lovelock's portrayal as a maverick scientist and peer-valued researcher has been addressed, in part, through the comparison of Lovelock to well-known historical scientists, whose similarly grand, unified, original theories signaled the beginnings of paradigm shifts. Olea-Franco (2002) argued that Lovelock seemed to believe that great scientific theories were produced by lone geniuses, such as Newton, Darwin and Einstein, who worked on their own, without connecting with current or past colleagues, where research was a hobby.

The reviewer noted that Lovelock seemed to take Darwin as an intellectual model and this linking through representation of Darwin as a predecessor to Lovelock occurred in promotion and publicity. The author profile for *Gaia: the practical science of planetary medicine* (1991) noted he was: "Inventive, unorthodox, ingenious, a latter-day Darwin – James Lovelock CBE, is undoubtedly one of the most outstanding and influential scientist-philosophers". The *Independent* said he was "the man who conceived the first wholly new way of looking at life on Earth since Charles Darwin" (McCarthy 2006). Joseph emphasised the role of Lovelock's "historic" voyage of discovery on board the *Shackleton* where he did

[90] Daisyworld was a computer model of an Earth-like planet, spinning around a sun and populated entirely by daisies. Although an acknowledged simple model, it aimed to show that, through feedback and self-regulation, a stable temperature for life was maintained on Earth. (Lovelock 1988). Claims about Daisyworld's robustness as a model have varied considerably (Schneider 2001 p1907).

pioneering work on the detection of CFCs (Joseph 1991 p144). After Gaia, fans flocked to Lovelock's home, "like the autograph hunters who tracked Charles Darwin down in rural Kent after the publication of The [sic] *Origin of Species*" (Ryle 1991 p3). Lovelock encoded subtle comparisions in his own representations. He has viewed his career as similar to that of "an explorer looking for new worlds" (Lovelock 2001 p5).

Other writings have described Lovelock's scientific status in similarly world-historical terms. *Rolling Stone* called him "one of the twentieth century's most influential scientists" and "one of the most provocative scientists of our time" (Goodell 2007). *The Independent* called him "the man who changed the world" (McCarthy 2000 p7). Evolutionary biologist William Hamilton compared him to Copernicus. Writing in *Nature*, German scientist H.J. Schellnhuber predicted Earth system science would culminate in a Copernican-style revolution that would alter our view of the planet (1999 cited in Turney 2003). Tickell (2007) equated the hostile reception to Gaia to new theories of evolution by natural selection in the nineteenth century and plate tectonics in the twentieth century. Other critics are more circumspect, noting that it will take more time before the potential revolutionary aspects of Earth System Science can be proportionately appraised (Turney 2003).

8.4. "To pay homage to Gaia is certainly to pay homage to Lovelock"[91]

In a letter to *Science*, Margulis (1993 p745) said that science magazines' coverage of Gaia should be based "not on personalities but on recent reviewed work". Lovelock – called the "father" of Gaia theory (Gribbin and Gribbin 2009 blurb) – has been relentlessly tied to his theory. This pattern of representation, where he has been portrayed *as* Gaia, *as* synonymous with the theory, has been consistent across the publicity, promotion and commentary.

Because contemporary science has become as professional and corporatised as advertising, scientists in large organisations were rarely "free to express their science as a personal view" (Lovelock 2000 pxvii). Gaia, by contrast, was Lovelock's unique original vision and this made "the theory a personal presence, more accessible to the non-scientist" (Irvine 2005 p45). Olea-Franco (2002 p601) wrote that Lovelock, by calling his autobiography *Homage to Gaia*, was essentially writing a homage to himself because to "pay homage to Gaia is certainly to pay homage to Lovelock". The book, like other scientific autobiographies, sought to write its author into the history of science.

[91] Olea-Franco 2002 p601

Lovelock made a literal connection between himself and Gaia in the closing section of his autobiography (2000), when he said that his age at the time, 80, was approximately the same age, when translated into human timescales, as Gaia (and he said he was comforted by the fact that he would eventually merge with Gaia when he dies). His descriptions of the science of Gaia have been frequently indistinguishable from his personal holistic world view. The clearest articulation of this personal philosophy came in *The Ages of Gaia*, in a chapter titled 'God and Gaia,' in which he wrote:

> I have tried to show that God and Gaia, theology and science, even physics and biology are not separate but a single way of thought. Although a scientist, I write as an individual (Lovelock 2000 p199).

This world view has appeared to be contradictory. Lovelock described himself as an empiricist, yet science and spirituality, morality and mysticism, have continued to combine in his expressed philosophy. He wrote: "Art and science seem interconnected with each other and with religion, and to be mutually enlarging (Lovelock 2000 p204). These tensions have been explored in publicity and commentary. Margulis said that Lovelock encouraged the use of the Gaia metaphor because it suited his quasi-mystical leanings (cited in Horgan 1998). Lovelock described how he yearned at times for a "religious experience" (2001 p412), but said his world was the material one, describing his stance on religion as "positive agnosticism" (Lovelock 2000 p204). He was "too deeply committed to science for undiluted faith; equally unacceptable to me spiritually is the materialist world of undiluted fact" (Lovelock 2000 p204). He said he was "too much of an animal to live exclusively in the intellectual world of modern science" (2001 p412). Although Flanagan said Lovelock was not mystical in his approaches, the Englishman could not seem to resist the pull of the spiritual. Lovelock wrote that Gaia was "a religious as well as a scientific concept, and in both spheres it is manageable" (Lovelock 2000 p194) and that the "life of a scientist, who is a natural philosopher, can be devout" (Lovelock 2000 p194), but Gaia was neither a "sentient being" nor "a surrogate God" (Lovelock 2000 p204).

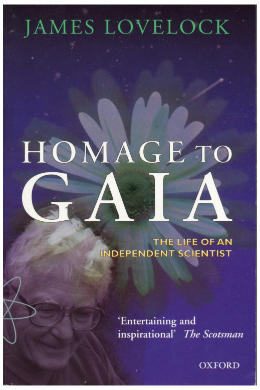
Personality, place and science have continued to coalesce in the construction of Gaia as a personal theory. Lovelock credited his love of nature to his "own feeling for natural things" (1995 p133), inspired by childhood countryside walks with his father. Similar descriptions were used to describe the inspiration the landscape of the west of Ireland, where he wrote *Gaia*, had on Lovelock. It was "like moving into a house run by Gaia" (Lovelock 1995 pviii). He was perhaps inspired by "the deeply religious sensibility of that land" (Lovelock 2009 p129), writing:

> I used to sit on my favourite slab of rock overlooking Bantry Bay and the broad Atlantic. Here I would think through scientific problems that were my life's work and here I composed my first book . . . I wrote it almost entirely in the cottage below. As I sat in the warm sun on my ledge, high up on the sandstone slabs of Hungry Hill, it was not easy to think about the Earth in any way except romantically (Lovelock 2001 p310).

His autobiography was described as a deeply personal book, "more a baring of the soul of a man than a physiological guide to the Earth muse . . . a deeply personal self-history" (Schneider 2001 p1906). It was structured chronologically and Gaia's changing scientific status was positioned in parallel to the peaks and depressions of his own life. For example, the 1980s were personally painful. At the time, Gaia was treated "more as science fiction than science" (2001 p267) and it was virtually impossible to publish a paper on it. During those years, Lovelock's first wife, Helen, moved into the terminal stages of multiple sclerosis and he had a series of operations after a heart surgery (the painful results were described in graphically intimate detail in his autobiography). By contrast, the 1990s were a period of professional and personal fulfilment. Gaia achieved its highest level of scientific respectibility and Lovelock found domestic contentment with his second wife, Sandy. He was awarded eight honorary degrees, three major international environmental prizes, and a CBE. *The Ages of Gaia* had the subtitle *A Biography of our Living Earth* and Flanagan noted that it was structured to reflect not only the ages of life on earth, but also the "epoch's of Mr Lovelock's life" (Flanagan 1988 p13).

Among the many examples of environmental damage outlined in Lovelock's oeuvre, several were drawn from his personal life. These included the changing landscape around Bowerchalke village, where industrial farming displaced wildlife populations and the destruction wrought by intensive farming on the the ecosystem of the river Carey that flowed by the Coombe Mill farmhouse (Lovelock 2007). He planted 20,000 trees on his land, but noted that this was a mistake as he should have let a natural ecosystem develop (Lovelock 2009). He volunteered to store processed nuclear waste underground at Coombe Mill, described his own eco-friendly lifestyle: not driving his Honda Jazz more than six thousand kilometers a year, using low-energy light bulbs, having a environmentally-friendly diet (vegetarian with some chicken and fish) (Lovelock 2007, Joseph 1991).

Promotion entwined Lovelock and his theory. The cover of *Homage to Gaia* featured an iconic image of Lovelock in the bottom left-hand corner, while the central image was of a daisy against a backdrop of a starry sky, an icons and indexes of nature. A problematic element of this cover was the image, half on the front cover, half on the side flap, of an atom, an index of science, or more particularly, chemistry, or perhaps nuclear issues. *He Knew He was Right*, likewise, featured a sketching-like image of Lovelock against a landscape of flowering vegetations with a glowing earth in the background, an index of nature (Gribbin and Gribbin 2009). The iconic image of Lovelock has been tied to the indexical image of nature.



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The cover of Lovelock's autobiography, 2001 edition, left, reproduced with kind permission of Oxford University Press, and, right, the cover of his authorised biography (2009)[92] *reproduced by permission of Penguin Books Ltd.*

Critical commentaries also tied Lovelock to his theory. The subtitle of Gribbin and Gribbin's contextual biography was *The Irrepressible Life of James Lovelock and Gaia* (2009). Turney's book title was simply *Lovelock and Gaia* (2003). An illustrative example from Joseph (1991) is worth quoting at length"

> Hard by the River Carey in St. Giles-on-the-Health, a hamlet on the Cornwall-Devon border in southwestern England, stands the laboratory of James E. Lovelock, a white windowed cabin attached to his house and patrolled outside by half a dozen peacocks and peahens, gyrating shrubs of green and gold that honk a merry tumult at the slightest provocation. Inside, a phalanx of spectroscopes, chromatographs, radiation detectors, and microcomputers flickers and hums, each instrument carefully overstrewn with texts and monographs on mathematical physiology, biogeochemistry, and atmospheric physics. Set incongruously in a fragrant meadow,

[92] The cover art from *Homage to Gaia* (2001) from Oxford University Press was reproduced from the original book cover, as was the cover art from *He Knew He was Right* (2009), published by Allan Lane.

