

Mutation and Infertility in Science Fiction

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Abstract

Mutation in the Science Fiction (SF) genre is viewed with revulsion as it results in strange beings, threatening monsters and alien others. Infertility is a common problem, worldwide, that will eventually affect up to a third of couples. This paper will discuss the role of mutation in nature and provide an overview of mutations resulting in infertility in SF. The science behind some of the narratives will be explained while extrapolations that exceed reasonable poetic license will be pointed out.

Introduction

Transformation or mutation in the past was often viewed as an infliction visited upon the individual by the gods as a punishment for some transgression. In the contemporary Science Fiction (SF) scene, such changes are commonly examined with suspicion and abhorrence.

Spontaneous mutations are common in nature, and most confer no specific advantage to the individual, and therefore, to the species. The next commonest category of mutations is disadvantageous or even lethal to the entity. A few are actually beneficial, and may advantage the individual to the extent of increasing its chances of procreation. This will favour the passage of the mutation to the next generation who will also enjoy said advantages and will also have higher chances of propagation. A sufficient number of mutations will eventually result in the establishment of a new species.

The effects of mutations depicted in SF are usually far more powerful, producing unrealistic extraordinary and fully-fledged physical and/or mental powers. Indeed, the genre uses the mutation *novum* as an excuse to explore the effects of such hypothetical abilities and powers, and the subsequent interactions with and effects on the rest of humanity. Examples abound as far back as ancient times, and Donna Haraway (1991) has observed that

[T]he Centaurs and Amazons of ancient Greece established the limits of the centred polis of the Greek male human by their disruption of marriage and boundary pollutions of the warrior with animality and woman. Unseparated twins and hermaphrodites were the confused human material (p. 180).

Infertility is a common problem, worldwide, and epidemiologists estimate that the number of couples in the developed world who will struggle to have children will double within a decade (Ledger, 2009). One in three couples is likely to suffer infertility in ten years' time, compared with one in seven today and this is thought to be due to the rising age at first attempt at pregnancy when fertility naturally declines, an increase in sexually transmitted diseases which damage the reproductive organs, a huge increase in obesity which is known to adversely affect fertility, and a declining level of male sperm count and overall sperm quality (Ledger, 2009).

The trope of infertility in SF is too vast to encompass in any reasonable length, and this paper will limit itself to an overview of mutation resulting in infertility in SF. While the genre encourages the writer to investigate aspects of humanity, society or the universe that are impossible to represent through conventional literature, the study of the scientific premises that underlie such conjectures is nonetheless warranted. In this essay, scientific excesses that go beyond the pale of reasonable artistic license will be discussed.

A common element in SF is that of fear, a dread of human change into a somehow alien other, and this concern occurs at multiple levels: at the level of the authoritarian state, at the level of

groups of individuals, and also at the level of the actual entity who is at risk of alteration or who may unwittingly thereby eventually, in his or her turn, reproduce equally distorted nonhumans. There is a sense of apprehension, a concern that subversion may overtake us by “operating necessarily from the inside” (Derrida, 1981, p. 24). There is a sense that individual humans may deliberately or unwittingly produce non-human offspring that are advantaged in ways that lead to the supplantation of the entire human race.

Authors therefore continually reassemble generic tales of horror into stories of genetic transformation that lead to mutation (Broderick, 1993, p. 369). This is reminiscent of Foucault’s (1970) iconic representation of the figure of “Man” erased from a sandy beach by an incoming tide of change (p. 387), and the SF equivalents are alien others, whether mutants or aliens who “have invaded contemporary western culture. They signify, they are part of everyday life” (Badmington, 2004, p. 10), threatening to displace humankind.

Narratives

State enforced infertility

In SF, the state may enforce infertility on selected high-risk individuals in order to preserve the genetic *status quo*, that is, attempting to keep humanity human by preventing mutations from creeping into the general germ pool. For example, in Arthur C. Clarke’s “Rendezvous with Rama” (1975), astronauts undergo voluntarily sterilization on entering the space service because after years in space, mutations due to damaged gonads are said to be almost certain.

However, today, frozen sperm is obtained before sterilization, allowing fertilization to take place when desired. In the medical world, after radiotherapy and chemotherapy for malignancies, the preservation of fertility is a medical possibility for both males and females and currently, the best options are oocyte cryopreservation for women and sperm banking for men. Equivalent techniques for prepubertal children remain experimental. On the other hand, it is very important to remind such individuals that fertility may be minimally or completely unimpaired and that contraceptives should be used unless pregnancy is desired.

