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Final Paper

The Literature of Anticipation

Science fiction as a genre has struggled over the years to find its own identity and win the respect of the literary community. Much of it is shunned by the mainstream intellectual population, limited to popular novels and b-movies, but even the least serious of such works can be a powerful indicator of the popular culture and reflects how society is dealing with a wide variety of issues. The themes of energy scarcity, overpopulation, and societal change are explored by a subset of the science fiction community which focus on utopian, or more frequently dystopian, futures. Despite the ongoing discussion on its true place in the creative world, much can be learned from the genre about how our society views its future, what it hopes for and what it fears.

Science fiction has a complex history and appears in many forms encompassing very different subfields. Much of the most stereotypical science fiction comes in the form of space opera, with its bug-eyed monsters and blaster-toting heroes flying through hyperspace, but this style coexists with the horror stories of swamp monsters and werewolves, fantasy sword and sorcery, and experimental new wave authors who push the limits of literary convention. For the most part, these subgenres tend to ignore the complex issues of energy conservation and population growth, focusing instead on creative plots and characters. The topics included in the discussion of energy policy are much more prevalent in what is called “hard” science fiction,

which is generally more tightly bound by reality, and play an even more important role for a whole group of authors focusing on social reform (Stocker 6-7).

This faction of writers attempts to use the medium of science fiction to create social commentaries and visions of the future meant to serve as predictions or warnings of things to come. Utopian or dystopian thinkers are often concerned with future overpopulation, potential food crises, environmental protection, pollution, and the goals of humanity, using this "speculative fiction" to deal with these topics in the intellectual exercise of writing (Stocker 6-7). These being very current issues as well, utopian literature is often less a prediction of the future than a commentary on the present. It has an idealism that looks for answers and alternatives to today's problems (Kilgore 4). It is also a literature which models the future in writing, allowing the readers to become accustomed to it and urging them to look beyond their present state, so that increasingly the genre has been self-defined as a literature of anticipation (54).

One major feature which must be kept in mind when discussing science fiction is that although the stories are generally based on some scientific background, authors are constantly exploring ideas which completely defy the laws of physics. Many simply choose to ignore the problems of interstellar travel, environmental collapse or energy scarcity or propose a fictional solution to the real problems their creations face so as to move on with their story telling. This is a reflection of the general tendency for our society to anticipate a "magic bullet" solution to our energy problems, hoping that nuclear fusion or some as of yet undiscovered energy source will be the wave of the future.

Most inventive science fiction focuses on transportation through the immense empty regions of space. Warp drive, hyperspace, and light speed have become common terms for the super-fast travel which would be necessary to colonize the galaxy. The classic example of such

technological fantasies is the power behind Star Trek's Enterprise, which uses a combination of nuclear fusion and antimatter fuel. For slower speeds the ship supposedly runs a standard fusion reaction, turning hydrogen into helium, and for faster settings approaching the speed of light, the engines collide matter and antimatter to create energy. Assuming that the technology was available to sustain a fusion reaction and that antimatter could be contained and used as fuel in some way, it would still take 81 times the ship's mass in hydrogen fuel to reach one half the speed of light. If antimatter were being used the fuel requirements would be much lower, requiring only two times the mass of the ship to reach the same speed (Krauss 26). Obviously the physical limitations on space travel are much stricter than generally portrayed in science fiction works, even with the technological advances on the edge of possibility.

Time permitting, I'll give a short presentation on what antimatter is. It's a good example of how science fiction often starts with real science and then veers off into the realm of fantasy. Antimatter itself would have been viewed at one time (before its existence implied by the famous Dirac equation was experimentally verified in 1930) as science fiction. The fictional part now is that according to present cosmological theory there isn't very much, if any, antimatter in our part of the universe, and if there is it's hard to imagine how it could be utilized as a fuel, since matter and antimatter annihilate each other when they come close together. How could one collect and store the stuff for use as a space ship fuel?

