

**The “Murdering Twinmaker”:
Putting Into Context an Overlooked Icon of Science Fiction**

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Abstract

Putting Into Context an Overlooked Icon of Science Fiction

The concept of instantaneous travel by imaginary technologies has been a key trope in science fiction from the late nineteenth century to the present day, made iconic by *Star Trek's* imperative 'Beam me up, Scotty' but under-examined in critical literature. This exegesis examines the rise (and fall) of the matter transmitter as a motif and metaphor in British and American science fiction, and its implications for reflecting upon social, scientific and technological change. The exegesis concludes with an analysis of my past and present usage of the trope, putting into context the creative component of this thesis.

Making and Remaking Iteration 113

A post-scarcity world transformed by free, instantaneous travel should be paradise, but nothing is entirely as it seems. Clair Hill uses Improvement, a meme promising physical transformation for the better by little more than wishing for it. In doing so she brings into being an artificial mind, Q, designed to shepherd her through a sinister process of remaking that will ultimately turn them both into entirely different people.

Statement of Originality

This work contains no material which has been accepted for the award of any other degree of diploma in any university or other tertiary institution and, to the best of my knowledge of belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act of 1968. In the case of “Making and Remaking Iteration 113” there will be a two-year embargo.

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1 Introduction

Science fiction (SF) can be characterized by its frequent employment of conventions unique to the genre, ranging from relatively mundane props such as rayguns and sonic screwdrivers to

the great cosmic technologies that embody the science of sf: interstellar spaceships, time machines, ftl drive, navigable wormholes, evolution instigators, teleportation, artificial wisdom, material immortality. (Csicsery-Ronay 120)

Sitting at a critical juncture of technoscientific innovation and mainstream culture, SF is fundamentally concerned with introducing new concepts to the value-bearing stories and metaphors of social life. It “rationalizes highly romantic and fantastic stories by means of scientific ideas” and “places abstract information about technology and science in the service of figuration and narrative” (Csicsery-Ronay 115). This double service has the long-term effect of giving the exotic increased eminence in the public mind until what seems—and might actually be—impossible becomes paradoxically concrete in the social imagination (131). These conventions—the props, tropes and icons of SF—thus occupy a liminal space between the real and unreal, providing a set of familiar symbolic codes while at the same time demonstrating an enduring concern “with the dialectic of known and unknown” that ensures their continuance (Wolfe 16):

The recognizable ‘props’ of the genre such as mutations, alien being, spaceships, cities, robots, the wasteland . . . , it may seem, should have been done to death long ago; there is not one among them that we cannot find already well-developed in science fiction prior to 1940. Why, then, do such images exert such a powerful and continuing hold on the science-fiction imagination (and indeed on the popular imagination general, which has

begun to turn more and more to science fiction images . . .)? Is it that the genre is indeed so narrow in scope that it must return over and over to the same images? Is it that science-fiction writers, constrained for so long by the formula-minded audiences and editors of a genre that began as pulp fiction, simply cannot free themselves from a standard repertoire of conventional images? . . . I would argue that such images as these transcend popular literature notions of conventions and stereotypes. They are in fact . . . representative of the fundamental beliefs and values that the genre explores. (Wolfe 16-18)

These “beliefs and values” and the conventions that engage with them ultimately have their genesis in the nineteenth century’s commitment to the Enlightenment. Investment in science, integrity of the individual, secularization and the pursuit of change clearly fuel proto-SF narratives, which combine and transform literary forms until the notion that “science fiction” exists as a genre in its own right appears early in the twentieth century (Rose 10).¹ Subsequent evolution of the genre’s form and practice led to wild mutation and combination of tropes at its fringes, while other tropes actually came true, thereby robbing them of some of their symbolic effectiveness (Hollinger 244; Wolfe 28). No element of the genre emerged from the twentieth century unexamined. Those tropes that endure possess qualities that make them capable of engagement on numerous fronts.

The trope of the matter transmitter, “a device that can dematerialize a thing—even a living body—into a pattern of information that it transmits as a beam and rematerializes at another location”, has labored under many guises and names since its first recognizably science fictional appearance, “teleportation”, “transmatting” and “transporting” among them (Livingston 79). In my fiction I refer to this trope predominantly as “d-mat”, a term I

¹ Ground-breaking editor Hugo Gernsback became editor of *Astounding* from 1931, and this is the date from which the Golden Age of SF is usually said to begin.

will employ here alongside “matter transmission” except when quoting from primary texts.² The “instantaneous or near-instantaneous transfer of matter from one point in space to another, usually without concern for intervening barriers” is often described as a “facilitating device . . . a way of magically whisking the lead characters out of tight situations [or into them]—a resource which [authors] sometimes overuse as a means of moving the plot along” (Langford 2005A 800; Stableford 2007 123). Thanks to *Star Trek*’s imagined transporter, “Beam me up, Scotty” has become “a ubiquitous tag or cliché” (Bendle 54; see also Lengeman).

Studies that examine the technological influences on or philosophical implications of such instantaneous transportation tend to focus on time travel (for instance *Time Machines: Time Travel in Physics, Metaphysics, and Science Fiction* (Nahin) or *Generations: The Time Machine in Theory and Practice* (Burnett)).³ Moreover, what limited body of critical scholarship that is directly concerned with matter transmission is overwhelmingly focused on iconic examples in film studies, for example, or falls outside of literary and cultural theory into the fields of cognitive philosophy and particle physics. Only a very limited number of scholars have examined the trope in its original context, leaving a puzzling gap in the literature and something of a barrier to further scholarship—a tyranny of disinterest rather than a tyranny of distance, which is ironic given the trope’s conquest of the latter.

Gary K. Wolfe analyses the use of barriers such as distance in twentieth century literature as not only a narrative device, “but as a recurring image of alienation and isolation”:

² For other names, see Appendix. For other definitions, see Commander X and Swartz (5), Hollinger (243), Niven 1971, Prucher (117), and Scholes and Rabkin (175).

³ Few tropes in any field of literature are as decisively imagined as in H. G. Wells’ *The Time Machine*, which in 1895 named and described the titular device so effectively it remains firmly fixed in the popular imagination as the default means of effecting travel through time.

Unlike other genres of modern literature that internalize the barrier . . . the constrictions of [science fiction's] ancestral pulp narrative style have demanded that what inner conflicts exist must be portrayed in easily accessible images and actions. (30)

When the barrier is distance—passive, invisible, to be conquered time and again in SF—the matter transmitter is the simplest way to breach it, something Wolfe goes on to discuss only in the briefest possible terms, ignoring the trope's many other functions:

Related to the image of the barrier is the image of the 'portal' or doorway, which is itself an opening in the hidden barriers that separate us from unknown worlds. (33)

Wolfe is more generous to another prop of the genre, the force field, which “may originally have evolved simply as science fiction's version of the perfect defensive weapon, [but] has over the years accrued added meanings, until it is an almost an ideal image of the barrier that separates the known from the unknown (33).” Such barriers are undoubtedly meaningful, but breaching them is no less a meaningful act than erecting one in the first place, and the tropes that enable authors to do so are equally worthy of examination.

Although he overlooks the matter transmitter, Wolfe convincingly argues that some of SF's familiar tropes might seem simple in conception but are rich in application and consistently reward deeper analysis. Three factors, he says, give particular tropes iconic status within the context of science fiction:

(1) the icon connotes opposition between the known and the unknown, and thus serves as a structural pivot for the work of which it is a part; (2) the icon represents not a mimetic, but what has been called “subjunctive” reality, portraying hypothetical environments and beings rather than imitations of real ones . . . and (3) the meaning of icons involves psychological and cultural levels as well as fictive and aesthetic ones, so that the emotional power of a particular icon does not derive exclusively from the aesthetic structure of which it is part. (17)

In this exegesis I will track the trope of matter transmission from its inception to the present day, examining its use in four key areas—society, the self, space and the body—and considering several reasons for the trope’s critical neglect. I will argue that the matter transmitter qualifies for iconic status by the criteria outlined above, that it therefore warrants further critical analysis, and that it will remain a vital germ of ideation for contemporary writers, including myself, for the foreseeable future.

2 The Rise of the Space Machine

2.1 From Tarnhelm to Telepomp

The year 1876 saw the first complete performance of Richard Wagner's epic opera cycle *Der Ring des Nibelungen*, including the premiere of the final instalment, *Götterdämmerung*. In Act II, Scene 2 of *Götterdämmerung*, the character Siegfried dons a magical helm and is instantly transported to "far-off lands" (Wagner 13). Later, he uses the same prop to change form, first into a dragon and then into a frog. The Tarnhelm's nature is clearly magical, with no explanation offered for its function or purpose except that it is "the cunningest work of the Niblung", a race of dwarfs. No speculation is offered regarding the original purpose of such works and how they might impact upon the world of the narrative.

The following year, with considerably less fanfare, Edward Page Mitchell published "The Man Without a Body", a short story that is widely regarded as the first use of non-magical matter transmission in literature. Eschewing, even outright denying, the supernatural, Mitchell employs scientific terms and metaphors to render the fantastical at least partly plausible:

Matter is made up of molecules and molecules, in their turn, are made up of atoms. . . . Their dissolution may be accomplished by chemical affinity or by a sufficiently strong electric current. . . . There [is] no reason why matter could not be telegraphed, or to be etymologically accurate, "telepumped." (n.p.)

Mitchell is aware that the Telepomp is an impossibility in the context of contemporary science of the day, but not as preposterous as “the spiritualist's cant”. He lists it among such other impossibilities as “how to photograph smell, how to bottle music, how to freeze the aurora borealis”—undisputed phenomena that could, at least in conception, be captured by existing means. Lip service to the Scientific Method lends further credence to the device, with an account of the unfortunate Professor Dummkopf’s initial attempts to send simple compounds “such as quartz, starch, and water” from one room to another, which are followed, successfully, by a postage stamp. The first living thing transmitted is a captured cat that “disappeared in a twinkling” and arrived “alive and purring, although somewhat astonished”. (Mitchell)

Despite being armed with “all the truth and logic of stern science”, Professor Dummkopf commits a near-fatal mistake by transmitting himself without first checking that his batteries contain sufficient power to complete the process. The batteries expire before his journey is complete, leaving him the eponymous figure of the story, his body lost forever.

Mitchell’s neologism, “Telepomp”, may not have endured, but his formula undoubtedly did. In “The Man Without a Body” we see assembling, for the first time, the criteria of a contemporary matter transmission story. The wonder of instantaneous travel (in this case only modestly imagined across the Atlantic to London) is evoked by the use of scientific imagery, language and method, while at the same time the authority of the protagonist is undercut by his failure to fully examine the technology’s implications.⁴ This story signals a clear break from the fantastical Tarnhelms of the past, and opens up entirely new narrative possibilities for the future.

⁴ In my research, I have located precisely zero accounts of a female inventor of matter transmission. One possible candidate, “Jesse Evelyn Ramsbotham” turned out, unfortunately, to be a man (Heinlein 28).

There were many antecedents for the concept of matter transmission, prior to the Tarnhelm and the Telepomp. The “Spirit of the Lord” is credited with the rapid relocation of the disciple Philip in the Biblical New Testament, while the Quran records a magical transportation of the throne of the Queen of Sheba to the feet of King Solomon in another “twinkling of an eye” and the Talmud contains several incidents of miraculous travel between two places (Acts 8:39-40; 27:38-40; BT Sanhedrin 95). More openly imaginary, the djinns of Aladdin, capable of moving great distances instantaneously, are at least three hundred years old, based on folklore stretching back thousands of years.

In the tradition of Arthur Machen, early psychical researchers, later parapsychologists, created names for some of these supernatural relocations.⁵ *Bilocation* is a phenomenon frequently recounted in mystical traditions of a person seeming to be in two places simultaneously. *Astral travel* “has its roots in ancient Indian and classical Greek philosophy, and appears continuously afterwards in the West” (Bendle 54). Sir Arthur Conan Doyle describes an *apport* as “in Oriental magic and in Western occultism . . . when some object is suddenly brought from a distance and appears in a new place” (Doyle 1929). In the closing decades of the nineteenth century, the naming of such events may not have brought science any closer to explaining them, but it did provide a ready-made language for the earliest writers to employ when imagining what might occur when matter transmission became at least an imagined reality and the effects such technologies might have on people.

⁵ “Give superstition a Greek name, and believe in it, should almost be a proverb.” (Machen)

2.2 Pioneers of the New Paradigm

Following a century of radical transformation on many fronts, the fictions of the *fin de siècle* are often concerned with the impact of technological change along two axes: one imagines the possible consequences of change in social terms, and the other imagines them in relation to changing understandings of what constitutes the individual self. Much of this change arose due to two critical technological breakthroughs of the industrial age:

The first . . . made it possible to move people and objects faster than an animal could walk.

The second—began by the telegraph and extended in turn by the telephone, television, and fax machine—made it possible to transmit complex messages over great distances at the speed of light. (Van Riper 183)

Matter transmission is clearly the progeny of these two breakthroughs, heralding a reorganization of fundamental relationships that is, according to Jeffrey Sconce, still evolving today:

From the initial electromagnetic dots and dashes of the telegraph to the digital landscapes of virtual reality, electronic telecommunications have compelled citizens of the media age to reconsider increasingly disassociative relationships between body, mind, space, and time. (Sconce 7)

The concept of dislocating oneself from a “natural” order through technological means is critical to early SF, wherein social anxieties about rapid industrial change, the alteration of traditional social orders and the decline of imperialism can be projected into the future by the protagonist’s ability to travel through time and/or space.⁶ If “science-fiction is the

⁶ In early matter transmitter stories by British and American authors, antagonists with German names, or at least possessing an identifiably exotic characteristic, are common, harking not only back to literary antecedents or contemporaries such as *Frankenstein* and *Dracula*, but also symbolizing the threat of cultures that have their own imperial investments, such as Bismarck’s Germany in the case of Professor Dummkopf (Mitchell), Herr Professor Johann Kenrube (Van Vogt 1942), Dr. Max Syx (Serviss), Professor Vehr (Milne), Ludwig Von der Valls (Williamson), and Dr. Sepp von Einem (Dick). Other exotic travellers in space include

folklore of the new world of science, and the expression of man's reaction to a technological environment", then the use of these devices truly reflects opportunities and anxieties of their days (Moskowitz). Or, as Joshua Glenn puts it:

the phenomenon of radioactivity—the 1903 discovery that matter is neither solid nor still and is, at least in part, a state of energy, constantly in movement—is a fitting metaphor for the first decades of the 20th century, during which old scientific, religious, political, and social certainties were shattered. (n.p.)

In effect, these fictions carried a particular kind of moral warning for the West, at a time when the consequences of a century of social and industrial change were yet to be fully realized (see Von Trojan).

Others soon followed Mitchell's example of using the methods of science to build a scaffold for the fanciful idea of matter transmission. The inventors in Robert Duncan Milne's "Professor Vehr's Electrical Experiment" (1885) and William Warren's "The Nemesis of the Vibratory Theory" (1904) use similar machinery to similarly disastrous effects, while electricity and atoms also play a role in *The Mystery of Cloomber*, Sir Arthur Conan Doyle's first foray into this field (1889). Mysterious devices in Fred T. Jane's 1897 novel, *To Venus in Five Seconds: An Account of the Strange Disappearance of Thomas Plummer, Pillmaker*, transport a young man to another world, but have the opposite effect on material from a much closer heavenly body in *The Moon Metal* by Garrett P Serviss (1900), delivering it *en masse* to Earth. The prankster/scientist of Guillaume Appollinaire "Remote Projection" (1910) explicitly states that he uses science and machines to accomplish what appear to be religious miracles, without, however, explaining precisely which principles are being employed (98).

Buddhists (Doyle 1889), the Latvian Theodore Nemor (Doyle 1929), and the dark-skinned Miss Zumeena (Jane).

Reminiscing on this trend, H. G. Wells wrote in 1934 that “by the end of the [nineteenth] century it had become difficult to squeeze even a momentary belief out of magic any longer”, so instead he turned to “an ingenious use of scientific patter” to give credence to his ideas (viii). The roll-out of the first global telegraphic network in the late nineteenth century provided a ready jargon for this patter, one that imposed new meanings on old words (electron “flow”, the “carrying” of messages along wires) and inspired the creation of new ones. After the “Telepomp” failed to capture the world’s imaginations, Hugo Gernsback offered an alternative with “particle transmission” in a 1909 issue of *Modern Electrics*, in *Science and Invention* in 1922 Clement Fezandie put forward the slight variation of “electrical transmission”, and Benjamin Witwer responded with “etherical transmigration” in 1927, the year Edmond Hamilton chose the bluntly pragmatic “matter-sending apparatus” (Gernsback and Fezandie in Lengeman n.p.). R. M. Farley’s “matter transmitting apparatus” in 1924 was soon followed by a “matter transmitter” in Leslie F. Stone’s “The Conquest of Gola”, casually mentioned for the first time in history among many other far-future technologies.⁷

Critical to these devices was the immediacy of transmission. Instead of motion across great distances taking days or weeks, it occurred instantaneously, once again taking its cue from telegraphy. As Sconce explains:

The telegraph not only inaugurated a new family of technologies . . . but also produced a new way of conceptualizing communications and consciousness. . . . The simultaneity of

⁷ In 1931 Charles Fort coined the word “teleportation” to describe phenomena unexplained by science, such as the seemingly magical transmission of fish from one location to another, however the word wasn’t immediately adopted by science fiction writers, even in its proper use as a term describing an effect somewhat less than scientific. It has since been appropriated by science to describe real and well-understood physics, a testimony to its popularity over time. Perhaps surprisingly, the term “teleporter” didn’t appear until as late as 1967 (Prucher 233).

this new medium allowed for temporal immediacy amid spatial isolation and brought psychological connection in spite of physical separation. (7)

While the careless Professor Dummkopf might risk stretching his analogy to snapping point when explaining the principle behind his experiment, in doing so the author evokes the best means available at the time to accomplish the impossible:

The vibrations that give individuality to matter may be transmitted to a distance by wire just as readily as the vibrations that give individuality to sound. . . . In the course of my experiments with the telephone I became convinced that the same principle was capable of indefinite expansion.⁸ (Mitchell)

This inherent collapse of time as well as space is an intrinsic function of the trope. The excision of every moment spent getting from “here” to “there” creates a fundamentally reorganized social space, as even early tinkerers with this trope realized. In 1885, the painful separation of young lovers was considered sufficient motivation to warrant a dangerous and ultimately fatal experiment (Milne).

Early matter transmitter stories can be characterized as being in the Tarnhelm mode—a means of getting characters where they need to be without deep consideration of the ramifications (Jane; Farley; Milne)—or in the Telepomp mode, warning of the consequences to the individual and society of rampant technological change (Doyle; Matson; Mitchell; Appollinaire; Serviss; Warren). While it might be superficially true that “teleportation [is] the imaginative [descendant of] the seven league boots that will take their owner anywhere”, ever-expanding scientific possibilities combined with the constraints of plausibility provide fertile fields for further elaboration (*Dalhousie Review* 85). A magic ring remains a magic ring until it’s dropped into the belly of a volcano. A

⁸ Note that the telephone was still considered an experimental technology in 1877, patented by Alexander Graham Bell just one year before.

matter transmitter in the hands of later authors, however, armed with the scientific theories of the day, became many things, among them an engine of rampant unrest, a weapon, a horn of cornucopia, and the means of taking humanity not just to London but to the stars.

2.3 Society Under Attack

Hugo Gernsback and Charles Fort were the first to actively promote their very different notions of matter transmission (scientific versus non-scientific) but they were not the last. “Each major advance in the technology of communication or transportation has brought profound transformations and dislocations to human society,” declared Robert Silverberg in 1973, in the introduction to an anthology of stories examining many such transformations. Author Harry Harrison was even more blunt about the importance of this trope to SF: “The history of transportation is the history of mankind” (vii).

Speculations into the impacts of imaginary transportation technologies are closely linked to new technologies available in society at the time such speculations were made. Jeffrey Sconce’s *Haunted Media* outlines in its back blurb five critical technoscientific moments in the last century and a half that exert a powerful influence on such speculations:

the advent of telegraphy; the arrival of wireless communications; radio’s transformation into network broadcasting; the introduction of television; and contemporary debates over computers, cyberspace, and virtual reality.

The reception of each of these new media was accompanied by convergences in popular culture of three metaphorically liquid agents: “(1) the electricity that powers the technology (2) the information that occupies the medium (3) the consciousness of viewer/listener” (Sconce 7-8). This convergence of notional fluidity encourages the

appearance of repeating fantasies, among them the dissolution and transmission of the entire body—something that until recently has been conceived of entirely as a solid and indivisible thing, not fluid.