> next to a beaming marble statue of Gaia, Green goddess of the Earth, Lovelock's little lab seems like a probe sent to unravel the secrets of nature (Joseph 1991 p15).

Lovelock said that his life as "a scientist-hermit" was not for everyone, and he enjoyed "living alone with Nature" (Lovelock 2000 p229). Joseph added: "Deep in the Cornwall countryside, Lovelock and Gaia themselves have coevolved. Far away from the scalding climate of academe and its acid rain of peer review, the living Earth theory has grown" (Joseph 1991 p33). Lovelock himself affirmed this idea, describing writing *Ages of Gaia* at Coombe mill, looking out

> onto the river valley with its small fields and hedgerows typical of the Devonshire country scene. The description of the place where this book was written is relevant to its understanding. There was no other way for me to work on an unconventional topic such as Gaia except at home (Lovelock 2000 pxvii).

An iconic portrait in London's National Portrait Gallery, which appeared at the start of this chapter, tied Lovelock to his theory. He was photographed standing against wild forest and vegetation which frames his figure, with his hands clapsed, connotating peacefulness and serenity. He was not dressed in the familiar iconography of science, wearing instead a cardigan suggesting perhaps domestic comfort. The white hair and glasses suggested wisdom and intellectualism. Similar connotations can be interpreted from some photographs printed in Lovelock's biography and autobiography, where he has been linked indexically to his theory. He was photographed hill-walking in England (gazing out over what can be interpreted as a Gaian landscape); in his garden (wild, untended, overgrowing) with a statute of Gaia in the background, an image that draws together Lovelock, ecology and mysticism.

Lovelock, left, as photographed in Nature *(© Tim Cuff/Alamy. Reproduced under license), and walking along a coastal path, centre (reproduced with kind permission of James Lovelock), and photographed with Gaia, right, in Lovelock's Coombe Mill garden by Bruno Comby of Environmentalists for Nuclear Energy. Downloaded from http://en.wikipedia.org/wiki/File:James_Lovelock_in_2005.jpg where the image was released under the Creative Commons Attribution-ShareAlike license versions 2.5, 2.0, and 1.0.*

The descriptions of Lovelock's home and home-laboratory recurred in journalistic profiles as did portraits of his appearance and dress, contributing further to images of an eccentric and wise outsider, merging further the public and private. *The Independent* described him as "a short, wiry figure with a frequent mischievous grin" (McCarthy 2004 p6). The same paper said he looked "like a grey-haired imp" (McCarthy 2000 p7). *The Daily Telegraph* noted he had "a full head of silver hair, a glint in his eye and a strong and rolling voice, albeit one with a slight lisp" (Farndale 2009 p19). *Rolling Stone* said he was "a small man, unfailingly polite, with white hair and round, owlish glasses" (Goodell 2007). *The Washington Post* said he was a "lean, white-haired gentleman in a blue wool sweater and khakis" (Powell 2006 pCo1). Brown (2005 p12) noted that while Gaia made his name, it also "brought him his second wife, Sandy" who had read *Gaia*. A *Mail on Sunday* interview that publicised his autobiography focused on his finding love again, aged 70 (Shepherd 2001 p21). It noted that phrases "such as 'sprightly' don't apply to Lovelock. He is lean, tanned, fit, dynamic" (Shepherd 2001 p21).

His personality was linked in publicity and critical commentaries to his work. His biographers noted that the hallmarks of his scientific career, "determination, independence, scrupulous accuracy and faith in what he knew to be right," were personality traits of his going back at least to his undergraduate years (Gribbin and Gribbin 2009 p40). Lovelock was "retiring and conflict-hating" (Turney 2003 p25). He got on well with his colleagues because of "his own inoffensive and unassuming friendliness" (Gribbin & Gribbin 2009 p78). Lovelock "in a quiet way, seems to get excited and enthusiastic about everything he does" (Gribbin and Gribbin 2009 p94), and he was "diffident and uncomfortable about pushing himself, or his ideas, forward" (Gribbin and Gribbin 2009 p132). He was "by nature a quiet man" who was "determined" (Gribbin and Gribbin 2009 p110), a "sensitive man with a deep sense of intellectual mischief" (Sagan and Margulis cited in Turney 2003 p12). Lovelock was described in *The Ozone War* (1978) as: "an unassuming Englishman with modishly long greying hair and a soft almost hushed voice. There is a gentleness about him . . . " (Dotto and Schiff 1978 cited in Lovelock 2001 p223). Ryle noted:

> People may disagree with Lovelock's vision of the world, but all those who have met him agree that he is a delightful man. Edward Goldsmith, the veteran ecological activist . . . [said] ‘It is impossible not to like Lovelock’ . . . ‘He's absolutely charming, very loveable. He's very brilliant. Very brave’ (1991 p3).

Journalism and commentary has also placed Lovelock within the context of fame. The *Sunday Telegraph* said that Gaia was

> a theory so radical and lyrical it would one day lead to his name being mentioned in the same breath as Stephen Hawking and Richard Dawkins, and him becoming one of our greatest, and most controversial, living scientists (Farndale 2009 p19).

As Lovelock became more well known, publicity and commentary has recontextualised him within discourses of fame. A friend commentated that “Jim has a deep physical aversion to having too many people around, and he always longs to retreat to the countryside” (cited in Joseph 1991 p161). Yet Lovelock received global press to his house and toured the world giving speeches and attending conferences (Joseph 1991). Lovelock’s wife, Sandy, discussed the constant demands on their time caused by “fame and notoriety,” as strangers wanted to discuss their theories with her husband (cited in Shepherd 2001 p21). Sandy Lovelock organised what Ryle (1991 p3) called:

> the huge inflow of Gaiana: scientific papers, press cuttings, letters from fans, from religious maniacs, and from people who say that her husband's books have changed their lives, a proportion of whom – to the Lovelocks' dismay – turn up to pay their respects in person.

The idea of fame altering a cherished image of Lovelock emerged in a description by Pearce, who reflected on his own attachment to a personal image of Lovelock. Pearce wrote in 1991 that the increasingly-mediated Lovelock had become commodified:

> Now you can read about Lovelock in the colour supplements; Margaret Thatcher sought his advice; Jonathon Porritt nominated him as his hero; and fashionable presenters interview him on TV. It's good for business, good for science and probably good for the planet, but I am beginning to yearn for the return of the mad boffin of Bodmin Moor (Pearce 1991 p43)

As well as news reports, interviews and profiles, Lovelock has appeared in journalism genres that stressed his personality, such as *The Observer*’s This Much I Know feature where the subject passed on lessons from life (Siegle 2005). The sections in *The Independent* where he answers readers’ questions directly (Lovelock 2006c, 2009a) coincided with the publication of his books, illustrating how he traded his personal life to promote his work. The difference between Lovelock's amiable personality and his devastating predictions has been remarked on by reviewers (Aitkenhead 2008), his work being "frightening stuff, and all the more chilling coming from a man of such a mild disposition and of such varied credentials" (McKie 2009 21). Moreover, Lovelock himself has discussed this seeming contradiction: "I'm a cheerful sod, so I'm not happy about writing doom books" (McCarthy 2006 p3). The connotations of his name have been explored by journalists, showing how Lovelock's has been constructed intertextually. For example:

> Lovelock's middle name is Ephraim, which makes him sound like an Old Testament prophet of doom, yet at the same time he has the eternal schoolboy optimism of the British boffin (Bate 2009 p39).

8.5. "A confused and babbling community of Green politicians and philosophers"[93]

Lovelock's books described a scientifically-underpinned environmental consciousness that emphasised harmonious and holistic[94] thinking about the natural world. As a result, he has been called variously the "godfather of modern environmentalism" (Macleod 2006 p15), the "godhead of the ecology movement" (Sunday Telegraph 2004 p23), "one of the creators of our current environmental consciousness" (Irvine 2005 p44), "a hero of the environmental movement" (The Independent 2004 p37), "a seminal figure in environmental science" (Wilkie 1989), and "the most eloquent and informed of the environmentalists" (Appleyard 2007 p16). *Time* magazine listed him in October 2007 as one of the world's environmental heroes. These references have cumulated to the point where "in the public mind Lovelock is the green guru" (Irvine 2005 p44).

Like Lovelock's relationship with mainstream science, however, his association with the modern green movement has been deeply ambiguous and often fraught. He has "often been considered a maverick by the green movement" (Irvine 2005 p44). Repeated (and repetitive) criticism of contemporary greens occured in *Homage to Gaia*, *The Revenge of Gaia*, The *Vanishing Face of Gaia*, in which he continually challenged core concerns of modern

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93 Lovelock 2001 p339

94 Biologists Levins and Lewontin also argued in *The Dialectical Biologist* (1985) against reductionism, saying that biologists should focus instead on the complex and holistic interactions between organisms and environments, as well as between science, society and economics.

enviromentalism. He labeled himself a “green, but not surprisingly, an old fashioned one” (Lovelock 2009a p30). Lovelock’s favourite writer and thinker on environmental issues was Jonathon Porritt[95], who stood far above what he called “a confused and babbling community of Green politicians and philosophers” (Lovelock 2001 p339).

Asked by a newspaper reader about his status as a green guru, Lovelock noted sharply that he was “a scientist, not a guru” (Lovelock 2006c). Lovelock equated much green thinking with anti-science: “Their [greens’] hearts are very much in the right place, but they often get the science wrong, and you can't really be a green without being involved with science” (cited in Irvine 2005 p44). He also wrote: “Too many Greens are not just innocent of science; they hate science” (Lovelock 2001 p200). He said he has been moved by the ideas of humanist-inspired deep ecologists but did not agree with their anti-technologist philosophy because science was the only method that can cure or heal or treat the earth (the medical metaphors are deliberate).

On the same basis, Lovelock has had an ambivalent attitude to *Silent Spring*, which he repeatedly referred to in his own works, calling it an “immensely influential book” (Lovelock 1995 pxv), an “important book” that “changed the course of politics” (Lovelock 2001 p199) and a “a globally effective scare story” (Lovelock 2009 p72). Lovelock criticised Carson for what he believed was the presentation of anecdote as evidence and argued that there has been a catalogue of “blunders made in the name of environmentalism” in the 40 years since *Silent Spring* was published (Lovelock 2007 p137), including the banning of DDT, which saved millions of lives in its curing of insect-born disease. These criticisms were offered from within, rather than from outside, the movement because he said he was “a green and would be classed among them,” yet he was “most of all a scientist,” and this gave his views more authority than those epoused by scientifically-ungrounded greens (Lovelock 2007 p12-13).

