Technology and Morality: The Stuff of Steampunk

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Abstract:
This article examines steampunk as an investigation of things and our relationships to them. Analysing the recycling of Victorian things in both the works of steampunk artists who displayed their work at *Anachrotechnofetishism* (a 2008 steampunk art show) and in Neal Stephenson's *The Diamond Age* (1995), I suggest that if steampunk can avoid the desire for complete knowledge and mastery that some of its proponents express, it offers unique opportunities to rethink the human, technology, and morality in a 'posthuman' world.

Keywords: *Anachrotechnofetishism*, *The Diamond Age*, material culture, neo-Victorians, posthuman, science and technology studies, steampunk, Neal Stephenson, things.

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> The question of questions for mankind – the problem which underlies all others, and is more deeply interesting than any other – is the ascertainment of the place which Man occupies in nature and of his relations to the universe of things. (Huxley, 'On the Relations of Man to the Lower Animals', 1873: 71)

> We can no longer pose the question of morality in the same way as we would have done at a time when human beings had hardly started to scratch the earth on which they passed from life to death without anyone *else* noticing. Morality and technology are ontological categories [...] and the human comes out of these modes, it is not at their origin. (Latour 2002: 256, original emphasis)

First and foremost, steampunk is about things – especially technological things – and our relationships to them. As a sub-genre of science fiction, it explores the difference an object can make; it imagines alternative Victorian pasts in which technological advances (such as those imagined by H.G. Wells and Jules Verne) radically alter the course of history and open up possible future techno-cultural worlds. As a craft and lifestyle movement, it produces material things that might make a difference today; steampunk artists produce fanciful Victorian-like gadgets (inspired by both actual and fictional Victorian mechanical inventions) or refurbish contemporary technological objects to make them look and feel 'Victorian' in order to challenge contemporary technological design and help us reconsider the

value of things. In both its literary and material manifestations, steampunk is about learning to read all that is folded into any particular created thing – that is, learning to connect the source materials to particular cultural, technical, and environmental practices, skills, histories, and economies of meaning and value.[1]

In its investigation of things, steampunk embodies some of the most compelling insights of the science and technology studies (STS) tradition, which suggests that "the significance of our relationship with things has become a question that needs to be raised with certain urgency" (Introna 2009: 26). At a time when we are inundated with complex person-thing hybrids, such as "frozen embryos, [...] sensory-equipped robots, hybrid corn, [...] whales outfitted with radar sounding devices" (Latour 1993: 49), we can no longer afford to perpetuate what Igor Kopytoff, among others, suggests is a fundamental tendency of Western thought – the separation of people and things.[2] As Latour suggests, we must resist 'modern man's' attempts to keep separate the pole of Nature (the domain of science) from the pole of Culture/Society (the domain of the social sciences and humanities) and abandon the thing/human poles for a more nuanced understanding of the intimate relationships between persons and things. In attempting to "re-access what they see as the affective value of the material world of the nineteenth-century", steampunks offer a unique opportunity to imagine more ethical relationships with things (Onion 2008: 138-139). By recovering a more intimate relationship to and understanding of the material world, they counter what Katherine Hayles has referred to as the "*systematic devaluation of materiality and embodiment*" in both contemporary theory and literature and its accompanying dangerous visions of a bodiless posthuman (Hayles 1999: 48, original emphasis).[3]

However, steampunks also display the tendency to "idealise 'complete' knowledge" and mastery that they imagine was part of the Victorian era, and in so doing they risk undermining their own attempts to imagine a more socially-responsible embodied posthuman that is comfortable integrating "the physicalities of human and machine" (Onion 2008: 151, 147). While their investigation of the relationship between people and things offers an opportunity to re-envision radically our relationship to technology and morality, their idealisation of mastery risks re-inscribing the values of liberal humanism onto posthumanism and may

instead perpetuate a fantasy of control and domination as old as technology itself.[4]

In examining a number of steampunk objects displayed at *Anachrotechnofetishism*, a 2008 steampunk art show, together with the futuristic neo-Victorian world depicted in Neal Stephenson's novel *The Diamond Age* (1995), this article will mine the possibilities inherent in steampunk. The first section discusses the values embedded in the steampunk things displayed at *Anachrotechnofetishism* in order to showcase the inherent political potential of steampunk art. The following sections focus on the neo-Victorians of Stephenson's novel to highlight both the possible insights of craft and lifestyle steampunk and the outmoded assumptions about the human that threaten to undermine its value. Drawing on science and technology studies (especially the work of Bruno Latour and Lucas D. Introna), I suggest that both material and literary engagements with the Victorian era help us to imagine more ethical relationships with all others – including things.[5] In order to do this, however, we would need to move towards a Latourian displacement of the centrality of the human as rational agent and towards re-assessment of both morality and technology as "ontological categories" through which the properly (post)human emerges (Latour 2002: 256). In steampunk, technology (which can be and so often has been demonised) has the potential to play the part of that which may reconnect us to ourselves, to the objects we make, and to our material environment. This potential can only be achieved by restoring technology, as Latour suggests, to its proper "ontological dignity" (Latour 2002: 252), and by reconfiguring the human as at best a distributed quasi-agent, whose mode of being fundamentally shapes and is shaped by things.

1. The Future-Perfect of Steampunk Things

Anachrotechnofetishism held from 12 September to 3 October 2008 at Suite 100 (an art gallery in downtown Seattle recently renamed Halogen), was neither the first nor the last steampunk art show, but it was significant for the ways it framed the meaning and value of the steampunk movement.[6] The website for the show serves as a manifesto of sorts for the artists whose work the gallery displayed. The show included the work of 13 American Steampunks who, according to the gallery's website, are "united by broad geography and narrow aesthetic." The narrow aesthetic involves "[m]arrying narrative and nostalgia to design and technology," in order to

"imagine the triumphs of the past overriding the failures of the present to create from the ruins and detritus a dazzling future-perfect" (*Anachrotechnofetishism* 2008). In emphasising steampunk's utopic dimension, the gallery's introduction underlines many steampunks' belief in their ability to shape a better future through the recycling of the past. The gallery seems to have adopted steampunk's self-conscious attempt to define itself as a craft and lifestyle movement, as seen in the pages of *SteamPunk Magazine* and outlined by Rebecca Onion in her 2008 article 'Reclaiming the Machine: An Introductory Look at Steampunk in Everyday Practice' in this journal. Through a brief reading of a few of the show's key objects, this section will outline some of the dominant values inherent in steampunk practice, paying particular attention to the ways in which many of these pieces are framed by the artists themselves through the gallery's website, which provides both brief artist bios and, in many cases, artist statements. The interplay between the pieces displayed and the self-conscious framing of the pieces, and of steampunk more generally, allows – indeed invites – us to investigate what is at stake in this movement.