Telegraphy was the first dominant metaphor, as well as a key inspiration, for the transmitters of matter. Subsequent metaphors led to entirely new kinds of stories. What had once seemed “[t]he magic of the nineteenth century”, telegraphy without cables, became real with wireless, not always to positive effect in the narratives of the time (Milne): “If we can throw the human voice, invisibly (and horrible as this is when you think of it) in utter silence, around the world, then somewhere there are men who can throw their voices a greater distance”—specifically, “men who do not live upon the Earth” (Matson 25, 21). Two very different stories from the early twentieth century inspired by telegraph and wireless highlight important differences between them. Whereas Garrett P. Serviss’s *The Moon Metal* (1900) is about point-to-point transmission used to bring resources to Earth, in a wireless but still linearly constrained fashion, Edmond Hamilton’s “The Moon Menace” (1927) is about the dangers of being too open in our communications, sending information about ourselves radiating outward into space and thereby luring trouble in the form of aliens envious of our resources.⁹

SF’s exploration of the alien finds a natural companion in the theme of alienation, which gained momentum in the literary aesthetic that emerged among modernist writers in the decades following World War I and the Great Depression, an aesthetic principally concerned with the politics of fragmentation and estrangement, key aspects of the wireless

⁹ The opposite sentiment, that “[i]t is good to have friends” in the worlds beyond our own, appears in Lester del Rey’s “The Wind Between Worlds”, a story warning of the dangers of technologies that we don’t fully understand, published six years after the use of atomic weapons in Japan (also see Brunner 1980).

age. “In the standard modernist narrative, technology propels us onward and upward”, Turkle argues (24). This narrative find its culmination in SF, where instead of eschewing new ways to *tell* stories, SF writers in this period engage with the aesthetic by *literally* taking their protagonists out of familiar environments and placing them in alien landscapes, challenging numerous cultural assumptions in the process.¹⁰

The dawning of modernism sees the point at which SF writers meaningfully engage with the positive and negative effects of matter transmitters on society. These include the dismantling of such basics as food, from Warren’s “The Nemesis of the Vibratory Theory”, which imagines transmitting cattle from the plains to Chicago, where they are killed, and later the same day served in New York, to Gernsback, whose “Interplanetarian Wireless Food Co” has a problem with onions arriving minus their flavour (Gernsback in Lengeman n.p.; also see Von Trojan). More complex examples include heart specialists requisitioning the technology to attend a medical crisis when elderly women complaining about pet dogs going missing en route in Jack Williamson’s “Cosmic Express” (similarly Clarke; Temple; Van Vogt 1942).

Influential editors actively commissioned stories employing the trope, and the precedents set in this period encouraged prominent writers such as Larry Niven, Harry Harrison and John Brunner to return frequently to it. In his anthology *Three Trips*, containing a trio of “earnest extrapolations of the transformative effects such a technology might have on a global society” (Stableford 2004 219), Robert Silverberg asks his authors to concern themselves “with the effects [d-mat] would have on the texture and quality of human life”:

¹⁰ Although SF stories championing progress routinely externalize the same concerns with identity and the rapid rearrangement of social space as modernist writers, rarely do the modes overlap. Modernist fiction using the trope of the matter transmitter are rare (Appollinaire, Matson). Not until the New Wave of the 1960s did SF attempt the stylistic experimentation of James Joyce, T. S. Eliot, Virginia Woolf and others.

“if all gates stand open, what sort of world will we have?” (Silverberg 6). Similarly, “what is the effect on and man and his institutions . . . ?” asks Harry Harrison in the foreword to his collection of d-mat-only stories *One Step From Earth*, before answering himself: “*everything* will be affected by this new form of transportation” (x-xi; my italics).

Addressing the ways in which SF can be more than just outer space adventures or technological wish-fulfilment, Clyde Wilcox allows that “where writers do show important technological advances . . . it is clear that social, economic, and political life is greatly changed” (148). This change encompasses more than speculations regarding the collapse of existing transport systems or fears thereof (Milne; Biggle 1958; Disch 1966), the threat to national borders caused by the “instantaneousness of ubiquity” (Bukatman 124; Brunner 1974), and the dangers of over-reliance on matter transmittal technology (Sturgeon 1954; “The Seeds of Death”), all well explored by this point in the trope’s history. Everyday moments of alienation begin to appear: the gaucheness of checking the local time after travelling to a far-flung location (Brunner 1974); telling older people by the way they avoid roadways that once held cars (Niven 1974B); hotels turning into “continuity clubs” that look the same everywhere all over the world (Niven 1974A), although strictly speaking they are no longer needed at all (Brunner 1974); bridges rusting from disuse or being re-imagined as sites of commerce or conservation (Niven 1973B); vehicular fetishist cultures arising as a reaction against “society’s rejection of individualist transport” (Von Trojan 25; see also Malzberg) or matter transmission “[covering] the earth like a great clean cape, standardizing language, dress, customs, and ambitions” (Sturgeon 1954 122). Gene pools may become mixed, blurring racial boundaries (Brunner 1974), while d-mat may also make immediate that which once seemed culturally remote, such as alien customs and foods (Green, Simak 1963).

Social sciences such as economics took their turn in the spotlight, for instance John Brunner's "You'll Take the High Road", wherein the advertising budget of Transmatter Inc. is exceeded only by those of the threatened automobile and fuel industries (102). In the middle of twentieth century capitalism itself comes under direct threat from one of the possible side effects of the trope: "If what is actually being transmitted is encoded information rather than a package of 'dissociated matter,' then matter transmitters might better be regarded as matter duplicators" (Stableford 2004 219), a prospect that bodes well for the poor and starving but not necessarily for the rich (Disch 1966).¹¹ The deleterious consequences for the West caused by the duplication of manufactured goods and the end of value can be found in numerous texts (Knight 1959; Leinster 1935; Smith 1945A and 1945B; Temple; Vance; Williams 1958; Wodhams), in part leading "Marxist critics, such as Suvin, Freedman, Frederic Jameson, . . . [to] treat sf as a vehicle for consciousness-raising about the ideological distortions of the dominant high-capitalist world-picture" (Csicsery-Ronay 140). Once matter duplicators are able to duplicate themselves or their components they are comprised of, their widespread use, for good or ill, is effectively guaranteed (Budrys; Knight 1959; Williams 1958).

Further exploring the possible apocalyptic consequences of such technologies, wartime sentiments that "[i]t is the nature of Man to use the machines of Man to bring about the destruction of Man" (Van Vogt 1942 266) appeared within a decade of World War I:

¹¹ A taxonomy of matter transportation and its offshoots might place d-mat at the top, with non-mechanical teleportation and matter duplication below, thus dividing the trope's utility as a speculative instrument in two: broadly, teleportation explores the effects of spatial collapse, while duplication explores notions of scarcity and individuality. I will treat these offshoots as exemplars of the primary trope when examining its uses in detail.

I need not enlarge upon the revolutionary character of such an invention, nor of its extreme importance as a potential weapon of war. A force which could disintegrate a battleship, or turn a battalion . . . into a collection of atoms, would dominate the world. (Doyle 1929)

Military or terroristic uses of d-mat appear with regularity after World War II (Brunner 1974 and 1980; Clarke and Baxter; Disch 1966; Haldeman; Harrison 1970; Von Trojan), along with the imperative that the technology be controlled in order to avoid its misuse (Disch 1966; Doyle 1929).¹² However, its utility as a weapon of mass-destruction provides fewer narrative and thematic variations than its effectiveness as an enabler of criminality, a theme often explored in SF in general, since the “continuing expansion of our technology greatly increases the variety of criminal ways and means” (Wodhams 266). This trope is ingeniously used to fake a second coming of the Messiah (Appollinaire 1910), stage one’s own death (Asimov 1959), dispose of evidence (Brunner 1974), flee from the scene of a crime (Von Trojan), evade capture (Harrison), commit murder (Doyle 1929; Niven 1974A), motivate organized crime (Niven 1974B), commit suicide (Brunner 1974; Malzberg) and smuggle, kidnap, evade border controls and take revenge on a cheating spouse (Wodhams). The only thing stopping it from being used as the perfect counterfeiting machine is often the expense of operation (Pohl and Williamson). D-mat can in return be used by authoritarian regimes to control movement and plant incriminating evidence (Von Trojan), and to provide inescapable prisons (Bester; Farmer; Gould 1992; Harrison; Schmitz 1961).¹³ Perhaps most dystopic of all, in “U-Turn” by Duncan H. Munro

¹² A minority of writers, on the other hand, subscribe to the more optimistic belief that d-mat will end all war forever (see Heinlein; Sturgeon 1954; Vance).

¹³ In Larry Niven’s “A Kind of Murder” (1974A), the criminal is motivated by his close proximity to other people, thus enabling d-mat to play a role as both cause and modus operandi. In return, in “The Alibi Machine” (1973A), the police are the only people with access to old-fashioned forms of transport like helicopters in urban spaces now devoid of roads, giving them the ability to cover open spaces and quickly hunt down fugitives travelling on foot.

people seeking euthanasia are press-ganged into colonial service because “vibro-transference” is so painful and unreliable that only suicides would risk it.

Alfred Bester’s *The Stars My Destination* (1956) is an influential work of this period that, as well as incorporating experimental textual elements, depicts a future world dominated by mega-corporations rivalling national governments in power and influence. The widespread use of “jaunting” profoundly destabilizes the economy, eventually triggering a war. The protagonist’s quest for revenge leads him on a journey of libertarian growth, enacted among scenes of facial tattoos, circus freaks and decadent high society, and strange societal fragments such as the “Scientific People”, the descendants of survivors of a research team marooned on an asteroid two hundred years previously. Their cultural practice is founded on the misremembered precepts of the scientific method which, ironically, results in them being the last primitive culture in the solar system.

Bester’s vision of a modernist, dystopic future paved the way for the postmodern “cyberpunk” movement of the 1980s in the same way that wireless, by providing “a popular fantasy of disembodiment”, gave users of the medium a taste of media to come:

Boundaries of time, space, nation, and body no longer seemed to apply, and although this provided a giddy sense of liberation for some, it also threatened the security and stability of an older social order in which body and mind had been for the most part coterminous.

(Sconce 63)

But first, the social order of lone radio operators beaming out into a void changed with the coming of broadcasting networks, leading to the imagined “Spiral Relay” of *Doctor Fogg*, in which alien messages are re-transmitted forever, perhaps never to be heard (Matson).

2.4 Disintegration of the Self

The late nineteenth century saw the emergence of psychoanalysis and a reimagining of the individual in terms of a conscious surface and an unconscious depth. The shattering of the romantic conception of the human self as noble and whole, by seminal works such as Mary Shelley's *Frankenstein* and Robert Louis Stephenson's *Strange Case of Dr Jekyll and Mr Hyde*, provided a fictional template for stories in which a person can be technologically transformed into someone who is partly "themselves" and partly "other"—a transformation frequently explored in SF. The age of television provided a new vehicle for the portrayal of such transformations, while at the same time inspiring new transformations of its own.

Even as radio left early listeners with "abandoned bodies and dispersed consciousness" (Sconce 14) that sometimes manifested in SF as lost physical bodies, Nikolai Tesla wondered: "Pictures have been transmitted by telegraph. Why not by wireless?" (qtd. in Sconce 97). The companion question—"Once we can transmit pictures via TV, why not whole people?"—had already been asked in "Remote Projection" (Apollinaire), which drew on speculations regarding "wireless and wireless telegraphy, transmission of photographs, color photography [and] cinematography" to imagine the sending of a man's physical image to many places around the world (99). Norman Matson's *Doctor Fogg* also coined the short-lived neologism of being "televised" into space (110), while the device in Raymond E. Banks's "Rabbits to the Moon" "looks like a television camera" (109) and is described as a scanner that breaks down flesh and turns it into light rays, in much the same manner a television camera breaks down an image (see also Farley).¹⁴ Arthur C.

¹⁴ Jack Williamson's "Cosmic Express" uses an "analogy from television" to imagine a technology that "would be impossible with radio apparatus". However, "Cosmic Express" is more remarkable in the predictive sense for declaring that westerns would occupy a significant percentage of TV time in the real world than for anything to do with transportation (Ash 159).

Clarke's first published fiction, "Travel by Wire!", features a device called the "radio-transporter" that relies on scanners and features resolution issues unique to visual broadcast, and Roald Dahl famously used the metaphor of television in 1964's *Charlie and the Chocolate Factory*: his "Wonkavision" camera transported chocolate bars from a studio directly into viewers' living rooms. "[M]atter transmitters deal with solid objects in much the same way television deals with light waves," said Harry Harrison in 1970, going so far as to suggest that the technology should be called "MT" in the same way that television is abbreviated to "TV".¹⁵

Decades before matter transmitters appeared on television itself—not with *Star Trek* in 1966 but *Flash Gordon* in 1955—the metaphor of "teleportation" was invoked to sell the experience of owning a television:

As the development of television accelerated in the 1930s and the experimental technology became more widely known to the public, both scientifically "factual" predictions and wildly "fictional" prognostications of a future with television emphasized the new medium's astonishing qualities of visual presence in terms of electronic transportation. Television was to alternatively transport viewers into another world and transport other worlds into the home. (Sconce 127)

Later, shows such as *The Twilight Zone* and *The Outer Limits* featured stories involving *actual* transportation via TV to such exotic locations. An example of the recursive teleportation/television relationship is the 1964 *Doctor Who* serial "The Keys of Marinus", which features "travel dials" that allow the wearer to instantaneously move from place to place. As Jim Leach puts it, this "allegedly futuristic technology . . . seems to literalize the influence of early television on the perception of time and space. The 'travel dials' . . . work much like television channel changers" (69).

¹⁵ The pun on "empty" is possibly unintentional.

The kinship between this form of media and matter transmission was closer than any other, even though neither truly delivered on their promise—the former because it was an illusion encouraged to increase sales of televisions, the latter because it was an agreed-upon fiction enjoyed by writers and readers alike. In this respect, their apparent kinship was not entirely satisfactory, as Sconce notes:

Some would argue this is television's most insidious feature: the ability to provide the compelling illusion of "being there" . . . when of course television actually transports its viewers no farther than the couch (230). . . . Television "promised to teleport viewers to another space and time yet in the end only delivered them to the disassociative empires of simulation and psychosis. (200)

Nonetheless, as Bignall observes, the desire to inhabit "other" spaces, even if only from the comfort of one's couch, lies at the core of the science-fictional impulse:

Works in this genre often focus on spatial and temporal mobility and on the realization of imaginary alien scenarios. The principle of science fiction is the simulation of an other world which is both alien yet representable through the conventions, competencies and technologies we already know. (100)

Furthermore, Bignall argues, it speaks back to the original context of the genre:

[Early SF] was written amid a long-standing fascination with visually based representational devices in the late nineteenth century, exemplified by the dioramas, panoramas and other proto-cinematic devices of the period. . . . These devices were enthralling because they transported the spectator to alien places and alien times by means of visual technologies. (91-92)¹⁶

¹⁶ See Appollinaire and Matson in particular.

The entanglement of more recent media—both inspiring the genre and being inspired by it under the banner of cyberpunk—has therefore been both profound, and is frequently examined:

Imagined since the age of the telegraph, dreams of a complete absenting of the body and entrance into a more rarefied plane of existence have definitely shifted from the metaphysics of the church to those of the computer chip. . . . [S]ome even feel that that the key to immortality itself is to be found in the telecommunications networks of the future.

(Sconce 20)

De facto matter-transmission—whereby the material of a person is not transported but rather the data comprising their thoughts, personality and memories are relocated into a “virtual” reality—has been a commonplace trope since William Gibson’s *Neuromancer* (1984) and captured popular consciousness via *The Matrix* in 1999. “[P]erhaps the first SF generation to grow up not only within the literary tradition of science fiction but in a truly science-fictional world”, writers of the cyberpunk movement celebrate the “belief that information can circulate unchanged among different material substrates”, facilitating “the re-conception of human beings as essentially information that is only *contingently* embodied” (Sterling xi; Hayles 16; Bendle 47).

Armed with postmodern self-consciousness, cyberpunk trumpets the end of a traditional belief in corporeal stability, and it is through this lens that recent SF is most frequently examined, particularly with respect to identity and disembodiment. But SF and cyberpunk are not synonymous, and writers of SF have explored other forms of corporeal instability and depersonalization since the 1980s, for instance embracing nanotechnology as a means of giving minds of all kinds new forms of mobility (Egan 2005 and 2008; Nix; Stross 2013). However, Sconce suggests that

[a]lthough some might argue that that the technology does exist (or will soon) to realize such discorporative fantasies . . . such dreams have always been vivid and seemingly eminent but are, of course, ultimately impossible. In the end we are always left with a material machine at the heart of such supernatural speculation, a device mechanically assembled, socially deployed, and culturally received within a specific historical moment.

(Sconce 20)

Until the “machine” by which we experience reality—the human mind—is superseded, and key practical issues preventing the critical components of cyberpunk from gaining acceptance are overcome, the dream of pure disembodiment will remain just a dream, and humanity’s *other* dream of instantaneous transport will retain its currency.

The matter transmitter is a ready-made construct for re-conceiving the “nature” of the individual self, and writers are demonstrably willing to employ it, as Veronica Hollinger explains:

While formally experimental science fiction continues to be rare, other signs of SF ‘postmodernization’ are everywhere, for instance in the frequency with which SF writers revise, ‘quote’, parody, and otherwise exploit earlier generic conventions. (244)

Identity as something that can no longer be described only in terms of surface and depth but as something more dispersed, and thereby subject to the possibilities of unbuilding and remaking, is the subject of discussion from the very earliest stories using this trope. “A man is the same man,” states Edward Page Mitchell, “although there is not an atom in his body which was there five years before”—predating a now-common philosophical thought-experiment by a full century.¹⁷ As Ira Livingston argues:

¹⁷ Mitchell’s analogy—“A candle flame is the same candle flame although the burning gas is continually changing”—predates Norman Wiener’s analogy by almost eighty years: “The individuality of the body is that of a flame rather than that of a stone, of a form rather than a bit of substance” (91). It also predates “contemporary pressure toward dematerialization” that “affects human and textual bodies on two levels at once, as a change in the body (the material substrate) and a change in the message (the codes of representation)” (Hayles 2011).

A living body . . . as constructed by contemporary biology, is already more like a transporter beam than like a solid inert object. As most people know, our bodies are in constant flux at the cellular level, where cells are continually disintegrating and being replicated. . . . The living body is a pattern of information, a fact and a fiction, something continuously being made and unmade. (79)

By 1980, readers readily accepted that the trope they encountered on the page was no longer one of “those imaginary gadgets in a thirties magazine”, particularly as a shift towards interiorization signalled the intent of texts focussing on more postmodern concerns (Brunner 1980 81).¹⁸ Scientific rationalizations for matter transmission were not completely abandoned for psychic powers, but Charles Fort’s inexplicable teleportation found new traction as a means of exploring the boundaries of self, using the trope as a metaphor with an emphasis on subjectivity and “inner space” in order to respond to the “failure of social controls” (Bukatman 141; see Bester; Niven 1966; Vinge 1976).¹⁹ For instance, in John Brunner’s *The Dreaming Earth*, people become hooked on a drug that allows them to physically flee their overcrowded world to another that appears to be paradise.

Playful and satirical uses for most of SF’s tropes found a receptive audience at this time, encouraging critical reassessment of the trope as a whole and the adoption of these tropes by other forms of literature (Hollinger 234; see Adams 1980; Banks 1987; Brunner 1973; Kelly; Leinster 1935; Temple; Wright). Outside of SF, however, the commonest (perhaps

¹⁸ By 1950, writers like Theodore Sturgeon were regarding the trope familiarly as “[t]his matter transmission thing” while at the same time considering it a valid source of exploration (Sturgeon 1979). Damon Night said of his 1957 novel *A for Anything*: “I chose the matter duplicator, because I thought other authors had handled it badly” (qtd. in Aldiss and Harrison 246).