Even more improbable is the transportation technique imagined by Douglas Adams in his fanciful *The Hitchhiker's Guide to the Galaxy*. The Infinite Improbability drive only works because of the basically infinite improbability that the spaceship would occupy any particular place in the galaxy. By generating that improbability, the drive enables it to actually become a reality and the ship instantaneously appears on the other side of the galaxy. One interesting side effect is that many equally improbable things happen at the same time. According to the book, the scientific community couldn't figure out how to create such a machine, but they did have a computer capable of generating *finite* amounts of improbability. After the task was declared

virtually impossible, a science student reasoned that if the machine was virtually impossible to create, then it must be finitely possible. All he had to do was use the existing machine to calculate the finite improbability of the existence of such a device and in seconds he found himself the creator of the Infinite Improbability generator, which appeared out of thin air. He was soon lynched by an angry mob of bitter scientists (Adams 10). Sadly this impossible invention is one of the only imagined means of transportation which does not consume some sort of fuel and is completely devoid of byproducts, highlighting the true unlikelihood of a perfect energy source appearing in the future.

This is a stretch, but I think the author is trying to make a connection to what is known in quantum physics as "The Bell Theorem," which has to do with the measurement of an event at one place in the universe being felt instantaneously at some distant place – faster than the speed of light or any signal can travel between the two places. Another example of trying to link science fiction to real science.

All sources of energy in the present have benefits and drawbacks that make the energy problem more complex. Most fictitious solutions to the problem also come with some sort of disadvantage which complicates the story and creates conflict. For example, Asimov's *The Gods Themselves* is based on the discovery of a parallel universe with different laws of nature which enabled the transfer of matter and energy back and forth between the two worlds. Because the other universe's strong nuclear force, that which holds protons together in the nucleus of an atom, is must stronger than ours, different atomic structures are possible. The energy pump works by transferring tungsten-186, stable in our universe, with plutonium-186, a stable compound in their world.

In our universe the lightest known isotope of plutonium is plutonium-228, so plutonium-186 is a very neutron deficient isotope and very unstable in our universe.

The radioactive plutonium isotope emits positrons and high amounts of energy, creating a clean energy source that will last for years.

This science is OK: a nucleus with too few neutrons will try to reach a more stable balance between the number of protons and the number of neutrons in the nucleus through radioactive decay in which protons change into neutrons by the emission of positrons.

The only problem is that in the equation, twenty electrons are also transferred, tipping the balance of electrons between the two worlds. Along with this comes a gradual change in the strength of the strong nuclear force, strengthening it in our universe and weakening it in theirs. Consequently the rate of fusion in each world's stars changes, and in an indeterminate amount of time, will cause ours to explode, a problem which drives Asimov's story (Chastain 81).

The explosion of the sun sounds like an outlandishly severe consequence of energy use, but some science fiction writers have made predictions nearly as dire based on their observations within our own reality. Doomsday prophecies have been around for thousands of years, but the realization of the finite nature of Earth's resources has only been achieved in the past half century. The MIT study on the Limits of Growth

You should reference this study, if it's the famous one I'm thinking of by Meadows & Meadows. It upset a lot of people who don't like the idea of limits to growth, and has been discredited by some by misjudging the time required for these limits to be reached. But their basic idea that limits exist and will be reached some day are correct.

concluded that Earth cannot sustain a growth phase for more than another hundred years. Whether that prediction was correct or not, it did spark a lot of national dialogue, the idea of a "Spaceship Earth" in the late 1960s, and the creation of Earth Day in 1970. It challenged the basis of industrial capitalism and society's faith in technology, resulting in a wide range of predictions for the future including the return to pre-industrial economics of scarcity, failure of democracy, and rise of totalitarianism. This movement was original and worrisome in a society

addicted to a growth economy, but despite its importance it was just catching up with years of dystopian literature which had preceded it (Kilgore 154-5).