Related to this alleged scientific ignorance, Lovelock argued that renewable energy sources would not generate enough power to replace fossil fuel-burning energy sources quickly enough to stop the accelerating global heating. Wind farms and industrial biofuel farms would ruin the British landscape and their inevitable shortfall in energy production would have to be made up with conventional fossil fuel stations. These green policies constituted

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[95] Porritt was the influential British author of books including *Seeing Green* (1984), *Playing Safe* (2000) and *Capitalism: As if the World Matters* (2005).

environmental vandalism by destroying the picturesque countryside, "a final solution" for rural regions that most greens fully supported (Lovelock 2007 p142). Promises of an imminent rewable energy future were "sales talk" from green technology-producing nations. Green policies of renewable energy were "an elaborate scam" (Lovelock 2009 p12), "the dark side of European green politics" (Lovelock 2007 p11). Green, he told *Rolling Stone*, "only half-joking, [was] the colour of mould and corruption'" (Goodell 2007). Respected climatologist Tim Flannery called these objections to green technology "glib" (Flannery 2006 pC03). The objections to green energy have seemed more ideological than scientific. Lovelock's politics moved from the socialism of his youth to a Thatcherite belief in market forces. He and Thatcher admired and respected each other (Lovelock 2001). Journalist Aitkenhead noted:

> It's not clear whether his politics are the child or the father of his science. His hostility to renewable energy, for example, gets expressed in strikingly Eurosceptic terms of irritation with subsidies and bureaucrats (Aitkenhead 2008).

Lovelock's disagreement with many contemporary green issues has been that humanism has become conflated with environmentalism, causing the movement to become increasingly preoccupied with human, rather than environmental, problems (Lovelock 2009). Like the Ehrlich's *The Population Bomb* (1968) and the work of Thomas Malthus, Lovelock has argued that unrestrained population growth was central to current environmental concerns (Lovelock 2007, 2009). Gaia offered "an essential basis of a coherent and practical environmentalism" (Lovelock 2007 p173), as it challenged the idea of the Earth as property. Yet Lovelock has not been represented as anti-human: he has sympathy with extreme environmentalists who wished for an entirely human-free earth (Lovelock 2007).

Lovelock's involvement in two scientific controversies – major landmarks in modern environmentalism – has illustrated his ambivalent relationship with the environmentalist movement. The first, in the 1970s, concerned the ozone damage from chloroflurocarbons (CFCs), released from aerosols and from disused domestic appliances. In the late 1960s, Lovelock's pioneering experimentation proved that CFCs did not degrade naturally, but instead accumulated indefinitely in the atmosphere. When Lovelock published the results in *Nature* in 1973, he did not ascribe much ecological significance to the chemicals, saying CFCs presented "no conceivable hazard," as he feared that scientific data that hinted at an environmental threat would be misrepresented by environmentalists to create unjustified alarm. Environmentalists and environmental scientists who built on Lovelock's work were baffled, especially since he acted as a witness in defence of the Dupont chemical company at a US congressional hearing, which led to accusations, which he has denied, that he was "'in the pockets of the aerosol industry'" (Lovelock 2001 p220). The chemists who proved that CFCs were an enormous environmental threat shared the 1995 Nobel prize in Chemistry. Later, Lovelock admitted his initial stance was "one of his greatest blunders" (Joseph 1991 p154). Joseph concluded that Lovelock, who believed Gaia would automatically address CFCs and ozone, was "so in love with his own theory" that he could assimilate details that challenged Gaia (1991 p162).

The second controversy was his recent provocative advocacy for nuclear power, a traditional focus of environmental protest (Bramwell 1989), as the only realistic alternative to burning fossil fuels. Lovelock's biographers called this his most controversial claim (Gribbin and Gribbin 2009). For journalists, this argument was the main point of controversy in *The Revenge of Gaia* and *The Vanishing Face of Gaia*, and was the central tension in their contemporaneous reports (for example, see Connor 2006, Elderkin 2006, Flannery 2006, Hanlon 2006). In addition, Lovelock argued for the necessity of nuclear energy in first-person articles in *The Independent* (Lovelock 2006), *Mail on Sunday* (Lovelock 2006a), *The Sun* (Lovelock 2006b). Such is his status that his comments constituted part of a reframing of nuclear energy debate in the UK (Bickerstaff, Lorenzoni, Poortinga et al. 2008).

Even though the views were represented as original in publicity and promotional material, Lovelock's qualified advocacy of nuclear energy was not new. In *Gaia* and *The Ages of Gaia*, he outlined nuclear power as an energy source to stop the release of carbon dioxide. This advocacy of nuclear power has featured in visual representations of Lovelock. In his biography, he is photographed with his wife at a nuclear processing facility, and the image was jarringly juxtaposed with a view of part of the coastline of the south of England where Lovelock regularly walked.

Lovelock's criticisms of the greens have been trenchant, but his writings on environmental philosophy have been weakly conceptualised, as he has not differentiated systematically between different aspects of the green movement. He has not offered a fair precis of the varying strands within environmentalist philosophy, despite being himself deeply embedded within the movement's traditions. Lovelock has come to embody centuries-old tensions and apparent contradictions within this world view. Bramwell (1989) analysed how ecology had its origins[96] in the 1880s, defined itself as a science-influenced ideology in the post-war 1920s and became a political movement in the 1970s as ecological ideas merged with the emerging new left movement of the 1960s.

The term ecology originated from German zoologist Ernst Haeckel (1834-1919) who used it in his *Generelle Morphologie* (1866), referring to how organisms were linked in a web with their environment. Haeckel was a Monist, believing in a unified man and nature. Believing that the universe was balanced and unified, that humans and animals had the same moral status, and that nature was the source of truth, "he enabled ecologism to became a viable political creed" (Bramwell 1989 p43). His new phrase, *Oekologie*, marked a move to an anti-mechanistic, holistic biology. After 1880, a 'green biology' offered an alternative conception of the world than the one presented by narrow scientific experimentation. This biology incorporated the intuition of the observer into science and so "the perceived inadequacies of the orthodox science world-picture were both shown and cured by the new holism" (Bramwell 1989 p238). However, Green biologists had to work outside the traditional scientific system, without professional recognition or reward, failing for decades to have their work appraised within formal, orthodox science (Bramwell 1989).

Ideas of a living earth have been linked with philosophies of vitalism that were prominent between the first and second world wars. Vitalism and holistic philosophy produced a system in which "the earth was a functionally related, mutually interdependent complex which . . . remained in an equilibrium condition" (Stoddard 1986 cited in Bramwell 1989 p61). Paul Ehrlich wrote also of a self-organising earth (Bramwell 1989).

Ecological theories have been most prominent in the countries of Britain, Germany and North America, which was due, not to different rates of industrialisation or land settlement, but to a shared large, educated middle cass which had a pronounced Protestant and liberal culture, and these nations have had different historical and culturally-specific varieties of ecologism (Bramwell 1989, Cohen 1998). Ecological ideas manifested in cultural and political criticism were called political ecology, characterised by "substantial ethical and moral claims, and proposed dramatic and apocalyptic remedies" (Bramwell 1989 p8). Greens depended on scientific, aesthetic and moral values, and the combination of

96 Ecologists have traced the movement's roots variously: to ancient Greece and to the Middle Ages, for example, but there has been a critical consensus that ecologism has been heavily influenced by Germanic conceptions of nature and nature-worship (see Bramwell 1989 pp175-200).

conservative moral critique, supported by quantitative-based arguments from science and economics, gave ecologism its force (Bramwell 1989). The modern green movement derived its force from a fusion in the 1970s between holistic biology and resource-scarcity enonomics.

Bramwell (1989) created a typology of the core characteristics of the ecologist, even though she acknowledged such a model has been contentious. The ecologist believed in a harmonious nature, adopted an active stance towards the natural world, adhered to aesthetic values that were closely-tied to spiritual values, opposed dualism, searched for transcendence (although have known that nature itself cannot be transcended), believed that nature was reality and this reality can be uncovered by science, and believed in objectivity yet had some scepticism about what might be termed traditional science. Ecologists have been absolutist and evangelical. The values of ecology have the "force of a religion" (Bramwell 1989 p238). The history of ecologism has been written chiefly from within, its historiography including disagreement over the movement's origins, the search for a scapegoat that somehow made society go wrong[97] (Bramwell 1989).

Furthermore, ecologism has been an all-inclusive ideology into which various alternative ideas and personalities have fitted: liberal, fascist, marxist, feminist, natural scientist, mystic, visionary, these various viewpoints contributing to what Bramwell identified as the "apparent contradictions" in the ecological movement, including its relationship to rationality (Bramwell 1989 p13, Brereton 2005). Other apparent tensions in the development of political ecologism have been historically constant, tensions between:

> planning and anarchy; the tribal village and the global village; humanism versus anti-humanity; materialism versus spiritualism, all depend on the blurring of the old boundaries between world and human, being and time, matter and spirit, produced by the realisation that we are all part of the one earth (Bramwell 1989 p239).

Within modern environmentalism, science has an increasingly ambivalent role, blamed for causing ecological damage while being asked to rectify that damage. Some argued that environmentalism has retreated from science because of its association with

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97 Various scapegoats have been blamed, in the northern European and north American traditions, including: Christianity, the Enlightenment (and its attendant scepticism, atheism and rationalism), the scientific revolution, Judaism, men, the nazis, the west, greed, materialism, acquisitiveness. The historical point at which this wrong path was taken was, variously, the Roman empire, the iron age, the end of the medieval era, and the industrial revolution (Bramwell 1988).

industrialisation, militarism and social control, its challenged claims of objectivity, challenges to expertise generally and the rise of alternative epistemologies to science. Others argued that the authority of science was the only legitimation for the environmental movement in late modernity (Cohen 1998, Yearley 1991).