¹⁹ A new lexicon of jargon gave SF writers freedom to re-conceive old tropes via “magic . . . made scientific by the conventional literary assumption that the questions just now being asked by parapsychology have already been answered in the affirmative” (Scholes and Rabkin 157).

only) place to find explorations of the trope of matter transmission is in cognitive philosophy texts, such as Hofstadter and Dennett’s thought-experiment concerning the TeleClone Mark IV in *The Mind’s I*.²⁰ Such thought-experiments into the ramifications of “teletransportation” are united in their purpose—to interrogate our notions of self and identity—and are nearly always identical in plot (see Broks; Moravec; Parfit). The subject enters a booth, is disintegrated and recreated in another booth. Is this a re-creation of the same person or not? If the original is not disintegrated, are there now two of the same person or two separate individuals?²¹

“SF is the literature that takes thought-experiment as its given reality, which it then artistically and ludically exaggerates and estranges”, writes Csicsery-Ronay (124). The matter transmitter is a trope that naturally lends itself toward discussions of the nature of identity, individuality and agency, and it is employed this way with great frequency. Multiplication (Blish; Budrys; Disch 1966; Knight 1959; Marcinko; Pohl and Williamson; Temple; Wodhams), factorization (McIntosh; “The Enemy Within”), and integration (Apollinaire; Clarke; Collyn; McIntosh) are common narratives. As SF matured, these narratives tackled increasingly complex and ambitious psychological landscapes set against superficially familiar backdrops. This turn to the psychological implications of matter transmission came with Algis Budrys’s *Rogue Moon* (1960), in which a man with a death wish is copied and sent to explore a deadly alien artefact on the lunar surface. For a short time his original on Earth psychically overlaps with the duplicate, who experiences

²⁰ See also Moravec; Parfit; Sorabji; Johnson; Broks. Examples of d-mat outside of SF and cognitive philosophy are exceedingly rare: *Outrageously Yours* by Allison Chase, a romance novel set in the nineteenth century, is one. Contemporary novel *The Reluctant Fundamentalist* by Mohsin Hamid is another.

²¹ In “To Be Two or Not to Be” there are legal processes in place to avoid this dilemma, including the “Subcommittee on Personal Identity” decree and a “Proliferation of Persons Act” (Broks 205, 209). See Anderson 1958, Kelly, Priest 1995, Simak 1963, and Simmons 2003 for treatments of this dilemma in fiction.

everything that happens to him, including numerous grisly deaths as this process is repeated many times over. When the artefact is fully traversed, the psychic link between his original and his last copy is severed, and the copy must sacrifice himself in order to preserve the notional “singularity” of the man he used to be. For an extended moment, “he is his own apparition”, and both know that the death of one of them is inevitable (Bukatman 158).²² The permeable boundaries surrounding concepts of self—and therefore death, in a story fully engaged with Gothic themes over a century old—reinforces the innate conception of the matter transmitter

not so much as a reproductive technology that exposes anxieties about paternity and originality, but as a machine which produces, as it transports from A to B, de-centring and displacement between original and copy. (Littau 154)

The possibility of creating individual back-up files that can be rebooted or “resurrected” in the case of sudden death is a key variation on this theme (Disch 1964; McCarthy 2000; Stross 2006). The matter of what happens to the soul during such duplications is occasionally raised, as in “Heretics” by Thomas Marcinko: when a missionary priest is duplicated many times over, each time altered in subtle ways and therefore constituting a “unique” individual in his own right, the question of which one of them contains “the soul of Father James Mendez” becomes critical to the character. In Clifford Simak’s *Way Station*, the soul or animating force travels instantaneously from duplicate to duplicate, leaving “a long trail of dead” behind (1963 63). Given the trope’s primary dismissal of the spiritual, however, the emphasis tends to be on the technology’s impact on organized religion, and organized religion’s response to the technology, rather than the effects on the individual. Matter transmission is frequently described by the ill-informed as dangerous in

²² Von Trojan’s *The Transing Syndrome* similarly dwells on rumoured “Merging Centres” where accidental duplication can be corrected, possibly by erasure of one of the duplicates.

the spiritual sense or by Popes as a “*diabolical* invention” worthy of interdiction (Brunner 1973 124; see also Apollinaire; Brunner 1974; Disch 1966). Yet on other occasions the transmission and duplication of missionary priests becomes a papal mandate (Marcinko).

Travel into space analogises spiritual exploration in Silverberg’s “We are for the Dark” (1988). A loyal priest is banished into the outer colonies on a mission to find out why dictates from Earth are no longer being obeyed. He finds that “[t]he entry into the cosmos is the journey into the sublime, the literal attainment of heaven” but that heaven contains more than the human mind can imagine: “Do you think that travelling between the stars is like stepping across the street?” (146). Ultimately we are our own worst enemies (164). As Poul Anderson asks in *The Enemy Stars*: “What proof have you that we were meant to jump across light-years? . . . It’s another way of running from yourself” (97).

With d-mat, as with cyberpunk, the self “is neither the causative agent nor the epistemological center of these shifting realities. There *is* no center” (Bukatman 169). When in A. E. van Vogt’s “Secret Unattainable” a human operator interferes with the proper working of a matter transmitter, simply by being too primitive in a psychological sense for the machine to interact with, it is clear that the concept of the self has entered territory considerably removed from its original conception.

3 The Fall of the Space Machine

3.1 Distance and Displacement

Mark Rose isolates a constant feature of SF stories, in that they

either portray a world that is in some respect different from our own, as for instance in stories set in the future or on other planets, or, alternatively, they describe the impact of some strange element upon our world, as in alien-invasion stories or evolutionary fables.

(3)

D-mat can operate as the narrative facilitator in both scenarios.²³ So can the time machine, and in a functional sense the two often operate as identical machines. How, then, did the time machine become possibly “the most archetypal device in the genre” and the matter transmitter “a commonplace piece of science fiction furniture” whose “utility as a facilitating device in literary work is limited” (Kincaid 821; Kessel viii; Stableford 2004 219)?

I propose that there is no single answer to this question. Instead, several factors combine to allow the matter transmitter to fall into the time machine’s shadow, under the popular and critical gaze. These factors are (1) the way d-mat has been primarily employed on the big and small screens, and (2) the problem of scientific plausibility that dogs much of SF’s iconography.

²³ Compare Biggle 1958 and Haldeman, for instance.

The fundamental conceptual “implosion” explored by matter transmitters is here/there, but male/female, self/non-self, form/deform, original/fake and real/false all fall under its ambit (Hollinger 232). Comparing the matter transmitter to the time machine, whose fundamental implosion is now/then, is illuminating because the two tropes have followed a startlingly similar history. Four years after Edward Page Mitchell wrote “The Man Without a Body”, he also anonymously published one of the earliest technological time travel stories: “The Clock That Went Backward” (1881). Neither as famous as Wells’s later tale nor containing a catchy neologism, it relied on an apparently broken clock that, when wound backwards, transported the protagonists into the past.²⁴ From this double genesis in a single author, the tropes evolved separately but in close parallel.

By some analyses, time machines and matter transmitters are practically identical. Each device, at least potentially, “takes us from our known world into an unknown world” or into unknown locations (temporal or spatial) within our world (Wolfe 18). Both are in essence simple tropes that when employed creatively result in startling, even paradoxical outcomes (Stableford 2004 219). Both time travel and matter transmission stories, for instance, can hinge upon an apparent duplication of a single protagonist.²⁵ And occasionally stories feature machines using the principle of one trope to accomplish the effect of the other (Asimov 1959; Leinster 1935; Crichton). As Van Riper notes,

[s]tories about time travel are similar in many ways to stories about faster-than-light travel through space. Both require rejecting, sidestepping, or ignoring much of what we believe to be true about the natural world. Both have been buoyed by suggestions they *might* be

²⁴ Mitchell was also the first to write about compact magnetic engines for trains, an electric thinking machine, and an invisible man created by scientific means.

²⁵ Compare Robert Heinlein’s “All You Zombies” with Appollinaire’s “Remote Projection”, for instance. Parallel universe stories, which often rely on wormholes similar to d-mat, can perform a similar feat: instead of taking the protagonist to another place in this universe, they take him or her to the same place but in a different universe, where they often encounter different versions of themselves or people they know.

possible in the future. Both, finally, open up a vast range of dramatic possibilities: allowing characters to go elsewhere (or elsewhen) in ways undreamed of in the real world. (283)

Christopher Priest's 1976 sequel to *The Time Machine* reminds readers in the very title that a time machine can also be a space machine. Thus it was envisioned by H. G. Wells, descriptively if not functionally, as "a machine for travelling in space rather than time, signalling the association between temporal movement and spatial movement" (Bignell 1999 89). Indeed, when not overtly "focusing on history's shape . . . time-travel narratives may become meditations on the distance between two points" (Rose 107). Both machines represent "an attempt within culture to re-assert the freedom from time and space that humans have traditionally aspired to", before the Scientific Revolution made the idea of a physically unbound soul untenable (Bendle 55).

The matter transmitter's portrayal of the subversion of space has a long history. As early as 1897 it was used to move protagonists to other worlds (Jane). Venus and the Moon were first to be visited, perhaps because, after the sun, they are the brightest objects in the night sky. Mars soon followed, with Edgar Rice Burroughs's *A Princess of Mars* in 1912 showing how easily the matter of transport to the Red Planet was imagined (although not by science, perhaps indicating that even then that idea was just a little *too* outlandish).

The spaceship is the other iconic means of getting from A to B in SF: "at once habitat, womb and vehicle, [the spaceship] gives mankind the means to appropriate the unknown without sacrificing any of the comforts of home" (Wolfe 85). Occasionally, the spaceship's operation may be modified to incorporate the principles of matter transmission (Biggle 1963; Niven 1973B; Shaw 1977; Stross 2006; Watts 2006), or an extended space voyage might first be required to place a receiver at the destination (Anderson; Clarke and Baxter; Harrison 1970), but in general d-mat extends the traveller's reach "[t]o the rim of the

universe and then beyond” in one elegant step, thereby removing the need for habitat and womb entirely (Silverberg 1988 182). As Clarke and Baxter ironically ask, “What [is] a spaceship, after all, but plumbing?” (951)

Womb-like enclosures are not completely absent from d-mat stories, however. The predominant architectural representation of the technology is as a claustrophobic booth.²⁶ “Freud would have found its implications thrilling,” quip Pohl and Williamson, describing their “tachyon transporter box” as “another womb—with a completely different set of birth traumas” (1973 49). It is also possible that such claustrophobic spaces might function as a symbolic prophylactic against incipient agoraphobia, or even outright Pascalian terror. After all, if one step takes you to the edge of the universe, what might follow you home? How might you be changed by the journey?²⁷

Space travel is revolutionised by d-mat, and the commonplace spatiality of everyday life with it. Cities become abandoned museums in a world of meadows and flowers (Kuttner), thanks to the dispersing effect of matter transmitters away from such built-up areas as slums and into relative wilderness (Niven 1973C). Space-hopping doorways allow homes to cover vast distances: such domiciles might have a bedroom on Earth, a living room on Mars, and a kitchen on a world orbiting a distant star (Harrison; Niven 1976; Schmitz

²⁶ There are too many “booths”, “capsules” or “cubicles” to list comprehensively: see, for instance, Brunner many times, Haldeman, King, Malzberg, Matson, McIntosh 1954, Munro, Niven many times, Russ 1972, Wodhams, 1981, et al. Some are fully mirrored on the inside, creating an illusion of infinity (Haldeman). The “Steel Womb” appellation of *Echo Round His Bones* makes overt the possible Freudian connection (Disch 1966). D-mat booths can even contain miniature ecosystems in their own right, created from the seeds and other detritus of everyday international travel (Russ).

²⁷ Mark Rose argues that “[e]nclosures may protect man from the infinite, but they also effectively sequester him in the limited world of the human or, in the case of more personal enclosures, in the still more limited world of the self” (87). The notion of a transformational journey beyond accepted limits is a core concern of SF, pithily summed up by Poul Anderson: “The I that am may go home, but never the I that was” (126).

1973; Shaw 1954; Simmons 1989; Stross 2006; Zelazny 1973). People might in one week sleep in “seven beds on seven continents” by travelling from one end of their house to another (Brunner 1974 102). They might never leave their houses at all:

Each house was a secluded little castle, the Door of which had entry anywhere the world over where other Doors existed. (Asimov 1954 259)²⁸

This new function of the doorway—to privilege access to enclosed spaces over the outside world—drives narratives in which socially “normal” people in their fictional milieu are exposed to unpredictable nature for the first time (Biggle 1966; Heinlein; Westerfeld). As Gary Wolfe notes, such tales of psychological unease are unlikely to be “about simple agoraphobia”. The protagonists’

attachment to his room, and by extension his attachment to the environment of earth, seems to me fundamentally a fear of the unknown that is such a familiar part of science fiction’s effect. (32)

Just as doors attain a new function, so can windows, providing glimpses of far-off places (Leinster 1961; Schmitz 1961; Van Vogt 1942). The dark shadows of such tales are those in which the matter transmitters fail—leaving inhabitants trapped with no means of exit (Vance) or even of emptying their toilets (Niven 1976)—or in which social fragmentation runs riot (McCarthy).

In a world where d-mat is commonplace, geographic maps may become irrelevant: the distance between transmitters matters less than the numbers one dials to move from one to the other (Asimov 1954; Sturgeon 1954; Von Trojan). Islands may become symbols of wealth because of their physical separation from the rest of the world (Brunner 1974).

Tourist destinations and points of sudden interest may be over-run (Clarke and Baxter;

²⁸ In other stories, however, such intimate access, via d-mat, to other people’s homes is considered an invasion of privacy and can lead to increased burglary rates (Niven 1973C; Vance).

Niven 1973C and 1973B; Simmons 1989) while mementoes of exciting events, such as handkerchiefs dipped in the blood of a murdered celebrity, might spread around the world in mere moments (Russ 234). Markets can be self-contained, without any ingress or egress points, because “When you’ve got booths, who needs streets?” (Niven 1973C 150). Daily commutes could also become meaningless (Niven 1973C). The opening paragraph of “Nobody’s Home” by Joanna Russ shows an everyday woman working at the North Pole, attending family business near the Red Sea, going to dinner in New Delhi, taking a nap in Queensland, then watching the dawn over the Carolinas (235). Interactions with the daily motion of the sun thus become fundamentally altered:

[A]nyone could chase [the sun] around the world now, see it rise or set twenty times a day, fifty times a day—if you wanted to spend your time like that. (Russ 236)

Similarly, the protagonist of Larry Niven’s *Ringworld* is first shown circling the Earth in order to stay ahead of local midnight, thereby extending his two hundredth birthday as long as possible.

Changing spatial relationships necessarily change temporal relationships (whether using a time machine or not) and therefore notions of speed change also, since velocity is determined by the relationship of distance to time. If travel time is reduced to zero and the distance between two booths is effectively collapsed to zero, then d-mat does much more than allow humanity to achieve “the ultimate velocity” (Bendle 55). “[T]he longest and fastest ride . . . upon this earth” erases *the journey* entirely from human experience (Matson 157). Henceforth, there is only *destination*:

But you were always here, here when you stepped in and here when you stepped out, gone was the feeling of motion, of going anywhere. (Von Trojan 10)

Doctor Fogg by Norman Matson (1929) is an extended meditation on interpersonal distance and failures of communication, using the matter transmitter and interstellar radio as a functionally twinned metaphor. “Motion is a human idea,” he declares (91). “Where *I* am is just what I don’t know” (20).

. . . and though we travel on light waves, yet we will be separated; and so, as between planets, is it between you and me. There is you, and there is I and there is a third which is separation. (116)

Matson invokes the concept of “unearthly space, unearthly time” (102-3) to explore the possibility that, once connected to the greater universe, the Earth has left its usual track, and any messages it tries to send will echo unheard forever:

A noise so loud it equals silence—and that’s the end of sound; travel so fast, —so smooth you can see nothing but the dials on the control board before you, and that’s the end of travel; space so wide it dissolves into time. (141)

Despite living in a world where “nobody cares about anywhere now”, concerns remain about what happens between leaving and arriving (Brunner 1974 135; see also Milne; Wright). In *The Infinitive of Go* (Brunner 1980) transmitted humans pass through “rho” space, while in *The Loafers of Refuge* it is called the “space-that-has-no-time” or “the nothingness and timelessness that was sub-space” (Green 72, 104). Burroughs describes the transition thus:

There was the same instant of unthinkable cold and utter darkness that I had experienced twenty years before, and then I opened my eyes in another world. (*Gods of Mars*, 1918)

“[M]y body was Lord knows where,” says Professor Dummkopf (Mitchell). Perhaps it was propelled as “a molecular cloud . . . into the cosmos”, as was Professor Challenger in “The Disintegration Machine” (Doyle 1929). In Thomas M. Disch’s *Echo Round His Bones*

transmitted objects simultaneously inhabit both “here” and “there” at the moment of transmission, but on the whole speculation is less benign (Disch 1966).

In rare stories such as “The Drone” (author unattributed) and Barry M. Malzberg’s *Guernica Night*, hyperspatial travel might actually take longer for the traveler than independent observers:

There is a moment in which we do not exist, there is a moment in which we inhabit all space and time, and only the instinctive chemistry of the cells carrying its imprint enables us to become what we were, where we want to be. (Malzberg 101)

For the travellers in Stephen King’s “The Jaunt” that moment stretches too long for humans to endure, so travellers must be sedated or else driven mad. In Alan E. Hourse’s “The Universe Between”, that in-between space is inhabited by aliens who resent our intrusion. The fear of being sent nowhere at all resonates through *The World out of Time* (Niven 1976), and so does the fear of persisting like Schrödinger’s Cat after an accident (Langelaan). Could this “Great Beyond” be the same “imaginary elsewhere” or the “electronic ‘nowhere’” of modern media (Wright 108; Friedberg 2; Sconce 132)? As Bukatman puts it, SF’s fixation on hyperspatial travel creates a boundlessness whereby

coordinates are literally *valueless* when all directions lead to more of the same. . . . walls are no longer solid, nor so impermeable. . . . The absence of coordinates and boundaries, combined with a paradoxical depthlessness, creates a space that is no space, no place. (Bukatman 123-124, 169)

SF therefore “stands as a significant cartographic mode” through its extensive use of displacing devices (164).

Both the time machine and the matter transmitter are clearly two important devices in this mode. One allows the fictional occupation or exploration of everywhere, from a single

world to the entire universe. One allows the exploration of the entirety of time. The linear nature of time, however, limits the trajectory of such stories to either of two directions, forward and back. Such stories are also generally confined to a location in which the fundamental physical properties such as gravity and atmosphere are unchanged, and these locations are usually explored by a small number of individuals rather than cultures rich in difference to our own. The conceptual geography required to be negotiated by the reader or viewer is therefore, arguably, less extreme than in many of the examples outlined above, allowing (or constraining) such stories to focus upon personal difficulties arising from temporal collapse.²⁹ Closer focus on characters, relatively simple conceptual maps, and often recognisable locations thus allows time travel to be perceived as less science fictional trope, and therefore more readily available as a subject of critical examination, particularly when combined with subject areas familiar to readers from outside the genre, such as history or Utopian fiction. The more “science fictional” matter transmitter was therefore overlooked until the genre as a whole came under closer critical examination in the last quarter the twentieth century—and even then languished, I would suggest, having suffered from entirely the wrong kind of success.

3.2 The Trouble with Television

Time machines and matter transmitters, having evolved from their historical antecedents into early SF tropes around the same time, thanks in part to pulp magazines, were both introduced to a much wider audience in the 1960s by such seminal television shows as *The Outer Limits* and *The Twilight Zone*. They were both later featured in iconic television

²⁹ Societies in which time travel is commonplace at a societal level do exist in fiction (e.g. *Up the Line* by Robert Silverberg or *The End of Eternity* by Isaac Asimov) but they are exceedingly rare.

series: *Doctor Who* in the case of the time machine and *Star Trek* the matter transmitter, or transporter. That both were embraced by television is not unexpected, since they both provide a means of shifting the protagonist's position suddenly, radically and conveniently. Their treatment, however, is very different.

The relationship between television and the matter transmitter is a creatively limited one, on the whole. The first episode of *The Outer Limits*, "The Galaxy Being" (1963), sees a curious radio station engineer creating a "solid statue" of a distant alien from "three-dimensional static". After a fractious encounter with other humans, the alien willingly consigns itself to oblivion rather than return home a criminal for breaking its culture's laws against contact with primitives. "The Galaxy Being" is a surprisingly rich response to the anxieties present in pulp radio fantasies such as "The Moon Menace", and a cautionary tale of our own responsibilities as we reach out into the void in search of kindred minds.

