Hard Reading: Learning from Science Fiction

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Like item 4, above, this piece started as a talk delivered at the Birmingham Novacon, that of 1974. It too turned into an article in *Foundation*, and formed the basis for successive entries on ‘Magic’ in the Nicholls and Clute (subsequently the Clute and Nicholls) *Encyclopedias* of 1993 and 1999. Since then the ‘New Age’ movement has led to a considerable revival of interest in magic. Ronald Hutton’s 2003 discussion (see especially his chapter 4) covers the long nineteenth- and early-twentieth-century arguments about it better than I can. In an article of 2007, not included here, I tried to work out what Tolkien, Charles Williams, and most of all C.S. Lewis thought about it, Lewis being extremely learned in the recondite field of Renaissance magical and proto-scientific thinking, and typically coming out with highly and deliberately contrarian answers.

However, rereading this piece years later reminds me as usual most of all of what I did not know back then. One thing I did not know was that not only did Randall Garrett write his ‘Lord Darcy’ stories about magic for John W. Campbell, he was also busily writing ESP stories for him at the same time, as ‘Mark Phillips’ and in collaboration with L.M. Janifer. If I had known this, I might have made more then of the point about Garrett’s Sir Thomas Leseaux (on p. 177). When the magic theorist in the alternate world angrily dismisses as old-wives’ tales things that we know work (like penicillin and digitalin), there is a deliberate parallel with the scientific theorist in our world angrily dismissing things that, well, are rumoured to work, but which cannot be admitted to work because they do not fit current scientific paradigms: phenomena like dowsing, or telepathy, or ghosts, or supernatural apparitions and warnings. All this was very much part of Campbellian sf. Much of it went well off the rails, like dianetics and the famous ‘Dean Drive’ for spaceships, and most of all Scientology. But there was a perfectly valid point behind it all, which was the one famously made by Thomas Kuhn:
innovations are much more readily accepted if they fit an accepted framework, and innovations which do not, which contradict such a framework, are liable to be dismissed as mere insanity or childishness, till the weight of evidence becomes overwhelming – at which point suddenly everyone will prove to have been in favour of change all along. I remember, incidentally, putting some similar point to Sir Roger Elliott, Professor of Physics at Oxford University, author of the ‘Elliott Equations’, well-known to nuclear physicists, and at that time my next door neighbour, and handing him one of *Analog*’s factual articles in support. He read it carefully, handed it back, and remarked, ‘These chaps just won’t do the experiments’. If I had been quicker on the uptake I would have replied, ‘But where would they get the funding?’, which is what John Campbell might have said. (No, Campbell would never have said anything so moderate.)

Whatever the case, another hook-up between sf sub-genres is obviously between the ‘world where magic works’ story and the ‘ESP’ story. The former connects to ‘alternate history’, the latter to the ‘world-changing invention’ story, as in Bester’s *Demolished Man* (1953) and *The Stars my Destination* (1956). It makes me want to draw another diagram, like the ones on p. 82, above and p. 164, below, but this time of ‘the inner structure of science fiction’. But maybe that is a job for another time and another book ...
Magic exists only in the mind. This is the belief that obviously underlies the *Oxford English Dictionary*'s authoritative definition, that magic is ‘the pretended art of influencing the course of events ... by processes supposed to owe their efficacy to the power of compelling the intervention of spiritual beings, or of bringing into operation some occult controlling principle of nature’ (*OED*, ix.185). Pretended, supposed, some occult principle: the words convey the detached scorn of the Edwardian lexicographer (the volume for the letter ‘M’ of the *Oxford English Dictionary* came out initially in 1908), secure in his superior knowledge. Nevertheless, his opinion remains the common modern one; while even in 1908 it was already ancient. In 1605, Francis Bacon had written in Book 1 of *The Proficience and Advancement of Learning*, sympathetically but firmly, that there were three sciences ‘which have had better intelligence and confederacy with the imagination of man than with his reason’, and so dismissed astrology, alchemy and natural magic all together. More surprisingly, three and a half centuries earlier his namesake Roger Bacon had not only asserted that the powers of art and nature were infinitely greater than those of magic, but had also pre-empted Clarke’s Third Law (‘Any sufficiently advanced technology is indistinguishable from magic’) with the remark that *multa secreta naturae et artis aestimantur ab indoctis magica*, ‘many secrets of nature and of art are thought by the unlearned to be magical’.¹ ‘Magic’, then, is just a word that ignorant people use to explain things they do not

¹ In his *Epistola de Secretis Operibus Artis et Naturae, et de Nullitate Magiae*, included in Bacon’s *Opera Inedita*, ed. J.S. Brewer (London, 1859) (vol. 15 of the Rolls Series). In view of this letter, it is especially ironic that Friar Bacon should have survived in legend only as a conjurer; see The *famous historie of Friar Bacon* (London, 1629) or Robert Greene’s play *Friar Bacon and Friar Bungay*, written some forty years earlier.
understand: in the face of such well-directed scepticism it is surprising that the concept has survived.

Yet the ‘world where magic works’ is a common setting for science fiction. Is this not, as hostile critics would say, just one more piece of evidence for the genre’s inherent escapism? In some cases the answer is, obviously, ‘yes’: Robert Heinlein’s *Glory Road* (1963) starts: ‘I know a place where there is no smog and no parking problem and no population explosion’, and goes on from there to shed worries, plausibilities and inhibitions up to and beyond the likely limits of pleasure; it also includes a few rather perfunctory magical props, like dragons and pentagrams. But *Glory Road* is weak precisely because of the absence of constraints on its hero, and the feebleness with which turns of the plot are rationalised; it cannot be called representative. If magic is not ‘escapist’, then, can it be considered instead as a ‘radical alternative’, a device by which authors express their resistance to present-day scientific philosophy, their awareness of its materialistic and exploitative tendencies? Once again, this thesis works quite well for some books, like C.S. Lewis’s *That Hideous Strength* (1945), and Ursula Le Guin’s initial ‘Earthsea’ trilogy (for which see item 10, below). But one of the surprising things about ‘worlds where magic works’ is that they have very often been created by authors who are normally the solidiest devotees of hard technology and the engineering outlook – Poul Anderson, Larry Niven, Sprague de Camp and the early Heinlein, to name no more. It seems unlikely that these writers are proclaiming either a flight from science or a resistance to it; their goal is rather the extension of science’s domain, a takeover of magic rather than a surrender to it. In this endeavour science fiction writers have, as often, collectively developed an intellectual position of some complexity and even rigour; they have also, as often, been relying on good old-fashioned nineteenth-century precedent.