Concern with regard to damaged germ plasm is also expressed in Poul Anderson’s “The Big Rain” (1954) where Venus is run by a dictatorship and dissidents are sentenced to slow death in radioactive uranium mines. Male and female prisoners are not allowed to return to society for fear of producing mutated offspring.

The state may take even more extreme measures *vis-à-vis* astronauts, and do so in “Aye, and Gomorrah.” In this famous short story by Samuel Delany (1967), astronauts are neutered prior to puberty in order to avoid the effects of space radiation on gametes, and are fetishized by some members of society who find their unattainability and non-arousal attractive. This is not entirely accurate as operatic castrati in the Baroque period (17th and 18th centuries) were often sexually active adults, capable of erection and ejaculation, albeit producing only spermless prostatic ejaculate (Hatzinger, Vöge, Sold, & Sohn M, 2009).

An even more extreme scenario is depicted in John Varley’s picaresque novel “The Golden Globe” (1998) wherein the anti-hero protagonist has had his testicles removed and kept in storage, for reasons unspecified in the novel. These concerns are actualized in John Blish’s “A Clash of Cymbals” (1959), one of his *Cities in Flight* novels, where the sperm of the Major of a space-roaming city is damaged by radiation, and he unknowingly fathers handicapped children after a sperm donation, and orders the destruction of these, his own unknown children.

Hagio Moto’s “Star Red” (1980) has Earth send criminals to Mars because most beings sent to this planet become infertile. However, after being abandoned for several decades, colonists’ descendants are discovered, and these have white hair, red eyes and telepathy. These new Martians are all massacred or captured for the purposes of medical experimentation. The author seems to be describing a form of oculocutaneous albinism, a group of inherited disorders characterized by a generalized reduction of cutaneous, ocular and pilar pigmentation from birth. These conditions are due to a decreased endogenous production of melanin, the

dark pigment that gives skin, hair and eye color. However, these conditions do not result in telepathy, or indeed, in any psychic abilities (Okulicz, Shah, Schwartz, & Janniger, 2003).

Fear of non-radiation-induced mutations also features in Theodore Sturgeon's "Why Dolphins Don't Bite" (1985), where the human colonists on the planet Medea create sterile, genetically engineered individuals for specific physical or mental tasks. Any (rare) offspring are also sterile. This is eventually discovered to be due to a deliberate Earth programming instruction implanted in the machines that create these individuals, in order to ensure that no human engineered mutations are inherited, potentially contaminating and altering the gene pool.

In Robert Heinlein's "Beyond this Horizon" (1948), Heinlein also briefly refers to genetically engineered freemartins created by the state. A freemartin is an infertile female mammal, which has been masculinized and has non-functioning ovaries through the intrauterine exposure of male hormones from an accompanying male twin. This is the normal outcome of mixed-sex twins in all cattle species, and also occasionally occurs in some other twin mammal pregnancies (Lillie, 1916).

State induced mutation

Conversely, the state may choose to deliberately genetically modify its subjects, and in Joan Slonczewski's "Daughter of Elysium" (1993), such a process is shown to result not only in immortality but also in sterility. Similarly, in Stephen King's "Firestarter" (1980), two individuals voluntarily participate in an experiment that changes their genetic makeup, and their eventual daughter develops the mental ability to initiate fires. The parents speculate whether their daughter might be able to eventually have children, or may be infertile, akin to a mule.

Personal mutagenic concerns

At the personal level, astronauts' concern about germ cell damage is also mentioned in passing in Anderson's "Iron" (1989), wherein we are told that the gametes of a husband and wife star-faring couple are banked. However, we are not told whether the concerns regard infertility, mutations or both. Similarly, in Anderson's "The Silent War: Book III of The Asteroid Wars" (1994), and in Varley's "Titan" (1979), astronauts' gametes are stored as a safeguard against radiation exposure during a voyage through the solar system. And in Peter F. Hamilton's *Confederation* universe (2000), asteroid dwellers and starship crews of both sexes deposit gametes for banking at puberty as a safeguard against radiation exposure.