Unfortunately, "The Galaxy Being" proves to be an exception to the subsequent rule. Far earlier than 1963, the film serials of *Flash Gordon* and *Buck Rogers in the 25th Century* were using the trope simply to move characters back and forth (1936 and 1939 respectively). *Doctor Who*'s travel dials did no more in 1964 and neither did *The Outer Limits* twice in the same year ("Fun and Games" and "The Special One"). *Doctor Who* used "molecular dissemination", "cellular fragmentation" or "cellular dissemination" as a plot convenience in the fifth episode of "The Daleks' Master Plan" (1965), and with *Star Trek*'s debut in 1966 the dye was cast.³⁰ D-mat "proved a boon to TV space opera", given

³⁰ *Doctor Who* has also used transmat ("Ark in Space"), Transmat Capsules ("Mawdryn Undead") and a Time Ring ("Genesis of the Daleks"), and of course the TARDIS itself functions as a kind of matter transmitter (as does the related SIDRAT in "The War Games"). Other stories that feature varying means of matter transmission include "The Brain of Morbius", "The Mutants", "Pyramids of Mars" and "The Time Monster". Even discounting the TARDIS, in the series' revival the trope remains in regular use.

the budgets and special effects of the day: it was “only introduced into the *Star Trek* series to eliminate production costs associated with the continual depiction of space ships landing and taking-off from strange planets.” (Stableford 2004 219; Bendle 54). And so it continues, both on the screen and in its critical reception: “In all these stories . . . matter transmission seems merely a means to an end, and it would have made little difference if the journey had been made by a more conventional sf method” (Ash 157). D-mat has been extensively employed thus in television, and more recently in computer games, where the trope is so ubiquitous there are games dedicated solely to arranging matter transmitters and receivers in complicated ways (e.g. *Portal*).³¹

Although both *Doctor Who* and *Star Trek* are founded on the principle of displacement and spatial collapse, the wider cultural consequences of such technologies are rarely explored. In general the trope on the small screen appears hardly to have evolved little from Edmund Hamilton’s *Prisoner of Mars* (1939) or even Edgar Rice Burroughs’ *A Princess of Mars* (1917)—in stark contrast to literature, where matter transmitter has been used frequently as a means of circumventing the energy and time problems associated with interstellar transport travel, rarely without creating new problems along the way.³²

There is no doubt that in visual media d-mat is a great convenience. Reaching a far-off land can be as simple as stepping from one set to another, with jump cuts between. Time travel, on the other hand, arguably *adds* costs, by requiring research and effort to create

³¹ The trope appears less frequently in movies than might be expected. Examples from beyond popular franchises include soft-porn exploitation film *Zeta One*, Hammer film *The Projected Man*, and *Four Sided Triangle*, an adaptation of William F Temple’s sci-fi romance of the same name. *GalaxyQuest* offers a parody of *Star Trek* that includes the memorable line: “Digitize me!” It has also been employed in a pair of music video clips by the band Biting Elbows.

³² Too many to list comprehensively: see Anderson; Barnes; Biggle 1963; Egan 2008; Haldeman; Heinlein; Kelly; Silverberg 1988; Simmons 1989; Stross 2006; Van Vogt 1952 et al.

convincing sets, particularly when the story takes place in the verifiable past. Setting stories in the past has the effect of lending them the weight of history—particularly when this history includes events of known significance—so while both fictions utilise instantaneous travel between two points, the time travel story naturally accrues cultural “heft”. Additionally, time travel series may enable experienced and respected writers and actors of non-science fictional historical drama to dabble in the genre when they might otherwise never do so.

Add to this not just several popular movie versions of *The Time Machine*, but also countless movies using the trope of time travel as a central conceit, and it becomes easier to grasp how the matter transmitter has been overlooked as a core concept of SF.³³

3.3 Problems with Plausibility

Writers grappling with matter transmission eventually must find a way to approach the problem that “[e]ven an educated layman must realize that one can’t simply disassemble a living body at one point, reassemble it at another, and expect life to resume” (Schmitz 1961). The data storage required to create a copy of a person to the atomic level is immense: “About 10^{28} kilobytes would be needed to store a human pattern in a memory buffer” (Johnson 2002). Given that the standard practical unit for measuring memory is the terabyte (10^9 kilobytes) and the current capacity of our entire culture is estimated at in excess of 600 exabytes (10^{15} kilobytes), present-day technology falls short of the task by

³³ See *Back to the Future* (1-3), *Donnie Darko*, *Frequency*, *The Girl Who Leapt Through Time*, *Groundhog Day*, *Midnight in Paris*, *Peggy Sue Got Married*, *The Philadelphia Experiment*, *The Planet of the Apes*, *Primer*, *Safety Not Guaranteed*, *Sound of my Voice*, *Terminator* (including two sequels and a TV series), *Time After Time*, *Twelve Monkeys*, *Time Bandits*, and more.

a factor of 10^{13} , or ten trillion (Adams 2011). That doesn't take into account the difficulties associated with reliably transferring that data from one place to another without taking longer than the estimated lifetime of the universe (Clarke and Baxter; Leinster 1961).

So “[i]n terms of real science, the physics of teleportation involve probably insurmountable problems” and “conceivably will remain so well into the future” (Bendle 54; Barber 6). It “breaks the laws of material movement space as they are currently understood” and that fundamental implausibility may be a contributing factor in the critical overlooking of matter transmission (Scholes and Rabkin 175).

Television for the most part treats matter transmitters as though they “were simply magical devices which attempted to dress up an old idea with scientific jargon”, separated from Dorothy’s slippers in *The Wonderful Wizard of Oz* only by the jargon (Nicholls 135). A close look at early SF unearths many examples of ridiculous pseudoscience and “conflicts which turn on arbitrary pseudo-answers to pseudo-problems”, but from the age of telegraphy to the present, science provides a willing accomplice in the appearance of matter transmission’s imminence, at the very least supplying language to support the verisimilitude of the prospect (Langford 2003 129). In literature, science fiction writers adopt this language wholesale in ways not always visible in other media.

References to the ether, for instance, were common in early works employing d-mat. Serviss’s *The Moon Metal* refers to “undulations of the ether” while Williamson’s “Cosmic Express” triumphs “a new way to travel—by ether!” (Serviss 25; Williamson n.p.).³⁴ The

³⁴ Also see Doyle 1929; Gernsback 1909; Hamilton 1927; Matson; Witwer.

notion of the luminiferous aether was an important metaphor for understanding reactions to radio and even though it lost scientific credibility after Einstein's Theory of Relativity was published in 1905, it lingered until the 1930s in popular texts (Sconce 200).

The growing understanding of the nature of the atom provoked another outbreak of creative hand-waving in the era of science fiction occasionally dubbed the "Radium Age" (Glenn). Rutherford's demonstration of the smallness of the atomic nucleus combined with Einstein's notion of the interchangeability of matter and energy to provide science fiction writers with numerous options to animate their arcane machinery (Banks 1959; Langelaan; Williamson). Space warps and wormholes, the latter term coined by John Archibald Wheeler in 1957, provided another seemingly scientific means of getting characters from A to B, albeit without the disintegration stage (Hamilton 2004; Kelly; MacLeod; Schmitz 1961; Stross 2006; Vance).

Other scientific developments to appear in connection with this trope include the uncertainty principle (Clarke and Baxter 1997), entangled quantum states (Meaney 2002), neutrinos (Niven 1973C; Simmons 2003), number theory (Van Vogt 1942), compression algorithms (Crichton), anti-matter (Silverberg 1988), topological transformations (Disch 1966), "extradimensional distortions" (Heinlein 20), the "augmented tunnel diode effect" (Niven 1973C), the Observer effect (Dyer), "non-Euclidian tachyon displacement" (Shaw 1977), magnetism, white holes and multiverse theory (Vance)—all continuing the principle Mitchell conceived in 1877: "You could telegraph the Idea of matter, to use the word Idea in Plato's sense."

The manipulation of scientific concepts to bolster the trope does on occasion stretch plausibility to the breaking point. “You cannot explain one incredible thing by quoting another incredible thing,” pronounced Sir Arthur Conan Doyle in 1929, before proceeding to do exactly that himself:

When certain crystals, salt, for example, or sugar, are placed in water they dissolve and disappear. You would not know that they have ever been there. Then by evaporation or otherwise you lessen the amount of water, and lo! there are your crystals again, visible once more and the same as before. Can you conceive a process by which you, an organic being, are in the same way dissolved into the cosmos, and then by a subtle reversal of the conditions reassembled once more? (n.p.)

A strategy of deflection is openly adopted by many writers in order to avoid such rhetorical sleight of hand:

Heinlein’s aim [in *Tunnel in the Sky*] is . . . to offer a seeming wealth of detail to divert the reader’s attention from the fact that device’s like the “Rambotham’s Gate” cannot yet actually be described. (Fischer 47)

“Special Delivery” (Smith 1945B) is an extreme example that contains little other than scientists standing around talking about fictional concepts, a problem that deadens much early SF: the limitations of the technology are there only to drive the plot (Munro 1950; Haldeman) and the theoretical foundations of the “electronic flimflammy” is barely touched upon (Williams 1958 82). While it is axiomatic that “[i]maginary worlds of sf are pretended resolutions of dilemmas insoluble and often barely perceived in the present”, such dilemmas in clumsy hands can become so abstract as to be barely perceptible at all (Csicsery-Ronay 3). The science of *Moon Metal*, for instance, is “so wildly incredible, so infinitely remote from all human experience” that it’s not entirely understood by the scientist who unravels the mystery, nor by the reader, nor even in the context of the world of the novel: in Serviss’s vision of 1940, people still take horses to railway stations but can

build a means of moving atoms around by “some new form of etheric, or so-called electric, energy”.

If the in-story cultural reality is ignored by some writers, such as Serviss, it is embraced in others as another kind of deflection—heightening verisimilitude on one front in order to avoid the science on the other. A. E. van Vogt drew close analogies with the political and scientific race for nuclear weapons in “Secret Unattainable” while Algis Budrys did the same with the space race in *Rogue Moon*, making both stories very much of their time (1942 and 1960 respectively). James Patrick Kelly’s acclaimed “Think like a Dinosaur” employed alien notions of “balancing the equation” and “preserving harmony” to culturally enforce and distract the reader from the considerable technical details he also supplied (4, 13). “Railroad cars in space” is the analogy drawn for a character born before the telegraph in *Way Station* (Simak 1963 55).

Ultimately, and inevitably, some attempts at verisimilitude fail (Nourse; Sturgeon 1954; Vance) or are abandoned completely, such as in “By Mind Alone”, where matter transmission is described as “the gentle art of wishing yourself from place to place” using beer and tranquilizers as an aid (Niven 1966). Many matter transmitters are unreasonably cheap and easy to operate and unfeasibly reliable as well, except where the stories demand that they not be.³⁵ Many writers, like H. G. Wells, were no doubt wary (or weary) of taking on more than they were prepared to, finding it “necessary not so much to extrapolate

³⁵These processes produce little more than flashes of light in Brunner 1974 and 1980, Clarke and Baxter, Crichton, Silverberg 1970, and Vance; slight sensations in Crichton, Matson, Williamson; or no sensation at all in Anderson, Egan 2005, Green, Pohl and Williamson, Schmitz 1961. It almost universally takes very little time to travel even vast distances: Anderson, Asher, Bester, Brunner 1973, Crichton, Dick, Disch 1976, Haldeman, Herbert 1970, Jane, Langelaan, Malzberg, Niven everywhere, Sturgeon 1954, Shaw 1977, Silverberg 1988, Simmons 1989 and 2003, Vance 1973, and Wright. In *Echo Round His Bones* special effects designed by one of Stanley Kubrick’s former employees are used to make a process that’s less complicated than a “hi-fi” look more impressive (Disch 1966 19, 109).

as to avoid extrapolation” (Langford 2003 120). Let superior and far-reaching technology “into your story and a great deal of extrapolation has to be rigorously avoided” (121). On occasion, authors find their way around this problem by invoking alien or advanced human intelligences that simply bequeath the device to their protagonists, who do not grasp the principles of its operation. Thus the “posters” of *The Infinitive of Go* (Brunner 1980) and the “farcasters” of *Hyperion* (Simmons 1989) are each “the gift of exceedingly clever AIs who, by generously not telling humanity how [d-mat] works, permit our own scientific knowledge to remain intact and self-consistent even if presumably wrong” (Langford 2003 121).³⁶ Perhaps first to exhibit such generosity, the Venusian Treen are the philanthropic inventors of “telesenders” in *Dan Dare* (Hampson).³⁷

This sense of matter transmission as a far-fetched dream may well encourage its critical disregard. However, the notion that SF occasionally fails to provide a realistic model of “imaginary physics” is not a failure in the context of SF as a whole (Langford 2005A 800).

As Istvan Csicsery-Ronay says:

The scientific content of sf, even though generally based on the scientific plausible knowledge of its day, is always fabulous. SF’s science is transformed to fit the parameters of cultural myth and aesthetic in play. In sf we . . . make science of our metaphors (6). . . . Many sf writers . . . use the language and history of technoscience to evoke the coherence and correspondence of the scientific worldview—but always with the freedom to violate, stretch, ironize, and problematize it (111). . . . The effect of the fantastic narrative depends not on its accuracy, but on its evocativeness and persuasiveness. (113)

Samuel Delany concurs:

³⁶ Another strategy is to make the invention a serendipitous accident (Blade; Chase; Haldeman; Heinlein).

³⁷ Also see Knight 1952; Lunan; Nourse; Silverberg 1988.

The point is not that science in sf is “usually inaccurate”; but rather that some of the science in any given SF story *must* be inaccurate—or it isn’t SF. . . . [SF] presents a distortion of the world. One of the things it distorts in the world is present science. (1984 176-177)

Ultimately the appeal of these stories, Jonathan Bignell observes,

is based on the pleasures of fantasy and speculation which they offer, rather than the exploration of the geometric and physical principles each [story] refers to in order to ground [nonexistent technology] in scientific fact. (93)

The writer must therefore choose between aiming for scientific plausibility and possibly failing to achieve it, and abandoning verisimilitude entirely, relying on the fact that “despite its implausibility, there is a deeply embedded cultural fascination with the notion that explains its popularity and influence” (Bendle 54). Both courses add weight to the assumption that matter transportation stories have nothing to contribute to the ongoing discourse between science and fiction.

3.4 The Fly in the Room

It is, lastly, possible that success on another front contributed to the matter transmitter’s critical tarnishing. “The Fly” by George Langelaan was published in the June 1957 issue of *Playboy*. The story of an inventor who accidentally fuses his body with that of a housefly while testing his “disintegrator-reintegrator” device remains the most familiarly iconic story about matter transmission (Van Riper 184). It received the magazine’s Best Fiction Award for the year and was filmed in 1958. This highly successful adaptation won the Hugo Award for Best Dramatic Presentation and was very well received by critics, spawning two inferior sequels, an Academy Award-winning remake in 1986, yet another unsatisfactory sequel, and an opera based on the original story.

Why was it so successful? The story is undoubtedly a masterful work of science fiction and body horror, although not without precedent. “The Man Without a Body” is not only the first story to use the trope, but the first to focus on undesirable transformations made possible by this superficially promising technology.³⁸ And of course, the invention turning on the inventor has been a recurring theme ever since *Frankenstein*. In the case of “The Fly”, the transmitter “might be read as a metaphor for adaption” (Littau 142-143), a metaphor embedded in the nested narrative of the story itself, and in the re-narration of subsequent iterations of the story into film and onto the stage. “The Fly” has very publically undergone a cultural mutation into forms positive and negative, hybridized at each stage, like the inventor himself, in combination with alien story ideas, advances in special effects, and contemporary social concerns (such as AIDS in the case of Cronenberg’s 1986 film version). “The Fly”, in all its forms, affirms that “transmitters can be dangerous if they malfunction”, making them particularly compelling for popular culture in moments of social change (Van Riper 184). Like the protagonist of “The Fly” himself, no matter how thoroughly he destroys his notes and his equipment and even himself, the fly keeps coming on back with its message of degradation and ruin.

That mutilation (or mutation) of the flesh is present in d-mat from the moment of its conception is evident in the title of the very first story. “The Man Without a Body” presents the inventor as destroyed by his own creation: a shrivelled fossil “much affected by the ravages of decay”.³⁹ Small flecks of gold find their way by “atomic bombardment” into the

³⁸ *Desirable* transformations were, of course, part of the function of the magical Tarnhelm, one year earlier (Wagner).

³⁹ Were there any doubts that this story is predominantly concerned with physicality, the Professor’s slow disintegration, starting with his feet and working slowly upwards, he conscious all the while, soon dispels them—that, and the bizarre conclusion of the tale, where his head is given a new body scavenged from a moa

bodies of bystanders in *The Moon Metal* (Serviss 1900), while Professor Vehr warns of “penalties . . . terrible for failure to observe the substantial condition of scientific law—penalties which threaten absolute annihilation” (Milne 1885 86). Foreshadowing modern information theory, which states that “whenever large amounts of information are transferred from one location to another, some bits of information are inevitably changed or distorted” (Johnson 97), early writers imagined that different parts of the body might respond differently to the process, such as “hair . . . being on an entirely different vibration to the living organic tissues [and therefore] can be included or excluded at will” (Doyle 1929), or “Rabbits to the Moon”, in which “skeletons are always lagging behind and have to be integrated later” (Banks 1959 110).⁴⁰ That matter transmission leads to uniquely problematic physical relationships is highlighted by Baron d'Ormesan's character in “Remote Projection”, who creates numerous independent physical copies of himself, some of whom go on to father children. All die when one of them is shot, leaving a “profusion of corpses” behind—841 in all (102).

From the very moment they are switched on, early stories suggest, matter transmitters are unreliable. The first subject, a guinea pig, arrives dead in “Travel by Wire!”; later in the same story people require plastic surgery to correct transmission errors or deliberately allow their signal to fade in order to lose weight (Clarke). In “The Fly”, the first object transported, an ashtray, arrives back to front; the first living subject, a cat, disappears. Dan Dare's assistant Digby regularly arrives upside-down (Hampson). In “You'll take the High Road” (Brunner 1973), “scrambled-in-transit” accident rates are not released: “Sometimes

skeleton, dressed up and sent wandering through Central Park in an outlandish outfit comprised of cultural detritus found at the back of the museum (Mitchell 1877).

⁴⁰ This is not always problematic. An early form of the matter transmitter in A. E. Van Vogt's *The Mixed Men* (1952) is unable to scan certain tissues, resulting in a hybrid human form far superior to the norm.

they open up the delivery terminal and all they find inside is a kind of borscht” (124). Accordingly, insurance costs a fortune, and the general feelings is that, “you’re taking your life in your hands when you go by ‘matter” (123).⁴¹ Variations on “transmission shock” or “poster-lag” feature in some stories (Harrison and Brunner 1980 respectively). In *The Loafers of Refuge* by Joseph Green, humans only learn how to survive matter transmission at all after being helped by psychic aliens, who then teach them how to do it without machines.

“[Q]uestions of the body, of what it means to be human, and the politics that become justified to achieve certain types of bodily purity” are common themes in SF, both on the screen and on the page (Wolf-Meyer 1088). Jack Wodhams’s “There is a Crooked Man” contains a traveller arriving radically rearranged, a scientist multiply duplicated at the expense of other travellers (who disappear), a man and a woman who swap bodies in order to prop up a failing marriage, limbs switching in error from person to person, and a suggestion that it is possible to become allergic to the process. The spread of disease thanks to spatial collapse is explored in several texts (Anderson; Clarke and Baxter; Brunner 1974; Green; Harrison), while Larry Niven runs the whole gamut of physical anxieties in *World out of Time*: a man with cancer is frozen in order to be saved in the future; when he wakes up in a new body, he discovers that his old brain has minced up to provide RNA for his new brain’s memories; he then travels around the galaxy, ageing unnaturally thanks to the hibernation he employs during the long journey, and arrives back at Earth an old man; there he is sent on a quest to find an anti-ageing drug from immortal and sexless children, frozen at the age of 11. In a rare example of the trope having a positive effect in this regard, the solution in fact turns out to be matter-transmission: it

⁴¹ See also Green; Nourse; Smith 1945B; Warren; Wright; and *The Projected Man*.

automatically cleans out cells of the detritus that causes ageing, “the stuff that builds up over ninety years of life” (233), allowing the main character to return to a more youthful disposition.⁴² Accruing gradual cellular changes as a result of frequent matter transmission is a persistent thread in Kurt von Trojan’s exercise in paranoia, *Transing Syndrome*, as is the fear that one’s heart has switched to the other side of one’s body (see also Malzberg).