In the case of magic, this precedent has been almost single-handedly Sir James Frazer’s enormous compilation *The Golden Bough* (finally growing to 12 volumes in the third edition of 1913–15, the one used here). It is doubtful whether any science fiction writer has ever read this all the way through, but then no one has needed to, since its ideas are evident from the start, easily graspable, and endlessly restated. Almost as much as is necessary, for example, can be deduced from the diagram which appears as early as page 54 of volume 1, showing the various ‘branches of magic’ (Figure 2). The drive towards generalisation alone makes it clear that Sir James assumed that magic was ubiquitous:

2 See Harry Harrison’s characteristically understated review (Harrison 1964: 6–8).
when an English yokel puts ointment on the nail rather than on the wound, and an Australian aborigine burns his enemy’s nail-parings to give him fever, *The Golden Bough* points out they are doing the same thing, that is, utilising the principle of ‘contagion’ below. Similarly, pricking manikins with needles to cause injury and pouring water on the ground to bring rain are both acts of ‘homoeopathy’, no matter who does them or where they are done. Magic, then, is an evolutionary stage through which all societies seem to pass, whether savage, classical, or even modern European – so Frazer concluded, although the conclusion worried him, as one can see from volume 1, pp. 236–7. Nevertheless, besides being ubiquitous, magic also appeared to him to be systematic: modern Europeans might laugh at the ludicrous gap between cause and effect in the examples cited, but they could not deny that there was felt to be a cause-and-effect relationship.

![Diagram of branches of magic](image-url)

**Figure 2** The branches of magic according to the laws of thought which underlie them, from Sir James Frazer’s *The Golden Bough*

From this Sir James deduced a third and most influential point: that in essence primitive magic was not like primitive religion, as most observers had assumed, but was instead similar to science, in its belief that the universe was subject to ‘immutable laws, the operation of which can be foreseen and calculated precisely’. *The Golden Bough* makes this claim overtly in volume 1, pp. 220–2, but the implication is there in the diagram alone. Magic can be classified according to laws; and these laws can be stated in terms analogous to those of physics. Frazer actually formulated the Law of Contact as: ‘things which have been in contact with each other continue to act on each other at a distance after the physical contact has been severed’, and there is in this at least an echo of Newton’s Law of Universal Gravitation, which also deals with action-at-a-distance. The echo is reinforced by casual allusion to the Third Law of Motion some 90 pages later: ‘In magic, as I believe in physics, action and reaction are equal and opposite’. Of course, there can be no doubt that Frazer saw these similarities as
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A joke, partly against the savage (who could not formulate his own principles with anything like European exactness), and partly against the scientist (who invented notions like ‘ether’ on very much the same scanty evidence as that for magical ‘sympathy’); Frazer remained at bottom, like the definer of ‘magic’ for the Oxford English Dictionary, unalterably convinced of the separation between science and magic and the total superiority of the former. Nevertheless, the idea was there: and it is a relatively short step from saying that magic is very like science to saying that it is actually a form of science. It is this further step that many science fiction authors have, with varying levels of seriousness, been happy to take.

Direct quotation of Frazer is fairly common. Sprague de Camp and Fletcher Pratt, at the start of their ‘Incomplete Enchanter’ series in Unknown in 1940, have Dr Chalmers remark that medicine-men believe that they are working through natural laws. ‘Frazer and Seabrook have worked out some of these magical laws. Another is the Law of Contagion: things once in contact continue to interact from a distance after separation …’. Later on, the other principle, that of similarity, is applied to shrinking the nose of Snögg, the troll-jailer. In Magic Inc., a few months later, Robert Heinlein did not need or bother to mention Frazer’s name, but could refer casually to reconstructions based on the ‘law of contiguity’ and the ‘law of homeopathy’: the latter meaning in essence that the part is the whole, the former that structures are implicit in their components. More detailed expansions have appeared since. Still, the real potentials of the ‘Frazerian’ story were exposed as well as anywhere in that early period by Fritz Leiber’s unduly neglected novel, Conjure Wife (1943).³

This appears to be based on a frightening anecdote from the Malleus Maleficarum, in which a man talking casually to his little daughter discovers to his horror that she and her mother are both witches, as are many women, all unsuspected by their male relatives.⁴ In the same way, Leiber’s hero, Professor Saylor, discovers suddenly and by accident that his wife has constructed round him a great web of magic defences to cover him from the malice of the other faculty wives, all of whom, like her, are witches by instinct and tradition. Dismissing it as superstition,

³ Like Magic Inc. and The Incomplete Enchanter, Conjure Wife appeared first in Unknown (April 1943). References here are to the Penguin reprint of 1969, which follows an American book-version of 1953.

⁴ See Montague Summers’s translation of 1928 (2.1.13). Leiber need not have read this to get the idea, since it is quoted in Margaret Murray’s very well-known The Witch-Cult in Western Europe (1921: 172).
he makes her burn her charms; and then, of course, his life turns into a paranoid’s nightmare, with student accusations, missed promotions, charges of academic plagiarism, and so on. In the end his wife, left magically defenceless, is turned into a soulless zombie by her female enemies. It will be obvious that Leiber has made one big change from the notions of the *Malleus*: while his images of the powers of witches are at least as gruesome as ancient ones, he nevertheless accepts magic as ethically neutral, usable protectively as well as aggressively. Nor does the place of magic against religion concern him at all, however vital it was for the witch-hunters Sprenger and Kramer. Further, at the moment of crisis, *The Golden Bough* appears, as talisman-cum-guidebook. For Saylor is a professor of sociology (which we would now call social anthropology) and, faced by a zombie wife, he falls back on his academic speciality. He accepts the assumption that the superstitions he has studied detachedly for so long are all garbled reflections of a real truth; takes down his textbooks (*The Golden Bough* is the only one mentioned); finds some seventeen formulas for calling back the soul recorded by primitive peoples, and reduces them all to a master formula. This combination of superstition and scientific method proves unconquerable, and the story ends (again, unlike the *Malleus*, where the wife was burnt) with triumph and reunion.