Concerns regarding radiation-mutated offspring are also voiced in Heinlein's "Solution Unsatisfactory" (1941) where military scientists developing weapons-grade radioactive dust are continually exposed to radiation, and in the same author's "Orphans of the Sky" (1965), a generation spaceship crew finds itself being slowly mutated due to the effects of cosmic radiation. The exact same scenario is again depicted in Michael McCollum's "Procyon's Promise" (1985).

Lois McMaster Bujold also depicts a fear of mutant births in her *Barrayer* series as evidenced in "Mountains of Mourning" (1991) wherein the isolated extra-solar human colony experiences an up to twenty percent birth mutation rates due to high levels of ambient radioactivity and exposure to alien toxins such as allergens, carcinogens and mutagens. These events happen in the setting of a culture that values military prowess; therefore their own mothers traditionally dispatched such infants through the simple expedient of having their throat cut.

The erroneous belief that high levels of ambient radioactivity would generate a common set of mutation/s that would ensue in entirely new species that would be adapted to radioactivity is perhaps most famously mooted in J. G. Ballard's, "The Voices of Time" (1960), which fulfills "the traditional role of the poet: to meditate on time and death" (Nicol, 1976, p. 157).

In all of these stories, the more dramatic mutagenic effects are highlighted, but the far more mundane potential sub- or infertility are not even mentioned despite recent studies that have reconfirmed the deleterious effect of radiation on the developing fetus in space, with a high probability of female fetuses being born sterile (Straume, Blattnig, & Zeitlin, 2010).

In contrast, in Kay Kenyon's "Maximum Ice" (2002), radiation-induced infertility features on a

generation ship which returns to Earth after a trip of 250 years in order to revitalize a failing crew that has been ravaged by cosmic radiation causing progressive infertility. A generation ship is a theoretical spacecraft that moves slower than the speed of light, and hence would take several thousand years to reach even nearby stars due to the vastness of interstellar space, with many generations born and dying while en-route. Robert Goddard (1882-1945), one of the fathers of rocketry, first conceived of the notion of generation ships (1918), and the concept was explored in further detail and popularized by Les Shepherd (1952).

This sort of spaceship would have to be huge so as to be self-sustaining and have a sufficiently large crew and relevant supplies for breeding purposes and for genetic biodiversity. Alternatively, a much smaller crew could assure sufficient biodiversity through the use of sperm and ovum banks. An insufficiently large population would tend to experience a process known as mutational meltdown, whereby deleterious mutations accumulate with loss of fitness and decline of the population size, further exacerbating meltdown in a downward spiral that inevitably leads to extinction (Lynch & Gabriel, 1990).

After Warfare

Forced long-term underground shelter after a nuclear war is portrayed in Edgar Pangborn's "The Company of Glory" (1975), where humanity struggles to survive with very decreased fertility and a high rate of birth mutations following a third world war, a plot that is repeated in Keith Robert's "Molly Zero" (1977) and even more famously, in Walter M. Miller's "A Canticle for Leibowitz" (1959). The latter generates a plethora of mutated births, and such children are extended the protection of the Church, to the extent of having an official patron, Saint Raul the Cyclopean (presumably a radiation mutated individual), the patron of the misborn. For this reason, these children are known as the 'Pope's nephews' or the 'Pope's children', the symbolic offspring of an individual with self-imposed infertility due to abstinence.

Natural evolution

Non-human mutational events have also been blamed for ending the human race, and in Kurt Vonnegut's "Galápagos" (1985), a naturally occurring micro-organism mutates and develops the ability to destroy humanity's female reproductive organs, and none escape except for a small group of castaways on a small island in the Galápagos group.

Jim Harmon's "The Contested Earth" (2007) has all human fertility being brought to a halt by unborn human fetuses who constitute the next stage in human evolution and who, through sheer psychic power alone, somehow stop other women from conceiving.

Hermaphroditism in association with sterility has also been blamed on mutation. The human settlers on an extrasolar planet in Stephen Leigh's "Dark Water's Embrace" (1998) are accidentally marooned and contend with progressively rising rates of infertility, infant mortality and mutations, particularly of the sexual organs with the development of hermaphrodites. The term hermaphrodite derives from ancient Greek mythology, where Hermaphroditus was fused with a nymph resulting in a being with both male and female characteristics. Hermaphroditus was thus a simultaneous (or synchronous) hermaphrodite (Hard, 2004, p. 164). Sequential hermaphroditism occurs when individuals alternate genders. Both are found in nature, with earthworms being simultaneous hermaphrodites and most coral fish being sequential hermaphrodites.

