Angels with Nanotech Wings: Magic, Medicine and Technology in *The Neuromancer* and *Brain Plague*

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Angels with Nanotech Wings

How many angels can dance on the head of a pin? This question perplexed medieval scholars. For them, the fantastic was not a matter of science fiction, but science fact. There was much debate as to whether angels were material or occult. The unseen and enigmatic have always provoked scientific hypothesis. Quantum mechanics asked whether the building blocks of matter form particles or waves. The miniature threatens to be everywhere but nowhere. Nanotechnology, or the art of engineering miniature assemblages that can transit our bodies, could soon produce the equivalent of guardian angels with silicone wings. These might watch over cells tempted to turn cancerous. Science tests changes through hypotheses and measurement. Mysticism requires speculation, faith and the unknown. We fancy that Arthur C. Clarke's famous dictum that "Any sufficiently advanced technology is indistinguishable from magic" (Clarke's *Third Law* 1962) has done away with the mystical. But like the Freudian repressed, it returns.

Only more recent studies of the life work of Isaac Newton have uncovered the relationship between his practice of magic, or alchemy, and the enlightenment rationality of his scientific discoveries (Golinski 1988). For Newton, one did not preclude the other. Alchemy provided him with what today, we might call a space for lateral thinking. This led to the creative break-throughs of his major works in optics and gravity. One of the many enduring purposes of alchemy has been medicinal. Newton's alchemy, unwittingly medical, came to reveal colour spectrums and the laws of gravity. Without the latter, no rocket could have reached the moon. Magically (because technologically), there is a longstanding tradition in which medical explorations, however crude, lead to the development of technologies at both the cutting and bleeding edges.

What then, does medical engineering have to do with discourses of magic and theology in contemporary science fiction? William Gibson's celebrated cyber-punk classic *The Neuormancer* (1984) and Joan Slonczenski's *Brain Plague* (2001), a novelistic 'buddy movie' about the relationship between a struggling artist Chrysoberyl and an accelerated culture of sentient cells, both confront forces neither entirely human nor scientifically verifiable. The microbes, which trespass into Chrysoberyl's body, summon her neurally in the voices of Old Testament supplicants praying to their god. In Gibson's novel, one manifestation of the cyberspace system's artificial intelligence, or AI, calls itself 'Neuromancer.' The word itself conjures a configuration of discourses – neurology, romance and necromancy. Necromancers like the 17th century John Dee, claimed to raise demons. Artificial intelligence is a force which science has confidently predicted or denounced as impossible. AI remains the stuff of science fiction, and in Gibson's

novel, its connection to evil spirits is made explicit in the novel's title. Indeed, both novels dramatize the less explored edges between mysticism, theology, and the discourses of medical engineering that are at present in development.

The technologies that pose the potential to take us into a medical revolution are neural-enhancers and nantechnological robots. An associate professor of molecular and pharmacology and toxicology, Dr. Roberta Dia Brinton is developing a "neurochip" (Networker@USC, Jan./Feb 1999). This silicone device can be planted into the neural connections of the brain, and compensate for basic genetic dysfunctions in neural tissue. Nanotechnology also works at the micro-level. Molecular-sized robots can now mark cells, so that doctors can track fluctuations in a medical condition. The next frontier will involve nanomachines that repair damaged cells.

Both *The Neuromancer* and *Brain Plague* seize every opportunity to throw their characters into countless situations of neural damage and drug addiction. In a time when 'mad cow disease' still haunts, and SARS terrifies, readers can readily identify with Chrysoberyl's risk venture. Allowing her brain to become the Promised Land for a culture of religiously minded microbes, Chrys gains their powers off immunization, but also team-mates to help her build a commissioned city, Silicone. Jonquil, one of the leader cells, declares the human project to be completely in line with that of the miniature world (chapter 13). Similarly, in Gibson's novel, Neuromancer implies that Case's role requires that he learn the correct codes to call up a burgeoning artificial intelligence (chapter 21). Case may be *posthuman* in his connection to cyberspace, but his contribution to the system - chemical, emotional and

unpredictable - cannot be dispensed with. Both novels explore what happens when medical interventions tread into terrains beyond the scope of healing, where creativity is pursued for creativity's sake.