The surprise in all this, for an unprepared reader, lies in the direction of Professor Saylor’s progress. When we hear the word ‘magic’ we inevitably think of reversion, savagery, effortless absence of ratiocination; to find magic then put into an academic context and sharpened by mathematical rigour is inevitably arresting. The juxtaposition becomes part of the stock-in-trade of all ‘magical’ authors, who have a particular penchant for setting stories in and around learned conferences; there is an especially close resemblance to *Conjure Wife* thirty years later in Roger Zelazny’s *Jack of Shadows* (1971), where a computer is even dragged in to replace Professor Saylor’s symbolic logic. But it is obvious, too, that Leiber enjoys the process of academic argument for its own sake. After all, if his hypothesis is true, it throws up one major question straight away: why has magic never been reduced to order before (given the amount of research dedicated to it the world over)? The question is in a way the reverse of one asked by Frazer, which was why magic had not been exposed before: and the answers to both are curiously similar. In a

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5 Both Garrett’s *Too Many Magicians* and the second part of *The Incomplete Enchanter* use this trick; de Camp repeated it twenty years later in *The Goblin Tower* (1968). Doctorates and professorships abound in almost all the other books cited.
relatively comic passage (i. 242–3), Sir James had pointed out how hard it was for even intelligent men to prove conclusively that the seasons did not, for instance, follow the rites that men carried out to bring them; he presented a plausible picture of the ‘practical savage’ turning a deaf ear to ‘the subtleties of the theoretical doubter, the philosophic radical’, and ventured to suggest that in England, anyway, the former would on general grounds be hailed as safe, sensible and hard-headed – much more trustworthy than any over-intellectual theorist! Leiber seems to have picked up from this at least the adjective ‘practical’. ‘Magic is a practical science’, Saylor theorises, because it is inevitably concerned with ‘getting or accomplishing something’. This means that the personality of the operator is a part of the magical operation; and this means that experiments are inherently non-repeatable. One of the bases of scientific method is accordingly removed, helping on the one hand to explain the absence of any ‘general theory’ of magic, and on the other administering a check to modern assumptions about the universal scope of experimental science. A second point returns one to the definition of magic in the *Oxford English Dictionary*, ‘the power of compelling the intervention of spiritual beings’. Obviously, if personalities rather than forces are the object of experimentation, further irregularities are likely to enter, making the whole thing more difficult. And, finally, Saylor notes that ‘Magic appears to be a science which markedly depends on its environment’ – in other words, it is subject to rapid change. The constants of physics may perhaps change as well (so Leiber suggests), but, if they do, they do so slowly. Magic, however, needs to be continuously updated by trial and error, and is as a result likely every now and then to fail and be discredited.

So, magic is affected by fluctuations in its controllers, in what it controls, in its surroundings: these are perfectly logical explanations for why people have kept on trying with it, without being able to reduce it to an exact science, and variations of them have been used by most later writers on the theme.\(^6\) Their coherence is enough to turn one’s scepticism, at least momentarily, against the assumptions of science rather than those of magic – why should experiments be capable of repetition by another experimenter, or in another time and place? Is that not assuming something unproven about the nature of the universe? In this way scientific method is turned against itself. And all the way through, *Conjure Wife* draws power from its cool and rational tone, its

\(^6\) Blish, for instance, remarks that ‘magic is intensely sensitive to the personality of the operator’ in *Black Easter*, chap. 3; while the end of Anderson’s *Operation Chaos* amplifies the idea of rapidly changing ‘constants’.
everyday setting, while its central images – the cement dragon, the Prince Rupert drop, the shattering mirror – all carry a physical as well as a magical explanation. The book’s penultimate paragraph, indeed, offers a rational explanation (that all the women involved are psychotic) as an alternative to the fantastic one (that they are all witches), while the last words of all are Professor Saylor saying evasively, ‘I don’t really know’. All this makes *Conjure Wife* fit one rather strict definition of fantasy, that it takes place just as long as one is uncertain about how to explain events. However, it also points out one way in which *Conjure Wife* does not fit the normal development of ‘Frazerian’ science fiction, for all its pioneering motifs and explanations.

This is, that most ‘worlds where magic works’ are alternate worlds, parallel worlds, future worlds, far-past worlds. *Conjure Wife* is one of very few to be set in a recognisable present. It gains from this, of course, in realism; but loses, inevitably, a quality of romance. It has witches, and spells, and even the glimpsed presence of He Who Walks Behind; but there are no centaurs, or werewolves, or mermaids, or basilisks, or any of the other ancient images of fantasy. The only dragon in *Conjure Wife* is a cement one. Yet there is clearly an urge in many writers and readers to resurrect these images and use them again, partly no doubt as a result of ‘escapism’, but at least as much out of a kind of intellectual thrift: ideas compulsively attractive to mankind for so long, it is felt, are too good to throw away. Nevertheless, this urge, powerful though it is, is met by an equally powerful current of scepticism. Twentieth-century readers, especially those with some scientific training or inclination, cannot even pretend to believe in anything that makes no sense, i.e., anything that has no rationalistic theory to cover it. Frazer and *The Golden Bough* provided a rationale for magic, as exploited by Leiber in *Conjure Wife*. But he dealt only with natural forces. How could his lead be extended to the more exciting paraphernalia of fantasy?