The representation of Lovelock as ecologist has been made more complex through its construction through discourses of Britishness and Englishness. He was described as the "thoroughly English Lovelock," "an easygoing country scholar" (Joseph 1991 p60 and p2) and "an unusual Englishman" (Turney 1999 p6), "an iconic figure in British science" (Gribbin and Gribbin 2009 inside-cover blurb) whose science has been placed in the British empiricist tradition. In 2003, he was made a Companion of Honour by the Queen. In his autobiography (2001) he described his values as coming from an earlier English era: good manners, playing fair, taking responsibility. Scientifically, most attention to Lovelock has appeared in British publications. Earth scientist Lee Kump (2009 p539) noted that American researchers rarely spoke of Gaia except in criticism or commentary on the work of Lovelock or Margulis, with the internal search engine of *Science*, the influential American counterpart to *Nature*, revealing no research papers where Gaia was used, except in critiques and comment pieces.

As expressed in art and literature, British ecological ideas were sensual, describing

> ideal of Englishness, the heritage of beauty, expressed in well-wrought things; the gardents, embroidery, stone-work, music and art of the long-silenced, oppressed native English . . . It was easy to perceive and demonstrate that harmony in the English village and English countryside. Both were living works of art" (Bramwell 1989 p97).

The old English countryside was, for Lovelock, "the face of Gaia" (Lovelock 2009 p142). He discussed the land around Coombe Mill, the work of local farmers, the fulfillment he has found in hill walking and coastal walks. He reminisced about the evocative names of villages in Wiltshire and Dorset (Lovelock 2000 p231). The passages about the vanishing beauty of the Engish countryside featured another characteristic element of British political ecology: a paean to a lost heritage. Among his most passionate prose were his descriptions of the "quiet rape and pillage" of his former village of Bowerchalke where it was dispossessed of its traditional inhabitants and lost its land to industrial farming (Lovelock 2000 p230). He wrote repeatedly about what he viewed as the appaling future image of his beloved coastlines of south east England being altered forever as they become vast wind farms. His vision of a future England would be like that of Blake, to build Jerusalem on "this green and pleasant land," with small and densely populated cities, not far from the countryside, where one third of the land would be left for woodland, with farming a mix of intensive production and smallholdings "for those with the vocation of living in harmony with the land" (Lovelock 2000 p235).

The revelations of the self found in these descriptions are typically representative of the English relationship to the land. Journalist Appleyard noted that "the garden of nature remains a sacred place in the British imagination" (Appleyard 2005a p4). Lovelock's descriptions have fitted seamlessly into the tradition of representing romantically the British landscape as a site "vanishing into the past, to be replaced by something harsher, colder and devoid of mystery" (Appleyard 2005a p4). Lovelock was further codified with the British intellectual tradition in 2007 when *Gaia*, *The Ages of Gaia* and *The Revenge of Gaia* were included among the books chosen by a *Sunday Times* panel to explain contemporary Britain. Appleyard wrote that, like Darwin's *Origin of Species*, the books exhibited "a peculiarly British relationship to nature, in each case defined by a strict and pragmatic empiricism" (2007 p16).

As well as creating mythical landscapes, Lovelock himself has been represented in relation to the fictional landscapes and fictional species of J.R.R Tolkien's *Lord of the Rings* (1954-1955), deepening his intertextual represented image. Journalist Ferguson opened an interview with Lovelock at Coombe Mill: "Tolkien would have been happy here, or one of his hobbits" (Ferguson 2009 p20). A *Washington Post* interviewer said the country location of Lovelock's home called "to mind a hobbit's sanctuary" (Powell 2006 p01). *Rolling Stone* noted Coombe Mill was located in a "fairy tale setting" (Goodell 2007). Ryle (1991 p3) observed that Lovelock lived an "Arcadian existence" and Lovelock told him:

> The last journalist who came down here said something about me being a shock-haired 110-year-old mad scientist living in an enchanted wood with a nubile blonde.

8.6. "I'm not Dr Strangelovelock"[98]

Its mythical and historical connotations have been described, but Gaia has also been tied to the imagined futures of science and science fiction, with some representations having shaped, and been shaped in turn by, Lovelock. Cosmologist Fred Hoyle[99] foresaw in 1948 that "once a photograph of the Earth, taken from the outside, is available . . . a new idea as powerful as any other in history will be let loose" (cited in Joseph 1991 p202). When Lovelock first saw the earth from space, he was inspired as it presented him with a radically original conception of the Earth. Seeking life on Mars he found a new way of viewing life on Earth. It gave him a top-down perspective that made him different from reductionist scientists (Lovelock 1995). Long before it became scientifically possible to obtain the image, Vernadsky and Suess also imagined viewing the Earth from space (Turney 2003). The image, furthermore, was already alive in science fiction, and Lovelock was a schoolboy fan of HG Wells, Jules Verne and Olaf Stapledon, who Turney (2003) analysed as a potential inspiration for Lovelock[100]. Lovelock returned again and again to this dominant image, the earth seen in its entirety from space, an image so central to his conception of Gaia that it appears on the cover of some editions of his first book and, in a fitting symmetry, again in his last. Lovelock's description of the planet from space sparked his creativity and optimism about a harmonious, holistic view of life on Earth.

The Revenge of Gaia and *The Vanishing Face of Gaia* were more dystopian and drew on different fictional and religious imagery. The ecocatastrophist predictions in *The Revenge of Gaia* were expressed, in the text and in the book's promotion, using apolalyptic images from fiction. The book's opening paragraph closed with: "It is as if we were committed to live through the mythical tale of Wagner's *Der Ring des Nibelungen* and see our Valhalla melt in torrid heat" (Lovelock 2006 p1). Its final image was of small bands of survivors in an arid and scorched world journeying from oasis to oasis en route to the new centres of civilsation in the Arctic. Its front-cover image, below, featured a 1950s B-movie-inspired portrayal of Armageddon. This film genre has been interpreted as encoding ecological fears, inspired by contemporaneous concerns over nuclear attack and chemical pollution (Brereton 2005).

98 Lovelock quoted in Farndale 2009 p19

99 Joseph also called Hoyle a "scientific maverick" (1984 cited in Joseph 1991 p202).

100 Stapleton's *Star Maker* (1937) would not have been read by a schoolboy Lovelock, but it would be "hard to imagine" (Turney 2003 p46) that Lovelock did not read it once it came out. The book contained a passage that described a view of Earth seen by the narrator who has departed the planet: "It was a huge pearl, set in spangled ebony . . . It displayed the delicacy and brilliance, the intricacy and harmony, of a live thing" (1937 cited in Turney 2003 p46).

Moreover, *The Revenge of Gaia* featured the front-cover blurb ‘The seismic top ten bestseller,’ anchoring the visual image of large-scale destruction.

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The cover of the 2007 edition of The Revenge of Gaia[101] *reproduced by permission of Penguin Books Ltd.*

Lovelock said he was driven to write it after meeting climate researchers and reading the 2001 report of UN Intergovernmental Panel on Climate Change (IPCC) (Gribbin and Gribbin 2009). Lovelock said that in the book he presented the IPCC report’s results “in a way comprehensible to the non-scientist. I certainly intended it as a wake-up call” (cited in Gribbin and Gribbin 2009 p195).

The ecocatastrophist tone continued in *The Vanishing Face of Gaia: A Final Warning*. Its content and structure was virtually identical to his previous book, containing the same arguments about the urgent necessity of nuclear power, the unrealistic expectations of alternatives energies, as well as a history (and further justification) of Gaia theory. Apart from the heightened intensity of the warnings in the title, there was little new information, except for the inclusion of more sections on how humanity could potentially cope with the seemingly inevitable consequences of global warming. Unlike the reaction to *Silent Spring*, the publication of *The Revenge of Gaia* failed to become a similarly galvanising event for modern environmental consciousness, and this was the motivation for the heightened alarm of *The Vanishing Face of Gaia: A Final Warning*, something noted by Kump when he said the book seemed “to arise from frustation that society hasn’t been roused by the wake-up call of *Revenge*” (Kump 2009 p539).

101 This cover art has been reproduced from the edition published by Penguin Books in 2007.

The tone-shift in Lovelock's language was noted by journalists. *The Observer*'s McKie noted "the great environmentalist has become increasingly apocalyptic in his predictions over the years as our climate warmed" (McKie 2009 p21). Michael McCarthy, then environmental editor of *The Independent*, noted that "with anyone else, you wouldn't really take it seriously" (McCarthy 2006 p3). An article in the *Daily Mail* asked if Lovelock was "a visionary or a crackpot," calling him a "prophet of doom [who] is a distinguished scientist," who "does not look like a man willing our extinction" (Sands 2008 p42). Journalist Richard North noted that Lovelock has became "a very extreme alarmist" (North 2006 p14 October 28). *The Times* labeled him a futurologist (Shepard 2007). The imagery around Gaia changed too, from the harmonious earth mother of his earlier work to a vengeful deity, to "Medusa, perhaps, rather than Ceres" (Watson 2009 p970). *The Revenge of Gaia* and *The Vanishing Face of Gaia* were written since the millennium, a period that saw the return of representations of the apocalypse in popular representations (Hari 2002).

The linguistic tropes used by reporters to represent Lovelock were taken from classical mythology and the Bible. Like Cassandra, Lovelock hated "being the bearer of this news, but he has the curse of knowledge" and has formulated "the most important scientific theory of these, the end of days" (Ferguson 2009 p20). A *Washington Post* interviewer said he was "no Book of Revelation [sic] apocalyptic" (Powell 2006 pc01). *Rolling Stone* said he was not gloomy despite his predictions that humanity faced the coming of "the Four Horsemen – war, famine, pestilence and death" (Goodell 2007). McKie said Lovelock was playing his final and greatest role as "prophet of doom for planet Earth" (McKie 2009 p21). Journalist Aitkenhead (2008) said meeting Lovelock felt "a little like an audience with a prophet". *Nature*'s review of his last book called him, in its headline, "a skeptical prophet" (Watson 2009 p970).

Lovelock has been astute in his intuitive understanding of how non-specialists assimilated fictional representations to form images of science, a view echoed in the professional literature (Weingart and Pansegrau 2003, Weart 1988). Commentators have, in turn, read Lovelock's later works through the frameworks of science fiction. Macleod explicitly linked *The Revenge of Gaia* with the scenario depicted in the eco-catastrophic film *The Day After Tomorrow* (2004). A *Daily Mail* columnist said the book read like "the plot of one of those lurid 1970s sci-fi movies in which the world ends in an onslaught of plagues, nuclear war or apes" (Hanlon 2006 p12). Boris Johnson in a column referred to Lovelock's "Mad Max-style vision of the coming century" (2006 p18) while *The Independent on Sunday* called it a "depressing Blade Runner scenario" (Connor 2006 p27). Lovelock himself contributed to this intertextual image-association, telling an interviewer that he was not "Dr Strangelovelock, gloating at what is going to come, but it is going to come, I fear" (Farndale 2009 p19). The scenarios depicted in these last two books have not formed part of the scientific consensus on global warming that argued that warming would continue gradually but could be contained. The books have positioned Lovelock's scientific work, this study argues, closer to the traditional role of science fiction as the "conscience of society and science" and, through its predicted futures, its thematisation of the "social consequences of scientific discoveries" (Weingart and Pansegrau 2003 p227).