Hermaphrodites were most famously depicted in the genre in Ursula Le Guin's, *The Left Hand of Darkness* (1969), with genetically engineered human androgynes that are biologically neuter for three weeks of each month, and going into 'kemmer' for the remaining week, a drastic biological change which transforms individuals into male or female genders at random.

Interestingly, the colonists depicted in "Dark Water's Embrace" unearth a well-preserved corpse of a member of the planet's long-extinct indigenous intelligent race that bears deformities nearly identical to those that are afflicting the human colonists. It transpires that the mutations suffered by the human colonists include the evolution of a third sex – hermaphrodite – that men must have sex with, since the hermaphrodite then 'strengthens' the sperm and

ejaculates it while having sex with a woman.

Human spontaneous mutations leading to telepathy, with a completely normal external physical appearance are manifest in Alan E. Nourse's "Psi-High" (1967). Psi is a term used by parapsychologists to refer to both extrasensory perception (ESP) occurring independently of sight or any of the other conventional senses and psychokinesis, i.e. the production of motion in physical objects by the exercise of psychic or mental powers, including telekinesis, the movement of objects by scientifically inexplicable means. The term "psi" was popularised by Thouless (1942) and interest in this field was heightened by J. B. Rhine's *The Reach of the Mind* (1947).

Experimental research on parapsychology has been ongoing for over a century with no concrete results. Indeed, it has been repeatedly shown that the subjective observation of paranormal phenomena is related to the degree of belief in said phenomena, as demonstrated, for example, by R. Wiseman and Greening (2003) who elegantly experimentally showed that believers are far more susceptible to suggestion and falsely witness nonexistent paranormal phenomena when compared to non-believers who are much less disposed to incorrectly perceive paranormal events under suggestion.

In "Psi-High", these mutations are found to be inherited in a Mendelian-dominant manner, and to occur in both men and women, implying that half the offspring of these "psi-highs" will also be psi-highs. However, these individuals are feared, and all school-aged children must undergo compulsory testing for psi abilities and must be registered with the authorities. These telepathic abilities are variable and crude, and require training for their fullest potential to be expressed (Nourse, 1955, "The Mercy Men"). Psi-highs are not allowed to marry each other as non-psis fear the powers of their offspring, a quarter of who would be, in effect, double-psi (assuming Mendelian inheritance of psi as an autosomal dominant condition), as evidenced when a psi-high couple illegally have a child, with truly formidable psi powers.

Philip K. Dick's "The Golden Man" (1980) depicts government agents tasked with tracking down and sterilizing or eliminating mutants, individuals with physical abnormalities and superhuman powers. The "golden man" is one such mutant who possesses the ability to foresee all possible outcomes from any single action. Moreover, his golden skin somehow makes him sexually irresistible to members of the opposite sex, seducing them with ease, clearly an advantageous mutation that would allow him to pass on his mutation to his offspring with relative ease.

In stark contrast, in Alfred Bester's "The Demolished Man" (1953), telepathic individuals known as "peepers" are accepted and integrated into all levels of society, and graded according to the strength of their telepathic abilities. All such individuals can communicate telepathically amongst themselves. Telepathic ability is heritable but can remain latent and undetected. Therefore, efforts are continually made to detect such individuals, as their abilities need development through instruction and exercise. The "Esper's Guild" is dedicated to improving telepathic proficiency, to create and enforce ethical conduct guidelines and to continue to increase this gifted population's numbers through intermarriage, as such individuals inherently tend to cluster and intermarry, strengthening these traits.

And finally, Fred Saberhagen's "The Golden People" (1964), depicts over a hundred babies who are genetically engineered to perfection, not only physically and mentally, but also to the extent of being endowed with psionic powers. These superbeings plot to take over humanity, but are eventually foiled by one of their own. In the course of the story, they strive to maintain their genetic purity by murdering a woman and a man who married with their own. Interestingly, a brilliant scientist whose wife was sterile created this group of individuals.

Discussion

Several themes emerge from this reading and perhaps the most obvious is that SF depicts potential futures from extrapolations of the present, in this way, preparing readers for possible futures. The equivalent of "publish or perish" in everyday life is adapt or accept obsolescence,

as allegorically repeated in these narratives.