Here the pioneering figure, as so often, was Robert Heinlein, the man ‘who first incorporated magic’, as Poul Anderson called him thirty years later. His *Magic Inc.* (which appeared first as ‘The Devil Makes the

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7 Put forward by Tzvetan Todorov (1970): things are either étrange (abnormal) or merveilleux (supernatural; there may be a period when one is not sure which category an event is in: ‘le fantastique occupe le temps de cette incertitude’. The theory is more neat than comprehensive, though it has often been cited academically.

8 Only Blish’s *Black Easter* is comparable, and that not very much so. It needs to be said that *Black Easter*, while evidently in this sub-genre, is nevertheless so individual as to demand special treatment, preferably in company with the other volumes of *After Such Knowledge*. 
Law’ in Unknown (Sept. 1940)) is set firmly in an alternate world full of salamanders, demons, gnomes, witch-smellers, etc. Yet the hallmark of the story is a kind of hard-boiled materialism characteristic of Heinlein at any time, but in this case working extraordinarily well, to produce a species of literary effect hardly possible in any earlier period. The tone is set in the first scene, where the ‘Heinlein hero’, Archie Fraser (it seems unlikely that the name is just a coincidence), confronts a thug who is trying to sell him ‘protection’. The situation is such a cliché in thrillers and films as to seem absolutely predictable; but both characters talk from the start as if magic was normal. Not only normal, one should say, but calculable and even trivial, for it is one of the strong points of Archie Fraser’s characterisation that his job – he is a building-materials supplier – does not bring him into contact with magic very much, being thoroughly earthbound and involving too much ‘cold iron’. As a result, he sees it both peripherally and objectively, concerned all the time to evaluate it in terms of cash. After his refusal to pay ‘protection’ and the consequent gutting of his store by gnomes, undines and salamanders, Fraser’s real concern is not with what he has had destroyed – being covered by insurance – but by the longer-term effects:

I was not covered against the business I would lose in the meantime, nor did I have any way to complete current contracts; if I let them slide, it would ruin the good will of my business, and lay me open to suits for damage. The situation was worse than I had thought …

The paragraph just quoted could come from any book set in normal and contemporary America; and that is the level on which Fraser continues to think. Faced with the problem outlined he talks to his insurers; then to a professional salvage consultant; then to one in private practice. Fees are negotiated, percentages adjusted, the threat of a monopoly exposed. The fact that on another level the conspiracy is literally Hellish, the practitioners demons, the consultants warlocks and witches, receives no overt comment from the principals and is studiedly underplayed. But the result of the coolness projected is, of course, reassurance. The idea behind it is: Fraser is a materialist; he believes in demons; if someone as sceptical as him is convinced, there must be some evidence for it … And so even the suspicious twentieth-century reader is drawn along, partly hostile, partly enchanted, but at least having his rationalism soothed (by Fraser) at the same time as it is irritated (by the events of the story). Further, the reader is assured early on that there are some things, even in a fantastic universe, which can be reacted to as firmly and as negatively as usual; in the first
scene, Fraser pounces on the thug who is threatening him because he notices he is wearing an amulet – and this means ‘he was superstitious, even in this day and age’. The ‘this day and age’ is a characteristic post-Enlightenment formula, and so is the concept of ‘superstition’, ‘unreasonable’ or ‘groundless’ belief, as the *Oxford English Dictionary* says (xvii.241). The phrase makes Fraser, once again, akin to us in spite of his acceptance of magic; and since he only accepts some magic, part of the interest of *Magic Inc.* is finding out where and how he draws his boundaries of belief.

On this, Heinlein spends a great deal more time than is strictly necessary for the narrative. Having been visited and threatened, Fraser goes over to see a friend of his, one Jedson, a fellow-businessman but one with a larger stake in magic – and finds him trying to get a witch to make clothes. The clothes never get made, the witch is irrelevant, but the scene (a fairly long one) tells us a good deal about the nature of magic: one, that it is often not cost-effective, two, that it works by homoeopathy and contiguity, as already mentioned, but three, that there is something beyond this involving the Half World of the demons. Similar side-issues crop up continually. Catching a taxi allows a digression on the dangers of travel over consecrated ground (where magic stops working); a scene in the state capital brings up remarks on the attitude of trade unions to non-human labour; going to a restaurant points out how useful illusory magic food is to a slimmer. And the real function of all this ‘wasted’ space is not to fill in the background or show off Heinlein’s bizarre imagination, but to remove magic from the sphere of the fantastic/supernatural and bring it solidly down to the everyday/commercial/legal/exploitable.

It might seem that de-glamorising magic ruins its point! But that would be to misconceive the attraction that magic has for the modern reader (of science fiction, anyway). For we are all in a sense blasé, in a sense spoilt. In a world of half-understood scientific miracles, mere strange things (like wonderful cures or marvellous implements) no longer have much power to shock; seven-league boots and flying horses are more or less with us already. But what we have become greedy for are novel theories, or systems, or inferences, or anything which suggests that there is a world outside the dimly understood but strongly felt cage of scientific probability, of the universe as-it-seems-at-the-moment. Where a medieval mind, in short, would be happy with a magic lance, we want to know how magic lances are made, whether the magic resides in weapon or user, what happens when magic lance hits magic shield, and in general what kind of world view is necessary to produce and enclose any such phenomenon. It is this
itch which Heinlein’s asides scratch so effectively; they show us how people very similar to ourselves would react if just a few of the bars of our intellectual cage were relocated.

From this point of view, the side-issues of Magic Inc. are in practice its high points. The story itself, of mobsters overcome by rugged individualists, has no surprises. It exists only to allow the detailed presentation of an alternate world (though admittedly one caught at a dramatic moment); and in reading about that alternate world one’s pleasure comes for the most part, first from comparing it with one’s own, and second from comparing it with the uninhibited world of ancient fantasy and fairy-tale. The similarities with the latter are obvious, superficial; with the former they are deep-rooted in the characters’ attitudes. The book could not work without the resultant double tension, the evocation of romance only to have it crushed and the presentation of sordid reality only to see it spin unpredictably away; and the pervasive tone that results, while hard to characterise, is at any rate something distinctive and novel in the history of literature, something marked above all not by credulity but by wit – the simultaneous perception of similarities and differences.