In the years since the MIT study, various thinkers and authors have proposed solutions to the world's growth problem, some of them straddling the fence between science fiction and science fact. Most include a sort of equilibrium state with a stable population and a strictly regulated economy designed to maintain balance. Although this vision means the end of exponential growth in population and economy, the hope of most visionaries is that growth in art and science will continue, continuing the progress of human society (Kilgore 155). Author Ben Bova foresees the decline of America as the major world power, economic fallout, political oppression, and fearful contempt from other nations if nothing is done about our energy habits. Following a general trend among what have been termed "astrofuturists," he advocates a mixture of land based nuclear and space based solar energy to meet future energy demand (200). The concept of collecting solar energy from space has gained wide popularity since the energy crises of the 1970s, creating a vision of satellite solar power or SSP which collects power from the sun, transmitting it back to receiving stations on Earth. Gerard K. O'Neill, one of the pioneers of such concepts, takes the idea a step farther, imagining a "Dyson sphere" of space colonies orbiting the sun, using solar energy efficiently and providing extra living space for the growing population (165).

> *Nuclear power is feasible; collecting solar energy in space is possible in principle but a little far out because of the expense of putting things into orbit; but it's hard for me to believe that "Dyson sphere" colonies (named, I presume, after Freemon Dyson, a well known theoretical physicist) could ever be afforded by society. At least these ideas are all possible in principle – they don't violate any laws of physics.*

Other visions of utopia have also integrated an energy policy incorporating ecologically friendly ways of living and a communal lifestyle with a stable population. *The Dispossessed* by

Ursula LeGuin is an image of socialist, feminist utopia including universal health care and education, widespread disarmament, elimination of cars due to reliance on mass transit and walking, as well as energy gathered from renewable sources including earth-temperature differential, tidal power, solar, wind, and some imported fossil fuels. As in many socialist utopian visions, the free market is eliminated and money is rendered unnecessary (Moylan 99). André Gorz in his *Ecology as Politics* and *Farewell to the Working Class* proposes a utopian revolution which stops economic growth, returning to a personal, post-industrial economy. The workweek in his world is reduced to 24 hours, leaving more time for "free creative work" and a life-long process of education for the whole person. A similar world envisioned by Bookchin, *Ecology of Freedom,* examines feminism, ecology and libertarian socialism. This work focuses on the reordering of society through individual empowerment, ecologically friendly societal practices, the sharing of all possessions through a communal lifestyle with the end of hierarchies, the groups based on common interests rather than ancestry or geography which is seen as one cause of strife between peoples. The morality of restraint and production for need rather than profit are recurring themes in many of these utopias, as is the redistribution of wealth, regional economies, and attention to the environment. As Wendell Berry said in his book The Unsettling of America, "The world has room for many people who are content to live as humans, but only for a relative few intent upon living as giants or as gods" (200-2).

Well, maybe these utopian ideas aren't any wilder than some ideas in physics, such relativity and quantum theory, that were unimaginable before their time.

His statement hits upon the key issue for the future of humanity, which is the conquering of human greed.

Yes, and greed *is such a deeply ingrained part of human nature. Will conquering it ever be possible?*

If science fiction is a representation of the popular culture's view of the future, its grandiose visions of space colonization are signs of a runaway industrial culture which needs to switch gears if progress on any level is to be made. Our technology obsessed society tends to look to technology to fix its energy problems and lead it to the stars, but it is much more important to focus on problems here on Earth. We need to lose the growth ethic which has pervaded our culture, gain better attitudes toward equity and overhaul our values and institutions if the utopian envisioned by science fictions writers will ever become a reality (Kilgore 164). The extreme socialism which most see for the future may never work in practice given the difficulties inherent in regulating an economy and controlling growth, but that does not mean that our growth must continue unchecked until disaster hits. It may be possible to adopt our present society to the demands of the future through intense conservation and a drastic change in attitudes toward economics and growth.

Another key to sustainability. Have no-growth economic systems been proposed or made to work anywhere?

How to accomplish these changes is something which most science fiction cannot explain, but it does give us a goal to reach for and a vision of the future which we may never see. By anticipating our future we may be able to shape it into the world we've dreamt of, and it will be the visionaries of this new literary genre who take those hopes and create the stories which, in all their forms, inspire us to dream.

Nice concluding paragraph!

A well-written paper nicely presented in class – A^{+}

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Include Meadows & Meadows "Limits to Growth"