The ecocatastrophist futures portrayed by Lovelock have been similar to the eco-paranoia that characterised 1970s. Similar fears and paranoias have informed Lovelock's recent writings, validated as they are by at least thirty years of scientific evidence attesting to the increasing likelihood of environmental disaster. As a scientific theory, Gribbin and Gribbin (2209 pxiv) called Gaia "one of the most crucial ideas of the twentieth century," an idea that achieved sudden recognition after decades of being ignored, because it fitted the theme of the times, when the scientific evidence because uncontestable that the earth was warming at an unprecedented rate, driven by human activities.

As well as the dystopian narratives, Gaia has been represented as a utopian idea, one that formed a new way of interpreting the world, undertaking science and conceptualising humanity's ethical foundations. The ethical implications of Gaia were outlined by Lovelock himself, implications that come from its two core principles, each extrapolated from science: that the environment imposed powerful constraints to keep ecosystems secure, that those who lived within these boundaries and took care of their environment had more chance of their children surviving. This second role underpinned a responsible collectivism rather than narcissistic individualism (Lovelock 2001). He believed that the theory's ethical dimensions could be adapted as foundational sets of secular morals that might appeal especially to agnostics, and he repeatedly quoted a speech by writer and statesman Václav Havel who cited Gaia as an example of a science that transended its material limits, anchoring human rights and freedoms (Lovelock 1995). In a preface to *Gaia*, Lovelock said he chose a popular writing style to appeal, not just to lay readers, but to engineers and physicians who needed "moral guidance" in their professional work (1995 px).

Philosopher Mary Midgley developed this idea of Gaia as a guiding secular ethic in her book *Science and Poetry* (2001) in an article (2000) and in a monograph (2001a). She argued that in the west, the current guiding ideology has been romantic individualism that prioritsed individual freedom. Contemporary science, with its roots in the seventeenth century, has influenced, and become part of, this dominant ideology, one expressed in the selfishness of sociobiological and neo-Darwinist thinking. Science and contemporary society have come to share an ideology of individualism, reductionism and atomism. Gaian ideas have had the potential to disrupt this dominant form of thinking, marking a change, through discussions of climate change, to a more socially collectivist ethical worldview. Gaia was "a central concept of our age" (Midgley 2001a p13), one that could, as well as leading to new scientific and technological developments, act as an alternative to atomism and individualism in society. Likewise, physicist and popular science writer Freeman Dyson (1993) argued that the collectivist ethos of Gaia was a welcome counterpoint to the overwhelming emphais on an ultimately-harmful competition.

8.7. "The Renaissance rustic"[102]

Lovelock's prominence as a celebrity has occurred as a result of his scientific Gaia theory, bound from its conception to promotion, that he commodified through popular publishing and which appealed simultaneously to a variety of non-specialist publics. As with Darwin, his personal and public selves have merged, his deeply-personal theory represented as being an intrinsic part of his persona, a persona as a scientist-author that has has been a marketable commodity traded by the publicity and promotional industries. He was represented, in his writings, and by the promotional and publicity industries, as a maverick scientist, a status simultaneously used to promote his work while drawing his authority from science, situating him at once as separate from the scientific establishment and from mainstream environmentalism. The current scientific and socio-political crisis over climate change provided the cultural background against which this rise to prominence occurred. The manufactured image of Lovelock gave him his "special charisma" (Volk cited in Neimark 1998 p4), a charisma that has resonated because of Lovelock's social function in embodying centuries-old tensions within the philosophy of ecology.

This is not to argue that Lovelock's views have been insincere or conceived primarily as pseudo-events, but that repetoires of promotion have been inherent in his work as a public

[102] Joseph, 1991, p2

scientist since he first chose to communicate Gaia chiefly through popular channels. These promotional and representational features have portrayed as part of his marketable persona the unique features of his background and personality that contributed to the formulation of Gaia theory – his interdisciplinary scientific training, his professional unaffiliation, his idiosyncratic modes of thought, along with his ambiguous and contentious relationships with the scientific and environmental traditions of which he is embedded.

The naming of Gaia contributed to its acceptance among some non-scientific audiences, and ensured it maintained a cultural presence even as it received a hostile reception from the scientific establishment. His decades-long attempt to communicate simultaneously in popular and scientific channels demonstrated not only how permeable were these modes of communication, but how the scientific development of Gaia was, in part, an incremental decoupling of what one scientist called the "packaging" of unscientific Gaian connotations from the underlying science (Somerville cited in Gribbin and Gribbin 2009 p205). Lovelock has not seemed to acknowledge that his longevity in science, and the theory's eventual acceptance, was due, in part, to its continued cultural presence, itself informed by his key metaphor, chosen for its audience-grabbing effect. Gaia was prevented from becoming a failed scientific research programme because, to a significant degree, it remained culturally prominent through its – and its creator's – continued appeal and promotion to non scientific publics, a feature of the development of maverick science. The intensive promotion of his later works has demonstrated his understanding of the promotional value of controversy.

Lovelock has come to personalise and embody the historical tensions and paradoxes and meanings inherent in the all-inclusive philosophy of ecology. This embodiment has been central to Lovelock's social function as a celebrity. Lovelock has become a vehicle for cultural cohesion within environmentalism where the history of ecology has been made manifest in the present. Lovelock has become a focus for the generation of cultural meanings of ecology. That his theories have had mythical and religious connotations has only deepened Lovelock's cultural formation for different audiences. This has helped explain his enduring appeal to a variety of seeming incompatible publics. Lovelock has been comfortably portrayed as the brilliant experimentalist *and* quirky British inventor *and* the holistic biologist *and* the environmentalist crusader *and* the anti-green rationalist *and* the transcedental near-mystic *and* the moralising prophet *and* the visionary eco-catastrophist. He has represented these diverse features because ecology has comprised these epistemologically unresolved elements within its philosophical framework. He has become the contemporary embodiment of this diversity in a single represented persona.

Now past his ninetieth birthday, Lovelock has continued as a focus of attention for the promotional and media industries. In a piece of creative symmetry, Lovelock is planning to see with his own eyes the mediated image that helped inspire the theory that made him famous. As a result of his public prominence, he has been invited, like Stephen Hawking, by Richard Branson to fly above the Earth's atmosphere with Virgin Galactic. Lovelock has already planned a book to coincide with the flight (Wade 2008). He said he intends calling it *Seeing the Face of Gaia*.

SECTION 3: CONCLUSIONS

Chapter 9. The celebrity scientists

9.1. The late modern scientific celebrity

The Visible College (1988) and *The Visible Scientists* (1975) analysed two collectives of twentieth century public scientists. This study has added a third broad grouping, the celebrity scientists. These three public science groupings all emerged from historical processes, reflecting the tensions of their times. The celebrity scientists, seen at their most intense during the 1990s and 2000s, have shared continuities with the groupings of earlier eras. The scientists all wrote and commented publicly about the nature of science and its relationship to society, used channels of public communication to disseminate their views, and stressed the cultural authority of science. The prominent positions of these public scientists demonstrated that, throughout the twentieth century, there has been a space in the public sphere for individual scientists to represent science as a whole.

There were also significant historical discontinuities between the three groupings, rooted in their historical contexts. The groupings emerged at times of contemporaneous crises. The 1930s scientists described in *The Visible College* had a shared socialist political vision for an inter-war British society gripped by a crisis in capitalism, a systemic vision that saw science as having a central social role to play. The scientists in the 1960s and 1970s, described in *The Visible Scientists*, became prominent during the cold war, at a time of social and political upheaval, where the traditional view of science as an ahistorical, context-independent, progressive, rational pursuit of truth began to unravel amid fears of nuclear destruction and environmental degradation, as well as receiving sustained scholarly investigation from social, historical, philosophical, cultural, anti-capitalistic, environmental and feminist perspectives. The era’s tensions in the scientific world view were caused in part by the technoscience-driven destruction of world war two, tensions embodied in part by Einstein, but most fully by Oppenheimer. Contested positions about the role of science, manifested in the sociobiology debate and the rise of environmentalism, were embodied in such individuals as Gould, Wilson, Lewontin and Carson. In the same era, the reiteration of the traditional view of a progressive positivist science, recounted in an internalist history, was made manifest in Sagan.

These debates have never been resolved, their tensions and viewpoints continuing to reappear in the writings of the contemporary celebrity scientists that have been analysed in the current study. These scientists emerged in late modern Britain in the closing decades of the twentieth century and early twenty-first century in a period shaped by the changing socio-cultural currents of increasing individualisation, globalisation, mediatisation, commercialisation, cultural relativism and postmodernism. These trends provided the socio-historical milieu in which Hawking, Dawkins, Greenfield and Lovelock became prominent as celebrity scientists, a phenomenon that was most intensively manifested in the 1990s and 2000s, an era shaped politically by Thatcherism and Blairism.

The subjects have been represented in similar ways, but there have also been crucial differences in their portrayals, and some of the subjects have manifested particular characteristics of celebrity more or less intensely than others. This has made it difficult, therefore, to outline a typology or model of the celebrity scientist. Nevertheless, the subjects have shared features that can be considered fundamental characteristics of contemporary celebrity scientists. They have based their cultural authority on their scientific credentials. They have achieved wide cultural appeal through popularisation. They have been represented as unique, distinctive individuals whose public and private lives have merged in their mass media representations. Their celebrity personae have been commodified, bound up with promotion in their popularisation work. They have embodied abstract ideas of science in the contemporary public sphere, have spoken in general culture on behalf of science, and have been constructed around discourses of truth and reason. Their representations have featured associations with iconic historical scientists, associations that have provided cultural continuity to science and have served as a means of marketing the modern scientist-authors. They have engaged in socio-cultural criticism, based on their largely scientistic world view. They have been criticised because their popular profile has been considered to have eclipsed their reputation inside their scientific fields.