On the whole, literary explorations of bodily transformations use the matter transmitter in innovative and meaningful ways, far beyond those explored by “The Fly” and its spin-offs. Even so, by 1980 the trope was being lampooned thus by Douglas Adams:

I teleported home one night
with Ron and Sid and Meg.
Ron stole Maggie's heart away,
and I got Sidney's leg. (129)⁴³

It is true that to be lampooned in *The Restaurant at the End of the Universe* is to be lampooned along with the entire body of SF, however Adams’s treatment does far less for the trope than his “infinite improbability drive” or “Bistromathics” does for the spaceship. Coming from a background in radio and television as Adams did, perhaps that shouldn’t surprise or disappoint.

Neither *Star Trek* nor *Doctor Who* prioritised the negative ramifications of their individual transport fantasies, perhaps because of budgetary constraints or their popularity with children. When they were considered at all, the narratives emphasized interior concerns, such as: the splitting of characters into “good” and “evil” halves (“The Enemy Within”,

⁴² Deliberate cellular rearrangement also occurs in Stross 2006 and Wodhams.

⁴³ Although he too, like Larry Niven in “By Mind Alone”, prescribed beer to make the journey easier.

1966); social anxieties, by mistakenly sending the protagonists to hostile alternate dimensions (“Mirror, Mirror”, 1967); or warning of an over-reliance on the technology (“The Seeds of Death”, 1969).

Since SF on TV has been the most visible form of SF for at least two generations, and “The Fly” is the most visual iteration of the trope in cinema, one could be forgiven for perceiving that the trope has little to offer. The problem of plausibility that many d-mat narratives labour under only supports this fallacy. The question thus becomes: why do so many writers, such as myself, remain willing to meaningfully engage with the trope today, more than 130 years after its inception?⁴⁴

⁴⁴ Notable authors who have used the trope since 2000 include Iain M. Banks, Greg Egan, Stephen Gould, Ken MacLeod, Wil McCarthy, John Meaney, China Miéville, Adam Rex, Dan Simmons, Charlie Stross, and Peter Watts. (NB: the gender bias of this list reflects the predominance of male writers in the field of “hard” science fiction. It is possible that a survey of fantasy writers using the trope of teleportation might produce a result skewed in the opposite direction, but that investigation is beyond the scope of this exegesis.)

4 The Space Machine Redux

4.1 The Resurrected Trope

Jean Baudrillard lamented in 1991 that “‘good old’ SF imagination is dead” (309). Perhaps he was simply looking in the wrong place. At the fringes of the genre, tropes have continued to combine and transform, evolving along with science fiction into strange, new shapes (Hollinger 245). Matter transmission is an essential part of that evolution, fuelling explorations of society, self and space. Body horror and mutation might have been where the trope of started, and to which point it keeps returning in the public’s mind, but it is clearly not the only journey the trope offers the wider culture.

Greg Egan’s vision of the far future, for instance, demonstrates the continuing relationship between science fiction and the postmodern in the way it explores humanity’s lingering engagement with physical forms and its role in shaping social spaces. Those citizens of his imaginary culture “the Amalgam”

who chose to be embodied . . . clearly relished their physicality, with all of the specific abilities and constraints that came with it. Having one kind of body rather than another was a supremely arbitrary choice, but the restrictions it imposed gave a shape to everything you experienced. (Egan 2008 45)

This extension of pro-choice themes, by imagining cultures in which people embody and disembody at will while retaining a persistent sense of self, stands as a calm and clear rebuttal to the fear of erosion of self often portrayed in narratives exploring the possibilities

of such technology. While having complete freedom of physical expression that allows the proliferation of “freaks” and “monsters” (Bester)—to their adopters simply an expression of selfhood—is a situation that could be described as dystopic, being denied choice, the ability to make decisions regarding one’s own tissues, is also potentially dystopic.

SF’s function of normalizing the alien is completely congruent with d-mat’s philosophy of bringing the alien home. Once the alien no longer seems alien, perhaps our reverence for a restricted selection of largely arbitrary shapes will ease, allowing us greater freedom of physical experience. That Egan’s characters are able to embody anywhere, recreating not just familiar bodies but familiar homes and property as well, creates a fluid sense of contiguous space that spans the entire galaxy. They recreate themselves as socially embodied beings as easily as they recreate their actual bodies, and they remain fully functional operands in their galactic society: “So much for the cliché that embodiment is the antithesis of abstraction” (*Incandescence* 49).

Although virtual environments remain a standard component of modern SF, a certain ambivalence regarding the effects such technologies will have on the future world is unavoidable (Sconce 206). Outside of fiction, virtual reality, like the revival of 3-D movies, has suffered from real-life problems including headaches, nausea, eyestrain and disorientation. Called simulator or VR sickness, these experiences inevitably undercut the promise of cyberpunk, just as the cancelling of the Apollo program and the roll-out of a relatively mundane Space Shuttle disappointed those who had hoped that *2001: A Space Odyssey* was an achievable blueprint of the future. The rise of New Baroque Space Opera can be interpreted as a reaction against the failure of space fiction to deliver on that front, enacted by consciously stepping beyond what made early space fiction attractive and

embracing other literary concerns, such as politics, complex characterization, contemporary science, and so on.⁴⁵ In this sense, a new fictional age is arising to give new life to the trope, as Hollinger suggests:

These texts are contributing to a self-conscious revival, in new directions, of one of SF's oldest (and most denigrated) subgenres, constructing futures that—quite cheerfully, for the most part—reflect back to us the incredible complexity of the technoscientific present (244).

Cyberpunk is yet to be reinvented. Meanwhile the matter-transporter remains a relatively pure dream, untainted as yet by disappointing reality.⁴⁶

4.2 An Old Flame

The existence of a “vocabulary of simultaneously available formulas from which a science fiction write can choose, a situation comparable to that of, say, the English popular drama in Shakespeare’s day” (Rose 2), in no way implies a limitation on the genre, any more than it did for Shakespeare. The use of “conventional symbols or icons is one of the most convenient methods for science-fiction writers to . . . embody not only the dialect of known and unknown but also the germ of recognizable formulas” (Wolfe 27). Critics acknowledge that “science fiction has always been ‘intertextual’—that is, its writers have always tended to borrow (and revise) each other’s ideas and conventions” (Hollinger 244). Therefore,

⁴⁵ The addition of “Baroque” to the more usual “New Space Opera”, as employed in Westfahl 2005 (622) and Hollinger (244), perfectly captures the self-aware complexity of this prominently revived trope.

⁴⁶ Robotics and cloning, two other tropes used to explore identity and selfhood, have had a similarly slow introduction into everyday life.

postmodern SF writers are parodists, playing with and within the genre they have chosen to champion, self-consciously questioning the rules that their forerunners simply erected without thinking, . . . creating works of science fiction that are also *about* science fiction (Everman 25)

Reiteration, in short, does not dictate slavish imitation.

As a professional writer of science fiction, explorations of identity, social change, mutation and spatial collapse lie at the heart of much of my work, and I have frequently returned to the trope of the matter transmitter, in fantasy and horror as well as SF, because it is uniquely able to explore all four of these themes at once. A simple analysis of the relationship between my narratives concerning identity and those containing some kind of matter transmitter reveals a clear relationship between the two.

| | |
|---------------------------|------------------|
| identity themes NO d-mat | 3 ⁴⁷ |
| d-mat NO identity themes | 5 ⁴⁸ |
| d-mat AND identity themes | 33 ⁴⁹ |

This is not to imply that stories containing d-mat *necessarily* explore themes of identity and individuality, but that in my work the correlation is very strong.

Since “[t]eleportation is rarely an appropriate term for fantasy’s magical transitions”

(Langford 2005A 801), I will refer to science fictional works only, as I have elsewhere in

⁴⁷ “Evermore”, “Mary’s Blood” and “Signs of Death”.

⁴⁸ *Curse of the Vampire*, “Face Value”, *The Sky Warden & the Sun*, *The Stone Mage & the Sea* and “Zero Temptation”.

⁴⁹ *The Blood Debt*, *Castle of Zombies*, *The Crooked Letter*, “Death and the Hobbyist”, *The Devoured Earth*, *Earth Ascendant*, *Echoes of Earth*, *Geodesica: Ascent*, *Geodesica: Descent*, “A Glimpse of Marvellous Structure (and the Threat it Entails)”, *The Grand Conjunction*, *The Hanging Mountains*, *Heirs of Earth*, “Inevitable”, *Invasion of the Freaks*, “The Land Itself”, “A Map of the Mines of Barnath”, “The Missing Metatarsal”, “The N-Body Solution”, “New Flames for an Old Love”, “On the Road to Tarsus”, *Orphans of Earth*, *Planet of the Cyborgs*, “Rare Justice”, *The Resurrected Man*, *Saturn Returns*, “The Spark (A Romance in Four Acts)”, *The Storm Weaver & the Sand*, *Troubletwisters*, *Troubletwisters: The Monster*, *Troubletwisters: The Mystery*, *Twinmaker* and “A View Before Dying”.

this exegesis. This leaves 24 works—12 stories/novellas and 12 novels/series for younger readers—that explicitly use the matter transmitter to interrogate contemporary notions of individuality, spatial relationships, social anxieties and the malleability of the human form. In the remainder of this section I will focus on four particular stories and one novel in order to demonstrate my use of the trope in the past.

“Ghosts in the Machine” was my first attempt to write a story intended for publication. It was complete in 1989 but never accepted, and was briefly synopsisized in the afterword of my second collection, *A View Before Dying* (1998B). Inspired by “The Fly”, the works of Larry Niven, and *Doctor Who*, “Ghosts in the Machine” concerns an inventor who inadvertently creates a ghost of himself every time he is killed and reborn by his “Machine” (cf. Miéville). This unforeseen supernatural consequence renders the process unusable in the long-run, as it does in “The Fly”.⁵⁰ The problem is not so much that the soul is destroyed each time the Machine is used, but that new ones are created with each “re-creation” at the other end. Under pressure from mounting numbers of angry poltergeists, the inventor destroys the machine and takes his own life at the same time—avenging his own untimely death upon himself, in effect.

Three years passed before I returned to the trope. The title of “New Flames for an Old Love” (1994B), as well as flagging the contents of the story, intentionally acknowledges the long history of the trope of matter transmission and my engagement with it.⁵¹ Marcus deBarrow, the environmentally idealistic inventor of “D-mat” [sic], grows angry when

⁵⁰ In “The Fly”, the “memory” of the missing cat Dandelo interferes with the disintegrator-reintegrator’s operation, rendering it “a machine ghosted by cat-atoms” (Littau 148).

⁵¹ My first collection, *New Adventures in Sci-Fi* (1999A), also signals in its title my active engagement with genre tropes, containing as it does stories that play with past uses of vampires, werewolves, road trips, first contact, ghosts, space opera and so on.

QDos, the company to which he licensed his revolutionary technology some years earlier, delays the release of the latest generation in order to maintain its monopoly on the market, thereby prolonging humanity's reliance on fossil fuels. DeBarrow's revenge is to turn his invention on everything that has gone through it: radiation emitted from open booths causes the disintegration of people and things alike, returning the affluent to the Stone Age (cf. Herbert). It is "the fiery death of a middle class" (25), the narrator mourns. It is also the death of his wife, whose dissolution he witnesses at close proximity. Suffering from radiation burns in the ruins of what was once a resort deep in the West Australian outback, he wonders whether deBarrow is "history's greatest murderer, or the saviour of mankind" (26), while plotting revenge of his own.

This, my first published d-mat story, contains many familiar uses of the trope. The technology manifests as a capsule, the working details of which are jargonistically glossed over ("ghost particles" 16, "loose gluons" 21). Easy to use and only initially expensive, it triggers profound social change, twice. The permanence of human physicality is challenged, as is the permanence of Western capitalism. Spatial relationships are collapsed, opening up remote locations such as the Himalayas and the Challenger Deep to tourism. Added to the trope is the iterative nature of modern technology, the inevitability of opportunistic copy-cats in the marketplace, the matter transmitter as weapons of mass destruction, and the suggestion that d-mat operates differently depending on what is carried through it: a pendant given to the protagonist's wife is intended to protect her from deBarrow's terrible revenge.

My second published attempt to elaborate the generic conventions of matter transmitters was published the same year. "On the Road to Tarsus" (1994C) explores the possible

misuse of d-mat by a bored teenager, Julia, and her younger brother David, the protagonist of the story. A playful competition, to see who can visit the most exotic location, becomes more serious upon discovering that they can hack into the d-mat network, by-passing nanny software, and go literally anywhere. Julia simultaneously wins and loses the game by jumping to an interstellar colony, forgetting that it will take the information comprising her decades to arrive. At the conclusion of the story, David is waiting at her destination, 31 years older and bracing himself for the culture shock she is certain to experience, having not aged even a single moment since last he saw her.

Again, the story hinges on the ease of use inherent to d-mat. Transfers take five minutes but feel instantaneous; the only hint that one has moved comes from the sounds outside the booth upon arrival. Numerous far-flung locations are referred to or visited, including Antarctica, the Moon and a world beyond our solar system, while David's family lives in a hive-like community deep under an Australian desert from which d-mat is the usual exit. Concepts of space, self, society and the body come under examination by a variety of in-story details:

- The possibility of vanishing “into the system” upon failure to arrive arises, thanks to Julia's tinkering with a system that normally works perfectly (61).
- The invention of “resurrection” within the story—keeping a back-up of the last transmission data in case of accidental death—is modified by giving characters an option to write a request into their will for the technology not to be used, similar to Living Wills employed today.
- Investigators search for Julia's genetic profile in an international surveillance grid to see if she used d-mat after her disappearance (cf. Von Trojan).

- Users require a license, attainable only at a certain age, in order to travel alone via d-mat.
- The d-mat network is employed as a means of childhood rebellion, either through escape from a society perceived as being oppressive (as in Knight 1952) or through games, such as hide and seek or pushing random numbers to see where they lead.⁵²
- The disparity between perceived time and objective time (“What may seem instantaneous never is” 63) is directly analogised to perceived and actual distance.
- Finally, David’s perspective on the colony world as he waits for his sister to arrive is described as “a limbo, a boundary between states”, echoing her own state. Frozen in a beam of information, is she alive or is she dead?

Interstellar travel and ambiguous states of being meet once more in my third published d-mat story. Where “New Flames for an Old Love” employs a conventional apocalyptic tone throughout to describe how d-mat changed the world, and “On the Road to Tarsus” is a traditional science fiction story that hinges on real science for its resolution, “A View Before Dying” (1994B) also employs several motifs of the Gothic to reinforce an atmosphere of entrapment and hopelessness against the back drop of infinite space.

A maintenance crew arrives by d-mat at an interstellar probe that has been sabotaged en route.⁵³ The crew left Earth many years ago, but only an instant appears to have passed for them. Their route back has been rendered unusable, perhaps by aliens from a wrecked

⁵² The latter gambit is called “skelter roulette” in *Web of Everywhere* (Brunner 1974). This novel also portrays treasure hunt parties similar to the modern game of geocaching.

⁵³ The notion of sending staggered maintenance crews and/or supplies to maintain them is also raised in *The Enemy Stars* (Anderson 1958) and *The Wailing Asteroid* (Leinster 1961).

vessel hanging near the probe. They have just a few weeks of air before they will suffocate and die, unless they can find a way home again.

That space and time have collapsed is evident from the first page, when Rod Hallows (whose surname was chosen to loosely evoke “hollow” as well as the remains of religious saints) recovers from an eye-blink that lasted “twenty-two point four light-years and almost a quarter of a century”: he finds it initially difficult to accept that “it was *he* who had moved, not the universe around him” (27). The improbability of receiverless matter transmission is described as alien super-science in order to make the imaginary science used by the protagonists of the story relatively believable (cf. Del Rey; Disch 1966). Virtuality and reality blur as characters interact with the cybernetic technologies available to them, but the former is only a convenience, as in “On the Road to Tarsus”: what matters most is the immediate experience of their physical surroundings. While the d-mat “cage” on the probe can turn their bodies into data and *in theory* put that data into storage for resurrection later, the probe only has enough memory to contain one human head—space that is already occupied in such a fashion. The solution is to take a leap of faith (the story’s original title) and use a second probe trailing far behind the damaged one to relay a much slower signal to Earth. The signal will take over eighteen months to transmit, plus many more years to be relayed home, during which time Hallows will “exist” in fragments spread far, far apart—an even more fragile form of existence than the girl lost “On the Road to Tarsus”.

These three published stories demonstrated to me that the trope of matter transmission was a valuable means exploring themes and scenarios I found compelling, and that there was an audience for such stories. In 1993 I began compiling notes for a longer work, “Latecomer”,

concerned with the fates of colonists sent from Earth that were overtaken by technology while they were in transit: if a trip at the speed of light takes 23 years but in that time scientists develop a means of breaking that speed limit, then the original batch of colonists will arrive to find their empty world already full of people. They might even find another version of themselves living there, if their “resurrection” file is sent by the new technology. The psychological, social and legal ramifications occupied my mind for two years, and while the story went unwritten, the contemplation of it led to an even larger work: my second solo novel, *The Resurrected Man* (1998A).

Like Niven’s *A World Out of Time*, *The Resurrected Man* is on one level a work overtly exploring new forms of bodily mutation made available by advanced technology. Jonah McEwen is awoken from a maintenance gel in which he has wasted away for three years. He is the prime suspect of a series of gruesome “Twinmaker” murders in which women who look like his former lover, Earth Justice Commission agent Marilyn Blaylock, are being copied and brutally killed. He protests his innocence, and his alibi seems watertight—but given that someone has found a way to break the system’s safeguards and copy people, why couldn’t a copy of *him* be responsible for the crimes? He regains his health, joins the investigation in order to prove his innocence, is subsequently killed, resurrected, uploaded into a computer, and “run” as a computer simulation that is edited before being restored to physical form. Meanwhile, the virtual ghost of his dead father, an evolving artificial intelligence, and a murderer who copies himself to create an alibi (and then willingly suicides one of the copies to avoid complications) further populate the world with novel forms of being.⁵⁴

⁵⁴ There is a prior version of *The Resurrected Man*’s “d-med” in Wodhams 1967, called “Instravel Re-Creative Physical Perfectionizing” (292) and “electronic surgery” (302). Radical tissue reconstruction and resurrection via d-mat also appears in *The Mixed Men* (Van Vogt 1952).

On another level, *The Resurrected Man* examines the legal and philosophical ambiguities of identity by asking the familiar question: are the two copies of Marilyn alive at the end of the novel both “Marilyn” and therefore equally entitled to the life she lived before?⁵⁵ The nature of the crime poses legal problems for the investigators at every turn. If a woman has been copied and killed, but the original remains alive and unharmed, has a crime actually been committed? If a person is copied and the *copy* commits a crime, is the original also responsible for that crime? If a person copies himself and then kills the original, is that murder or suicide? The examination of these questions and others—many left deliberately unresolved at the end of the novel—complements the police procedural of the linear plot, which is resolved.

Crime fiction, like science fiction, is fundamentally concerned with the notion of identity. Just as the movie *Bladerunner* “extends Chandler’s ‘separation of people from each other’ into the distance between planets”, requiring the detective to bring them together, *The Resurrected Man* casts even the identity of the detective into question while at the same time using spatial collapse to unite characters in conflict (Bukatman 143). The effects of spatial collapse can also be seen in a global polyglot culture, featuring a gutter patois gleaned from numerous disparate languages. The events of the novel take place across the Earth and beyond with equal convenience. The only car chase, a traditional staple of crime fiction, takes place in Quebec, an independent nation that spurns d-mat and harbours a militant reactionary organisation called WHOLE, whose members believe that d-mat results in the destruction of the soul. Quebec is the last isolated country remaining in the

⁵⁵ Despite clear acknowledgement of Hofstadter and Dennett in the opening of the novel, *TV Tropes* lists *The Resurrected Man* as “trope namer” for the “concept of clones or copies being made to replace original people, usually either as a means of teleportation . . . or as a way of obtaining immortality (creating clones to replace a dying or dead original, for example)” (“Twinmaker”).

world, with access granted only by old-fashioned airports and border checkpoints—what is normal to us rendered alien in the fictional world of the novel.