Creativity is a concept that calls for clarification and attracts censure. In a now famous essay, entitled "The Work of Art in the Age of Mechanical Reproduction" (*Collected Essays*, Hannah Arendt), celebrated writer and scholar Walter Benjamin (1892-1940) wrote about how the 'work of art' undergoes transformation through reproduction. Photography and film provided two key examples. The 'aura' around a painting fades when reproduced through catalogues, photographs and copies. Benjamin argues that words such as "creativity" and "genius" have become outmoded. The model of the powerful and solitary creative spirit becomes discarded in an age where reproduction begins to produce a technology of creativity.

Both Chrysoberyl and Case, the protagonist of *The Neuromancer*, do not operate as even independent beings. They can only perform creatively with the aid of prostheses, pharmacological drugs and, in Chry's case, microbes. For Case, super-hacking requires learned competence from systems with vast and already formulated rules. He can only outface his AI opponents Wintermute and the Neuromancer through spontaneity. Case is the rightful precursor of Neo, from the blockbuster movie *THE MATRIX* (1999). Played by Kenau Reeves, Neo learns that his only advantage against the 'Matrix', or the vast AI network, is the act of breaking rules. AIs cannot improvise. Humans can. With an ability to play the system brilliantly, but also be unpredictable and emotional, humans can overwrite the apparently triumphant cybernetic system and its agents. Gibson's novel and its successor *The Matrix*, provide what I

have termed elsewhere (1999) a theoretical fiction for analyzing how a system can be transversed and transformed through an act of creativity. Such fictions are more than 'objects' that give us ethical or scientific insights into our current practices. These fictions act as bridges between systems from the past and those in the future. That bridge requires innovative thinking, and this requires more than a solitary human working from inspiration.

A relatively young field devoted to the topic of how individuals interact with domains of knowledge has helped our understanding of creativity. The cliché that creativity is an aggressively individualistic act has been subverted. Creative work is rarely left touched by culture and its collective concerns. One of the field's pioneers, Mihaly Csikszentmihalyi, has provided a definition of creativity which resonates uncannily with *The Neuromancer*, *Brain Plague*, neurochipping and nanotechnology. A domain of practice, be this the visual arts or biology, has its own fields, such as multimedia design or neurobiology. "Creativity occurs" clarifies Csikszentmihalyi, when

> …a person using the symbols of a given domain…has a new idea or sees a new pattern, and when this novelty is selected by the appropriate field for inclusion into this relevant domain. The next generation will encounter that novelty as part of the domain they are exposed to, and if they are creative, they in turn will change it further. Occasionally creativity involves the establishment of a new domain (1996, p 28).

Take for example, the neurochips being developed by Dr. Roberta Diaz Brinton and her colleagues (Online, Networker@USA, Sep/October,

1999). Miniature chips can be connected into brain synapses. Once the bar on the high jump of the technology is raised several more notches, the benefits for stroke victims will be awaited. Such technology and its modern alchemists have formed a new domain. They have sutured the areas of microbiology and computer engineering. The results of these creative collaborations appear in business and marketing. One company specializing in the development of neural microchips dubbed itself, not surprisingly, "Neuromancer Consulting: Your Telemedicine Partner." This example resonates with Csikszentmihalyi's concept of creativity as a third term working between the already established and the future of research and business. Science fiction inspires representations of medical application and the domains of future research. The sci-fi narrative may be regarded as the 'fuzzy logic' between what can be identified and quantified, and what can be qualitative and ineffable.

The Medieval mind embraced the spiritual dimension of angels in unpredictable numbers. Despite the wish to quantify the angel, many acknowledged the angel as numinous and beyond measurement. Perhaps the metaphor of the angel persists because we know that in the creative enterprise, be it scientific or artistic, resides in the ephemeral. Biomedical science will quantify and control, but when the angel of unpredictability shakes its wings, the chaos of weird science will out. Science fiction analyses such chaos. It pursues sociological and aesthetic critiques of biomedical interventions, their uses and abuses. Such applications take off into the future on wings of technological achievement. These will be the wings of flight for angels with glue on their horns.