One might think that what has just been said would be an adequate raison d’être for any literary form; and, in literary terms, so it is. Science fiction writers, however, tend to adopt sterner criteria than mere critics. And James Blish, notably, has stigmatised the whole sub-genre of books about magic (in his 1968 ‘Preface’ to Black Easter) as classifiable ‘without exception as either romantic or playful’ – remembering perhaps that though it is only a short step from saying that magic is like science to saying it is a form of science, nevertheless it is a markedly definitive one. Is his criticism true, and is it adequate? Can ‘worlds where magic works’ be defended on grounds other than those of entertainment? These are questions that science fiction authors are themselves inclined to pose: they are not all easy to answer.

One can begin by admitting the immediate force of Blish’s categorisation. The ‘romantic’ half of magic literature covers what are usually called ‘sword and sorcery’ books, from Tolkien to Robert E. Howard: books which present magic without trying to explain it, books which recreate (or exploit) an ancient glamour. Heinlein and Leiber, though, both fall presumably into the ‘playful’ bracket first because they have no serious interest in the history of magic, second because they are concerned with drawing as much complexity as possible from as few ‘rule-changes’ as possible. A comic streak is discernible in both, rather faintly in Leiber (the running parallel of small-town America with savage Polynesia), pretty obviously in Heinlein (the rescuing demon
who turns out to be from the FBI, snap-brim hat and all). The streak becomes a distinguishing mark in Poul Anderson’s *Operation Chaos* (published as a book in 1971), at least in its earlier chapters. The first story, for instance (published as ‘Operation Afreet’ in *Fantasy & Science Fiction* 1956), ends with the psychoanalysing of the enemy spirit, who turns out to have a phobia about water; the juxtaposition of ancient and modern lets us feel comfortably superior as well as amused. Something could be said about the way in which Andersen moves from the mere manipulation of logical twists in that story to the genuinely powerful analogies of ‘Operation Changeling’, set in the same universe but written thirteen years later, but the reasons are political rather than magical, and have to be left.9 It is enough to say that through his career Anderson in particular has been able to confirm Blish by contrasting magic and science, fantasy and reality, in a way that is not only ‘playful’ but almost diagrammatically so.

In his early book, *Three Hearts and Three Lions* (1953), for instance, Anderson relies virtually exclusively on the transit from what one might call ‘legendary datum’ to ‘technological answer’. Thus, in one scene, the hero Holger is pursued by a dragon; since it is, like all proper dragons, fifty feet long, winged and fire-breathing, even a Beowulf can hardly hope to beat it fair and square. ‘How’d ye conquer him, best o’ knights?’, as the swan-maiden so rightly asks. ‘A little thermodynamics is all’, replies Holger modestly. ‘Not magic. Look, if the creature breathed fire, then it had to be even hotter inside. So I tossed half a gallon of water down its gullet. Caused a small boiler explosion … Nothing to it.’ The operative words, of course, are ‘had to’: dragons ‘have to’ have internal heat to a rationalistic mind, a modern one, just as giants have to be squat (to bear their own weight, by the law of proportion), and dwarves are bound to be cheeky (in overcompensation for their inevitable inferiority complexes). Even in fantasy, what is known cannot be put aside. Most of Holger’s adventures, accordingly, follow this pattern: a ‘legendary datum’ is presented, something familiar from fairy-tale, as that dragons breathe fire, or that fairies cannot touch iron, or that some human children are werewolves. This is then scrutinised closely, to show that (as we would expect of primitive notions) the data contain ‘unconsidered assumptions’ that appear self-contradictory; fairies, after all, have equipment of the same kind as men, werewolves have human parents, dragons presumably have animal intestines. A ‘logical query’ emerges: what metal do fairies use, since they must use something? How do dragons contain their internal heat? How do werewolves survive

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infancy? And then we are given the appropriate ‘technological answer’ – fairies must be able to work aluminium, magnesium, beryllium ... dragons must have guts like boilers. As for werewolves, they can only be explained by the concept of a recessive gene. ‘If you had the entire set, you were a lycanthrope always and everywhere – and were most likely killed the first time your father found a wolf-cub in his baby’s cradle. With an incomplete inheritance, the tendency to change was weaker.’ So some werewolves, like haemophiliacs, survive by accident till puberty, and till other influences trigger their metamorphosis.

Arguments like this have a kind of delight to offer, especially when they are urged on as thick and fast as they are by Anderson. They give one permission to believe in fairyland, they allow one to speculate that ancient stories are indeed the garbled descendants of truth. Nevertheless, they do start and end in comedy: wizards with spectroscopes (Anderson), English knights with old-school ties (Astolph in de Camp and Pratt’s The Castle of Iron), wizards who turn not into elephants but into plague-germs (Merlin in T.H. White’s The Sword in the Stone). ‘Playful’ is a fair description of them. To go further, one needs to look at what is perhaps the greatest tour de force in ‘Frazerian’ literature, Randall Garrett’s ‘Lord Darcy’ series, mostly from Analog.¹⁰

This contains echoes of practically all the works mentioned so far. In Three Hearts and Three Lions, for instance, the elf-duke sings a few lines of an epic:

Gérard li vaillant, nostre brigadier magnes,  
tres ans tut pleins ad esté en Espagne  
contbattant contre la Grande Bretagne.