If in viewing the finished objects on display, one loses sight of the fact that this "aesthetic technological movement" (Catastrophone Orchestra and Arts Collective 2006: 5) is very much part of a DIY subculture that openly shares its techniques, the gallery's website is there to remind spectators of this fact. So for example, Jake von Slatt's piece, 'Steampunk Stratocaster' (see Figure 1) displays the technique of electrolytic etching on brass, which is explained in great detail both on his website, 'The Steampunk Workshop', and in the first issue of *SteamPunk Magazine*.[7] As is typical of steampunk DIY instructions, von Slatt insists on sustainable practices, recommending that readers procure their component parts from thrift shops, "junk" stores, or even through "dumpster-diving", and that they dispose of any chemicals in environmentally-friendly ways.

Figure 1: Detail, Jake Von Slatt's 'Steampunk Stratocaster'
© **Jake von Slatt**, reprinted with kind permission of the artist.

The instructions clearly showcase this counter-cultural movement's aesthetic of recycling and re-using.[8] The material used (in this case brass) and the clockwork cogs and wheels depicted are meant to invoke Victorian things, while contributing to the steampunk "non-luddite critique of technology" (Catastrophone Orchestra and Arts Collective 2006: 4). These "archeologists of the present" are attracted to the materials and machine parts of the past precisely because one (presumably anyone) can *tinker* with them (Catastrophone Orchestra and Arts Collective 2006: 5). One of steampunks' primary complaints about today's technology is its "overly analytical abstractness", which does not allow for tinkering except by the highly specialised (Catastrophone Orchestra and Arts Collective 2006: 4). As such, it is important to recognise that steampunks explicitly reclaim the right to *tinker*, to *make* – and to make, often by trial and error, things that are aesthetically pleasing even if not necessarily efficient or useful. Consider, for example, von Slatt's statement about his art:

> I work largely with found objects and build artifacts from alternate pasts that imbue and connect modern contrivances with their 19th Century roots. I actually consider my true work to be the web pages that describe the construction of each piece, the piece itself merely the byproduct of the workshop experience. Our world is full of technology and almost all of it began during the 19th Century and the Industrial Revolution. By exploring this time we lay a foundation of understanding for technology and its role in history and daily life. With this understanding we can make smart decisions concerning the role of it in our lives and speak with knowledge and power to the corporations that would prefer we remain ignorant of the tech they would sell us. (von Slatt 2008)

Steampunks, then, reject contemporary technology's lack of transparency for the average-skilled person, and they call for cross-pollination between historical times, materials, and makers. In making things themselves, they hope to "rediscover" what one steampunk refers to as the "the inherent dignity of created objects" (Calamity 2007: 25), while also contributing to the "democratization of mastery" (Onion 2008: 153).

The politics inherent in the steampunk movement are even more explicit in a piece by David Dowling, entitled 'This Will Not Go On Forever'.[9] Very much aware that our current consumption patterns are not sustainable, many steampunks seek to encourage us to "radically re-envision our lives, our interactions with both people and technology" (Killjoy 2007: 2). The significance of this particular piece is in the details of the materials of which it is made, which include wood, paint, steel, machine parts, chain, bone, dirt, human hair, oil, and glass. Rusty cogs and wheels turn within a wooden frame covered with glass. Accumulating at the bottom of the frame there is bone, hair, and oil, mixed in with mechanical debris. Indeed watching the rusty machine parts turn, one notices that oil drips into the mess accumulating at the bottom and even exceeds the frame, leaking into a bucket below. Although this is not apparent in pictures of the piece, it was difficult not to notice the steady leaking of dirty oil when actually viewing the piece in situ. The parallel between human and machine parts is striking, the implication being that both human and mechanical remains become part

of the refuse accumulating in our world. Our fate is tied to the fate of the things we make – the implication is that with certain kinds of making, or more importantly re-making, we renew/remake ourselves. Or conversely, as one steampunk puts it, if we adopt (as we have) a worldview that everything is disposable, this view will "exten[d] to our fellow humans" (Calamity 2007: 25).

Knowing in fact, as Dowling maintains, that "This" will not go on forever, steampunks insist that we can *and should* remake ourselves through the things that we make and re-use. Molly Friedrich's 'Mechanical Womb with Clockwork Fetus' (Figures 2 and 3) recycles brass, nickel, steel, copper, acrylic, rubber, plastic, and glass to suggest a new beginning.

Figure 2: Molly Friedrich, 'Mechanical Womb with Clockwork Fetus'
© Molly Friedrich, reprinted with kind permission of the artist.

Figure 3: Molly Friedrich, 'Mechanical Womb with Clockwork Fetus'
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Although some may find the clockwork fetus encapsulated in its glass, brass, and wooden mechanical womb somewhat disturbing, the piece is rather delightful in its attention to detail. Attached to the womb is a magnifying glass that invites spectators to examine these details up close – details such as the clockwork fetus' red wire umbilical cord and his/her steampunk goggles. This piece is remarkable not only because of its fanciful take on science-fiction, but also because it brings new life to old materials

and is, when looked at in light of the maker's perspective on steampunk art, an image of hope:

> The whole world is changing fast, and large facets of our lives are going to have to adjust to it, but it need not be a tragedy at all. Call me steampunk, tinkerer, villain, artist, mad scientist, misguided; but most of all, call me a survivor, for I am already planning to be a part of the new world that will be forged fresh upon the old. (Friedrich 2008)

The steampunks' work and words are compelling. Their insistence on an increased mindfulness toward things and our relationships to them is particularly significant and timely, as it fosters increased sensitivity toward our endangered material environment. In its echo of the spirit of the Victorian Arts and Crafts movement with its fundamental respect for "the maker and the process of making, as much as the object made", but without its accompanying anti-technological stance, the steampunk movement restores the intimate relationship between art and technology hinted at in the etymology of the term (Blakesley 2006: 9).[10] More importantly perhaps, steampunk also offers – even as it undermines – a unique opportunity to explore the possibility of what might be called an "ethics of things" (Introna 2009: 28).[11] Steampunk art gestures toward such a radical ethics, which attempts to meet the challenges of seeing beyond ourselves and of understanding and accepting our inevitable enmeshment with a wide variety of things and all that is embedded within and radiates from them. At the same time, however, some steampunks stop short of the radical rethinking of the boundaries of the human and the profound undermining of human agency (and mastery) that such an ethics would require.