Angels With Glue Horns

Horns conjure the devilish side. Equal amounts of 'good' and 'evil' might keep the cosmos in balance. Though a matter of irrelevance to hard-core science, tiny left-overs of shattered theologies hurtle into our medical and aesthetic futures. The interaction between science and art produces an ethical minefield. Dr. Brinton treads carefully. The nanochips she is developing interconnect with brain tissue. They do so though an interface that would allow the chip to absorb human tissue would be the next gigantic step for pharmacology. However, as Brinton underlines: "It is possible to encode information into the neurochips. Those signals can be devised for good or evil – that's a possibility" (Networker@USA). While Brinton refers to societal consequences, she nonetheless uses theological terms.

I am using the terms angels and demons as metaphors. I intend to tread the opposition. Angels can have horns and pointed tails, just as demons of revolt can bestow on us powers of creative thought. By using angels and demons I maintain their magic, in Arthur C. Clarke's sense. But I depart from his formulation by arguing that the magical, angelic or demonic side of the technology defines the unforeseen consequences of its application. One could characterize science fiction as both a mode of sociological critique and a reminder that science will confront us with bolts from the blue.

As yet, we can only speculate how technologies such as neurochip and neural-chemical interventions will affect consciousness. Nor do we have concrete examples of how though biomedical engineering can be put to uses beyond the medical. In *The Neuromancer*, the neurologically debilitated protagonist Case can only 'jack' back into the giant 'matrix'

through receiving a neural re-wiring, both organic and synthetic. This is paid for by his self-appointed and enigmatic boss Armitage, himself more construct than human, well-oiled on countless prostheses. Armitage ensures Case's loyalty by inserting hidden toxin's into his employees new nervous system. Disloyalty would mean re-debilitation. Such handicaps would deprive Case of the creative life, which for him is the cowboy life of Cyberspace. In the world of *The Neuromancer*, experimental technologies are applied to extreme limits. Gibson's novel warns of how medical technology will always provide the next innovation, and offer the human the next Faustian temptation. And as Dr. Faust discovered, the dynamics of self-empowerment demand dependency.

In fact, *The Neuromancer* is a world characterized by the one underlying fact: there is no creative life, no possibility of making a difference, no path to a colourful existence, without prostheses and medication. Dermatrodes link Case into his adventures and benthylmethane (a fictional drug) control the emotional perils of his virtual life. In his battle with AI life, the enigmatic enigmatic Neuromancer and his sidekick Wintermute, Case tackles products of the system that have developed their own agenda. In Gibson's novel, the relationship of cause and effect between creative thinking and medical cures, becomes inverted and diversified. The macabre alliances between electrodes, medication and human tissue are what produce AI. And here is the rub: the AIs have not been birthed from intention, but are the results of endless collisions by trial and error. The survival of the fittest is a lottery born from endless interactions. It is these endless algorithms of connect, disconnect, failure and success, which are the material procedures of science. Medical

engineering can spawn technologies which create their own systems of cause and effect. And it is this 'created' that the scientific creators might never have intended.

The potential creations of medical technology are more pervasive than a single Frankstein's monster running wild on a backward clock. Today, be it through the prostheses of nanotechnology, medication or neurochipping, we could soon be living on miniscule pieces of monster. The parts are expendable, multiple, aesthetic and fractal. Any pattern, natural or synthetic, can be broken down, re-produced, disseminated. The smaller versions iterate the larger structure. Nanotechnology can explore and compute the natural fractal landscape of the human body in quest of disease. K. Eric Drexler, who coined the term nanotechnology, has written about the 'tiny machines' of DNA/RNA protein cells. Star- studded with exotic atoms, these contraptions make 'assemblers.' These miniscule miracles can re-programme bacteria and blood cells. Inevitably, they should be able to make semiotics with brain cells. Roberta Brinton identifies the next threshold of her field's research. It will occur when microchips and neurons can 'talk to each other.' Here would be the moment when the organic and inorganic glue together like never before. They would make a consciousness which as yet, no one has sampled. The miniature worlds might become a source of dependency to the macrocosm of daily, human consciousness.