The foundation of their celebrity personae has been their reputation as credentialed scientists. A level of scientific achievement has been a given. The scientific stature has not been the same for each case study – Hawking and Greenfield have been Oxbridge professors in scientific fields, whereas Lovelock has been an independent consultant, and Dawkins has not published original peer-reviewed research for decades – but a recognised level of scientific achievement has been a necessary foundation for their fame. They have drawn their authority from the larger historically-constituted authority of science, giving them a license to speak on behalf of the scientific community, although this has been contested, a license that was codified further for Greenfield and Dawkins with their establishmentsanctioned institutional science communication positions. The cultural authority of science as a collective endeavour has been bestowed, in a culture shaped and driven by individualism, on particular scientists. A part of the discursive formation of the celebrity scientists has been their portrayal *as* scientists who had the authority to speak on behalf of science itself.

The celebrity scientists have been constructed around discourses of truth and reason. As contemporary politicians have underwritten political values, the subjects have underwritten scientific values. The scientists have been unusual among celebrities in that their representation has had epistemological and ideological dimensions: they have portrayed science as western civilisation's supreme method of understanding the natural world. This has been the social function of the scientific celebrity. It has been constituted historically. The represented embodiment of science as a body of knowledge has shifted from scientists to scientist-popularisers, who have taken the role of representatives of science, unifying publicly its cognitive accomplishments, methodological techniques and disciplinary aims. Their high-profile meant ideas, issues and ideologies of science have been refracted through the prism of their personalities.

The celebrity scientists have been popularisers. They have come to widespread public prominence by communicating scientific topics via mass media. Hawking, Dawkins and Lovelock's made their most notable first public interventions through publishing books explicitly aimed at non-specialists. Greenfield came to prominence on televised lectures, but she subsequently used books as the medium through which she communicated with mass audiences. The subjects' positions as scientist-authors have linked them with the scientists from the 1930s and those from the 1960s and 1970s, although contemporary scientific celebrity has been achieved *primarily* through publishing at least one popular science book.

The book has been the point of origin for extended media manifestations that were essential to the construction of scientific celebrity. Most of the coverage of the celebrity scientists came *after* they published books. This has shown that the book has maintained its status as not just a cornerstone of culture, but as a prominent feature in the public culture of science, remaining an influential science communication medium. As Lewenstein (2008) noted, popular science books have been sites where crucial religious, cultural and political issues involving science have been explored. In a multi-media age, books have remained an essential part of a *culture scientifique*. As in the seventeenth century, the book has remained a principal site for creating fame.

As scientists-authors, the celebrity scientists have shared characteristics with literary celebrities. They have needed public definition, a distinctive public signature to distinguish them as unique writers. The construction of this distinctive public image has depended on mixing professional and private characteristics. Creating an authentic authorial image that could be marketed has not involved the manufacture of an artificial identity, but the emphasis through representation on certain aspects of a subject's existing personal and professional characteristics. The unique scientist-author persona of each of the case studies has been relatively consistent across representations in the genres of popularisation, publicity, promotion and criticism that have combined to form their star image. Dawkins has been the positivist atheist. Hawking has been the disembodied genius. Lovelock has been the environmentalist guru. Greenfield has been the glamorous female scientist. Because their distinctive personae have been readily identified across genres, they has been easily represented in emblematic journalism. This has in turn reinforced the individual scientist's unique cultural signature.

The merging of public and private to form a marketable authorial persona has involved commodification. The authors' ideas have been packaged around their personalities, resulting in the commodification of the self and what philosopher John Gray called modernity's "commodification of experiences" (cited in Self 2002). Lovelock has merged in representations with Gaia. Dawkins has merged with rationalist-atheism. Hawking has merged with theoretical physics. This has resulted in the celebrity scientist-authors functioning partially as branded star authors. "In publishing," wrote novelist Martin Amis (2002 p142), "success creates a centrifugal process: the big book spins off spinoffs". Cottage industries in publishing have developed around Dawkins, Hawking, and Lovelock and Gaia. The subjects' private lives have also been commodified, used as tradable information, especially in publicity by mass media, but also in the personal details that have been revealed in the subjects' popular books. The celebrity scientists have become, to an extent, commodities that have been sold by mass-market publishers. A dissolution of the public-private distinction has been a feature of the discursive formation of the celebrity scientist, a dissolution that has resulted from, and is constituent in, their marketing as star authors.

Promotion, selling and celebrification have been entwined since the start of the subjects' public careers. The literature on celebrity studies has argued that it has been difficult to pinpoint the exact moment that someone was first viewed as a celebrity. The development of a celebrity persona has been understood as a process of celebrification. A crucial point in this process, however, was when mass media representation moved from focusing on the subject's professional life to portraying their personal life. This process started for the celebrity scientists when they published books aimed at a wide non-specialist audiences. At this time, their image as unique, distinctive authors became commodified and marketed. Since then, their relationship with their readers has been constructed commercially. Their personalities and personal lives have been further commodified in interviews, news reports, books and profiles, which have discussed their physical bodies, personal lives, domestic environments and life histories, as well as their opinions on subjects ranging from conflict in the middle east to restaurants in Oxford.

The celebrity scientists have provided cultural continuity to science. They have become the latest protagonists in the superficially smooth grand narrative of western science. Science as a grand narrative has been constructed frequently through personalities. Situating the subjects in this story of science has meant linking them in popularisations, promotion, publicity and commentary to eminent historical scientists, such as Newton, Darwin and Einstein. These historical representations have been folded into the multifaceted representations of contemporary figures. The metaphorical associations of Newton have been used to construct Hawking's image. Dawkins has constantly evoked Darwin and has been tied in representations to the renowned naturalist, as has Lovelock. Greenfield, to a less pronounced degree, has been tied in forms of representation to Hodgkin and Curie. The case studies have been vehicles of cultural memory and cohesion, continuing the embodied representation of a science that is progressive, cumulative and cerebral.

The scientists have also created continuity and coherence within British intellectual history. Hawking proactively forged his intellectual and institutional association with Newton. In addition to his professional associations with Darwin, Dawkins has joined the philosophical tradition of British empiricism. Darwin too has been used as a comparison for Lovelock, who has embodied the British affinity with the countryside, as well as the cultural fondness for the likeable eccentric. Braudy noted that lasting fame has had deep cultural roots, representing "unfinished business in the national psyche, emblems of heroism . . . that may last for decades, even centuries" (1997 p600). This is perhaps why Collini's (2006) paradox of denial does not appear to have manifested itself as strongly in the discourses surrounding scientists as it has around portrayals of writers and historians. This has been perhaps because scientific work has been tied more readily to the British intellectual characteristics of empiricism, instrumentalism and practicality. Newton and Darwin, furthermore, have remained uncomplicated emblems of national pride. Scientists who have not fitted this emblematic continuity have not had the same nationalistic connotations. The more politically active scientists, Bernal and Haldane, for example, have not been used often as points of historical comparision for contemporary scientists. Arguably, their image has been at odds with the largely apolitical work of Hoyle or Hawking. In this, the historical sidelining of the 1930s socialist-scientists has been a manifestation of the paradox of denial of intellectualism in British life.

The connections with iconic historical scientists has also been used in promotion and publicity as a means of marketing the contemporary authors. Newtonian, Einsteinian and Darwinian imagery has symbolised science and genius, and connecting contemporary figures to these symbols has been used – sometimes by the scientists themselves, sometimes by the cultural industries promoting them, sometimes by journalists – as a way of emphasising the subjects' status as prominent scientists, even though the subjects' peers have not viewed such comparisons as proportionate. In contrast, Einstein consciously drew on earlier representations, and was tied in representations to Newton, but he did revolutionise Newtonian thought. A gifted self-publicist, Einstein was also lifted to global prominence through mass media, but only after creating a revolutionary theory; he was not represented as being qualitatively different from the calibre of his science. These comparisions with eminent historical scientists – who all proactively helped shape the myth of scientific progress that they subsequently came to represent – have also reflected the ongoing difficulty in conceptualsing ultra-specialised contemporary science. It has been difficult for non-specialists to evaluate and situate culturally the work of the celebrity scientists, hence the often lazy comparisions with Einstein or Newton, hence the sometimes bizarre intertextual references to convey the character of the scientists (the Emma Peel of neuroscience, the Dirty Harry of science).

All four subjects have been engaged in public science and boundary-work. They have justified the cognitive superiority of science compared to other intellectual fields and have argued for the continued cultural authority of science. This has been expressed most cogently by Dawkins's advocacy of Darwinism and Hawking's description of physics as the apex of the sciences. The writers have demarcated science from non-science, something that featured prominently in Dawkins's strict separation of science from religion and Lovelock's attempted division of science-based ecologism from politically-motivated environmentalism. Except for Greenfield's earlier work, none of the subjects' writings have been straightforward non-specialist translations of established science. If popular science has been the autobiography of science, then the celebrity scientists have been its autobiographers.

The subjects' cultural criticism has been underlined by a shared scientism. They have not only reinforced the culture-wide view of science as contemporary society's dominant way of knowing, but have advocated scientistic approaches to socio-cultural issues. This has been the ideological dimension to their fame. For Dawkins, memes explained religious belief and he argued that scientific understanding would eradicate the religious belief that has caused various social ills throughout history. Greenfield argued that anti-social behaviour might be curbed through stopping the neural-rewriting caused by sensation-saturated screen culture. Hawking claimed that a grand unified theory of physics would be the answer to humanity's search for existential meaning. Lovelock argued that scientific environmentalism was needed to adapt to an inevitable climatic catastrophe, although his scientism, aligned with a spiritual dimension, has not been as strongly expressed as that of the other subjects. If historians have told the national narrative (Collini 2006), then the celebrity scientists have articulated the epistemological basis of western society. They have, to varying degrees, embodied scientism as the supreme epistemology.

Appleyard – referenced, again, as he has consistently been one of the most astute critical commentators on the relationship between science and society – in *Understanding the Present* (2004) criticised scientists for commenting on areas of culture and society that were more ably described by specialists in those areas. However, this movement between specialism and generality has been inherent in the role of the public intellectual, and scientific public intellectuals historically have applied their specialised knowledge on a wider canvas. Gould's lasting brilliance as an essayist has reflected his sustained engagement with the socio-historical dimensions of science. Oppenheimer's framing as a scientific intellectual has depended, not only on his positioning at a crucial point in mid-twentieth century science, but on his deep reading in the humanities that shaped his evocative reflections on the nature of science. The contentious issue, this study argues, has not been that the celebrity scientists have written about areas outside their specialisms. The contentious issue has been that their cultural criticism has been so conceptually and analytically weak.