As Rebecca Onion has shown, the steampunk aesthetic is frequently accompanied by a problematic "striving for complete comprehension – and the idea that such a type of comprehension may indeed be possible" (Onion 2008:144). One might admire steampunks for their commitment to understanding and being able to fix (or at least tinker with) the technologies that they use, but one must wonder whether their desire for technological transparency is not also a desire for mastery over technology. For example, von Slatt explains his attraction to the Victorian era in terms of the potential for the democratisation of technological mastery; he maintains that the

Victorian era was "the last era in which a high school graduate was given the complete set of scientific concepts to fully understand the technology of the age" (qtd. in Brownlee 2007). In emphasising the DIY component of steampunk, von Slatt and other steampunks idealise the Victorian culture of the amateur or non-professional, who could "contribute to the advancement of science" by mastering its principles him/herself (qtd. in Brownlee 2007). Although the 'democratization of mastery' emphasised by the DIY component of steampunk effectively critiques the fundamental opacity of contemporary technology, it is premised on an unrealistic understanding of the human and its relation to technology. The concept of mastery is based on the assumptions that the human is both separate from and at the origin of technology, two assumptions that are particularly questionable in a posthuman world, in which the human being is distributed across and constituted by organic and technological parts. In such world, the possibility of human mastery over technology is replaced by what we might call mutual constitutivity in which humans make and are made by technological things. Ultimately, it is this desire for mastery that undermines what is perhaps the most valuable potential contribution of the steampunk movement – the exploration of posthuman ethics (an ethics of things) that the movement itself suggests.

Neal Stephenson's *The Diamond Age*, with its vision of technological imperialism perpetuated by the group that calls itself the "neo-Victorians", not only gives us cause to be suspicious of the steampunk desire for mastery, but also provides an opportunity to investigate alternative understandings of the relationships between humans, technology, and morality that promote the exploration of an ethics of things suggested by steampunk.

2. The Neo-Victorian Industry of Things

The Diamond Age, published before the emergence of international craft and lifestyle steampunk (but after the emergence of steampunk literature), depicts a future world dominated by the neo-Victorians and explores the potential results of the complete loss of the kind of mindfulness towards things that contemporary steampunk artists attempt to promote. Stephenson's novel suggests that our failure to accept the fundamental otherness of things *as* things, even as they become increasingly part of our own bodies, fosters and perpetuates cycles of domination and oppression. In

a sense, Stephenson (much like the steampunks discussed above) suggests that as long as we fail to develop more ethical relationships with things we will also fail to develop more ethical relationships between humans. Indeed, in imagining a possible neo-Victorian industry of things, Stephenson explores all that is entangled in any one created thing and radically undermines traditional (anthropocentric) understandings of agency and ethics.

The Diamond Age depicts a world after the nanotechnological revolution radically reduces of the size of technological objects and allows them to be literally in*corporated* into human bodies; it displays a radical realignment of the boundaries between humans and nonhumans, people and things. Set in a near future, in which it is "difficult not to build things that were lighter than air" and the greatest threats to individuals and communities, more often than not, come in the form of "microscopic invaders" or nanosites, this novel showcases an unprecedented intimacy between people and things, while also exploring a more profound human alienation from the making of things than ever before (Stephenson 1995: 56, 57). Interestingly, the inhabitants of this world seem to understand all that is *built into things* (values, interests, social structures/relationships) while fundamentally misunderstanding their own relationship to technology and morality. Stephenson's vision helps us appreciate better the political potential of steampunk and begin to rethink its call for technological mastery.

Among the many clans in Stephenson's novel, the neo-Victorians display some of the most peculiar relationships to things in the novel. On the one hand, they spearheaded the nanotechnological revolution and created a network of matter compilers (machines that build things one atom at a time), connected through Feed lines to Source Victoria (the source of all atoms), so that one could 'make' anything from food to interactive 'smart' books, simply by giving one's matter compiler a command. On the other hand, they prefer things uniquely crafted by hand, which they procure from a clan of craftspeople, one of the only clans with the requisite knowledge and skills to make anything at all without the use of nanotechnology. This clan of neo-Morrisites, dedicated to "mak[ing] beautiful things" (Stephenson 1995: 261), satisfies the neo-Victorian desire for one-off man-made (as opposed to machine-made) things, but it is entirely dependent on the neo-Victorians (and their economic dominance) for their survival.

Furthermore, the neo-Victorians maintain their economic supremacy by encouraging the consumption of nanotechnologically-built things in all other clans. Clearly, the neo-Victorians have a profound sense of the significance of things. They protect their own uniqueness and superiority by protecting the uniqueness and superiority of their things. Or as one character puts it, the neo-Victorians are "always spouting all kinds of crap about how one thing was better than another thing, which eventually led […] to the belief that some people were better than other people" (Stephenson 1995: 185). This peculiar, yet telling, slippage between people and things raises questions about how the industry of things enlists people into particular ways of being and suggests that people might contribute to maintaining or changing their mode of being by maintaining or changing the way they make/use things, as do the steampunks discussed previously.

As the neo-Victorians extend the network of Feed lines all over the world, linking matter compilers in nearly every home to Source Victoria, they extend their control over others and their position at the pinnacle of a hierarchical order. Embedded in the neo-Victorian Feed technology is the neo-Victorian belief in social Darwinism and the hierarchical order it supposedly ensures. As one neo-Victorian Lord puts it, "while people were not *genetically* different, they were *culturally* as different as could possibly be, and [...] some cultures were simply better than others," that is "some cultures thrived and expanded while others did not" (Stephenson 1995: 20-21). The neo-Victorians' belief in the survival and domination of the culturally fittest and their assumed cultural superiority is built into the organisation of Feed lines that run from the diamonoid structure of Source Victoria down into every home all over the world, most recently "reaching millions of new peasants every month" in China's Middle Kingdom – populated by a tribe that was less successful according to neo-Victorian standards (Stephenson 1995: 70). By controlling the source of all atoms, the neo-Victorians monitor what everyone's matter compilers are making, such that users of the system are quite literally plugged into it and its inherent ideology.