The lines are modelled on the start of the Chanson de Roland, greatest of the Charlemagne romances of our world, the books which provide the fantastic universe into which Holger has fallen (or re-fallen, since he is in romance terms the paladin Ogier the Dane). But, of course, they are about the Napoleonic wars, history to us, fantasy to the elf-duke; and their hero is Conan Doyle’s Brigadier Gerard. Randall Garrett, too, draws on Conan Doyle, since Lord Darcy and his henchman Master

¹⁰ The series comprises four novelettes, a serial and four shorter stories, all but two published in Analog between 1964 and 1976. The serial, Too Many Magicians, was published in book form in 1966 and the stories were collected as Murder and Magic (1979) and Lord Darcy Investigates (1981). All nine works were collected in an omnibus volume as Lord Darcy (1983), and two further short stories were added in an expanded version of the latter in 2002. Citations here are from the 1983 volume.
Sean O Lochlainn are evident analogues of Sherlock Holmes and Dr Watson (down to Lord Darcy possessing a brilliant, fat, bone-idle cousin like Sherlock’s Mycroft). They inhabit an alternate universe in which magic has developed rather than science, as in Operation Chaos, and the main result of this is that Master Sean, the forensic sorcerer, is far more important than Dr Watson ever was. As in Magic Inc., the high points of the Garrett series are in fact his explanations and experiments, not the detective story that encloses them. And, finally, Garrett’s creation resembles Conjure Wife and The Incomplete Enchanter in being solidly and overtly based on Frazer.

Yet it embodies distinct and even massive development. It will be remembered that Sir James stated the Law of Contagion as: ‘that things which have once been in contact with each other continue to act on each other at a distance after the physical contact has been severed’. De Camp and Pratt rephrased this as ‘Things once in contact continue to interact from a distance after separation’. Master Sean, however, states it firmly and early as:

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\text{any two objects which have ever been in contact with each other have an affinity for each other which is directly proportional to the product of the degree of relevancy of the contact and the length of time they were in contact and inversely proportional to the length of time since they have ceased to be in contact. (Lord Darcy (1983): 22)}
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Here the Newtonian analogy is inevitable, deliberate. If one can state the Law of Universal Gravitation as \( F_G = G(m' m^\prime) / (r^2) \), one can easily rewrite Garrett’s Law of Contagion as \( F_C = A((rc'l)^\prime) / t \). There is a rigour in the framing never apparent before. There is also an expansion. All previous authors had stuck close to Frazer’s two basic principles, similarity or homoeopathy and contagion or contiguity. Garrett uses both, but adds the Laws of Relevance, Synecdoche and Congruency, with Psychic Algebra (and evidently a great deal more) lurking in the background. The laws are not just stated, furthermore, but used and explained. The concept of ‘relevancy’, for instance, which Garrett has added to Frazer’s Law of Contagion, comes up at least five times in the five works that make up the ‘Lord Darcy’ series. In the first of them, ‘The Eyes Have It’, it functions in two of the ‘forensic’ tests that Master Scan carries out to assist Lord Darcy’s murder investigation. First, it establishes that a button has been torn from a particular robe; then a spell is cast on the bullet taken from the murdered man’s heart and now set up on a pedestal in line with the muzzle of a suspect gun:
As the last syllable was formed by his lips, the bullet vanished with a ping! In its vise, the little gun vibrated.

‘Ah!’ said Master Sean. ‘No question there, eh? That’s the death weapon all right, my lord. Yes. Time’s almost exactly the same as that of the removal of the button …’ (Lord Darcy (1983): 23)

After this demonstration of expertise, the question is pretty evidently why magic cannot find the murderer as easily as it can identify the weapon. But here ‘relevancy’ returns. As Master Sean explains, a gun is ‘relevant’ to the bullet it fires in a way that is not true, for instance, of a dress and its wearer; the gun changes the bullet strongly and quickly, while being worn affects a garment only slowly, if at all. So the best of sorcerers cannot trace a murderer from a single clue. Obviously, it would ruin the story if he could, and it is vital for Garrett to leave some room for Lord Darcy’s deductive powers. Nevertheless, ‘relevancy’ makes a kind of sense, first, because we can all see that some contacts are just more intimate than others, and this ought to be allowed for in any ‘Law of Contagion’, and, second, because the whole scene can hardly fail to make us think of present-day ballistics testing. We too can identify a gun from a bullet; but not a person from his clothes. In a later story, ‘The Muddle of the Woad’, the point comes up again. Once more, a scrap of cloth is a clue, and once more Master Sean regrets that ‘relevancy’ cannot help, while preparing an apparatus consisting of a tumbler and several pounds of fine green floc (i.e., finely chopped linen), if cloth is ripped, he remarks, it can be repaired by a kind of seamless mending:

but that’s a simple bit of magic compared to a job like this. There, all [one] has to do is make use of the Law of Relevance, and the two edges of a rip in cloth have such high relevance to each other that the job’s a snap.

But this floc, d’ye see, has no direct relevance to the bit o’ cloth at all. For this, we have to use the Law of Synecdoche, which says that the part is equivalent to the whole – and contrariwise. (Lord Darcy (1983): 135)

And he goes on to put the floc and the scrap in the tumbling barrel, cast his spells, and have the whole thing revolved for several hours. The result is ‘reconstruction’, a long robe of fuzzy floc, capable of being seen and measured, but without any structural strength: the undifferentiated linen has attached itself to the original scrap in the way that the latter’s inherent structure has dictated. Again, what is plausible in this experiment is its limitations. Heinlein had proposed a similar trick in
Magic Inc., but there the whole thing was simpler, sturdier, more reliable – in fact, it all worked ‘just like magic’. Garrett makes the binding forces much feeble, not stronger, as Master Sean says, than the attraction of rubbed amber for lint (or what we would call ‘static electricity’). Nevertheless, the experiment suggests to us once more that a piece of cloth may be ‘relevant’ to another but not to a third, a hypothesis that simultaneously makes sense and offers the laws of magic something obvious to work on. Later, the same principle is used to differentiate an accidental ink stain from deliberate handwriting (intention makes the latter ‘relevant’ to the paper in a way the former is not) and again to explain how some keys are ‘relevant’ to some locks.