Even mythology has had to adapt since mutations and monsters are modern myths. To our forebears, natural forces were unknown and unknowable, and in an attempt to cope with vast imponderables, ancient humans created myths with anthropocentric and therefore understandable creatures such as gods, monsters and spirits (Schelde, 1993, p. 14).

The mystery gone, the tension faded away, banished by the harsh light of science and technology; “there are no longer pockets on Earth that humankind has not invaded, subjected to scientific scrutiny” (Schelde, 1993, p. 3). Science has deconstructed these fears and such that traditional monsters appear nowadays appear incredibly naive.

However, that which has been lost has been replaced by new frontiers that humanity can potentially explore, such as outer space (Schelde, 1993, p. 4), along with alien others, monstrous or otherwise. Monsters of some kind or another abound in SF, and even the narrative that arguably comprises the first true modern SF work, Mary Shelley’s “Frankenstein” (1818), featured a monster that turned on its creator (Aldiss, 1973, p. 10). Scientific progress inevitably dictates that aliens, computers, androids, robots and cyborgs are the new, frightful and mysterious adversaries and “in that sense [...] SF is modern folklore” (Schelde, 1993, p. 4).

The fear of mutants in SF is arguably a contemporary manifestation of mankind’s fear of the unknown, encompassing a sometimes not unwarranted fear of science and the potential consequences of arrogant scientific experiments (Schelde, 1993, p. 9). Some examples include the “Mule”, a physical freak and a strong coercive telepath who appears in Isaac Asimov’s *Foundation* series and who takes over the entire human galactic empire (1953). Incidentally, the Mule is known by this name because he is sterile (Asimov, 1953, “Second Foundation”).

Lord Clane Linn is yet another mutant who accedes to the imperial throne in A. E. Van Vogt’s “Empire of the Atom” (1956), a sword-and-spaceship novel set in a post-holocaust world where soldiers fight with swords, and working spaceships whose mechanisms are no longer understood. Linn is a radiation-damaged mutant, brilliant but physically frail, and the novel charts his survival through Borgia-type family intrigues and his accession to power. Classical mutants also appear in Van Vogt’s “Slan” (1940), genetically bred, highly intelligent and telepathic supermen, designed to aid humanity but who become despised by ordinary humans and are shot on sight.

On the other hand, mutants may be actively sought by the State, such as “The Immortals” depicted by James Gunn, from whom a simple blood transfusion suffices to temporarily alleviate the effects of aging (1962).

It is also worth noting, at this point, that some critics claim that certain narratives identify “the female writer with the ‘other’ – the mutant, the monster, the alien,” as evidenced, for example, in the works of C. L. Moore (Gubar, 1980, p. 27).

The various ways in which these novel and unfamiliar beings arise demonstrates that in SF, “[a]ll that is required is a scary monster. How the monster came to be or where it came from is, if not irrelevant, peripheral” (Schelde, 1993, p. 2). Such alien others are often readily identifiable, and it is interesting to note that an aureate tinge is often attributed to a novel condition or mutation within the genre, as evidenced in “The Golden People” (Saberhagen, 1964) and “The Golden Man” (Dick, 1980). Similarly, in Richard Cowper’s “The Twilight of Briareus” (1974) and in John Wyndham’s earlier work “The Midwich Cuckoos” (1957) children are born with golden eyes. Indeed, it is almost as if simply tingeing a body part with a golden color suffices to demarcate and thereby conveniently alienate an individual or group of individuals.

More modern mutants include Lee and Kirby’s “Marvel” comics X-Men superheroes (1963), mutants with diverse powers who are feared and reviled by most of humanity as they are perceived as the next stage in human evolution and who will therefore make ordinary humans obsolete. Thus, through mutation, deliberate or inadvertent, it is as if scientific or natural

forces threaten to deprive us of our humanity (Schelde, 1993, p. 9).

Mutation, spontaneous, or in the case of SF, accelerated by special conditions or induced by the state, is only one of the ways in which species change, with time. In nature, mutation, genetic drift (a process which leads to random changes of the proportions of two or more inherited traits within a population and reassortment of mutant alleles) and gene flow (the incorporation of genes from one population into another) all contribute to changes in individuals, which die with the individual if no specific advantage is conferred, or are passed on to offspring if such changes are advantageous and facilitate breeding. Thus, it is the slow change of species which causes evolution, and new traits may affect not only a species' anatomy but also its biochemistry and behavioral characteristics. Clearly, changes that confer benefit are favoured as such individuals have greater chances of surviving to reproduce, leading to the process of natural selection.