Making something with one's matter compiler by drawing atoms from Source Victoria also automatically *draws one into* a subjugating network of surveillance and control. In the language of the science and technology studies tradition, because everyday things "always already embody in some way particular values and interests […] those that

encounter and use these inscribed things may become, wittingly or unwittingly, enrolled into particular programmes, or scripts for action" (Introna 2009: 27-28). Aware that using neo-Victorian things enrols them into the neo-Victorian project of domination and control, several groups attempt to subvert the neo-Victorians by subverting the socio-technical network they uphold. Some try to break the Feed lines directly, while others attempt to hack into the web-based encryption that protects the economic transactions that undergird the Feed system, so that alternative technologies might supplant the dominance of neo-Victorian technology.

Several subversive groups conspire against the neo-Victorians by developing Seed technology, that is supposed to supplant both the material Feed network and all that is embedded within it. The creators of Seed technology hope that "one day, instead of Feeds terminating in matter compilers, we will have Seeds that thrown on the earth, will sprout up into houses, hamburgers, spaceships, and books" (Stephenson 1995: 384). It is clear that embedded in Seed technology is the hacker's dream of free information and the belief of some groups (including the Chinese of the Middle Kingdom) in a more organic mode of production akin to the production of rice. Clearly Seed technology promises to remove control from the few and distribute technology and the freedom to make things (without surveillance) to the many. However, if Seed technology initially appears to be more ethically-grounded than Feed technology, the text suggests that this is not likely the case. Seed technology is not necessarily better than or preferable to the neo-Victorian technology, because the creation of the Seed requires the Drummers (a distributed organism or network of human beings infested with nanotechnological computers [nanosites] that communicate and compute through light and body fluids). In order to hack into the security system of the media net and produce the new Seed technology that will subvert and replace the neo-Victorian Feed, these Drummers have ritualistic orgies that culminate in the burning and subsequent ingestion of the ashes of a woman's body. As such, although this new technology promises to be more equitable, it is difficult to believe that it will be, especially given the problematic method through which it is being developed. To be sure, the novel does not attempt to champion one technology over another but to show all that is entangled in any given technology. By showing the complex socio-technical networks in which humans find themselves embedded, the novel raises profound doubts about

the efficacy of human agency, which invites a rethinking of the very possibility of mastery in a posthuman world and an investigation of our relationship to technology and morality more generally.

The neo-Victorians believe that they can maintain the Feed system without necessarily becoming part of it (hence their preference for hand-made things). Of course, this position of mastery and control is ultimately shown to be untenable when one of the top neo-Victorian engineers, John Hackworth, is literally invaded by nanotechnological parasites (nanosites) that redirect his will. These microscopic computing devices were developed by a shady technologist named Dr. X, who learns how to imitate neo-Victorian nanotechnology. Dr. X, working toward the interests of the Middle Kingdom (supposedly on the lower end of the social hierarchy according to neo-Victorians) employs his nanosites to re-direct Hackworth's energies toward the development of an alternative technology that would subvert neo-Victorian Feed technology. In fact, because the nanosites enter Hackworth's bloodstream and interface directly with his brain, he contributes to the development of Seed technology (and hence the undermining of neo-Victorian dominance that he previously helped establish), all without being aware of it.

The struggle over the making of things shows how certain moral codes or values are embedded in each mode of technology, while at the same time exploring the complex relationship between technology and morality that undermines any assumed human agency. This novel does not demonise or glorify any technology, so much as it shows that humans are not at the origin of either 'their' technology or their morality, as Latour effectively argues (see Latour 2002: 254). Embedded as they are in complex networks of people and things, humans are who they are by virtue of this same embeddedness. Technology in this novel is no mere instrument or tool used by human beings for particular purposes and with certain intentionality. Instead technology, as it is presented in Stephenson's text, much more closely resembles Latour's understanding of it. As Latour explains, technology should not be thought of in terms of instrumentality, because "[f]ar from fulfilling any purpose", new technologies "start by exploring heterogeneous universes that nothing, up to that point, could have foreseen and behind which trail new functions"; in other words, according to Latour, new technologies "incite around them that whirlwind of new worlds" (Latour 2002: 250).

As groups fight for control of technology and a particular moral order, the reader is left to examine all the ways that technology and morality might be interrelated and how human intention and agency are fundamentally undermined. This is not to say that this novel recycles the common science-fiction theme of technology 'taking over' and enslaving humans, but rather that it shows how technology is necessarily more than just an instrument or extension of the human; in Stephenson's novel, technology fosters unexpected and unintended universes of possibilities – moral landscapes, relationships between people and people and between people and things, which could not have been foreseen and which are difficult to disentangle. As if averting their eyes from this complexity and declining the challenge it presents, the neo-Victorians continue to believe they can maintain societal control through their control of the dominant technology. They refuse to see technology as anything but a tool or extension of themselves and, despite their firsthand experience of technology as being fundamentally unmasterable, the neo-Victorians refuse to discover that in a posthuman world "there are *no masters anymore* – not even crazed technologies" (Latour 2002: 255). The neo-Victorians' failure to break what Latour maintains is a 'modern' habit of domination, invites readers to examine the model of the human to which this dream of mastery belongs.

3. Technology and Morality in *A Young Lady's Illustrated Primer*

The neo-Victorians may behave as if they are in control of both their technology and their morality, but the novel insists on this fundamental lack of masters and of mastery, by showing that even the most powerful characters (Neo-Victorian engineers, technologists, and even the best hackers) are ultimately not in control of either, as any form of 'human' agency is severely undermined by both the enmeshment of humans and things and the spatially distributed nature of existence. The novel repeatedly shows that even the Neo-Victorians, who cherish their belief in control, are not immune to the unexpected effects of their own technology and cannot keep their moral codes (any more than their computer codes) as immutable and impenetrable as they would like. Indeed, this seems to be the 'lesson' of the Primer, the central object of this novel.

The many plot threads of *The Diamond Age: Or, A Young Lady's Illustrated Primer*, as its complete title reads, revolve around a very special

object – an interactive or 'smart' Primer meant to instil neo-Victorian values in neo-Victorian children. Neo-Victorian Lord Finkle-McGraw commissions the development of the special Primer for his granddaughter in particular, but believes that the neo-Victorian clan more generally is in need of a way to make sure neo-Victorian values continue to be upheld as strongly as they were when the clan first established itself. The neo-Victorians, who modelled themselves on the 'original Victorians' in reaction against the unfortunate moral relativism of the twentieth century, need to develop ways to make sure that subsequent generations maintain the original strength of the Victorian Revival's convictions. Somewhat surprisingly, Lord Finkle-McGraw believes that the best way to achieve these aims is to design a Primer that inspires subversiveness, encouraging children to leave the neo-Victorian tribe only to return once they realise "it is, in the end, the best possible tribe" (Stephenson 1995: 365). To say that the Primer exceeds his intentions and expectations would be an understatement. As soon as the Primer is created, it falls into several non-neo-Victorian hands for which it was never intended, and even the neo-Victorian engineer John Hackworth, who is commissioned to develop the Primer, unintentionally becomes a double-agent (under the effects of Dr. X's nanosites), working for both Queen Victoria II and the Drummers, who labour to produce the Seed and undermine the neo-Victorians.