Their standards of scholarship in the humanities and social sciences have been almost universally poor. There has been scant historical contextualisation of ideas or events. There has been little evidence of systematic reading or research. Historical evidence and argument, when used, has been presented in narrow, internalist accounts. Dawkins has positioned himself clearly in the neo-Darwinian tradition within biology, but has not placed himself in wider intellectual contexts, except in reference to Carl Sagan. Mimetic theory has arguably been an academic non-starter, as the field has not developed substantially past its initial theorising. Lovelock has not clearly placed himself inside the ecological tradition that he has come to symbolise. Hawking's self-mythologising has effectively amounted to anti-history. Greenfield has repeatedly mentioned her classics education, but there has been little evidence of a classicist's insights into character. Collectively their cultural criticism has been humanism drained of the breadth of cultural and historical understanding characteristic of humanism.

This colossal blind-spot for these writers has been what respected literary critic John Cornwell called "Winston syndrome" in a *Sunday Times* review of *The Story of God* (2005) by fertility expert Robert Winston. In a review headlined, A Holy Terror, he wrote (2005 p44) that Winston "buzzes about like an intoxicated bee in the great gardens of science and religion, his arguments lacking coherence and logical connection". The major symptom of the condition was "a failure to recognise the intellectual integrity of disciplines outside the natural sciences". The symptom could be just as accurately called Dawkins syndrome, Hawking syndrome or Greenfield syndrome.

If the scientists had come up against boundary work in the humanities and social scientists as strident as the popularisers' defence of science, then perhaps such poor intellectual standards would have received a stronger cultural challenge. Yet the critical commentary on the celebrity scientists has chiefly come, for decades, from a narrow coterie of journalists and academics: Bryan Appleyard, Andrew Brown, Mary Midgley and John Cornwell. Written more than a decade ago, Tudge's (1997) call for a broader community of knowledgeable science-critics has remained valid – and unanswered.

The celebrity scientists have drawn their authority from their scientific credentials, but also from what Appleyard (2004) called, in relation to Dawkins, the dominant contemporary world view, centred on secularism, scientism and progress. Challenging these scientists has meant addressing critically at some level this underlying world view, leaving critics vulnerable to charges that they were somehow failed scientists or anti-scientists or extreme relativists, charges that Hawking and Dawkins have levelled at critics. Paradoxically, the lack of historical reflection by the celebrity scientists has meant that their own view of science has not been clearly conceptualised. Hawking's has been an unreflexive scientism. Dawkins's has been an unquestioned scientism. Lovelock's has been a conflicted scientism. Greenfield's has been an unacknowledged scientism. Cultural critic Clive James wrote that German literary critic Marcel Reich-Ranicki often pointed out that "a literary culture deprived of rigorous criticism would soon die of niceness" (James 2007 p592). The lack of a critical community has meant that commentary on the work of scientist-authors has died, not of niceness (all those off-the-record barbs prove otherwise), but of acquiescence.

A more vibrant critical culture around science could improve the overall level of scientific public intellectual work. *The God Delusion* prompted a substantial amount of journalistic and book-length criticism. A variety of perspectives were articulated, constituting a vivid example of public debate around science that contributed meaningfully to a *culture scientifique* in which scientific, religious, cultural and political ideas merged in cultural discourse. Dawkins's avowed secular humanism has emerged in his writings, but this study argues that his critiques of religion and irrationality would have been substantially more nuanced, as critics noted, if they had been informed by intellectual history or deeper interdisciplinary engagement. As it stands, this type of writing on culture and society, although ostensibly committed to Enlightenment ideals, may paradoxically result in deepening further the rifts between science and some of its publics. The celebrity scientists, instead of constituting a third culture, instead of uniting the two cultures to achieve social justice, have largely pushed the traditional two cultures further apart. Lovelock has been the exception here, his writings at times sharing characteristics with a broader framework of ecological-based literary criticism (Love 1999).

As other celebrities, as public intellectuals, the celebrity scientists have been criticised on the basis of their professional credentials. Their high public profile, the argument has run, has eclipsed their inter-scientific reputation. This criticism has been linked with the dominant model of popularisation and the arguably still-current view, despite politically-driven cultural movements for almost three decades that urged scientists to communicate with wider publics, that popularisation was a second-order activity. There has often been a double boundary-work occurring around these scientists. At the same time as they defined science's external boundaries, the scientific community has debated the case studies' internal scientific status. In their strongest form, these criticisms have been that Dawkins was not really a scientist as he has not undertaken original empirical work for decades, that Greenfield was an advertising executive for science cited infrequently in professional literature, that Lovelock was a mystic who invented things in his garage, that Hawking described self-aggrandising grandiose theories that far outstripped what was scientifically achievable, especially by a physicist rated by his peers as substantially less eminent than he has portrayed himself. These criticisms have been tied to the mediatisation of science, most prominently in the rejection of Greenfield's nomination for Royal Society membership. The underlying assumption has been that science should, like sport, be meritocratic, and mediatisation has disrupted science's supposed peer-validated meritocracy. This tension has been present to a degree in the popularisation work of some of the subjects. Dawkins and Lovelock used their second books to stress their scientific credentials, with *The Extended Phenotype* and *The Ages of Gaia* being more suited for specialists than non-specialists, as if the authors were determined to demonstrate that they were not *just* popularisers.

9.2. The particular differences between Hawking, Dawkins, Greenfield and Lovelock

The four subjects have had different views on the purpose of science popularisation. Dawkins and Lovelock (and Gould) have viewed popularisation as original scientific knowledge. Dawkins's supporters have claimed his field-clarifying *The Selfish Gene* revolutionised biology. Lovelock's work on Gaia has earned concentrated attention from the academic community as earth systems science, but the theory was sustained for decades largely *outside* the scientific community. Moreover, popularisation has remained a terrain on which scientific disputes have been argued, as has been seen in the evolutionary biology controversies centred around Dawkins and Gould. Popularisation has also been a space in which the cultural authority of science has been maintained through boundary work, as has been seen in Dawkins's dismissal of Gaia in *The Extended Phenotype*. Greenfield has attempted in *Tomorrow's People* and, especially, *ID*, to build scientific theory through popularisation. Hawking, however, has not tried, in his popularisation work, to create new scientific knowledge, and his books can be placed in more traditional transmission models of science communication.

There have been significant differences in the subjects' individual portrayal and the particular processes that have driven their fame. The celebrity scientists have each had a unique star image, comprised of a complex totality of individual representations, grounded in their own socio-historical and professional development. Although core characteristics of celebrity have been common to each case study, different explanatory concepts have been used to describe how each came to public prominence. The celebrification of the commercial author has been a factor in each subject, but two further concepts have accounted for Dawkins's fame. The first has been the public, literary controversy. Dawkins has been involved in three major controversies in his writing career: the sociobiology debate, the Darwin wars, and the science versus religion debate. Through these debates, he has been proactively involved in literary self-fashioning, continually reorienting his writing to alternative beliefs characterised as pseudo-science or anti-science or religion that he has challenged from his science-aligned position. This self-fashioning has been progressive. It has contributed to the ever-more complex totality of his star image. His coherent world view and rhetorical style have added weight to his public intellectual work.

Hawking's public intellectual work has been limited in scope, but he has been arguably the most striking example ever of the disembodied intellect. He has been the Platonic ideal of the disembodied scientist. Centuries of similar representations have culminated in his persona. The centuries-old idea of disembodiment has been commercialised by Hawking and his publishers. His value as a public intellectual has remained almost purely symbolic and the book has been an extension of this symbolism. Hawking has been science incarnate, but the incarnation has been heavily commercially constructed.

Disembodiment has been a consistent feature in Hawking's representation, but feminine embodiment has been a chief characteristic of Greenfield's mass media portrayal. Tokenistic language has been entwined in her representation, underlining her unique status. Her particular representation as a celebrity has been constructed within historical discursive formations about female scientists generally, formations that featured similarly tokenistic language. This discourse has shaped her celebrity even as she has tried at times to challenge these descriptions. This tension has been further nuanced by the fact that Greenfield has willingly adhered to the feminised and sexualised descriptions that often formed part of this tokenistic representation. Of all the case studies, she was the one that, despite her protestations to the contrary, has appeared to understand most clearly her own celebrity and its value to her and the issues she has wished to highlight. Unlike the other subjects, she has written knowledgeably about the issues faced by contemporary working scientists. Greenfield has aligned herself most clearly, compared to the other subjects, with the U.K. public understanding of science political movement. She has understood that selling a politically-sanctioned view of science to various publics has involved selling her own image, and that marketing her books has meant marketing herself. Compared to the writings of the other subjects, she has been the one who has inserted herself least explicitly into her popularisations. Perhaps as a consequence of her media savviness, she has remained the subject that illustrated most sharply the tensions between the supposed traditional meritocratic science and the emergent post-academic mediatised science. It has been called The Greenfield Problem, but it has represented a widening schism in scientific culture.

Lovelock's celebrity has been similarly nuanced. The concept of the scientific maverick has been a powerful concept for explaining his prominence. A difference in Lovelock's fame trajectory has been that, consistent with his maverick status, he has published through popular channels only *after* formal channels were effectively closed. His fame arguably has resulted from his decision to publish, as a last resort, for wider publics. Lovelock has demonstrated that maverick science was influential when tied to mediatisation. An interesting historical counterfactual[103] would be to explore the evolution of Gaia theory had it been accepted initially for publication in a prestigious journal. The mystical dimensions that have contributed to its popularity among wider publics would arguably have been erased earlier, but it has been the potent combination of mysticism, morality and science that meant Gaia, as did *Silent Spring*, captured the aesthetic dimensions of the modern ecological crisis. Gaia's mix of spirituality and science has reflected a recurring tension in Lovelock's own psyche as revealed in his writings. His theory and his personality have merged and have found an audience among wide publics whose ecologism has historically encompassed science and mysticism. Lovelock's celebrity image has been constructed in discursively similar ways to Carson's, demonstrating that books have been foundational texts in modern ecologism and that the ecologist has been represented verbally and visually as different from other scientists, because of their perceived unique holistic attachment to the natural world.