Moreover, speciation refers to processes that lead to the formation of new species, and occurs when a parent species splits into two or more reproductively distinct species that may be able to have sexual intercourse but from which no offspring can ensue. Darwin described these processes after observing them in the Galapagos and Canary islands during his epic voyage on the *Beagle*, speculating that survival and speciation occurs through the natural selection of varieties. And since Darwin, even the theory of evolution has mutated and evolved, from gradualism to modifications such as punctuated equilibrium which attempts to explain the sudden jumps in species seen in the fossil record (Gould and Eldredge, 1977).

This exposes yet another apprehension with regard to potential mutants. A fundamental axiom of humanism, is the notion of contemporary, ordinary man as a starting point (Althusser, 1976, p. 52). However, Jean Baudrillard refutes this by querying whether there is even a genetic definition of human, and pointing out that we share over 90% of our genetic material with mice and apes (2000, p. 22). Arguably, therefore, hypothetical mutants, who would have very marginal genomic differences from baseline humanity, should, in Kantian style, be accorded the same rights and privileges as the rest of us.

However, mutation implies novelty, potentially unleashing forces that may overturn humanity (Badmington, 2004, p. 43), so that if mutants' abilities should advantage them in such a way so as to enable them to reproduce at a higher rate than mundane humanity, then such mutants would inevitably replace everyday humanity, as explained above and as exemplified in the genre in narratives such as Dick's "The Golden Man." Indeed, as evidenced by alien abduction encounter accounts, sex with the alien other may potentially be "better than the best sex or the best anything you could have" (Mack, 2000, p. 252). And almost as if in defence of humanity and in affirmation of humanism, Hollywood blockbusters have included a variety of films that depict alien invasions of Earth (Badmington, 2004, p. 47).

This overview exposes several commonalities, intersections that are shared within the wider corpus of the genre in general. SF welcomes thought experiments, famously asking "What if?" (Schelde, 1993, p. 2). SF also strives to expound upon feasible tropes, presenting itself as a hand-maiden of science and thereby gaining legitimacy (Suvin, 1972, p. 379). However, some important scientific points are missed or excessively belabored.

For example, most narratives dealing with radiation evoke the specter of mutation while the vastly stronger chances of the development of infertility or even outright sterility are ignored, not only by the individual, but also by the state. Moreover, completely unjustified assumptions that cannot possibly be extrapolated from any known science are sometimes made, such as the mutations that are seen in Moto's "Star Red" (1980), which include telepathy. Indeed, telepathy and other extrasensory phenomena are frequently alluded to in this essay as mutations that are internalized and therefore do not readily identify the individual as a mutant. And this despite the numerous studies that have failed to reveal any evidence of the existence of such powers.

Thus, through bodily or internalized changes, mutants, aliens and other monsters stand in as

metaphors for alien others who must be befriended and absorbed or embattled in order to keep one's culture intact (Schelde, 1993, p. 3). Moreover, SF narratives continually demonstrate that in the chaos and continual changes that face humanity in the contemporary world, SF and reality are not always intercalated but may overlap actually overlap (Schwartz, 1971, p. 1043). However, the commonest concept that emerges from examining the intersection of mutation and infertility is that of fear, fear of the alien, the other, into which humanity might potentially be transformed or replaced by. This trepidation manifests itself in a wide variety ways within the genre, with, for example, a classic being "The Invasion of the Body Snatchers" (Wanger, 1956) wherein humans are inexorably substituted by extraterrestrial pods into physically identical but unemotional others.

Such narratives also demonstrate that the trope of mutation in SF is often treated as a set of binary oppositions, human versus inhuman, and ultimately, an us versus them struggle (Badmington, 2004, p. 3), categorically alienating the alien. Badmington moreover contends that a narrative that looks upon mutants and alien others favorably, simply reaffirms this traditional divide and difference (2004, p. 6).

One may argue that the individual works that comprise the corpus of SF collectively encompass a vast set of mutations precisely because "SF is a revolutionary, mutant literature" (Fitting, 1975, p. 164). Additionally, "[e]very work modifies the sum of possible works, each new example alters the species," (Todorov, 1975, p. 6), with each narrative slowly but surely functioning as an individual mutation, small or large, thereby helping the genre to sustain its evolution, with endless possibilities as to where this might lead.

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