"BACK TO THE FUTURE": TECHNOLOGICAL SINGULARITY IN GIBSON'S SPRAWL TRILOGY

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Abstract: *Ray Kurzweil's concept of singularity as presented in his 2005 "The Singularity is Near: When Humans Transcend Biology" is based on complex calculations relying on the existing patterns of biological and technological evolution. His predictions about the course of future human development remarkably correspond to the worlds of the 1980s cyberpunk literature. The paper analyses William Gibson's "Sprawl Trilogy" in the light of Kurzweil's predictions for the future and explains its correspondence with the structural logic of postmodern reality.*
Key words: *cyberpunk, genetics, hyperreality, nanotechnology, robotics, singularity*

1. Introduction

A few months ago, while randomly flipping through TV channels, my attention was caught by flickering trajectories of brain-computer interfacing and pulsing images of neurons firing to computer-generated data. The cyberpunk fan in me cheerfully acknowledged the familiar phantasmagoria of what seemed to be a yet-unseen documentary on 1980's sci-fi avant-garde - only to find out that what I was, in fact, watching, was a film version of Ray Kurzweil's 2005 best-selling *The Singularity is Near: When Humans Transcend Technology*. The resemblance between Kurzweil's vision of the future and the worlds of literary cyberpunk, epitomized by those in William Gibson's *Sprawl Trilogy*, was astonishing.

The astonishment was primarily owed to the fact that Ray Kurzweil is an award-winning inventor, mathematician, and one of the leading experts in computer and artificial intelligence. He is also a remarkably accurate - and hence influential - futurologist whose predictions have been based on existing trends in the development of technology and science.

William Gibson, on the other hand, is the most influential author of the 1980s cyberpunk movement. His early work provided the blueprint for what were to become the trademarks of cyberpunk writing: computers, computer(ized) environments and artificial intelligence. And yet, even while fuelling digital fantasies of thousands of aspiring computer geeks, Gibson wrote most of his Sprawl trilogy on a typewriter and consciously avoided using the internet well into the 1990s. His hi-tech literary worlds were admittedly inspired by Alfred Bester's 1950s sci-fi serial "Tiger! Tiger!", William Burroughs's concept of the Interzone, and the down-and-out aesthetics of the "Velvet Underground" band (Gibson 1995:318).

In this paper, my intention is first to show to what extent Kurzweil's informed and well-grounded projections coincide with the largely-invented motifs in Gibson's 1980s *Sprawl Trilogy*. The analysis will be followed by an attempt to explain the correspondence in terms of the metaphysical structuring of the postmodern age.

2. Ray Kurzweil and the concept of singularity

Because singularity is a concept which not only means different things in different disciplines and to different people, but is also rarely encountered in literary criticism, a brief explanation is in order. In mathematics, singularity refers to a value that exceeds any final limitation (Kurzweil 2006:22), while in physics, the concept "marks a point where the curvature of space-time is infinite, or, in other words, it possesses zero volume and infinite density" (Hawking et al. 1997). Kurzweil's use of singularity follows Vernor Vinge's appropriation of the term to "describe the point in history where accelerating technological progress becomes near infinite and thus unknowable" (Vinge qtd. in Bell 2003:6). This definition refers to the explosion of intelligence, implicit in the functioning of Kurzweil's theory of the law of accelerating returns, according to which the rate of evolutionary development is doubly exponential as each subsequent improvement takes less time and less effort.

Kurzweil (2006:14-21) divides the history of evolution in six epochs, which differ according to the complexity of information patterns. We are currently nearing the end of the fourth epoch. The state of singularity corresponds to Epoch Five of evolutionary development, in which the exponential growth will be so great that technology will seem to develop at "infinite speed" (24). This will result in the merging of the data in our brains with the non-biological intelligence of our technology. Epoch Six refers to the aftermath of singularity, in which the computational potential of the matter and energy in the universe will be employed for the spreading of intelligence once the computational potential of the Earth no longer suffices. Epoch Six is the last epoch with existing intelligence that one can imagine.

Kurzweil's predictions rely primarily upon the development and the increasing synergies of three disciplines which have been the most vigorously researched and the most generously financed over the last twenty-five years: biotechnology, nanotechnology, and robotics. The advancements in biotechnology are principally focused on genetics - i.e. the reading and manipulation of the genome - and they started with the Human Genome project in 1990. The possibilities of interfering with genes thoroughly redefine the established notions of life, living, metabolism, age, heredity, illness, etc.