As soon as it is produced, the Primer shows itself to be a subversive technology and suggests that in fact all technologies may ultimately be subversive by nature. A remarkable invention, this 'smart' or 'pseudo-intelligent' interactive book (whose pages are composed of numerous miniscule computers networked together) allows children to interface with real and virtual worlds and becomes the centre of several plots and counter-plots against neo-Victorian rule. It was intended for Elizabeth (Lord Finkle McGraw's granddaughter) alone, but pirated copies find their way into the hands of a number of children, including Fiona (Hackworth's daughter), Nell (a disadvantaged young girl not part of any clan and living in an abusive home in the Leased Territories), and one million orphan Chinese girls in the Middle Kingdom rescued from infanticide by Dr. X. Beyond falling into the 'wrong' hands, the Primer does not have its intended effect. Although it seems to instil subversiveness, this subversiveness does not reinforce neo-Victorian values as Lord Finkle-McGraw intended it would.

The Primer is the most prominent example of this text's insistence on technology as (to borrow Latour's definition) a "mode of detour" (Latour 2002: 251). The neo-Victorians believe that "[i]t is upon moral qualities that a society is ultimately founded," maintaining that "[a]ll the prosperity and technological sophistication in the world is of no use without that foundation" (Stephenson 1995: 322). Indeed, they claim that they "learned this in the late twentieth-century, when it became unfashionable to teach such things" (Stephenson 1995: 322). However, what they seem to be learning in the current century is that even the strictest moral codes will not remain immutable. Although their morality is built into their technology, technology is in itself a highly unstable foundation, because it is given to fostering change. The complexity of their technology, which suggests that technology, its aims and effects are anything but transparent, highlights the need for a different understanding of morality as well – one that will move beyond the dependence on a fixed code of morals or system of values.

4. Voicing Victorian Nostalgia

If the neo-Victorians fundamentally misunderstand technology, it is ultimately because they rely upon an outmoded notion of the human and his/her assumed agency, which is signalled by this text's obsession with voice and its relation to human identity. It is perhaps not surprising that the few critics who have examined *The Diamond Age* are much more likely to focus on the many striking examples of nanotechnology in their analyses,[12] than noting this text's focus on voice or interrogating its explicit invocation of the nineteenth century through the neo-Victorians.[13] However, technological objects in Stephenson's futuristic world are not only exceptionally small, but they are also voice-responsive; voice is the primary mode of interaction between human beings and technological objects through the "Universal Voice Recognition Interface" (Stephenson 1995: 52). Through the Primer described in the previous section, this text associates voice with human presence/essence, underlining that for which the neo-Victorians are obviously nostalgic: a human that remains in control of his/her actions and his/her tools.

The interactive Primer "sees and hears everything in its vicinity" and speaks with a borrowed female voice – a human voice transmitted to the Primer in real time from an interactive theatre where a 'ractor' (an actor in interactive media) reads lines presented to her (Stephenson 1995: 106).[14]

Through this feature, voice in *The Diamond Age* is represented as a commodity that is both highly abstracted and mediated and functions (somewhat paradoxically) both as information and as human 'essence'. Significantly, the Primer does not use a computer-generated voice, but is animated by a "real" voice because, as its inventor explains, "we still can't come close to generating a human voice that sounds as good as what a real, live ractor can give us" (Stephenson 1995: 109).[15] The ractor, Miranda, is "presented with streams of text to be read, and she read[s] them" (Stephenson 1995: 135). As she reads the lines, "[t]he stage was programmed to take the feeds from nanophones [implanted] in her throat and disp them into a different envelope" (Stephenson 1995: 90). These feeds are then transmitted through media space and emitted by the Primer, wherever it may be. Although Miranda's voice is merely an instrument, which plays the words dictated by the Primer's programming, mere sound that is picked up by nanophones, altered, and emitted by the Primer at a distant location, it still supposedly conveys a human essence. Through her interactions with the Primer, Nell intuits a human presence and comes to suspect that "the Primer was just a conduit, a technological system that mediated between Nell and some human being who really loved her" (Stephenson 1995: 403). Miranda becomes similarly attached to the human presence she senses and develops a strong maternal attachment to Nell, which motivates her to try to locate her. This text's oddly traditional understanding of voice, and its relation to human presence,[16] is even more conspicuous if one considers that it was the 'original' Victorians who (thanks to the invention of the phonograph) first witnessed the severing of the 'natural' association between voice and human presence, as Ivan Kreilkamp, among others, has shown (see Kreilkamp 2005).

Through the neo-Victorians, this text stages an outright denial of the enmeshment of human beings and technology, calling attention to a misguided assumption that, no matter how enmeshed, one could tell the human from the machine. Stephenson repeatedly highlights this anti-technological bias that would clearly draw a dividing line between humans and their machines, between people and technological things. It is, in fact, one of the main lessons Nell learns from the Primer. As part of one of her many quests in the Primer narrative, Princess Nell (Nell's virtual reality identity) visits Castle Turing, in which Duke Turing imprisons her. In order to escape, she must determine whether Duke Turing is a human or a

machine – clearly, a version of the Turing test first described in 1950, which tested whether a computer could 'pass' as human.[17] Based on the Duke's responses to her questions and to her poetry, Nell correctly infers that he is a machine and learns that "a Turing machine, no matter how complex, was not human. It had no soul. It could not do what a human did" (Stephenson 1995: 442).