Brain Plague examines the problems dependency between macrocosms and the monads within. Between the cities of arteries and stem cells, and those of human civilization, is the glue, or interface of Chrysoberyl's consciousness. It is tough being a local deity. For her, the tiny microbes, some angelic, priest-like, or unholy experimental, become indispensable

and omniscient to their heroine. Without the rise and fall of their nano civilizations, Chrysoberly would lose her muses, and her success. Without them and her expanded neural abilities, she could not take on an ambitious architectural project. But the dramas of worldly success at the macrolevel, become challenged by the spiritual ambitions of dissenting microbes. One 'nano-being' Rose, wants to improve her condition inside Chry's brain. Rose wants to "enlighten" the protagonist's mental centers in "small, subversive ways, feeding the brainless, tending the sick. Yet its seductions tempted her more than she cared to admit. The host's doses of AZ gradually sapped one's will" (2001, p 242). Rose would like to knock some sense into her Great Host. Angelic in their quest for social improvement, demonic in their defiance, Rose wishes to change the shape of microbe destiny to come. Revolt produces creativity in its host.

Yet the resulting glue of medical interventions produces a dangerous reliance, that Chrysoberyl witnesses in a fellow host, Daeren. She notices that he has acquired the "shifting eyes of a slave." The implication is that the price of creative excellence is slavery to a domain. This domain is not static. It is undergoing its own evolution. There are winners of the freedom of the fittest race, and losers.

Both *Brain Plague* and *The Neuromancer* may be a warning that the price of developing medical technologies that can advance consciousness, creativity and our capacity to self-reflect upon the tensions between both, may exact the dangerous price of our dependency. That weakening reliance may produce unseen diseases and neurological conditions, which, in turn, demand, further interventions. Throughout Gibson's novel, Case is constantly in need of medical attention and medication.

Chrysoberyl does not receive a cure so much as an ongoing medical condition which predicates her as an artist. Angels and demons are metaphors for a spiritual, non-materialist excess which pervades both novels, and the contemporary technologies who 'magic' is an unknown quantity. The mysterious excesses of what we cannot predict from the fruits of our scientific adventures, become the technical visions of a fictional genre that cannot rid itself of ancient spirits.

The Memes in the Machine

While not the genes themselves, memes are their powerful relatives. As a metaphor for genes, the meme swims around in the pool of information and ideas which jump from one generation to the next. Richard Dawkins lists many items that can jump, from catch phrases and techniques of building arches to broader bodies of (*The selfish gene*, 1976, qtd. and expanded on in Drexler, p. 35-38). Just as genes compete, replicate, copy then deviate from each other in the journey of transformation, so do memes. In terms of contemporary evolutionary biology, particularly in the recent work of Stephen Pinker, memes and genes are inextricably linked. To read the interaction between the gene and the meme as comparable to that between a switch and a light, would be to simplify a problem of oceanic proportions. How the 'hard wiring' of the neurological brain and its genetic codings process memes will underline the work of this century. Yet the frontiers of medical research will provide us with many cutting edge examples. The goal of medical technology is to find ways of making synthetic units to heal damaged tissue and genes. When the healing process has consequences for meme pool, our relationship to creativity and identity becomes transformed.

Both *The Neuromancer* and *Brain Plague* examine how drugs, brains wired enmeshed in a virtual matrix, and humans soaring on the wings of microbe imagination, are all propelled by the memes in our heritage machines. Both science fiction novels critique how our memes rely on the history of medicine, and suggest how creativity will miscode or misread medical interventions. According to Dawkins, it is the competition and collisions between different memes, the way in which one 'incorrectly' imitates and replicates another that evolution (or devolution, according to some) takes place.

The Neuromancer attempts to dramatize a life in which posthumanity can control their all too human side; but it is precisely this flesh-ridden burden, forever in want of medical attention, that remains stamped on the novel's players. Gibson's matrix of names bears testament to the fate of medical bodies in perpetual crisis. Take the protagonist Case, who in every chapter, experiences the vicissitudes of being a medical 'case'. His helper, Dixie Flatline, has a surname suggestive of emergency resuscitation equipment. Case's boss Armitage has a bodily 'arm' in his name, and is discovered to be much older than expected. (Note the 'age' in last suffix). Armitage is a sum-total of his prostheses, through which one replica has replaced yet another. The 'original' Armitage is but a simulacra. One of the two AIs, Wintermute, manifests virtually as 'Finn.' Perhaps the reference to the fin of a fish harks back to the first creatures of evolution. The more complex the interaction with virtual reality, the greater is the tendency of images from prehistory to stalk the hard-wired future. The novel's climax brings home how the coded, molecular level of information, that is the meme, makes the apparently cybernetic Case unavoidably human.