In their former establishment positions as ambassadors for the public understanding of science, Dawkins and Greenfield have demonstrated contrasting interpretations of their

[103] See Ferguson (1997) for a discussion of the use of counterfactuals in historical explanation.

ostensibly-similar roles. Dawkins has conceptualised his role as the public defender of science's cultural standing, advocating consistently a positivist science that has earned its unrivalled standing as the pre-eminent method of discovering objective truths about the natural world. Greenfield has viewed her role as the marketeer for a rebranded image of science, presenting the public face of scientific work that is fun, inclusive, demanding and rewarding, as well as highlighting the view that scientific knowledge is a prerequisite for democratic citizenship. Neither Dawkins nor Greenfield has engaged meaningfully, however, with the risk-based issues raised by British parliamentarians that contributed to the breakdown in trust between science and various publics in the closing decades of the twentieth century.

Greenfield has been a different case to the other subjects in that her public profile has represented most sharply the transformations in contemporary scientific research organisation that have been conceptualised variously as mode-2 and post-academic science. She has written about being an entrepreneurial scientist who has accepted public and private funding. Private companies have been spun-off from her research. She has advertised commercial products and explictly discussed communicating science in a similar way to advertising consumer products. Her career has shown most intensely the ease of movement in contemporary science between university, industry and government, with each of these areas linked also in her media representations. Lovelock's career as an independent scientist has been so unique as to defy categorisation into mode-1, mode-2 or another organisational type of science, but his decades-long research output has shown also the ease of movement between industry-commissioned research, popular science writing and traditional university-based scientific theory-building. This ease of movement between increasingly interconnected spheres has been a characteristic of contemporary science, one revealed in the representations of some of the celebrity scientists. However, Dawkins and Hawking have not exhibited this contemporary ease of movement, and their views of scientific knowlege – rational, objective, progressive, cumulative – has chimed with traditional narratives of scientific development and research organisation.

Although the representation of the four subjects have been tied to wider discourses of truth and reason, their images have also been tied to distinctive traditions within intellectual history. Dawkins has been tied to atheistic positivism, Hawking to disembodied rationalism, and Lovelock to all-encompassing ecologism. Greenfield has been the exception, her public image constructed according to a postmodern eclecticism, combining liberal feminism, puritan work-ethic, photogenic glamour, media-savviness, none of it cohering into a definite world view.

9.3. The celebrity scientists and contemporary science

The four celebrity scientists have illustrated various aspects of contemporary science – and late modern cultural representations of science. Collectively, the subjects have been sites of meaning for modern science. They have also been extreme examples of mediatisation in post-academic science, and protagonists in an increasingly commercialised era of public science, but have nevertheless contributed to a richer general scientific culture.

Analysing the representations of the four subjects as celebrities, public intellectuals and public scientists has meant opening the methods, assumptions and aims of science to critical exploration. The account produced under this analytic framework has provided an answer to the question asked by historian of science Janet Browne (2003a p176): "Since most biographical writing about the famous nowadays concentrates on private life, and the tensions between creativity and the marketplace, where might the content and public evaluation of scientific theories fit in?" The theories of the four subjects of this study have been examined as part of the holistic appraisal of their celebrity image. The book-length arguments between Gould and Dawkins have been public discussions of contested scientific meaning, focusing on different interpretations of the evidence for various views of evolution. Greenfield's discussions of the neurological basis of personality and behaviour have demonstrated public hypothesis-testing. The increasing scientific acceptance of earth systems science, which developed from Gaia theory, has been described, over decades, in Lovelock's popular books.

The celebrity scientists' different disciplinary approaches to science have illustrated Evelyn Fox Keller's (1985 p5) assertation that

> different collections of facts, different focal points of scientific attention, but also different organizations of knowledge, different interpretations of the world, are both possible and consistent with what we call science.

These different viewpoints have been refracted through the personalities and writings of the celebrity scientists. Tensions within science, within culture, have been expressed, not as hereditarianism versus environmentalism, but as *Dawkins versus Gould*, not reductionism versus holism, but Dawkins versus Lovelock, not individuality versus collectivism, but *The Selfish Gene* versus *Gaia: A New Look at Life on Earth*. This has allowed non-specialists easier access to what are rich professional debates. The interrogation of the subjects' representations has also challenged the scientism they have advocated. The subjects' discussion of the role of imagination in the scientific method has challenged narrow positivist views of that method, opening up discussions of the scientific method that have not equated imagination with irrationalism

Various tensions within, and critiques of, modern science have been explored through an analysis of individual scientists. Lovelock, for example, has illustrated tensions in contemporary ecology. The field has been increasingly analysed through rational reasoning and scientific methods, but there has been a simultaneous ambivalence about science, creating a situation where scientifc and non-scientific environmental understanding could "cohabit in the individual consciousness" (Eden 1996 p191). Lovelock has personified this tension. He has aligned himself formally with science, but his descriptions of his methods – intuitive, emphatic, empirical – has shown him to be engaged in what Beck (1992) called reflective scientisation. In this, science's greater public exposure has given it a degree of demystification (Eden 1996). Lovelock's criticisms of peer review have been reflected in professional articles and specialised science journalism (Wager 2008, Pearce 2010). Lovelock's books have also contained elements of the non-scientific forms of expertise outlined by Irwin (1995), including local knowledge grounded in experience, contextual knowledge gained through holistic thinking, and an active knowledge that relates to practical action.

The celebrity scientists have been protagonists in an increasingly commercialised and mediatised era of public science. As the case histories of Newton, Darwin and Einstein have shown, science communication has been tied historically to commercialism[104], but this study has argued that these commercial forces have become considerably stronger in mode 2, post-academic scientific research, as well as in contemporary popular science publishing. This intensified commercial focus has resulted in the subjects' celebrity status affecting not only their status within science, but the production of scientific knowledge within their disciplines. Dawkins and Lovelock have influenced scientific work through the knowledge produced through popularisation. A mathematician claimed physics papers were rejected

[104] For historical perspectives on science and commercialism, see Fyfe (2005) and Fyfe and Lightman (2007).

from peer-reviewed journals because their findings interfered with those of Hawking's (Dunning-Davis 2003). If popular science has influenced professional science, and popular science has been tied to celebrification and its inherent commercialism, then celebrification has, to a degree, influenced professional science. In this, the case studies have emerged as extreme examples of an intensified mediatisation of science. This has offered further evidence that the current phase of public understanding can be appropriately called PUS Inc.

The subjects of this study have been undertaking public intellectual work, often for decades. This study has argued that the mechanics of celebrification – the creation of a public signature, the commodification of the self, the shallow linking to intellectual history – have been inherent, more intensely than they have been historically, in the representation and self-representation of the contemporary scientist-author-public intellectual. Celebrification has not been a *consequence* of, but has been *constituent* in, the scientists' sustained presence in wider culture.

The increased celebrification of science – a process that has been present historically, but has not been manifested as strongly as it has been in contemporary culture – has contributed to a richer *culture scientifique*, even though the broad critical community of science critics imaged by Tudge (1997) has not yet emerged. This study has shown that pluralistic conceptions of science have been expressed, not only in science communication's professional literature, but in books aimed at non-specialists and, alongside the rest of society and culture, in *The Sunday Times*, *Time*, *the Daily Mail*, and *Vogue*. While the Newtonian industry has been confined largely to a small group of scholars, the modern scientist-author industry has been democratised, comprising publishers, publicists, columnists, commentators, reporters, reviewers, researchers – and general readers. Newton and Einstein had their reputations protected until long after their deaths, but such image-management has become more difficult, resulting in coverage of the four subjects that has shown science to be a human endeavour, involving jealousies, rivalries, passion, personal vision, fights for status, control of knowledge, and various interpretations of material reality, based on evidence gathered through various scientific methods. A close analysis of the celebrity scientists' careers has shown how their work has been embedded within, and has contributed to, wider cultural movements and currents.

This study has presented a recontextualisation of science and scientists within wider cultural frameworks, demonstrating that scientists have been no different as subjects for investigation to writers, sportspeople or academics. A *culture scientifique* has needed critical academic studies that positioned scientists within general culture, and not as somehow standing outside it. This analysis has argued that particular celebrities emerged at specific points in time that cannot be replicated. Scientific fame cannot be manufactured by a profile in *The Sunday Times* (no matter how the scientist dresses). Scientific fame cannot be generated after an ahistorical call for more Carl Sagans. Scientific fame cannot be created by an appearance on famelab (Highfield 2006), a U.K. science communication talent show that aimed to create high-profile scientists, in a process similar to the creation of pop stars on *X-Factor* or *America's Got Talent*. Celebrity, including scientific celebrity, has been a historically constituted process.

This study has pointed to avenues of potential future research. Its focus has been on scientist-authors. A further study might explore whether similar patterns of representation recurr in the portrayal of high-profile scientists who did not achieve their prominence through popularisation. There are some modern scientists who arguably could be said to embody contemporary science in the same way as Oppenheimer did in the mid-twentieth century. NASA's James Hansen, who has a had a prominent role in the scientific and political dimensions of climate change, would be one, as would geneticists James Watson or Craig Venter, who have each embodied momentous shifts in modern biological science. Indeed Watson's *The Double Helix* (1996), first published in 1968, has been interpreted as a "polemic arguing for a new, competitive, high-stakes approach to biological research" (Yoxen 1985 cited in Lewenstein 2008).

This study has not been a narrative of cultural decline. Commercialisation has not led to an automatic decline in the quality of popular science writing. The intensified celebrification of science has been an example of the "co-evolution of science and society" (Gibbons 1999 cited in Trench 2008 p126). Celebrity has become part of culture and the *culture scientifique*. The celebrity scientists are part of a new age of public science, one tied intensively and irrecoverably to commercialisation and mediatisation. This new culture has been corporatised, commercialised and personalised. In this culture, as Gitlin (2002) noted, the media have become, not merely channels of communication for depicting reality, but are part of contemporary reality, and that has come to include scientific reality. The mass media have become a powerful contemporary means of determining cultural power – and have influenced the social construction of scientific power. These trends of mediatisation and celebrification of science are likely to increase in the immediate future, becoming more powerful shapers of the cultural meaning of science. A larger issue for Hawking, Dawkins, Greenfield and Lovelock will be whether their celebrity and fame will morph into renown and eminence, but this can only be evaluated over a greater historical timeframe, long after the glamorised coverage of the pop scientists of the nineties has faded from the pages of *Vogue*.

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