The true detection in all this is being done by the reader! What Master Sean says is as often as not explanation for why he cannot solve mysteries, and so at times has a rather marginal reference to the Sherlocking that is the ostensible subject of the story; in ‘The Eyes Have It’, for instance, Master Sean identifies the murder weapon, and finds that its owner is a black magician. However, this man turns out to be quite innocent of the case under investigation; the murder is solved purely logically by Lord Darcy, and Master Sean’s last test – developing the image on the dead man’s retina – is both inadmissible as evidence and curiously misleading. Has magic, then, led nowhere? In a sense, yes. But in a deeper sense the reader gains his pleasure not from outguessing Lord Darcy (as he might do in a conventional detective story) but from evaluating the logic of Master Sean. It is vital that what he says should appear logical, and internally consistent (‘relevancy’ has to be the same principle under all its variant aspects); also, that what he says should be plausible, reminding us at least from time to time of phenomena we really believe to exist – like static electricity or ballistic markings. In the same way the ‘magic’ has to be recondite to be arresting, and matter-of-fact to be convincing. Randall Garrett’s stories are successful precisely insofar as these conflicting criteria are met; but when they are satisfied (as they are with great wit and thoroughness) a literary effect is created which is quite different from, and superior to, the jigsaw-puzzle neatness of even the best of Sherlock Holmes. The story is there for the setting, in short, and not the other way round.

Is all this merely ‘playful’? James Blish probably thought so. At one point in Black Easter he has one of his characters quote Master Sean: ‘As a modern writer says somewhere, the only really serviceable symbol for a sharp sword is a sharp sword’.11 The casual nature of the reference is slightly patronising and suggests a consciousness of superior knowledge.

For all its consistency, Blish seems to have considered Garrett’s magic as no more than an intellectual construction without historical truth, hence a game – and so much can be accepted. The ‘Lord Darcy’ stories, though, are serious in a way that Operation Chaos and Magic Inc. are not: they enshrine a genuine interest not in the history of magic but in the history and nature of science. A part of their total effect is in fact ironic. And (as modern literary critics know to their cost) nothing, nowadays, is allowed to be quite as deadly serious as that.

The point is made briskly by an unimportant but recurrent character, Sir Thomas Leseaux, the theoretical thaumaturgist. It needs to be remembered that Garrett, like his predecessors, is aware of the fundamental question, if magic works, why have we not been able to systematise it? And his answer involves an element not used with any force by de Camp or Leiber or Heinlein or Anderson: that is, the Talent. Something else that makes magic different from science is that some people can do it while others cannot, not because of their intellectual power or lack of it, but because of some indefinable but quantifiable faculty, like a gift for music or mathematics. Master Sean has the Talent and Sir Thomas Leseaux has not. However, this does not stop Sir Thomas from being a Doctor of Thaumaturgy, it means simply that he does pure research and others put it into practice. It means also that he is committed to the theory of magic in a way that even Master Sean is not; and here the irony sets in. In ‘The Muddle of the Woad’, Sir Thomas is lecturing Lord Darcy on the evils of superstition (another hangover from Magic Inc.). The lower classes, he insists, ‘confuse superstition with science’:

‘That’s why we have hedge magicians, black wizards, witches’ and warlocks’ covens, and all the rest of that criminal fraternity. A person becomes ill, and instead of going to a proper Healer, he goes to a witch, who may cover a wound with moldy bread and make meaningless incantations, or give a patient with heart trouble a tea brewed of foxglove or some other herb which has no symbolic relationship to his trouble at all. Oh, I tell you. my lord, this sort of thing must be stamped out!’ (Lord Darcy (1983): 123)

Here the primary irony is against Sir Thomas. We no longer believe in ‘incantations’, but ‘mouldy bread’ makes us think of penicillin; foxgloves contain digitalis, a drug used in treatment of heart diseases. So the witch-women may know something after all. The second irony, though, is against pure scientists of any kind. Sir Thomas ignores facts that are outside his theory; in his world, the facts are materialistic – so can there
be ‘facts’ that are magical? Symmetry suggests it, and the scorn with which unorthodox phenomena are treated is a constant in both real and imagined worlds. Garrett is then indicating once more the bars of the scientific ‘cage’. It is hard to know how far he means it seriously, but at any rate he presents it much less fancifully than Anderson or Heinlein. Sir Thomas’s revelation of bias, like Professor Saylor’s half-lecture in chapter 16 of *Conjure Wife*, addresses itself to a genuine question: why, if there is anything in magic, it has not already become evident. The answer is coherent, if not absolutely cogent.