> His [Case] vision crawled with ghost hieroglyphs, translucent lines of symbols arranging themselves against the neurtral backdrop of the bunker wall. He looked at the backs of his hands, saw faint neo molecules crawling beneath the skin, ordered by the unknowable code (1984, p. 241).

The ghosts cause a physiological effect, as though Case is in the lure of a drug. Thus, the shifting, nanotechnological interactions below the surface of the skin, which suggest a primeval stirring in the undergrowth, act medicinally, and most unpleasantly. The 'ghost' and the 'hieroglyphs' conjure ancient knowledge, and make its particles capable of tracking Case's bloodstream. The memes of ancient and primeval times meet those of our futurity. Indeed, creativity, from the evolutionary point of view, is linked to dissemination of memes, which will not dispense with the human body as a medical entity or, in contrast to evolutionary theory, as that set of codes which is constantly re-written by environmental factors: a technology that feeds on the unpredictable edges between health and sickness.

In *Brain Plague*, the microbes debate questions of theology and creativity on a platform along brain capillaries. Revolutionary microbes worship lesser gods or none at all. One microbe Rose reminded me of a religious Quaker. So often, she turns within for inspiration. The old cliché that artists in a creative struggle need to "go inside and ask the big questions" is not a decision Chrysoberyl needs to make. The life and death of microbe nations, cultural inheritances religious and technological revolutions at the monadological level, permit Chrys no sleep. In the cities of Chry's mind, the meme-like microbes develop their fields of knowledge at alarming rates. One microbe - Saf, ironically, less than

safe - learns how to build the first microbe space-ship. While the miniature populations can be transported from one human host to another through injections, the space ship is a sign of the memes ability to make a giant, and above all, self-motivated leap for 'meme kind.' Its quest for outer space is both religious yet infectious. In the wrong mixtures, these disease protecting microbes can themselves become the disease. Hence, this comical aspect of *Brain Plague* uses the miniature narrative of microbe evolutionary leaps, to bring together three discourses – that of creativity, memes, theology and the spread of disease.

Multiplying through both *The Neuromancer* and *Brain Plague* the discourses of mysticism, theology, innovation and biomedicine dissolve, separate and intercut, making myriad patterns. These intimations of posthumanity are not fantasies based on fanciful expectations about the future of neural programming or nanotechnology. Nor can the fiction of sci-fi be held responsible for making inaccurate or partial predictions from the multiple pathways of now. The cybernetic system of *The Neuromancer* conceives of a metaphorical and exaggerated version of the Internet, which is not the Internet itself. Gibson's novel hypothesizes that which has not happened; but this prediction may be a prescient metaphor for that we cannot envisage. When Neuromancer appears as a boy doing somersaults in the cyber system, he explains to Case that stating and calling the correct computer codes is the equivalent of raising demons.

Neuromancer has given us piece of advice about interpreting works of sci-fi in an age of neural pharmacology. Neuromancer gives us a code for reading, with and against the grain of science. Science fiction conjures untested moral, ethical and creative ciphers in technologies full of untapped demons and angels. Neuromancer warns us that no biomedical

intervention can provide an innocent panacea. Humans seize hold of one intention, to turn or pervert it to another. They do so in an attempt to escape from the human into the *posthuman*. Yet our fleshy, meaty, crude chemicals, full of emotion and fury, smoulder out. Towards the end of Gibson's novel, Case realizes that he cannot escape "the old alchemy of the brain and its vast pharmacy" (1984, p 262). When Chrysoberyl credits the "brain in the back" for her work, she refers to technologies of the future. But in *Brain Plague*, the nano-beings are based on a model as old as Leibniz's monads, and his concept of worlds within worlds. What makes the new biomedical interventions intimidating is that our humanness and its unpredictability show no signs of disappearing. We are our angels and demons. And as science fiction warns us, there are few places where either party will fear to tread.

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