This confidence that one can always tell the human from the machine is especially surprising in the futuristic, posthuman world Stephenson creates. Given the kinds of technologies this text puts forth, one must be suspicious of its association of voice with human *essence* or *soul* and to see that underlying such an association is a nostalgia for the human as a natural entity (uncontaminated by technology) – a yearning that, like all forms of nostalgia, is a yearning for an impossibility. [18] In *The Diamond Age*, humans are hardly separable from their machines; they are who they are by virtue of the technologies they use. The thorough enmeshment of humans and machines becomes clearest when Miranda attempts to find Nell. The "soft" voice that Nell believes is "meant just for her" is not easily traceable to its human origin, because it exists as highly encrypted information travelling through media space as part of an economic contract (Stephenson 1995: 93). Indeed, Miranda is told that finding Nell is "astronomically improbable", and the only way to do so is by becoming a drone or zombie computer – that is, by submitting herself to the collective mind of the Drummers described earlier. Joining the Drummers involves a complete enmeshment of human and machine in the form of an infestation of each human with millions of nanosites, a loss of individual, human agency, and the sacrifice of the human to the running of a program. Miranda's initial reason for joining the Drummers (to locate Nell) is almost immediately forgotten as she is absorbed into the collective mind, which is focused on the running of a program – in this case, the development of Seed technology to subvert the current neo-Victorian dominance. The lengths to which Miranda must go to try to find Nell are indicative of the difficulty of separating the human from the machine and undermine the characters' assumptions that voice, no matter how heavily mediated, can still convey – or is somehow equivalent to – human essence.

Instead of rising to the challenges posed by new and highly invasive nanotechnologies, neo-Victorians have recourse to outmoded understandings of the human and its relation to both technology and

morality. The neo-Victorians have ample evidence of the fundamental opacity of technology, but continue to believe that they can treat it as a simple means to an end. Understanding technology as detour (we might even say pure subversion) means understanding, as Latour has shown, all that is folded into any technical action (Latour 2002: 248-250). The work of morality in a technologically advanced world will never be as simple as the development and upholding of a particular moral code or set of values. Instead, once one realises the myriad ways technology obscures all the heterogeneous times, places and actants inherent in its ability to afford or deny access to different kinds of goals, the work of morality becomes the careful examination of all that gets folded into technology and ensuring that the folds remain reversible (Latour 2002: 258).

5. Towards an Ethics of Things?

Stephenson's novel, much like the steampunk art with which this article began, trains us to read things differently and demonstrates the political potential of learning to read things. Learning to unpack all that is built into things involves asking where things came from, how they were made, what kinds of behaviours they elicit/require from us, where they might be leading us and to what purpose. In reading things, we learn to see our fundamentally posthuman condition, our profound embeddedness in what the science and technology studies tradition refers to as socio-technical networks of humans and nonhumans. However, as Stephenson's novel suggests, we also glimpse a slippage between our treatment of things and our treatment of people, such that the recognition of our fundamental lack of mastery, suggested by a more nuanced understanding of both technology and morality, might lead us beyond relationships of domination. If we accept that "we are the sorts of humans that we are" *because* of our use and making of things and that things "make up and mediate our contemporary way of being", we can no longer hope to order our tools or our ethics as precisely as we would like (Introna 2009: 29). We can, however, continue to attend to the business of making, recognising it for what it is – a mode of being with others, human and nonhuman.

If the Victorian era and its things are newly fashionable today, it behoves us to wonder why. Steampunks self-consciously attempt to ward off accusations of being merely nostalgic, by adopting and encouraging a critical stance towards the things they make.[19] Their sense of historical

relativity, which incites an interrogation of the possible parallels between the Victorian period, our own times, and possible future-perfects, is something worth cultivating, as is a critical investigation of what they (we?) might be nostalgic for, even as we slowly come to understand our fundamental lack of mastery in an increasingly complex posthuman world.[20] Learning to read all that is implicit in things (where their component materials came from, by what means they are made, by which persons and corporations, and with what environmental impact) is a skill that is key not only to green movements, but also more generally to ethical ways of being in the world. Steampunk encourages this kind of thinking and challenges us to re-think the human in ways that subvert the most sedimented patterns of thought, but only if it remains open to investigating alternative relationships to and with things.

Notes

1. It must be noted that although this article focuses on the steampunk aesthetic in literature and in plastic arts, the aesthetic is not limited to such manifestations. For an overview of the many manifestations of this aesthetic, please see Rebecca Onion's, 'Reclaiming the Machine' (2008).
2. See Igor Kopytoff's 'The Cultural Biography of Things'. In this essay, Kopytoff explains that one of the West's "predispositions to see the world in certain ways" is "that of conceptually separating people from things, and of seeing people as the natural preserve for individuation (that is singularisation) and things as the natural preserve for commoditization" (Kopytoff 1996: 84). Bruno Latour also discusses the separation of people and things in Western thought, arguing that this mode of thinking characterises the modern and has allowed the kind of environmental crises that we face today; see *We Have Never Been Modern* (English translation, 1993).
3. The concept of a posthuman subject refers not only to a human-technological hybrid or cyborg, but also to competing, historically-specific constructions of such an entity. In *How We Became Posthuman*, Hayles shows how developments in cybernetic theory, biology, and the embodied experiences of new information technologies in the course of the twentieth century contributed to a reimagining of the human as 'posthuman', that is, as an "amalgam" of "heterogeneous components, a material-informational entity" (Hayles 1999: 3). Although the posthuman subject is a material enmeshment of human and machine, Hayles shows that the conceptualization of

information as "an entity separate from the material forms in which it is thought to be embedded" and molecular biology's treatment of "information as the essential code of the body" together with our everyday interactions with information technologies foster misguided and ultimately dangerous fantasies of abandoning our bodies to join the 'pure' (and supposedly immortal) realm of information (Hayles 1999: 2, 1). Responding to such fantasies as they are depicted in literature, film, and predictions of the future, Hayles shows that our interactions with information technologies do fundamentally alter our bodies (material and imagined), our ways of being, and our ways of perceiving the world. Furthermore, she argues that the fantasies of a bodiless posthuman must be interrogated and corrected by "remembering" materiality (especially our own and that of our endangered natural world) and the fact that information (whether computer code or DNA code) is always materially-instantiated. While Hayles critiques the bodiless posthuman, then, she invites us to imagine a more ethical embodied posthuman.