In any case, the parallels between scientific and magical history reach extraordinary density all through Garrett’s series. In the course of one story or another we come across the magic equivalents of freezers, torches, televisions, vacuum cleaners: in each case the implement is provided with a theory of operation, and some hint as to how the evident technological bottleneck (e.g., filaments in light bulbs) has been noticed and unblocked. Other references also suggest that even if the theoretical superstructure of the ‘magic’ world is different from ours, it still has to deal with the same phenomena: in trying to determine the identity of a dead man (in ‘A Case of Identity’) Master Sean performs a blood test based on the number 46. He has no idea why this is significant, and to him biology is a stifled art, but 46 is the number of human chromosomes; his method is strange but his answer is right. Still other references frankly make us wonder, like Lord Darcy’s remark on number symbolism: ‘Inanimate nature tends to avoid fiveness’. Sir Thomas Browne, that early half-scientist, thought differently (his *The Garden of Cyrus* (1658) was devoted to the collection of quincunxes of all kinds) but it seems to be a ‘fact’ – could it mean anything? More extensively, the whole of *Too Many Magicians*, the only full-length novel in the series, is linked thematically by the notion of the human mind deluding itself. At the start of the story Master Sean has his magic bag returned to him by a series of unconscious but hardly accidental transfers; later we have the ‘Tarnhelm effect’ explained to us, which shows that no one can be made invisible, but people can be conditioned against looking directly at what they fear; the technological secret at the centre of the book is the Royal Navy’s new ‘confusion projector’, a spell which makes it impossible for men to carry out destructive activities, like loading guns. One could shrug all these off as mere fantasies, but the subject-matter has got uncomfortably close to matters we believe to be real, but as yet outside an adequate materialistic theory: the unconscious mind, psychic compulsions, hypnosis. Recognition of this may indeed make one laugh, and to that extent the novel is still ‘playful’. But the fact is not dispersed by laughter: recognition of that is also part of the novel’s effect.
There is indeed an overall suggestion of the ‘radical alternative’ about Garrett’s world, politico-culturally as well as magico-scientifically. The latent similarity to Sherlock Holmes is useful, to begin with, in that Victorian England provides a rough analogue to the state of technical progress in Lord Darcy’s world: steam-trains but horse-drawn carriages, gas-lights but no electricity, a kind of telegraph but neither wireless nor telephones. The ‘feel’ of things is historically familiar. But against this there is a series of marked differences. Since the political history of the world is changed (Richard I did not die in 1199, but recovered to found the Plantagenet Empire ever more solidly), Lord Darcy is not allowed the fundamental irresponsibility of Holmes. He is in the service of the Duke of Normandy (service is personal rather than to the state), he has a stricter theory of ethics than Holmes’s blend of common law and class feeling, and both he and Master Sean are good Catholics, since the Church, revitalised by its control of magic, has never needed reform. It is hard to evade the conclusion that this imaginary world is somehow nicer than both its analogues, Victorian England and contemporary America, being at once strict, fair, personal and devout. Randall Garrett does not follow through to denounce the pervasively bad effects of materialism on the psyche, or to follow Mark Twain in assuming that science, democracy and nonconformism are all much the same thing: but he knows there is a case for both theories, and their latent presence gives his stories further intellectual mass. Probably the burden of the series is that Frazer wrote truer than he knew: Victorian England did have savage analogues, and so do all human societies. The position of assured superiority taken up, for example, by the Oxford English Dictionary lexicographer is inevitably a false one.

Magic exists only in the mind, as has been said. Another way of putting that is to say that magic is an accident of history. If a phenomenon fits current theory, then, however improbable it is, it is ‘natural’. If it does not, it is inevitably ‘supernatural’. But it is a mistake to think this borderline a fixed one. Rainbows kept a touch of the supernatural till Newton, magnets till William Gilbert (at least). In the present day,

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12 It seems likely that the Holmes-analogue misled Garrett slightly at an early stage; he introduces a ‘teleson’ to parallel the Victorian telegraph, but realises later what an anomaly anything electrical would be. In Too Many Magicians we are told that no one knows how the ‘teleson’ works. [After this piece was printed in Foundation, Randall Garrett wrote to me on this point, saying cheerfully that he ‘denied the allegation and defied the alligator’. Regrettably, I have since lost the letter, and, alas, forgotten his explanation, but he did have one: the ‘teleson’ was not a mistake.]

13 William Gilbert wrote his De Magnetis in 1600, and has a claim to have
ghosts, hypnosis, clairvoyance and dowsing are all supernatural in differing degrees; it would be rash to think they will all forever remain so (or all be brought to heel). Magic, therefore, need not be just a word used by ignorant people to explain what they do not understand, but a word used by sensible people to indicate that they know their understanding is limited. This thesis underlies all the books that have been discussed here, and one should not allow semantic prejudice to disguise its essential modesty, on a serious level, nor its capacity for producing wit, on a comic one.

There remain three final caveats. One is that this article has assumed that all threads run from Frazer. This need not be entirely true: de Camp and Pratt mention W.B. Seabrook, who wrote a series of books on witchcraft and primitive custom between 1928 and 1941. Larry Niven has based an entire series on the proposition of J.H. Codrington (1891), that mana is ‘the belief in a supernatural power or influence ... present in the atmosphere of life’, readily accessible as quoted in the article on ‘magic’ in the 1954 Encyclopaedia Britannica, vol. 14, p. 1043. Niven takes Codrington’s metaphor literally, as Leiber did with Frazer’s ‘laws’, and the process of development is the same. But this shows only that not all magic stories need have their roots in the same bit of the nineteenth century (though, as it happens, Frazer actually quotes Codrington at i. 227, so perhaps they do). Second, it is evident that science fiction motifs have a life of their own. Several of the authors discussed quote each other, even answer each other’s conundrums (it is characteristic that James Blish should actually defend ‘superstition’, quite logically, against both Heinlein and Garrett in Black Easter, chap. 8). This means that some authors have probably never heard of Frazer or Seabrook or anybody else in that field, but have got their ideas from science fiction itself. One can only remark that this does not seem to happen as often as might be expected; in many authors, honest passion for learning outweighs even the boredom jammed into obsolete anthropology, thus providing almost the only audience still surviving that is interested in The Golden Bough for itself.

But, finally, one should remark that Sir James did reach one audience besides writers of science fiction, and that is, writers of books on the occult. Margaret Murray, in particular, decided at some time before 1920 that magic was neither magic nor science, but actually religion: ‘Ritual Witchcraft’, not ‘Operative Witchcraft’, as she put it. The further story of founded electrical studies by doing so; he also believed, however, in contagious magic (putting ointment on nails not wounds), and thought magnetism had something to do with it.
her mission has been detailed in Europe’s Inner Demons, by Norman Cohn (1975), and more recently by Ronald Hutton’s Triumph of the Moon (1999). Her influence, indeed, continues to grow through different versions of the ‘New Age’ movement. Nothing is more characteristic, however, than the indifference shown to this development by authors of science fiction. Anderson and Heinlein make perfunctory gestures towards established religion; Leiber, de Camp and Pratt ignore it; James Blish respects orthodoxy and heresy about equally. Garrett, the only author actually to bring religion into his story and use it sympathetically, nevertheless stops to make evident and derisive references to the Murray-cult in his picture of ‘The Holy Society of Ancient Albion’ in ‘The Muddle of the Woad’: fanatics without grasp of history or logic, whose self-aggrandising desire for excitement is open only to exploitation. Curiosity about magic, in short, can be tolerated, but never reverence for it. This is only the last of many ways in which magic and science are treated identically.