Nanotechnology, which is essentially about controlling matter at atomic and molecular levels, has been the fastest developing and also the most heavily financed scientific discipline since the 2000s. Understandably so, as the basic *modus operandi* of nanotechnology promises results that are nothing short of magical - imagine the implications of the possibility to transmit instructions from a centralised data store to molecular nano-assemblers (nanobots) which would build whatever is coded from the atomic level up.

Robotics primarily involves the development of a non-biological intelligence that exceeds human intelligence, the so-called strong artificial intelligence (narrow AIs are already used in air traffic control, medical diagnoses, etc.). A number of approaches and models have been developed over the last 60 years to create an intelligence that would be indistinguishable from human intelligence. Kurzweil clearly favours the reverse engineering of the human brain, which involves the usage of nanobots in coding all the processes in the human brain, providing a blueprint for the functioning of strong AI. The launching of the heavily financed international BRAIN project in April 2013, the goal of which is to decipher the

code of the human brain by employing the tools of nanotechnology (Kozmos 2013:13), may see results that come in well ahead of Kurzweil's 20-year estimate.

3. Kurzweil's singularity @ Gibson's *Sprawl Trilogy*

Kurzweil's predictions predominantly rely on possibilities offered by the technological and scientific discoveries of roughly the past 25 years. Prior to 1990, most of the propositions discussed in *The Singularity is Near* would have been unthinkable in terms of the possibilities offered by existing technology and science. Nevertheless, as I will show over the following pages, Gibson's 1980s novels *Neuromancer* (1984), *Count Zero* (1986) and *Mona Lisa Overdrive* (1988) - generally referred to as the *Sprawl Trilogy* - contain a number of concepts which are not only comparable but more often than not identical to those proposed by Kurzweil.

The theme that loosely connects the novels are the efforts of various AIs (e.g. Wintermute, Neuromancer, Continuity) to break free from human control and merge with extra-terrestrial AIs to create an intelligent universe very similar to the one of Kurzweil's Sixth Epoch. They pursue their goals by employing human operatives (e.g. Case, Molly, Turner) and personality constructs (e.g. Dixie Flatline, Colin, The Finn), whose task is to sabotage various corporations. These operatives are either completely dehumanised or run by ancient clans sustained by cloning and cryogenics, such as the Tessier-Ashpools.

For the analysis of Gibson's *Sprawl* novels in terms of Kurzweil's predictions in *The Singularity is Near*, I distributed the latter in seven categories based on the three disciplines discussed above and their combinations (see Table 1 below). I then searched for concepts corresponding to Kurzweil's proposals in the three novels. Employing such categorisation facilitated the organisation of the concepts analysed, while providing immediate insight into the extent of Gibson's innovation. The analysis resulted in roughly eighty concepts and phenomena that structurally and functionally correspond to Kurzweil's predictions. With some, it was impossible to determine whether their functioning relied upon the same factors as Kurzweil's, or whether a concept or phenomenon should be regarded novel or not. An example of this is the re-setting of Julius Deane's DNA in *Neuromancer* (Gibson 1995:20) and the rejuvenation of Danielle Stark in *Mona Lisa Overdrive* (Gibson 1989:185).

In any case, the quantity of corresponding concepts may well contribute to the impressiveness of the degree of coincidence, but it is rather trivial to the actual quality of correspondence, which is the main concern here. This is why presentation and evaluation is limited to key corresponding concepts, with an emphasis on those which had no grounding in the 1980s technological and scientific reality.

	KURZWEIL		GIBSON	
GENETICS	cloning		3Jane Tessier-Ashpool	
	gene manipulation		DNA manipulation	
NANOTECH	intelligent textiles		mimetic polycarbon	
ROBOTICS	human-like AIs		Wintermute	
GENETICS / NANOTECH	bodily clean-ups, replacements		blood, pancreas replacement	
	nanobot brain operations		addiction removal by chemo-pliers in the brain	
	"growing" of organs		vat-grown organs / humans	
GENETICS / ROBOTICS	AI diagnostics		AI's instructions to reverse a handicap	
NANOTECH / ROBOTICS	self-organizing swarms of small robots (military)		AI sent robots helping human operatives	
GNR	3D computation		"the Aleph"	
	brain-computer interface	upload of skills and knowledge	"jacking-in"	microsofts
		personality constructs		ROM/VR constructs
		mind expansion		*vévés*
	human body 2.0 and 3.0		body augmentations	
	virtual reality	plugging into sensory beams of others	cyberspace	simstim
		foglets		Virek
	singularity (2045)		"when it changed" (2030)	
	intelligent universe (epoch six)		merging of AIs to form a transcendent intelligence	