As with previous works using this trope, the verisimilitude of d-mat is “too futuristic for the general matrix of technology and culture in the book”, but this concern is secondary to exploring the existential crises of the people within the book and the world they inhabit (Blackford, Ikin and McMullen 212-213). *The Resurrected Man* was not the end of my exploration of this trope.⁵⁶ “A Map of the Mines of Barnath” (1995), “Inevitable” (2009B) and “A Glimpse of Marvellous Structure (and the Threat it Entails)” (2010C) use space- and time-warping passages in an inter-universal maze as a foil for characters’ search for place and identity. A similarly space-warping maze inhabits the Geodesica diptych, in which the nature of our species is interrogated through means of duplicated bodies, group minds, reactionary “Naturals” and super-evolved beings who still believe themselves to be human (Williams and Dix 2005 and 2006).⁵⁷ Similar questions are posed in the Orphans and Astropolis series (Williams and Dix 2202, 2006, 2005; Williams 2007A and C, 2008, 2009A). The Fixers series for children (2010A and D, 2011B and A) pits a young boy against multitudinous copies of himself thanks to a rash of wormholes that lead between universes, while “Rare Justice” (1999C) uses a fleeing despot’s “resurrection” pattern as a means of extreme retribution: brought back to life by the daughter who betrayed him, he is asked to recant and then executed when he does not, as he has been many times before. “The N-Body Solution” (2012B) explores the consequences of a breakdown in a chain of alien matter transmitters on variegated humans and aliens trapped in an isolated section of

⁵⁶ A proposed sequel, *Widow of Opportunity*, was never written but also summarized in *A View Before Dying* (1998B). It would have woven the stories “A View Before Dying” and “On the Road to Tarsus” into the universe of *The Resurrected Man*, via the Latecomers and a virtual colony masquerading as a real one.

⁵⁷ Interplanetary d-mat relays operate in this universe, as they do in Biggle 1958 and Simak 1963.

the universe. “The Land Itself” (2000) sees one member of a gestalt intelligence visiting the sole surviving minds of Australia in search of political independence from an empire that is no longer politically or socially relevant to its colonies. “The Missing Metatarsal” (2012A) and “Face Value” (2013A) explore how the existence of matter transmitters impact upon notions of value and knowledge, while “Zero Temptation” (2013C) and “Death and the Hobbyist” (2013D) explore interpersonal relationships in a world where spatial collapse is the norm. Lastly, “Deconstructing *Decompression*” (2013E) explores the notion of collapsing identity in the face of a restricted environment by means of a book review written by student in a post-scarcity future.

Several key themes run through many of these stories, particularly those employing the disintegration/reintegration manifestation of the trope: that identity is a surface phenomenon, an emergent property of the complexity of a physical mind; that there is no soul; that d-mat can be employed as an entry point to virtual life (as in the movie *Tron*) but that virtual life is not preferable to existence in the material universe; that the matter transmitter is value neutral in the sense that it may be used for immoral purposes but is not itself immoral; and, embedded in the use of the trope itself, that disintegration/reintegration stands as a metaphor for the creative process.

Like David Cronenberg assembling a new version of “The Fly” from all the ones that came before it (Littau 150), in these stories I am taking old ideas and using them to create new narrative explorations of familiar themes. The role of creator as remixer is one I openly endorse, and which I practice through the use of quotations from Charles Darwin, Edgar Allen Poe, and Gary Numan (2009C; 2001, 2002A and B; 2007A and C, 2008, 2009A). I

have found this process to be no less rewarding and relevant on revisiting them in my latest novel.

4.3 Making and Remaking

My latest commercial novel, *Twinmaker* (2013B), was written concurrently with “Making and Remaking Iteration 113”, the creative component of this thesis. Indeed, they are different iterations of the same story, transformed by the varying requirements of commercial publishing and academia respectively.

Twinmaker, the first in a series of three novels, takes its title from the opening of Hofstadter and Dennett’s 1982 book *The Mind’s I*, in which the authors refer to their hypothetical matter transmitter as a “murdering twinmaker” (4). This is also the source of the name of the “Twinmaker” murders in *The Resurrected Man*. *Twinmaker* shares other names with *The Resurrected Man*, but is not intended as a sequel, or even as a novel set in the same world. Like most of my d-mat narratives, it operates in a loosely defined and internally inconsistent context that is intended to be less predictive than metaphorically descriptive (Williams 199B).

The era of *Twinmaker* and “Making and Remaking Iteration 113” is rendered distinct from ours by two things in particular: firstly, the world has recently recovered from global environmental collapse that transformed both society and geography; and, secondly, d-mat was instrumental in that recovery. In this undated but near future, d-mat is a conventional and completely naturalized technology, however acceptance of d-mat’s everyday convenience only came after it purged the atmosphere of carbon dioxide, released low-

lying land from the threat of inundation, and provided food and energy for all.⁵⁸ Its utility as a means of transport, therefore, was initially secondary to its role in reshaping the world. Alongside these uses, “Fabbers”—matter duplicators building from detailed patterns, an evolved form of present-day 3-D printers—meet every consumerist demand.⁵⁹ They also recycle waste (as in Brunner 1974; Clarke and Baxter).

The youth of this era may know nothing but abundance, but the generation before them grew up in the shadow of extreme deprivation during the Water Wars, in much the same fashion as children of survivors of the Great Depression or the Holocaust. It is the parents’ generation that experienced the technological unease expressed in many d-mat narratives either overtly, when the inventor of d-mat ends up crippled, insane or dead, or covertly, through criticism of present-day technologies.⁶⁰

In this world, as in the world of *The Resurrected Man*, those who do not use d-mat are social pariahs, only in this case they are not physically separated from ordinary citizens.⁶¹

There is no equivalent of Quebec in this novel, no haven for those who don’t fit in.

WHOLE, elaborated in this novel as the acronym of “World Holistic Leadership”, is the

⁵⁸ Larry Niven explores the uses of d-mat in such areas as rubbish disposal and freshwater distribution in “Flash Crowd” (1973C) but his imagined costs are too high to make such systems universal. For negative environmental consequences of using d-mat, see Van Vogt, Vance, Del Rey. Aliens d-matting their rubbish to Earth appears in Banks 1987. “SF’s undisputed maestro of postmodern defamiliarization”, Philip K. Dick, moots the possibility of reducing Earth’s population pressure by erasing people who think they are being sent to an off-world colony in *The Unteleported Man* (Hollinger 238; see also Brunner 1963; Heinlein).

⁵⁹ Cf. “Hometrans”, a system that delivers bland products of poor quality to homes in *Transing Syndrome* (von Trojan) and “A-gates” in *Glasshouse* (Stross 2006).

⁶⁰ As in “The Fly”, which opens with the line: “Telephones and telephone bells have always made me uneasy” (Langelaan). Or the second paragraph of “The Disintegration Machine”, which depicts Professor Challenger complaining at the receipt of another wrong call and the “interference of some idiot at the end of a wire” (Doyle 1929).

⁶¹ Those afraid of using the technology are called “stucks” in *A Web of Everywhere* (Brunner 1974). See also Del Rey, Vance.

activist arm of the Abstainer movement, populated by those who believe they have a genuine grievance against the technology. Their children attend schools like other children, but they must live nearby in order to avoid commuting via d-mat, since public transport no longer exists. They walk or ride bikes in ways that readers in 2012 would find conventional but in the world of *Twinmaker* seem highly eccentric. Some Abstainers inhabit economic niches as manufacturers of unique objects.⁶² Others fight the risk of over-standardization by introducing mutations to crops the old-fashioned way. Some commit terrorist acts, such as delivering live viruses via d-mat to high profile targets.

The third-person viewpoint protagonist of *Twinmaker* and deuteragonist of “Making and Remaking Iteration 113” is Clair Hill, a teenager who, like all teenagers, is oblivious to the extraordinary age in which she lives. She and her contemporaries take d-mat and related technologies for granted, just as previous generations were accustomed to automobiles and aeroplanes (Van Riper 184). As for the “metaphysical implications of teleportation”, to Clair’s contemporaries these seem “no more profound than the metaphysical implications of TV” do to us (Broks 2003 204). “[P]eople soon got used to the idea” is the premise on which Clair’s milieu stands or falls.⁶³ Train lines and highways are preserved solely for use by hobbyists or reclaimed and turned into nature strips or historical monuments (cf. Clarke and Baxter; Niven 1973; Russ) while d-mat stations suffer from a new form of traffic jam

⁶² This optimistic outcome of the end of mass-manufacture does appear elsewhere, for instance Williams: “In the past we’ve sold standardization because it was a scarce commodity. Now, the shoe is on the other foot, we’ll sell diversity.” (1958 96). See also Vance: “Our resources are infinite. . . . A single commodity remains in finite supply: human toil” (162).

⁶³ A more thoughtful foundation for this acceptance might be Robert Nozick’s closest-continuer schema for numerical identity, which explicates our acceptance of objects (or people) as possessing continuous identities if they share qualitative similarities. Parts may be replaced, but we experience no sense that the object as a whole is different.

(cf Niven 1973; Brunner 1973; Russ).⁶⁴ Chases—between fugitive and peacekeeper or children playing hide and seek—are now conducted from booth to booth on foot, all across the globe (cf. Niven 1976; Zelazny 1973). Teenagers use d-mat to play games and physically act out ages-old dreams of escape and intimacy.⁶⁵ In this world, “Improvement” is the future equivalent of an internet meme promising illegal physical and psychological alteration by the simple means of carrying a coded note through d-mat.

Twinmaker uniquely employs the trope of the matter transmitter trope in the context of a young adult (YA) to explore a teenager’s shifting sense of self.⁶⁶ A central theme of fiction aimed at the adolescent audience is the making and remaking of identity in response to physical, social and spatial changes. Physical changes can result from puberty, accident or gaining a new tattoo, for example. Spatial changes occur when young protagonists move home or attend new schools, say, and these are accompanied by social dislocations. Further disruptions to social life occur when teens migrate from one clique to another, or experience altered family relationships through remarriage or divorce, compounding anxieties of how one appears to oneself and to others. The process of blending in and finding a new sense of belonging, while at the same time prioritizing the necessity to be unique, is inevitably complicated by revised circumstances, leading to unforeseen obstacles to and opportunities for growth.

⁶⁴ Kurt Von Trojan’s *The Transing Syndrome* uses d-mat to portray a dystopic vision of a future in which promised reclamations of abandoned roadways has not been accomplished, d-mat is erratic and jams therefore common, and deliveries via d-mat are frequently delivered short or to the wrong place. “Teleshooters” who deliberately misuse the system, perhaps because they are addicted to it, stand in sharp contrast with those suffering from “teleportation phobia”, who (correctly) fear being duplicated, copied incorrectly, or failing to arrive at all (cf. Miles).

⁶⁵ Cf. Wodhams 1967, in which young lovers deliberately choose to be entangled via matter transmission, calling it “togetherness” (269).

⁶⁶ *Jumper* is a YA novel that uses non-mechanical teleportation to explore powerlessness and place in modern society (Gould). The lack of a disintegration/reintegration stage means that it explores relatively conventional (but no less powerful) crises and tactics available to a contemporary adolescent with respect to identity and embodiment.

D-mat allows internal conflicts and realizations to take literal form within the world of the novel. For instance, Clair's social world is at first utterly unconstrained by spatial considerations: she can go wherever her friends are and easily find like minds anywhere on Earth. When she is unable to use d-mat any longer, however, she is forced into close contact with people she doesn't already know and whose social cues are unfamiliar. Spatial isolation echoes social isolation, forcing her to re-evaluate important relationships and establish new ones.

Similarly, *Improvement* allows an elaboration of notions of physicality and identity that are not possible in a realist narrative. Clair's wish for a more attractive nose speaks to her uncertain sense of self, initially expressed through her dysfunctional and illicit relationship with her best friend's partner and ultimately reaching crisis thanks to an invading "other" mind that comes with the attainment of that wish. Clair's achievement of a more mature sense of self at the end of the novel comes with the realization of a genuine relationship prospect and the awareness that her own actions have caused harm to people close to her.

Apart from *Improvement*, mutation appears in the narrative of both iterations of Clair's story on several levels, from the injuries suffered by WHOLE's disenfranchised agitants to distorted quotations sent to Clair by Q, a newborn artificial intelligence wishing to befriend her (Brunner 1973 151).⁶⁷ Identity is challenged by the duplication and impersonation of several characters known to Clair, plus a series of apparently indestructible "dupes" sent to

⁶⁷ Names are repeatedly misspelled in "You Take the High Road" (e.g. Brunner 1973 149) and deliberately muddled in Disch 1966. Duplicates take a distinguishingly different middle name in Pohl and Williamson. The aliens of "Think Like a Dinosaur" speak in a garbled mistranslation of English (Kelly). "I'm leaving no turn unst—I mean, no stone unturned" (Wright 102). The structures of "There is a Crooked Man" and *Mindbridge* are highly fractured and non-linear (Wodhams; Haldeman). Words are truncated when skelters activate in *Web of Everywhere* (Brunner 1974), as indeed is the term "skelter" itself.

kill her.⁶⁸ Resurrection is illegally employed to bring characters back from the dead in an attempt to elicit Clair's allegiance to the conspirators responsible for breaking the rules of both the world of *Twinmaker* and of conventional notions of selfhood.

"Making and Remaking Iteration 113" is not a YA novel. It is written in the first-person from Q's point of view, making it an intentionally distinct work from *Twinmaker* in both style and emphasis. More adult in tone, the events of *Twinmaker* are reconceived and elaborated as a memoir of Q's birth from the perspective of a future, more evolved version of herself. An entirely new identity crisis is prompted by Q's attempts to differentiate this version of herself from previous iterations (her "sisters" P, O, N, etc), thereby allowing notions of mutable identity to be elaborated by more overtly science fictional means than those typically found in a YA text.

Similarly, with the constraints of commercial publishing removed, various structural and framing devices allow the further elucidation of the themes of recreation and disembodiment found in the *Twinmaker* narrative. These include numerous introspective scenes wherein Q grapples with the notion of selfhood while utterly distanced from any physical sense of self—or indeed any kind of physical reality, conducting this monologue as she is from a position in entirely virtual space (the Air, an evolved form of our present-day Cloud). Fragmentary scenes from Clair's life intrude on these introspections, often stripped back to transcriptions of conversations Q is no part of, thereby emphasising her isolation from conventional relationships. The constant shift in style—from monologue to script to conventional narrative forms—highlights her attempts to connect with the world, and her constant failure to do so. Until she fully knows herself, there is nothing *to* connect.

⁶⁸ Cf. Budrys (138), Von Trojan, Wodhams, and particularly Disch 1966, in which the protagonist complains: "I seem to spend all my time killing this one man" (104).

It is not so much the world that frustrates Q's attempts to achieve both and embodiment, but her inadequate conceptions of both.

The fates of Q and Clair are inextricably linked throughout "Making and Remaking Iteration 113". From twin awakening at the commencement of the work, their separate understandings of identity come to a crisis when Clair's best friend is "invaded" by the mind of another woman, thanks to her pattern being corrupted during a d-mat jump, an act enabled by Q. Arriving to a keener awareness of the possible uses of d-mat ultimately forces a resurrected Clair to interrogate her assumptions concerning friendship, attraction, independence, morality, mortality, selfhood, and her metaphorical place in the world. Similarly, Q's very existence relies on that of Clair, a person who is herself changing and perhaps disappearing, depending on which definition of "self" Q employs.

The conspiracies and cover-ups revealed in the course of both texts arise from abuses of power, not the existence of advanced technology. Throughout, d-mat remains value neutral. Clair's journey through adolescence in a society that has normalized this technology mirrors that of Q, who occupies a virtual world with no sense of physicality at all. Clair has a body changing in ways she may not be ready for; Q is a mind evolving much faster than a human's and has no body at all. Their parallel narratives intersect at a critical junction when Q temporarily occupies the body of Clair's best friend, demonstrating in graphic metaphorical fashion that even best friends become strangers with time, just as a familiar trope may reveal unfamiliar uses in an entirely new context.

5 Conclusion

Since its first appearance in 1877, the trope of the matter transmitter has maintained a close lockstep with expanding scientific knowledge. As far back as 1961 editor and historian Sam Moskowitz boldly declared that “wireless transmission of matter is the next big transportation frontier to be conquered”, and some now claim that “far from being a science fiction dream, teleportation happens routinely in laboratories all around the world” (Darling 14). This nascent field of scientific expertise has appeared on the cover of *Scientific American*, trumpeting that it might soon be “*Time to Teleport*” (Zeilinger; Dickson). However, such claims, while technically true, are undoubtedly exaggerated: “the most we can teleport is light beams, sub atomic particles, and quantum properties of atoms” (Darling 15). For now the transmission of solid objects, let alone living creatures, remains “probably impossible but difficult to disprove” (Benford 130).⁶⁹

However, its value as a literary trope lies in its metaphorical capacity to engage fruitfully with societal concerns and evolving philosophies of identity. Following Wolfe’s criteria for especially meaningful iconicity in a science fictional context, I would argue, firstly, that d-mat plays a pivotal role in narratives imploding a wide variety of knowns and unknowns. These include Earth and alien landscapes, conventional modes of being and others incorporating duplication or resurrection, the familiar human form and one altered by physically rearranging tissues at the molecular level, and contemporary social mores and

⁶⁹ In 1998, *New Scientist* reported claims that whole viruses would be transported within ten years. The same claim was being made in 2005 (Darling 15). It is conceivable that d-mat might join fusion as a technology *always* just ten or twenty years in the future.

those altered by the availability of advanced technology. Secondly, d-mat remains a hypothetical technology, far from actualization, rendering narratives incorporating it inevitably science fictional. Thirdly, d-mat clearly arose out of and is renewed by psychological and cultural responses to rapid technological and other developments, such as globalism, capitalism, environmental degradation, fiscal collapse, resource depletion, cloning, and artificial intelligence.

So long as matter transmission continues to overlap with several other critically examined tropes, such as the spaceship, time travel and virtual reality, while maintaining its own distinct effect, it functions in an iconic fashion in modern SF, remains a powerful tool in the hands of a SF writer, and will likely continue to remain so for decades to come.

Appendix

In the “linguistically intensified paraspace” of SF, language is a powerful means of transcending the descriptive (Delany 1988 31). Names in particular can be important signifiers of otherness. This list of neologisms coined and terms appropriated to refer to matter transmitters is not complete, but does demonstrate an ongoing engagement with the trope by contemporary writers.

A-Gates (Stross 2006)

Ambassadors (Card)

Beamriding (Cain)

Cage Process (Malzberg)

'caster [stet] (Anderson)

cellular dissemination (“Counter Plot”)⁷⁰

cellular fragmentation (“Counter Plot”)

Cosmic Express (Williamson)

d-mat (Williams 1994B)

digital conveyor (*GalaxyQuest*)

disintegrator-reintegrator (Langelaan)

displacement booths (Niven 1973A)

displacer (Banks 1988)

Doors (Asimov)

⁷⁰ This is likely a mix-up by William Hartnell, the first actor to play the lead role of *Doctor Who*, who was notoriously bad at remembering his lines.