4. In *How We Became Posthuman*, Hayles warns of the tendency to "graft" the values of liberal humanism, which include "a coherent, rational self, the right of that self to autonomy and freedom, and a sense of agency linked with a belief in enlightened self-interest", onto the posthuman, thereby missing out on the opportunity to re-invent the human without re-enacting the history of domination and oppression inherent in the liberal humanist subject (Hayles 1999: 85-86).
5. My intellectual relationship to Latour is manifest in my article's title echoing Latour's 'Morality and Technology', which radically redefines morality and technology in terms that seem effectively instantiated by steampunk (in at least some of its forms).
6. One of the first major steampunk art shows was held at the Hamptons Antique Galleries, Bridgehampton, NY, in August 2008 (see Casey 2008); the first Steamcon took place 23-24 October 2009 in Seattle; and most recently the University of Oxford featured a steampunk show at the Museum of the History of Science from 13 October 2009 until 21 February 2010.
7. Images of the 'Steampunk Stratocaster' and other objects on display at *Anachrotechnofetishist* are available at http://suite100gallery.com/show/2008/09/12/anachrotechnofetishism.
8. Note that Jean-Jacques Girardot and Fabrice Mereste suggest that steampunk can be defined by its aesthetic of recycling. Although they are concerned with defining literary steampunk exclusively, their definition, which focuses on the ways in which literary steampunk recycles literary texts, genres, and history itself can be adapted to apply to craft and lifestyle steampunk as well. For

more on their definition of steampunk, see 'Le Steampunk: une machine littéraire à recycler le passé' (2005).

9. For an image of Dowling's 'This Will Not Go On Forever', see http://suite100gallery.com/artwork/770.
10. In 'The Question Concerning Technology', Heidegger challenges the instrumental ("technology as a tool") and anthropological ("technology as a human activity") definitions of technology, re-establishing (through etymology) a link between technology and art as a mode of "bringing forth" (Heidegger 1977: 10). Heidegger explains that technology "stems from the Greek *Technikon* mean[ing], which belongs to *technē*" – a term which refers "not only [to] the activities and skills of the craftsman, but also [to] the arts of the mind and the fine arts" (Heidegger 1977: 12, 13).
11. In his article 'Ethics and the Speaking of Things', Introna elaborates a possible "ethics of things", or more precisely an "ethics of [human/nonhuman] hybrids" (Introna 2009: 28). I prefer the phrase "ethics of things", because I hope to emphasise the centrality of things in steampunk aesthetics/ethics.
12. For example, Katherine Hayles's 'Is Utopia obsolete?' focuses on nanosites to show that the instability of boundaries and the interconnectivity foregrounded by such technologies are the basis of a "'mutopia' which both inscribes and implodes utopian space" (Hayles 2002: 133). John Johnston's 'Distributed Information' also focuses on nanosites and their implication in the Drummers as a "hive organism" to illustrate the importance of complexity theory to Stephenson's work. Also see Miksanek 2001: 55-70 and Milburn 2002: 261-295.
13. While most critics have yet to pay attention to the importance of voice in *The Diamond Age*, some critics have at least noted the significance of the novel's invocation of the Victorian past. For example, Peter Brigg attempts to highlight ways in which this text "project[s] the past into the future in order to consider the present" (Brigg 1999: 124). However, Brigg does not consider that the *particular* past and future Stephenson presents might be connected in terms of technological change and its effects. Note also that, although *The Diamond Age* is not the primary focus of Steven Jones's article 'The Book of *Myst* in the Late Age of Print', he does note important ways in which the novel refers to the Victorian period it draws upon. He mentions, for example, the resemblance between a central diamonoid structure built by the neo-Victorians (Source Victoria) and the Crystal Palace of 1851 and between the Dickensian plot and Stephenson's parody of Dickens's Nell. Perhaps, most significantly, he notes this text's interest in the codex book as an example of a

more "general (re)turn to the dominant images of high industrialism in the search for links to our own possible futures" (Jones 1997: 21).

14. The fact that the Primer has a female voice is particularly appropriate given the importance of the female voice in the discourse network of the historical period that Stephenson draws upon (see Kittler 1990).
15. The importance of real voice in this text is underlined by the difference between Nell's original Primer with its real voice and the derivative copies of the Primer, which use computer-generated voices. Whereas the Primer helps Nell develop into a self-reliant individual, the group of Chinese orphan girls, who receive derivative copies that use computer-generated voices, become part of a subservient army that serves Nell.
16. I am referring here to the long tradition of phonocentrism/logocentrism (famously deconstructed by Derrida in *Of Grammatology*), in which voice is privileged because of its association with the present/living/speaking father/origin.
17. In the Turing test, a human test subject would have to determine whether another subject was a human or a computer based on responses to written questions; a computer had to be "indistinguishable in its responses from a human being" in order to pass the test (Wood 2002: xiii).
18. Nostalgia is generally defined as a longing for an idealised past or an idealised home, but a number of critics suggest alternative meanings. Ann Colley maintains that in the mid-nineteenth century, nostalgia came to be associated with personal acts of memory, which helped mitigate experiences of loss and alienation that resulted from a changed or changing homeland. For others, nostalgia is a kind of selective remembering (or, as Nicholas Dames suggests, a kind of forgetting), which is instrumental in the creation of narratives of identity or, as Helen Groth argues, of (pre-industrial) "nature". Nostalgia comes to be associated with both a pre-industrial existence and with resistance to modernity and its technologies; thus, it is also associated with conservative politics. In her article, 'Mere Nostalgia', Kimberly K. Smith argues that nostalgia was "invented" in the nineteenth century as a progressive paratheory to "delegitimate conservative politics as emotional and irrational" (Smith 2000: 521), that is, to dismiss as nostalgia any resistance to modernisation. She claims that "it is not coincidental that the emotion is most commonly associated with the loss of a rural past" and the distrust or dismissal of nostalgia as irrational is "integral to the emotional regime supporting capitalism" (Smith 2000: 522). In naturalising nostalgia as "an inescapable element of the human condition", a "natural" emotion, but one that is based on "irrational sentimentality" and thus not to be taken seriously, nostalgia

could be used to label and thus dismiss even legitimate concerns about "the possibility and desirability of more organic communities" (Smith 2000: 519, 518, 516).

19. The first issue of *SteamPunk Magazine* contains at least two pieces that attempt to differentiate between a politically subversive steampunk practice and a mere "dressed-up, recreationary nostalgia" or "Neo-Victorianism" (Catastrophone Orchestra and Arts Collective 2006: 4, 5), or between 'Nostalgic Steampunk' that works to create "the Victorian Era as a Romantic myth infused with utopian desires", while "ignoring the more uncomfortable genuine history of the era", and 'Melancholic Steampunk' that engages with the Victorian era and all "the corruption, the decadence, the imperialism, the poverty and the intrigue" that it entails, "not as an indictment of the Victorian era but as an indictment of our own" (Gross: 2006: 62-63).
20. Beyond helping us to imagine more ethical futures, steampunk's play with history can also help scholars rethink their own study and construction of the Victorian period, offering important reminders of critical blind-spots (see Sussman 1994 and 2000).