Table 1. Kurzweil – Gibson Correspondence Chart

The most obvious result of the advancements in the field of genetics is cloning. Kurzweil is mainly interested in the potential of cloning for therapeutic purposes. As clones occur regularly in sci-fi, the character of Jane Tessier-Ashpool, who appears as a clone in *Neuromancer*, is not exactly an innovation. On the other hand, Gibson's motifs based on DNA manipulation are surprisingly close to what Kurzweil envisions - on the basis of science rather than literary imagination - as realistic possibilities offered by contemporary genetics. Kurzweil (2006:212) is primarily excited by the promise of life extension enabled by controlling the expression of degenerative genes and converting one's skin cells into fresh versions of any other cell type to rejuvenate organs and tissues. The logic of re-setting the code of Julius Deane's DNA to prolong his life (Gibson 1995:20) is practically identical. Another example of gene manipulation close to Kurzweil's predictions can be found in *Count Zero*, where a lesbian couple is parenting a biological baby conceived by means of DNA-splicing (72).

The next category comprises the correspondences related to the logic and functioning of nanotechnology, which first emerged as a purely theoretical proposal in Eric Drexler's 1992 *Nanosystems* (Kurzweil 2006:228), a revised version of his 1991 doctoral dissertation in the field of engineering. It was therefore impossible for Gibson to be in any way familiar with the concept while

writing the *Sprawl Trilogy*. Nevertheless, the explanation of the functioning of a black sphere, which can turn from a sex-toy to intelligent hand-cuffs or a powerful explosive, as "something to do with the molecules" (1995:255) is synonymous with the manipulation of materials on molecular level, i.e. nanotechnology. As for the direct correspondence between Kurzweil's predictions and Gibson's motifs in terms of nanotechnology, let us mention multiple-function, intelligent textiles, which can adapt to the environment or serve various purposes (Kurzweil 2006:332), proposed by Kurzweil, and Gibson's mimetic polycarbon clothes, which adapt to the environment (1995:74), or polycarbon exo, which adds to its carrier's strength (1989:184).

Kurzweil's human-like artificial intelligence (AI), produced by reverse engineering of the human brain, has a number of sci-fi predecessors - e.g. Hal from Kubrick's (1968) *2001: A Space Odyssey*. Gibson's AIs are not only able to converse, plan and predict, but also to "feel a compulsion" (1995:246), create a personality (1995:305) or write a book (1989:52).

The next category involves the probable outcomes of the synergies between genetics and nanotechnology. In *The Singularity is Near,* Kurzweil minutely explains the application of nanotechnology at the cellular and gene levels to perform clean-ups of bodily fluids and replacements of organs and tissues by inserting billions of computer-controlled nanobots into the bloodstream. From there, they can access target cells and cell-nuclei, performing their tasks (253-255). In *Neuromancer,* a very similar procedure is described when Case's blood, spinal fluid and pancreas are replaced (44). We should also mention brain operations (Kurzweil 2006:307-309) which involve nanobots travelling to the specific region of the brain, mechanically "repairing" it according to instructions transferred by wi-fi. An identical procedure is described in *Mona Lisa Overdrive*, where chemo-pliers are used to pry drug addiction away from receptor sites in Angela Mitchell's brain (18). Growing organs by transforming skin cells into other cell types by means of nanobots that manipulate cell nuclei and DNA is another of Kurzweil's predictions within this category - one that has many parallels in Gibson's trilogy, including vat-grown organs (cf. 1987:391), vat-grown humans (cf. 1995:94) and even vat-grown food (cf. 1995:62).

According to Kurzweil, the most important consequence of the synergy between biotechnology and robotics is AI diagnoses (2006:281-283), cross-referencing all the symptoms and evaluating them with regard to the patient's medical history and immediate environment, while, at the same time, suggesting possible treatments. An identical procedure is found in *Neuromancer*, where Wintermute provides instructions to reverse Case's seemingly irreversible handicap (44).