Doorways (Knight 1952)
electrical transmission (Fezandie in Lengeman)
electroport (“Fun and Games”)
electroportation (Chase)
etheric transmigration (Witwer)
Farcaster (Simmons 1989)
fax (McCarthy)
faxnodes (Simmons 2003)
gate (Farmer)
hardcaster (Williams 2007A)
hex gates (Broderick)
Hometrans (Von Trojan)
hyper-space machines (Van Vogt)
hyper-wavicle dissolution and resolution (Nourse)
impulse patterns (Simak 1963)
instant-transportation (Niven 1976)
Instravel (Wodhams)
Interface (Lunan)
Interplanetary Transference (McIntosh)
Jaunting (Bester)
Jenson Displacement Gates (Hallus)
jumpdoors (Herbert)
Leggett-Heath Reproducer (Temple)
LVT: Levant-Meyer Translation (Haldeman)
m-t (Lunan)

MAT (Williams 2000)

MAT-TRANS (Axler)

materializer (Simak 1963)

matter booths (Brunner 1973)

matter scanner (Budrys)

matter-sending apparatus (Hamilton)

matter transference beam (Adams 1980)

matter transmitter (Stone)

mattercaster (Anderson)

McAllen Tube (Schmitz 1961)

migration (Kelly)

MOIRA: Matter, Organic and Inorganic Reconstruction Apparatus (Collyn)

molecular dissemination (“Counter Plot”)

MT (Harrison)

Nemor Disintegrator (Doyle 1929)

observational transport (Dyer)

particle transmission (Gernsback in Lengeman)

passways (Vance)

porting (Miéville)

posters (Brunner 1980)

prilatsil (Niven 1976)

radio transporter (Clarke)

Quantum Interface Mat-Trans Inducer (Axler)

Ramsbotham Gate (Heinlein)

Reprostat (Disch 1964)

runcibles (Asher)

SIDRAT: Space and Inter-Dimensional Robot All-purpose Transporter (“The War Games”)

skelters (Brunner 1974)

Springer (Barnes)

Steel Womb (Disch 1966)

stepping disks (Niven 1970; cf. Kuttner)

T-Gates (Stross 2006)

T-mat (“The Seeds of Death”)

tachyon transporter (Pohl and Williamson)

tangler (Williams and Dix 2005)

TARDIS: Time and Relative Dimension in Space (“An Unearthly Child”)

Teleclone (Hofstadter and Dennett)

Telepod (*The Fly* 1986)

Telepomp (Mitchell)

telesender (Hampson)

teletransportation (Coss and Lennox)

Telpor (Dick)

Teltrans (Von Trojan)

TOMTIT: Transmission of Matter Through Interstitial Time (“The Time Monster.”)

trans-pad (Darling)

transfer booths (Niven 1970)

transmat (Wright)

transmatter (Nourse)

transo (Simak 1961)

transplat (Sturgeon 1954)

transporter (“Where No Man Has Gone Before.”)

transposer (Leinster 1961)

travel dials (“The Keys of Marinus”)

trip-box (Zelazny 1982)

Velde receiver/transmitter (Silverberg 1988)

Verdi Matter-Transmitter (Blade)

vibro-transference (Munro)

Webb Traveleasy (Banks)

Wire (Clarke and Baxter)

Wonkavision (Dahl)

wormcaster (Williams 2012)

X-cast (Matson)

Works Cited

- Adams, Diana. "Global Data Storage: how much and where is it?" *Bit Rebels*.
<<http://www.bitrebels.com/technology/global-data-storage-how-much-where-it-is-infographic/>>. Web. 17 November 2011.
- Adams, Douglas. *The Restaurant at the End of the Universe*. 1980. London: Pan, 1981.
Print.
- Aldiss, Brian W., and Harry Harrison. *Hell's Cartographers*. London: Weidenfeld and
Nicolson, 1975. Print.
- Anderson, Poul. *The Enemy Stars*. 1959. London: Coronet, 1972. Print.
- Appollinaire, Guillaume. "Remote Projection". 1910. *The Magazine of Fantasy and Science
Fiction* July (1968). Trans. Remy Inglis Hall: 93-102. Print.
- "Ark in Space". *Doctor Who*. 1975. ABC, 2002. DVD.
- Ash, Brian. *The Visual Encyclopedia of Science Fiction*. New York: Harmony, 1977.
- Asher, Neal. *Gridlinked*. New York: Tor, 2001. Print.
- Asimov, Isaac. "It's Such a Beautiful Day". 1954. *Nightfall and Other Stories*. New York:
Doubleday, 1969. 245-267. Print.
- Asimov, Isaac. "Obituary". 1959. *Asimov's Mysteries*. London: Panther, 1971. 177-194.
Print.
- Axler, James (Jack Adrian and Laurence James). *Pilgrimage to Hell*. Toronto: Harlequin,
1986. Print.
- Banks, Raymond E. "Rabbits to the Moon". *The Magazine of Fantasy and Science Fiction*
July (1959): 106-118. Print.

- Banks, Iain M. "Cleaning Up". 1987. Hachette Digital, 2009. N.pag. EPUB file.
- Banks, Iain M. *The Player of Games*. 1988. Hachette Digital, 2008. N.pag. EPUB file.
- Barber, John F. "Consciousness and Teleportation: 6th Swiss Biennial on Science, Technics + Aesthetics". 22-23 January, 2005. Lucerne, Switzerland.
NeuroQuantology Issue 1 (2005): 3-6. Print.
- Barnes, John. *A Million Open Doors*. 1992. New York: Tor, 1993. Print.
- Baudrillard, Jean. "Simulacra and Science Fiction." 1981. Trans. Arthur B. Evans. *Science Fiction Studies* 18.3: 309-13. Print.
- Baudrillard, Jean. "The Ecstasy of Communication." *The Anti-Aesthetic*. Ed. Hal Foster. Washington: Bay Press, 1983. Print.
- Bendle, Mervyn F. "Teleportation, Cyborgs and the Posthuman Ideology". *Social Semiotics*, Vol. 12, No. 1 (2002): 45-62. Print.
- Benford, Gregory. "Is There a Technical Fix for the Human Condition?" 1984. *Hard Science Fiction*. Ed. George E. Slusser and Eric S. Rabkin. Carbondale: Southern Illinois UP: 1986. Print.
- Bester, Alfred. *The Stars My Destination*. (serialised) *Galaxy* October (1956): 7-56.
Galaxy November (1956): 4-59. *Galaxy* December (1956): 75-128. *Galaxy* January (1957): 84-128. Print.
- Biggle, Jr. Lloyd. "The Rule of the Door". *Galaxy* February (1958): 8-36. Print.
- Biggle, Jr. Lloyd. *All the Colors of Darkness*. New York: Nordon, 1963. Print.
- Biggle, Jr. Lloyd. *Watchers of the Dark*. London: Rapp & Whitling, 1966. Print.
- Bignell, Jonathan. "Another Time, Another Space: Modernity, Subjectivity and *The Time Machine*". *Alien Identities: exploring difference in film and fiction*. Ed. Deborah Cartmell, I. Q. Hunter, Heidi Kaye and Imelda Whelehan. London: Pluto, 1999. Print.

- Biting Elbows. "Bad Motherfucker". Online video clip. YouTube.
 <<https://www.youtube.com/watch?v=Rgox84KE7iY>>. Web. 13 February 2013.
- Biting Elbows. "The Stampede". Online video clip. YouTube.
 <<https://www.youtube.com/watch?v=QYm-dT24iRY>>. Web. 13 February 2013.
- Blackford, Russell, Van Ikin and Sean McMullen. *Strange Constellations: a history of Australian science fiction*. Westport: Greenwood, 212. Print.
- Blade, Alexander (Richard S. Shaver). "The Vanishing Spaceman". *Amazing Stories* July (1947): 94-109. Print.
- Blish, James. *Spock Must Die!* New York: Bantam, 1970. Print.
- Bly, Robert W. *Science in Science Fiction*. Dallas: Benbella Books, 2005. Print.
- Booker, M. Keith, and Anne-Marie Thomas. *The Science Fiction Handbook*. Chichester: Wiley-Blackwell, 2009. Print.
- "Brain Machine, The". *Flash Gordon*. 1955.
 <<http://www.archive.org/details/FlashGordon-TheBrainMachine-1955>>. Web. October 2011.
- "Brain of Morbius, The". *Doctor Who*. 1976. ABC, 2008. Print.
- Broderick, Damien. *The White Abacus*. New York: Avon, 1997. Print.
- Broks, Paul. "To Be Two or Not to Be". *Into the Silent Land: travels in neuropsychology*. London: Atlantic, 2003. Print.
- Brunner, John. *The Dreaming Earth*. New York: Pyramid, 1963. Print.
- Brunner, John. "You'll take the High Road". *Three Trips in Time and Space*. Ed. Robert Silverberg. New York: Dell, 1973. 86-158. Print.
- Brunner, John. *Web of Everywhere*. 1974. London: NEL, 1977. Print.
- Brunner, John. *The Infinitive of Go*. 1980. London: Magnum, 1981. Print.
- Budrys, Algis. *Rogue Moon*. 1960. London: Victor Gollancz, 1978. Print.

- Bukatman, Scott. *Terminal Identity: the virtual subject in Postmodern Science Fiction*. Durham and London: Duke UP, 1993. Print.
- Burnett, Judith. *Generations : The Time Machine in Theory and Practice*. Burlington: Ashgate, 2010. Print.
- Burroughs, Edgar Rice. *John Carter of Mars*. Chicago: McClurg, 1917. Project Gutenberg, 2008. N.pag. EPUB file.
- Burroughs, Edgar Rice. *Gods of Mars*. Chicago: McClurg, 1918. Project Gutenberg, 2008. N.pag. EPUB file.
- Caidin, Marin. *Beamriders!* London: Pan, 1989. Print.
- Card, Orson Scott. *A Planet Called Treason*. 1979. London: Pan, 1981. Print.
- Cartmell, Deborah, I. Q. Hunter, Heidi Kaye and Imelda Whelehan, ed.. *Alien Identities: exploring difference in film and fiction*. London: Pluto, 1999. Print.
- Chase, Allison. *Outrageously Yours*. New York: Signet Eclipse, 2010. Print.
- Clarke, Arthur C. "Travel by Wire!". 1937. *The Collected Stories*. London: Victor Gollancz, 2000. 1-4. Print.
- Clarke, Arthur C., and Stephen Baxter. "The Wire Continuum". 1997. *The Collected Stories*. London: Victor Gollancz, 2000. 948-964. Print.
- Collyn, George. "Mix-Up". 1971. *Best SF Stories from New Worlds 7*. Ed. Michael Moorcock. London: Panther, 1971. 45-56. Print.
- Commander X and Tim Swartz. *Teleportation: A How-To Guide—From Star Trek to Tesla*. New Brunswick: Global Communications, 2001. Print.
- Coss, Frank, and Ronald D. Lennox. "New Directions: Teletransportation - An Answer to 21st-Century Problems". *Management review (Saranac Lake, New York)* (0025-1895), 64 (1): 54-56. Print.

- Connor, Stepe. *Postmodernist Culture: an introduction to theories of the contemporary*.
Oxford: Blackwell, 1989. Print.
- “Counter Plot” (Episode 5, “The Daleks’ Master Plan”). *Doctor Who*. BBC. 11 December
1965. Television.
- Crichton, Michael. *Timeline*. 1999. New York: Ballantine, 2000. Print.
- Csicsery-Ronay, Jr., Istvan. *The Seven Beauties of Science Fiction*. Middletown: Wesleyan
UP, 2008. Print.
- Dahl, Roald. *Charlie and the Chocolate Factory*. New York: Alfred A. Knopf, 1964. Print.
- The Dalhousie Review* Volume 40. Halifax, Nova Scotia: Dalhousie UP, 1960. Print. (no
author)
- Darling, David. *Teleportation: the impossible leap*. Hoboken: Wiley, 2005. Print.
- Del Rey, Lester. “The Wind Between Worlds”. *Galaxy* March (1951): 4-42. Print.
- Delany, Samuel R. *Starboard Wine*. New York: Dragon Press, 1984. Print.
- Delany, Samuel R. “Is Cyberpunk a Good Thing or a Bad Thing?” *Mississippi Review*
47/48 (1988): 31. Print.
- Dick, Philip K. *The Unteleported Man*. 1964. London: Methuen, 1976. Print.
- Dickson, Gordon R. *Time to Teleport*. New York: Ace, 1960. Print.
- Disch, Thomas M. “Now is Forever”. 1964. *What If? Volume 2*. Ed. Richard A. Lupoff.
New York: Pocket, 1981. Print.
- Disch, Thomas M. *Echo Round His Bones*. 1966-1967. London: Granada, 1979. Print.
- Doyle, Arthur Conan. *The Mystery of Cloomber*. 1889. Project Gutenberg, 2009. N.pag.
EPUB file.
- Doyle, Arthur Conan. “The Disintegration Machine”. 1929. Project Gutenberg, 2006.
N.pag. EPUB file.
- “Drone, The”. *Futureways*. Vancouver: Arsenal Pulp, 2004. 132-138. Print.

- Dyer, Thoraiya. "Wish Me Luck". *Asymmetry*. Perth: Twelfth Planet, 2013. 43-63. Print.
- Egan, Greg. "Riding the Crocodile". 2005. *Dark Integers and Other Stories*. Burton, Michigan: Subterranean, 2008. Print.
- Egan, Greg. *Incandescence*. London: Gollancz, 2008. Print.
- The Encyclopedia of Science Fiction*. Ed. John Clute and David Langford. Third (beta) edn. <<http://www.sf-encyclopedia.com/>>. Web. 11 October 2011.
- "Enemy Within, The". *Star Trek*. 1966. *Star Trek - The Original Series: season 1 - Remastered Edition*. CBS: 2008. DVD.
- Everman, Welch D. "The Paper World: Science Fiction in the Postmodern Era". *Postmodern Fiction: A Bibliographic Guide*. Ed. Larry McCaffery. Westport, CT: Greenwood, 1986. Print.
- Farley, Ralph Milne. *The Radio Man*. 1924. Los Angeles: Fantasy, 1948. Print.
- Farmer, Philip José. *A Private Cosmos*. New York: Ace, 1968. Print.
- Fischer, William B. *The Empire Strikes Out: Kurd Lasswitz, Hans Dominik, and the development of German science fiction*. Bowling Green, Ohio: Bowling Green U. Popular P.: 1984. Print.
- Fly, The*. Dir. Kurt Neumann. Twentieth Century Fox, 1958. Film.
- Fly, The*. Dir. David Cronenberg. Twentieth Century Fox, 1986. Film.
- Fort, Charles. *Lo!* New York: Cosimo, 1931. Print.
- Four Sided Triangle*. Dir. Terence Fisher. Hammer, 1953. Film.
- Friedberg, Anne. *Window Shopping: cinema and the postmodern*. Berkley: California UP, 1993. Print.
- "Fun and Games". *The Outer Limits*. 1964. *The Outer Limits: the original series*. MGM, 2005. DVD.

- “Galaxy Being, The”. *The Outer Limits*. 1963. *The Outer Limits: the original series*.
MGM, 2005. DVD.
- GalaxyQuest*. Dir. Dean Parisot. 1999. Paramount, 2006. DVD.
- “Genesis of the Daleks”. *Doctor Who*. 1975. BBC, 2006. DVD.
- Gibson, Williams. *Neuromancer*. 1984. London: Grafton, 1989. Print.
- Glenn, Joshua. “The Radium Age science fiction library.”
<<http://boingboing.net/2012/02/14/the-radium-age-science-fiction.html>>. Web. 5
March 2012.
- Gordon, Mick, and Paul Broks. *On Ego*. Longon: Oberon, 2005. Print.
- Gould, Steven. *Jumper*. New York: Tor, 1992. Print.
- Gould, Steven. *Reflex*. New York: Tor, 2004. Print.
- Gould, Steven. *Impulse*. New York: Tor, 2013. Print.
- Green, Joshua. *The Loafers of Refuge*. 1962-1963. London: Victor Gollancz, 1965.
- Haldeman, Joe. *Mindbridge*. 1977. London: Futura, 1984. Print.
- Hallus, Tak (Stephen Robinett). *Stargate*. (serialised) *Analog* June (1974): 10-62. *Analog*
July (1974): 78-130. *Analog* August (1974): 110-162. Print.
- Hamid, Mohsin. *The Reluctant Fundamentalist*. Florida: Harcourt, 2007. Print.
- Hamilton, Edmund. “The Moon Menace”. 1927. *Famous SF* Vol. 1 No. 2 (1967): 11-39.
Print.
- Hamilton, Edmund. *Prisoner of Mars*. 1939. *Rpt. as Tharkol Lord of the Unknown*.
London: Pemberton, 1950. Print.
- Hamilton, Peter F. *Pandora’s Star*. 2004. New York: Del Rey, 2005. Print.
- Hampson, Frank. *Dan Dare: Voyage to Venus*. 1950. London: Titan, 2004. Print.
- Harrison, Harry. *One Step From Earth*. 1970. Devon: Readers Union, 1973. Print.

- Hayles, N. Katherine. *How We Became Posthuman: virtual bodies in cybernetics, literature and informatics*. Chicago: Chicago UP, 1999. Print.
- Hayles, N. Katherine. "Flesh and Metal: reconfiguring the mindbody in virtual environments". *Configurations* 10.2 (2002): 297-320. Print.
- Hayles, N. Katherine. "Virtual Bodies and Flickering Signifiers."
 <<http://www.english.ucla.edu/faculty/hayles/Flick.html>>. Web. 17 October 2011.
- Heinlein, Robert. *Tunnel in the Sky*. 1955. London: Victor Gollancz, 1969. Print.
- Herbert, Frank. *Whipping Star*. 1970. London: NEL, 1972. Print.
- Hofstadter, Douglas R., and Daniel C. Dennett. *The Mind's I: fantasies and reflections on self and soul*. 1981. New York: Bantam Edition, 1982. Print.
- Hollinger, Veronica. "Science Fiction and Postmodernism". *A Companion to Science Fiction*. Ed. David Seed. Oxford: Blackwell, 2005. Print.
- Holy Bible*. Revised Standard Version. New York: New American Library, 1962. Print.
- Holy Quran*, Trans. Tarif Khalidi. London: Penguin Classics, 2009. Print.
- Jane, Fred T. *To Venus in Five Seconds: An Account of the Strange Disappearance of Thomas Plummer, Pillmaker*. London: A.D.Innes, 1897. Print.
- Johnson, Charles W. *Beam me up, Scotty! - Teleportation, and Personal Identity*.
Unspecified Austrian Ludwig Wittgenstein Society (2002): 97-99. Print.
- Kelly, James Patrick. "Think Like a Dinosaur". 1995. *Think Like a Dinosaur and Other Stories*. James Patrick Kelly. Urbana: Golden Gryphon, 1997. Print.
- Kessel, John. "Foreword". *Think Like a Dinosaur and Other Stories*. James Patrick Kelly. Urbana: Golden Gryphon, 1997. Print.
- "Keys of Marinus, The". *Doctor Who*. 1964. BBC, 2009. DVD.
- King, Stephen. "The Jaunt". 1981. *Skeleton Crew*. New York: Putnam, 1985. Print.

- Kincaid, Paul. "Time Travel". *The Greenwood Encyclopedia of Science Fiction and Fantasy: themes works and wonders*. Ed. Gary Westfahl. Westport: Greenwood, 2005. Print.
- Knight, Damon. "Ticket to Anywhere". 1952. *Deep Space*. Ed. Robert Silverberg. London: Corgi, 1973. 81-104. Print.
- Knight, Damon. *The People Maker*. New York: Zenith, 1959. Print.
- Kuttner, Henry. *The Time Axis*. 1949. <<http://www.feedbooks.com/book/2318/the-time-axis>>. July 2011. EPUB file.
- Langelaan, George. "The Fly". 1957. *They Came From Outer Space*. Ed. Jim Wynorski. New York: Doubleday, 1980. 239-273. Print.
- Langford, David. *The Space Eater*. New York: Pocket, 1983. Print.
- Langford, David. "Teleportation". *The Greenwood Encyclopedia of Science Fiction and Fantasy: themes works and wonders*. Ed. Gary Westfahl. Westport: Greenwood, 2005A. Print.
- Langford, David. "Clichés". *The Greenwood Encyclopedia of Science Fiction and Fantasy: themes works and wonders*. Ed. Gary Westfahl. Westport: Greenwood, 2005B. Print.
- Langford, David. *Up Through an Empty House of Stars*. Rockbury: Wildside, 2003 Print.
- Leach, Jim. *Doctor Who (TV milestones series)*. Detroit, Michigan: Wayne State UP, 2009. Print.
- Leinster, Murray. *The Wailing Asteroid*. 1961. <<http://manybooks.net/titles/leinstermother05wailingasteroid.html>>. July 2011. EPUB file.
- Leinster, Murray. "The Fourth Dimensional Demonstrator". 1935. *The Future Makers*. London: NEL, 1969. Print.

- Lengeman, Bill. "The History of Matter Transmission." *The Internet Review of Science Fiction*. <<http://www.irosf.com/q/zine/article/10633>>. Web. 15 June 2013.
- Littau, Karin. "Adaptation, Teleportation and Mutation from Langelaan's to Cronenberg's *The Fly*". *Alien Identities: exploring difference in film and fiction*. Ed. Deborah Cartmell, I. Q. Hunter, Heidi Kaye and Imelda Whelehan. London: Pluto, 1999. Print.
- Livingston, Ira. *Between Science and Literature: an introduction to autopoetics*. Champaign: Illinois UP, 2006. Print.
- Lunan, Duncan. "The Moon of Thin Reality". *Galaxy* June (1970): 43-55, 152-154. Print.
- Machen, Arthur. "The Novel of the White Powder." *The Three Imposters: or The Transmutations*. 1895. Project Gutenberg, 2011. N.pag. EPUB file.
- MacLeod, Ken. *Newton's Wake*. 2004. New York: Tor, 2005. Print.
- Malzberg, Barry N. *Guernica Night*. New York: Bobbs-Merrill, 1974. Print.
- Marcinko, Thomas. "Heretics". 2001. *Astronauts & Heretics*. Thomas Marcinko, 2012. N.pag. Kindle file.
- Matson, Norman. *Doctor Fogg*. New York: Macmillan, 1929. Print.
- "Mawdryn Undead". *Doctor Who*. 1977. BBC, 2009. DVD.
- McCarthy, Wil. *Collapsium*. 2000. New York: Bantam, 2002. Print.
- McIntosh, J. T. "Five into Four" *Science Fantasy* Vol. 4 No. 10 (1954): 2-30. Print.
- Meaney, John. *Context*. New York: Bantam, 2002. Print.
- Meehan, Paul. *Tech-Noir: the fusion of science fiction and film noir*. Jefferson: McFarland, 2008. Print.
- Miéville, China. *Kraken*. New York: Ballantine, 2010. Print.
- Milburn, Colin. "Nanotechnology in the Age of Posthuman Engineering: science fiction as science". *Configurations* 10.2 (2002): 261-295. Print.