Bibliography

Anachrotechnofetishism, ([2008]) accessed 26 Feb. 2010, http://suite100gallery.com/show/2008/09/12/anachrotechnofetishism.

Blakesley, Rosalind P. *The Arts and Crafts Movement*. London: Phaidon Press, 2006.

Brigg, Peter. 'The Future as the Past Viewed from the Present: Neal Stephenson's *The Diamond Age*', *Extrapolation: A Journal of Science Fiction and Fantasy*, 40:2 (1999), 116-124.

Brownlee, John. 'Meet Mr. Steampunk: Jake von Slatt', *Wired* (29 June 2007), accessed 24 September 2008, http://www.wired.com/culture/design/news/2007/06/vonslatt.

Calamity, Professor. 'My Machine, My Comrade', *SteamPunk Magazine*, 3 (Fall 2007), 24-25.

Casey, Eileen. 'Steampunk Art and Design Exhibits in The Hamptons', *Hamptons.com* (1 Aug. 2008), accessed 21 Oct. 2010, http://www.hamptons.com/detail.php?articleID=4486.

Catastrophone Orchestra and Arts Collective. 'What, Then, Is Steampunk? Colonizing the Past So We Can Dream the Future', *SteamPunk Magazine*, 1 (Fall 2006), 4-5.

Colley, Ann C. *Nostlgia and Recollection in Victorian Culture*. London: MacMillan Press, 1998.
Dames, Nicholas. *Amnesiac Selves: Nostalgia, Forgetting, and British Fiction, 1810-1870*. Oxford: Oxford University Press, 2001.
Derrida, Jacques. *Of Grammatology*, Gayatri Chakravorty Spivak (trans.). Baltimore: The Johns Hopkins University Press, 1997.
Dowling, David S. 'This Will Not Go On Forever', *Halogen*, ([2008]), accessed 26 February 2010, http://suite100gallery.com/artwork/770.
Friedrich, Molly 'Porkshanks'. 'Artist's Statement on "Mechanical Womb with Clockwork Fetus", *Anachrotechnofetishism*, ([2008]), accessed 26 February 2010, http://suite100gallery.com/show/2008/09/12/anachrotechnofetishism.
Girardot, Jean-Jacques; and Fabrice Mereste. 'Le Steampunk: une machine littéraire à recycler le Passé', *Cynos*, 22:1, 55-64.
Gross, Cory. 'Varieties of Steampunk Experience', *SteamPunk Magazine*, 1 (Fall 2006), 60-63.
Groth, Helen. 'Literary Nostalgia and Early Photographic Discourse', *Nineteenth-Century Contexts*, 25:3 (2003), 199-217.
——. *Victorian Photography and Literary Nostalgia*. New York: Oxford University Press, 2003.
Hayles, Katherine N. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago: University of Chicago Press, 1999.
——. 'Is Utopia Obsolete?', *Peace Review*, 14:2 (2002), 133-139.
Heidegger, Martin. 'The Question Concerning Technology', in *The Question Concerning Technology and Other Essays*, William Lovitt (trans.). New York: Harper Colophon Books, 1977, 3-35.
Huxley, T.H. 'On the Relations of Man to the Lower Animals', in *Evidence as to Man's Place in Nature*. New York: D. Appleton and Company, 1873, 71-132.
Introna, Lucas D. 'Ethics and Speaking of Things', *Theory, Culture & Society*, 26:4 (July 2009), 25-46.
Johnston, John. 'Distributed Information: Complexity Theory in the Novels of Neal Stephenson and Linda Nagata', *Science Fiction Studies*, 28:2 (2001), 223-245.
Jones, Steven. 'The Book of *Myst* in the Late Age of Print', *Postmodern Culture*, 7:2 (Jan. 1997), n.p.
Killjoy, Margaret P. 'Introduction: A Journal of Misapplied Technology', *SteamPunk Magazine*, 2 (Summer 2007), 2.

Kittler, Friedrich A. *Discourse Networks 1800/1900*, Michael Metteer (trans.). Stanford: Stanford University Press, 1990.

Kopytoff, Igor. 'The Cultural Biography of Things: Commoditization as Process', in Arjun Appadurai (ed.), *The Social Life of Things: Commodities in Cultural Perspective*. Cambridge: Cambridge University Press, 1986, 64-91.

Kreilkamp, Ivan. 'A Voice Without a Body: The Phonographic Logic of *Heart of Darkness*', in *Voice and the Victorian Storyteller*. Cambridge: Cambridge University Press, 2005, 179-205.

Latour, Bruno. 'Morality and Technology: The End of the Means', Couze Venn (trans.), *Theory, Culture & Society*, 19:5-6 (Dec. 2002), 247-260.

——. *We Have Never Been Modern*, Catherine Porter (trans.). Cambridge, MA: Harvard University Press, 1993.

Miksanek, Tony. 'Microscopic Doctors and Molecular Black Bags: Science Fiction's Prescription for Nanotechnology and Medicine', *Literature and Medicine*, 20:1 (2001), 55-70.

Milburn, Colin. 'Nanotechnology in the Age of Posthuman Engineering: Science Fiction as Science', *Configurations*, 10:2 (2002), 261-295.

Onion, Rebecca. 'Reclaiming the Machine: An Introductory Look at Steampunk in Everyday Practice', *Neo-Victorian Studies*, 1 (Fall 2008), 138-163.

Smith, Kimberly K. 'Mere Nostalgia: Notes on a Progressive Paratheory', *Rhetoric & Public Affairs*, 3:4 (2000), 505-527.

Stephenson, Neal. *The Diamond Age: Or, A Young Lady's Illustrated Primer*. New York: Bantam Dell, 1995.

Sussman, Herbert L. 'Cyberpunk Meets Charles Babbage: The Difference Engine as Alternative Victorian History', *Victorian Studies*, 38 (1994), 1-23.

——. 'Machine Dreams: The Culture of Technology', *Victorian Literature and Culture*, (2000), 197-204.

von Slatt, Jake. 'Artist – Jake von Slatt – Halogen', *Halogen*, ([2008]), accessed 26 Feb. 2010, http://suite100gallery.com/artist/jakevonslatt.

Wood, Gaby. *Living Dolls: A Magical History of the Quest for Mechanical Life*. London: Faber and Faber, 2002.