In the nanotechnology/robotics category, the most accurate match is Kurzweil's prediction of self-organising swarms of small robots performing military operations (2006:330-373) and Wintermute-sent robots who kill Turing agents chasing Case in *Neuromancer* (196).

The category of the synergies between genetics, nanotechnology and robotics (GNR) is the one in which the semblance between Gibson's imagination and Kurzweil's informed projections is the greatest as well as the hardest to rationalise. Take, for example, the possibility of developing 3-D molecular computation by 2020, which would bring present 2-D chip computing speed close to the speed of light, enabling the creation of nanocircuits which would be self-configuring (2006:111-117). The functioning of such computers would be very

close to the functioning of the human brain, only infinitely faster and with a limitless memorisation capacity. In *Mona Lisa Overdrive*, Gibson introduces the Aleph, "one solid lump of biochip" (154) containing an infinite storage capacity, "an *abstract* of the sum total of data constituting cyberspace" (210). The Aleph encloses a universe to which ours - due to a far smaller computational potential - is subordinate.

The degree of correspondence is even greater when we observe the manner and the uses of brain-computer interfacing. The logic of electronically stimulating the neurons is identical. Let us compare the possibility of uploading skills and knowledge, for example. According to Kurzweil, such uploading would be enabled by using nanobots in the brain to translate the information from a data unit into electronic impulses stimulating the brain to perform the functions of memorising and learning (2006:198-201). Gibson's protagonists upload skills and knowledge by inserting microsofts (cf. 1987:98) into sockets behind their ears.

The mechanism that enables uploading information into the brain also allows the downloading of information from the brain into a storage unit (Kurzweil 2006:200). Kurzweil thus predicts the formation of personality constructs which might be VR-based or appear in the physical reality as foglets (i.e. nanobot produced entities). The constructs populating Gibson's worlds contain data downloaded from the human brain, embodied either as a hardware unit (cf. Dixie Flatline in *Neuromancer*), a virtual reality avatar (cf. Virek in *Count Zero*) or as a holograph-like entity in physical reality (cf. Colin in *Mona Lisa Overdrive*).

The most important aspect of brain-computer interface in terms of singularity is the possibility of mind expansion via nanobots in the brain functioning as the interface between virtual and physical reality, merging biological and non-biological intelligence (Kurzweil 2006:316-318). Gibson presents an identical concept, the so called *vévés* in the brain (cf. 1987:133), which allow Angela Mitchell to mentally connect to cyberspace and coexist in physical and virtual reality at the same time.

According to Kurzweil, the GNR technologies will radically alter the concept of the human body. Version 2.0 will no longer require most of the organs as their functions would be implemented by nanobots. The trend is to optimise the various functions the body is to perform. The largely non-biological version 3.0 will have a greatly expanded plasticity and will be subject to change at will in both virtual and physical realities (2006:310). Gibson offers similar examples of bodily augmentations. The most obvious example are characters with various implants (cf. Molly Millions in *Neuromancer*), characters with chemically conditioned organ functions (cf. Case's liver and pancreas made biochemically incapable to react to drugs in *Neuromancer*), or characters whose bodies comply with Kurzweil's human body 3.0 prediction (cf. Virek in *Count Zero*).

There are numerous parallels between the possibilities implicit in the functioning of the virtual reality of Gibson's cyberspace. I will only concentrate on a couple of the more curious: the mechanics of plugging into sensory beams of others and foglets. Kurzweil (2006:316) explains the former as the possibility of "plugging into someone else's sensory-emotional beam and experience what it's like to be that person". The sensory beam refers to nanobot projections of thoughts and feelings from one's brain to virtual reality. Others connect to that beam via their nanobot interfaces. In *Neuromancer*, Gibson introduces an identical concept called simstim, which allows Case to participate in Molly's break-in from behind his computer (71), while in *Count Zero* and *Mona Lisa Overdrive*, simstim is used

chiefly for cinema-like entertainment, which is also the main use of Kurzweil's concept. Foglets, "nanobots […] that can connect themselves to replicate any physical structure" (Kurzweil 2006:33), have a direct correspondent in Wintermute's physical reality embodiments (cf. Gibson 1995:172) or in characters like Virek in *Count Zero*, who is just a cell-soup in a vat but who is able to create a body in a manner very similar to Kurzweil's.