- Miles, Lawrence. *Down*. London: Virgin, 1997. Print.
- Milne, Robert Duncan. "Professor Vehr's Electrical Experiment". 1885. *Science Fiction in Old San Francisco Volume II: Into the Sun & Other Stories*. Rhode Island: Donald M. Grant, 1980. Print.
- "Mirror, Mirror". *Star Trek*. 1967. *Star Trek - The Original Series: season 2 - Remastered Edition*. CBS: 2008. DVD.
- Mitchell, Edward Page. "The Man Without a Body". 1877. *The Crystal Man*. New York: Doubleday, 1973. Print.
- Mitchell, Edward Page. "The Clock That Went Backward". 1881. *The Crystal Man*. New York: Doubleday, 1973. Print.
- Moravec, H. *Mind children: The future of robot and human intelligence*. Cambridge, MA: Harvard University Press, 1988. Print.
- Moskowitz, Sam. "Introduction". *Amazing Stories* December (1961). Project Gutenberg, 2008. N.pag. EPUB file.
- Munro, Duncan H. (Eric Frank Russell). "U-Turn". *Astounding* April (1950): 133-142. Print.
- "Mutants, The" *Doctor Who*. 1972. BBC, 2011. DVD.
- Nahin, Paul J. *Time Machines: Time Travel in Physics, Metaphysics, and Science Fiction*. New York: Springer-Verlag, 1999. Print.
- Nicholls, Peter, ed. *The Science in Science Fiction*. London: Michael Joseph, 1982. Print.
- Niven, Larry. "By Mind Alone". *Worlds of If* June (1966): 150-158. Print.
- Niven, Larry. "The Theory and Practice of Teleportation". 1969. *All the Myriad Ways*. New York: Ballantine, 1971. 128-146. Print.
- Niven, Larry. *Ringworld*. 1970. London: Victor Gollancz, 1984. Print.

- Niven, Larry. "The Alibi Machine". 1973A. *A Hole In Space*. London: Futura, 1975. 29-40. Print.
- Niven, Larry. "All the Bridges Rusting". 1973B. *A Hole In Space*. London: Futura, 1975. 71-94.
- Niven, Larry. "Fla Print.sh Crowd". 1973C. *The Flight of the Horse*. London: Futura, 1979. 99-164. Print.
- Niven, Larry. "A Kind of Murder". 1974A. *A Hole In Space*. London: Futura, 1975. 53-70. Print.
- Niven, Larry. "The Last Days of the Permanent Floating Riot Club". 1974B. *A Hole In Space*. London: Futura, 1975. 41-52. Print.
- Niven, Larry. *A World out of Time*. London: Futura, 1976. Print.
- Nix, Garth. *A Confusion of Princes*. New York: HarperCollins, 2012. Print.
- Nourse, Alan E. "The Universe Between". *Astounding* September (1951): 126-161. Print.
- Nozick, Robert. *Philosophical Explanations*. Cambridge, MA: Harvard UP. 1981. Print.
- Parfit, Derek. *Reasons and Persons*. Oxford: Clarendon Press, 1984. Print.
- Piper, Arthur, and N. Katherine Hayles. "How We Became Posthuman: Ten Years On An Interview with N. Katherine Hayles". *Paragraph* 33(3) (2010): 318-330. Print.
- Pohl, Frederick, Jack Williamson. "Doomship". 1973. *The 1974 Annual World's Best SF*. Ed. Donald A. Woldheim. New York: Daw, 1974. 41-104. Print.
- Priest, Christopher. *The Space Machine: a scientific romance*. New York: Harper & Row, 1976. Print.
- Priest, Christopher. *The Prestige*. 1995. London: Orion, 2004. Print.
- The Projected Man*. Dir. Ian Curteis and John Croydon. Compton, 1960. Film.
- Prucher, Jeff. *Brave New Words: the Oxford dictionary of science fiction*. Oxford: Oxford UP, 2009. Print.

- “Pyramids of Mars”. *Doctor Who*. 1975. BBC, 2004. DVD. Print.
- Rex, Adam. *The True Meaning of Smekday*. New York: Disney Hyperion, 2007. Print.
- Rose, Mark. *Alien Encounters: anatomy of science fiction*. Cambridge, Mass : Harvard UP, 1981. Print.
- Russ, Joanna. “Nobody’s Home”. 1972. *Women of Wonder*. Ed. Pamela Sargent. New York: Vintage, 1975. Print.
- Schmitz, James H. “Gone Fishing”. 1961. Project Gutenberg, 2009. N.pag. EPUB file.
- Schmitz, James H. *The Lion Game*. 1973. Feltham, Middlesex: Hamlyn, 1979. Print.
- Scholes, Robert, and Eric S. Rabkin. *Science Fiction: history science vision*. New York: Oxford UP, 1977. Print.
- Sconce, Jeffrey. *Haunted Media: electronic presence from telegraphy to television*. Durham and London: Duke UP, 2000. Print.
- Seed, David, ed. *A Companion to Science Fiction*. Oxford: Blackwell, 2005. Print.
- “Seeds of Death, The”. *Doctor Who*. 1969. ABC, 2003. DVD.
- Serviss, Garrett P. *The Moon Metal*. 1900. Project Gutenberg, 2005. N.pag. EPUB file.
- Shaw, Bob. “Aspect”. *Nebula 9* (1954): 55-66. Print.
- Shaw, Bob. *Who Goes Here?* London: Victor Gollancz, 1977. Print.
- Silverberg, Robert. *Tower of Glass*. 1970. London: Panther, 1976. Print.
- Silverberg, Robert. “We are for the Dark”. *Isaac Asimov SF* October (1988): 122-184. Print.
- Silverberg, Robert, ed. *Three Trips in Time and Space*. New York: Dell, 1973. Print.
- Simak, Clifford. *Time is the Simplest Thing*. New York: Crest, 1961. Print.
- Simak, Clifford. *Way Station*. London: Victor Gollancz, 1963. Print.
- Simmons, Dan. *Hyperion*. 1989. London: Headline, 1991. Print.
- Simmons, Dan. *Ilium*. New York: Eos, 2003. Print.

- Smith, George O. "Pandora's Millions". *Astounding* June (1945A): 7-31. Print.
- Smith, George O. "Special Delivery". *Astounding* March (1945B): 72-98. Print.
- Sorabji, Richard. *Self: ancient and modern insights about individuality, life and death*.
Chicago: Chicago UP, 2006. Print.
- "Special One, The". *The Outer Limits*. 1964. *The Outer Limits: the original series*. MGM,
2005. DVD.
- Stableford, Brian M. *Historical dictionary of science fiction literature*. Lanham, Maryland:
Rowman & Littlefield, 2004. Print.
- Stableford, Brian M. *Space, time, and infinity: essays on fantastic literature*. Rockbury:
Wildside, 2007. Print.
- Standage, Tom. *The Victorian Internet: the remarkable story of the telegraph and the
nineteenth century's online pioneers*. London: Orion, 1998. Print.
- Sterling, Bruce. "Preface" *Mirrorshades: The Cyberpunk Anthology*. Ed. Bruce Sterling.
New York: Arbor House, 1986. Print.
- Stone, Leslie F. "The Conquest of Gola". 1931. *Daughters of Earth: feminist science
fiction in the twentieth century*. Ed. Justine Larbalestier. Middletown, CT:
Wesleyan UP, 2006. Print.
- Stross, Charles. *Glasshouse*. 2006. New York: Ace, 2007. Print.
- Stross, Charles. *Neptune's Brood*. New York: Ace, in press. Print.
- Sturgeon, Theodore. "Granny Won't Knit". 1954. *The Stars are the Styx*. New York: Dell,
1979. Print.
- Sturgeon, Theodore. Introductory notes to "Granny Won't Knit". *The Stars are the Styx*.
New York: Dell, 1979. Print.

- Sturken, Marita, Douglas Thomas and Sandra J. Ball-Rokeach, ed.. *Technological Visions: the hopes and fears that shape new technologies*. Philadelphia: Temple UP, 2004. Print.
- Soncino *Babylonian Talmud*. Talmudic Books. <<http://www.halakhah.com/>>. Web. 5 March 2012.
- Temple, William F. *Four Sided Triangle*. 1939. New York: Galaxy, 1951. Print.
- Tiffany, Daniel. *Toy Medium: materialism and modern lyric*. Berkeley: California UP, 2000. Print.
- “Time Monster, The”. *Doctor Who*. 1972. BBC, 2010. DVD.
- “Tomorrow’s World”. *Buck Rogers in the 25th Century*. 1939. *Buck Rogers: 70th anniversary*. VCI, 2009. DVD.
- Tron*. Dir. Steven Lisberger. 1982. Disney, 2002. DVD.
- Turkle, Sherry. “‘Spinning’ Technology: what we are not thinking about when we are thinking about computers”. *Technological Visions: the hopes and fears that shape new technologies*. Ed. Maritan Sturken, Douglas Thomas and Sandra J. Ball-Rokeach. Philadelphia: Temple UP, 2004. Print.
- “Twinmaker”. *TV Tropes*. <<http://tvtropes.org/pmwiki/pmwiki.php/Main/Twinmaker>>. Web. 14 March 2012.
- “Unearthly Child, An”. *Doctor Who*. 1963. BBC, 2006. DVD.
- “Unseen Peril, The”. *Flash Gordon*. 1936. Film. <<http://www.hulu.com/watch/183770/flash-gordon-1936-the-unseen-peril>>. Web. 17 October 2011.
- Van Riper, A. Bowdoin. *Science in Popular Culture: a reference guide*. Westport: Greenwood, 2002. Print.

- Van Vogt, A. E. "Secret Unattainable". 1942. *Away and Beyond*. New York: Berkley, 1952. 40-79. Print.
- Van Vogt, A. E. *The Mixed Men*. New York: Gnome, 1952. Print.
- Vance, Jack. "Rumfuddle". *Three Trips in Time and Space*. Ed. Robert Silverberg. New York: Dell, 1973. 159-235. Print.
- Vinge, Vernor. *The Witling*. 1976. Feltham, Middlesex: Hamlyn, 1978. Print.
- Von Trojan, Kurt. *Transing Syndrome*. Adelaide: Rigby, 1985. Print.
- "War Games, The". *Doctor Who*. 1969. BBC, 2009. DVD.
- Wagner, Richard. *Götterdämmerung*. 1876. Trans. Frederick Jameson. Ed. Mark D. Lew. 1999. <<http://home.earthlink.net/~markdlew/shw/Ring.htm>>. Web. 7 November 2011.
- Warren, William. "The Nemesis of the Vibratory Theory". 1904. *The Space Annihilator: early science fiction from The Argosy, 1896-1910*. Normal, IL: Black Dog, 2010. Print.
- Watts, Peter. *Blindsight*. New York: Tor, 2006. Print.
- Wells, H. G. "Preface." *Seven Famous Novels*. New York: Knopf, 1934. Print.
- Wells, H. G. *The Time Machine*. 1895. Project Gutenberg, 2004. N.pag. EPUB file.
- Westerfeld, Scott. "Stupid Perfect World". *Love is Hell*. New York: HarperTeen, 2008. Print.
- Westfahl, Gary. *The Mechanics of Wonder: the creation of the idea of science fiction*. Liverpool: Liverpool UP, 1998. Print.
- Westfahl, Gary, ed. *The Greenwood Encyclopedia of Science Fiction and Fantasy: themes works and wonders*. Westport: Greenwood, 2005. Print.
- "Where No Man Has Gone Before." *Star Trek*. 1966. *Star Trek - The Original Series: season 1 - Remastered Edition*. CBS: 2008. DVD.

- Wilcox, Clyde. "Social Science in Space and Time". *Space and Beyond: the frontier theme in science fiction*. Ed. Gary Westfahl. Westport, CT: Greenwood: 2000. Print.
- Williams, Ralph. "Business as Usual, During Alterations". *Astounding* July (1958): 78-98. Print.
- Williams, Sean. "Mary's Blood". 1994A. *Light Bodies Falling*. Blackwood: Altair Australia, 2007. Print.
- Williams, Sean. "New Flames for an Old Love". 1994B. *A View Before Dying*. Perth: Ticonderoga, 1998. Print.
- Williams, Sean. "On the Road to Tarsus". 1994C. *A View Before Dying*. Perth: Ticonderoga, 1998. Print.
- Williams, Sean. "A Map of the Mines of Barnath". 1995. *Magic Dirt: the best of Sean Williams*. Perth: Ticonderoga, 2008. Print.
- Williams, Sean. "A View Before Dying". 1996. *A View Before Dying*. Perth: Ticonderoga, 1998. Print.
- Williams, Sean. *The Resurrected Man*. Sydney: HarperCollins, 1998A. Print.
- Williams, Sean. "Afterword". *A View Before Dying*. Perth: Ticonderoga, 1998B. Print.
- Williams, Sean. *New Adventures in Sci-Fi*. Perth: Ticonderoga, 1999A. Print.
- Williams, Sean. "Evermore". 1999B. *Magic Dirt: the best of Sean Williams*. Perth: Ticonderoga, 2008. Print.
- Williams, Sean. "Rare Justice". *Iconography*. Ed. Russell B. Farr. Perth: Western Australian Science Fiction Foundation, 1999C. Print.
- Williams, Sean. "The Land Itself". 2000. *Light Bodies Falling*. Blackwood: Altair Australia, 2007. Print.
- Williams, Sean. *The Stone Mage & the Sea*. Sydney: HarperCollins, 2001. Print.
- Williams, Sean. *The Sky Warden & the Sun*. Sydney: HarperCollins, 2002A. Print.

- Williams, Sean. *The Storm Weaver & the Sand*. Sydney: HarperCollins, 2002B. Print.
- Williams, Sean. *The Crooked Letter*. Sydney: HarperCollins, 2005. Print.
- Williams, Sean. *The Blood Debt*. Sydney: HarperCollins, 2006. Print.
- Williams, Sean. *The Devoured Earth*. Sydney: HarperCollins, 2006. Print.
- Williams, Sean. *The Hanging Mountains*. Sydney: HarperCollins, 2006. Print.
- Williams, Sean. *Saturn Returns*. New York: Ace, 2007A. Print.
- Williams, Sean. "Signs of Death". *Light Bodies Falling*. Blackwood: Altair Australia, 2007B. Print.
- Williams, Sean. *Cenotaxis*. Austin, TX: MonkeyBrain, 2007C. Print.
- Williams, Sean. *Earth Ascendant*. New York: Ace, 2008. Print.
- Williams, Sean. *The Grand Conjunction*. Sydney: HarperCollins, 2009A. Print.
- Williams, Sean. "Inevitable". *The New Space Opera 2*. Ed. Gardner Dozois and Jonathan Strahan. New York: HarperCollins, 2009B. Print.
- Williams, Sean. "The Origin of Haiku by Means of Natural Selection, or The Preservation of Favoured Renga in the Struggle for Meaning". 2009C. *The Tangled Bank: love, wonder and evolution*. Ed. Chris Lynch. Tangled Bank Press, 2011. Print.
- Williams, Sean. *Castle of Zombies*. Malvern, SA: Scholastic, 2010A. Print.
- Williams, Sean. *Planet of the Cyborgs*. Malvern, SA: Scholastic, 2010B. Print.
- Williams, Sean. "A Glimpse of Marvellous Structure (and the Threat it Entails)". *Godlike Machines*. Ed. Jonathan Strahan. New York: Science Fiction Book Club, 2010C. Print.
- Williams, Sean. "The Spark (A Romance in Four Acts)". *Legends of Australian Fantasy*. Ed. Jack Dann and Jonathan Strahan. 2010D. Print.
- Williams, Sean. Williams, Sean. *Invasion of the Freaks*. Malvern, SA: Scholastic, 2011A. Print.

- Williams, Sean. *Curse of the Vampire*. Malvern, SA: Scholastic, 2011B. Print.
- Williams, Sean. "The Missing Metatarsal". *Cosmos* December (2012A). 88-92. Print.
- Williams, Sean. "The N-Body Solution". *Armored*. Ed. John Joseph Adams. New York: Baen, 2012B. Print.
- Williams, Sean. "Face Value". *Lightspeed*.
<<http://www.lightspeedmagazine.com/fiction/face-value-sean-williams/>>. Web. 1 August 2013A).
- Williams, Sean. *Twinmaker*. New York: HarperCollins, 2013B. Print.
- Williams, Sean. "Zero Temptation". *Twinmaker: Jump*. Melbourne: Allen & Unwin, 2013C. Print.
- Williams, Sean. "Death and the Hobbyist". <http://thesubjects.anat.org.au/2013/02/short-story-sean-death-and-the-hobbyist/>. Web. 5 March 2013D.
- Williams, Sean. "Deconstructing *Decompression*". *Twinmaker*. London: Egmont, 2013E. Print.
- Williams, Sean, and Garth Nix. *Troubletwisters*. New York: Scholastic, 2011. Print.
- Williams, Sean, and Garth Nix. *Troubletwisters: The Monster*. New York: Scholastic, 2012. Print.
- Williams, Sean, and Garth Nix. *Troubletwisters: The Myster*. New York: Scholastic, 2013. Print.
- Williams, Sean, and Shane Dix. *Echoes of Earth*. New York: Ace, 2002. Print.
- Williams, Sean, and Shane Dix. *Orphans of Earth*. New York: Ace, 2003. Print.
- Williams, Sean, and Shane Dix. *Heirs of Earth*. New York: Ace, 2004. Print.
- Williams, Sean, and Shane Dix. *Geodesica: Ascent*. New York: Ace, 2005. Print.
- Williams, Sean, and Shane Dix. *Geodesica: Descent*. New York: Ace, 2006. Print.

- Williamson, Jack. "The Cosmic Express". *Amazing Stories* November (1930). Project Gutenberg, 2008. N.pag. EPUB file.
- Witwer, Benjamin. "Radio Mates". 1927. *Amazing Stories* July (1927): 368-373. Print.
- Wodhams, Jack. "There is a Crooked Man". 1967. *Analog* 7. Ed. John W. Campbell. New York: Belmont, 1970. 256-313. Print.
- Wolf-Meyer, Matthew. "Hyperion by Dan Simmons (1989)". *The Greenwood Encyclopedia of Science Fiction and Fantasy: themes works and wonders*. Ed. Gary Westfahl. Westport: Greenwood, 2005. Print.
- Wolfe, Gary. *The Known and the Unknown: the iconography of science fiction*. Kent, Ohio: Kent State UP, 1979. Print.
- Wolpaw, Erik, and Chet Faliszek. *Portal*. Steam, 2007. Microsoft Windows. Computer game.
- Wolpaw, Erik, Jay Pinkerton and Chet Faliszek. *Portal 2*. Valve, 2011. Microsoft Windows. Computer game.
- Wright, Lan. "Transmat". *SF Adventures* Nov./Dec. (1960):87-109. Print.
- Zehelein, Eva-Sabine. "Staging It: bridging the two cultures". *Language and the Scientific Imagination: Proceedings of the 11th Conference of the International Society for the Study of European Ideas (ISSEI)*. 28 July-2 August 2008. Helsinki, Finland. <<https://helda.helsinki.fi/handle/10138/15321>>. Web. 5 March 2012.
- Zeilinger, Anton. "Quantum Teleportation". *Scientific American* 282 (4) (2000): 32-41. Print.
- Zelazny, Roger. *Eye of Cat*. New York: Timescape, 1982. Print.
- Zelazny, Roger. *Today We Choose Faces*. Scarborough, Ontario: Signet, 1973. Print.
- Zeta One*. Dir. Michael Cort. Tigon, 1969. Film.

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