In 2045, according to Kurzweil, the development of GNR technologies will ultimately result in the merging of biological and non-biological intelligence, which will create a society and culture advancing at unimaginable speeds in unimaginable directions. A comparable concept also appears in *Mona Lisa Overdrive*, where something very similar is referred to as the time "when it changed" (127), which took place fifteen years prior to the events in the book (i.e. between 2025 and 2030). The changing refers to the merging of Wintermute and Neuromancer in *Neuromancer*, which eventually resulted in the development of technology enabling the merging of biological and non-biological intelligence and simultaneous existence in physical and virtual reality (cf. Angela Mitchel's *vévés*). Furthermore, the initial merging of AIs, which set them free from human constraints, ultimately brought about the creation of an intelligent universe, which corresponds to Kurzweil's Epoch Six of evolutionary development, and which is described on the last page of *Mona Lisa Overdrive* (308).

4. Back to the future

All the major predictions Kurzweil suggests and justifies with the developmental trends in GNR technologies in his 2005 best-seller have parallels in the novels of Gibson's 1980s trilogy. The obvious question is how Gibson could predict the main directions of technological development with such accuracy, given that virtually none of the technological concepts Kurzweil employed in his projections existed prior to the 1990s.

My proposition is that Gibson did not predict the development but conditioned it. As ludicrous as such a suggestion may seem, it is, in fact, implicit in the structural logic of postmodern reality. The 1980s were the first truly postmodern decade, in which the effects of the paradigm shift becoming operable since World War 2 culminated at the level of experiential reality. Cyberpunk was, actually, the first literary movement to internalise the mechanisms implicit in the structuring of the new postmodern epoch, and contribute to the structuring of its reality (cf. Krevel 2012:179-182). Cyberpunk was thus the first literature to function as a medium in the postmodern sense - an information generator which, according to all the major theoreticians analysing the paradigms of the new epoch, provides material for the creation of postmodern reality. The governing mechanisms of postmodernity are, in my opinion, best summarized by Jean Baudrillard's (1994:121-127). description of postmodern reality as hyperreality comprised of third order simulacra.

Hyperreality is reality created from models. It is a reality which consists of systems of media-generated information, the stability of which relies upon the connectivity of data. Since before the actualisation as hyperreality, all data have the same value, the notions of real and fictive no longer apply. Literature, particularly fiction, which has traditionally been considered fictive, is in essence a medium: it generates data which contribute to the formation of hyperreal systems in which we live, i.e. it conditions reality. Let me illustrate my point with the late 1980s and

early 1990s cyberpunk subculture, which drew on the vocabulary, behaviour and attire of cyberpunk literary protagonists, or the aftermath of Dan Brown's *The Da Vinci Code* publication.

From conversations with various computer and AI experts, I gathered that Gibson is an international cult figure in the world of computer science. That explains why he is frequently mentioned in scientific articles and books on computer, AI and nanotechnology development (Bell 2003, Rennie 2010:27, Stix 2008:56, Hayles 2005:140). It is therefore not unreasonable to assume that inventions and innovations in the field of computer and computer-related disciplines over the last twenty-five years have been fundamentally influenced by certain concepts and notions introduced by Gibson. Such a claim is also supported by the findings of probably the best *connoisseur* of the relations between literature, technology and science, N. Katherine Hayles, who pointed out that "visions of the future, especially in technologically advanced eras, can dramatically affect present developments" (2005:131).

5. Conclusion

Our projections, literary and otherwise, reflect our current desires and aspirations: less work, affluence, super intelligence, immortality, etc. It seems that, with the development of contemporary intelligent machines, dominating science fiction since the advent of literary cyberpunk at the beginning of the 1980s, and permeating our quotidian reality since the 1990s, we have finally designed the technology and a metaphysical foundation which allow us to come very close to achieving these goals.

The results of my analysis of Williams Gibson's 1980s *Sprawl Trilogy* in the light of Ray Kurzweil's informed projections of the future in *The Singularity is Near* confirm the above, and seem consistent with Vernor Vinge's explanation of the inevitability of singularity:

> The dilemma felt by science fiction writers will be perceived in other creative endeavors. As we move closer to this point, it will loom vaster and vaster over human affairs till the notion becomes a commonplace. (qtd. in Bell 2003)

In view of that, perhaps our stories about the future should be more optimistic and full of hope. In this respect, Kurzweil's often-criticised optimism is rather reassuring, regardless of how utopian it may seem.

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