

# RFID: Human Agency and Meaning in Information-Intensive Environments

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## **Abstract**

RFID tags, small microchips no bigger than grains of rice, are currently being embedded in product labels, clothing, credit cards, and the environment, among other sites. Activated by the appropriate receiver, they transmit information ranging from product information such as manufacturing date, delivery route, and location where the item was purchased to (in the case of credit cards) the name, address, and credit history of the person holding the card. Active RFIDs have the capacity to transmit data without having to be activated by a receiver; they can be linked with embedded sensors to allow continuous monitoring of environmental conditions, applications that interest both environmental groups and the US military. The amount of information accessible through and generated by RFIDs is so huge that it may well overwhelm all existing data sources and become, from the viewpoint of human time limitations, essentially infinite. What to make of these technologies will be interrogated through two contemporary fictions, David Mitchell's *Cloud Atlas* and Philip K. Dick's *Ubik*. *Cloud Atlas* focuses on epistemological questions – who knows what about whom, in a futuristic society where all citizens wear embedded RFID tags and are subject to constant surveillance. Resistance takes the form not so much of evasion (tactical moves in a complex political Situation) but rather as a struggle to transmit information to present and future stakeholders in a world on the brink of catastrophe. *Ubik*, by contrast, focuses on deeper ontological questions about the nature of reality itself. Both texts point to the necessity to reconceptualize information as ethical action embedded in contexts and not merely as a quantitative measure of probabilities.

## **Key words**

control ■ Deleuze ■ surveillance

**F**ROM THE beginning, RFID technology has been entangled with politics. It pinged western consciousness (not for the first time; Pruett, 2006) when Leon Theremin's listening device was discovered hidden inside a wooden replica of the Great Seal of the United States that had been presented to the US Embassy in Moscow by a group of Russian schoolchildren and installed in the Embassy's conference room (Glinsky, 2000; the original is on display in the National Security Agency Museum). Mystified by the device, Embassy personnel discovered that it backscattered a radio frequency wave after modulating it so it contained new information – in this case, Embassy conversations. Surveillance remains one of the principal concerns raised by RFID technology, now so small and cheap that it can be embedded in a wide variety of products and objects. More subtle, but no less important, are the effects of RFID in creating an animate environment with agential and communicative powers. While surveillance issues are primarily epistemological (who knows what about whom), the political stakes of an animate environment involve the changed perceptions of human subjectivity in relation to a world of objects that are no longer passive and inert. In this sense RFID is not confined only to epistemological concerns but extends to ontological issues as well.

Combined with embedded sensors, mobile technologies and relational databases, RFID destabilizes traditional ideas about the relation of humans to the built world, precipitating a crisis of interpretation that represents both a threat to human autonomy and an opportunity for re-thinking the highly politicized terrain of meaning-making in information-intensive environments. RFID and associated technologies fundamentally change the rules of the game. There are many who are already at work co-opting RFID technology for military and capitalistic purposes. If our responses remain solely on the level of resisting the spread of the technology – important as that may be in certain respects – we lose the opportunity to seize the initiative and explore the technology's potential for shedding the burden of long-held misconceptions about cognition and moving to a more processual, relational and accurate view of embodied human action in complex environments. The challenge RFID presents is how to use it to re-think human subjectivity in constructive and life-enhancing ways without capitulating to its coercive and exploitative aspects.

The context in which this challenge presents itself is one of the major developments of intelligent technologies in the 21st century: the movement of computation out of the box and into the environment. Whereas mid-20th century research in artificial intelligence focused on trying to create, in a single entity, all the complex capacities of human thought (a project doomed to failure, for reasons that Hubert Dreyfus (1992), among others, has demonstrated), contemporary research in distributed cognition concentrates on creating complex interrelated systems in which small sub-cognizers that perform within a very limited range of operation are combined with readers that interpret that information, which in turn communicate with relational databases that have the power to make correlations on much wider (and

extensible) scales. No one component of these systems comes anywhere close to the complexity of human thought but, combined together, the components constitute a flexible, robust, and pervasive ‘internet of things’ (Gershenfeld, 1999; Gershenfeld et al., 2004) that senses the environment, creates a context for that information, communicates internally among components, draws inferences from the data, and comes to conclusions that, in scope if not complexity, far exceed what an unaided human could achieve (for a discussion of KDD, ‘Knowledge Discovery in Databases’, see Fayyad et al., 1996).

In this model of distributed cognition, the emphasis shifts from the traditional triad of human/animal/machine to human/animal/thing. While the components of RFID could be considered machines, their small size, ubiquitous presence in the environment, and very limited range of sub-cognition makes them more thing-like than machine-like, a construction in line with moving from the traditional AI model of a single thinking entity to myriad small sub-cognizers. The focus on many tiny interactors (smart dust rather than the Terminator) foregrounds communication between components of a system, relational dynamics between different systemic levels, embodied interactions, and contextual awareness. The traditional Heideggerian progression of humans as world-building, animals poor in world, and stones without world (Heidegger, 1995) is brought into question; as a result, the relations between human, animal and thing come up for grabs, functioning as a chaotic nexus in which technological innovations, anxieties about surveillance and privacy, capitalistic and military exploitations, and creative storytelling swirl together in a highly unstable and rapidly changing dynamic.

My interest here is in exploring the implications of this dynamic by triangulating between technological practices, information-theoretic conceptualizations, and fictional representations of RFID technologies. As I and others have argued, science fiction can be a potent resource for interrogating new technologies, especially when the rapid pace of change outstrips the capacity of social theory to grapple with emerging complexities (Burrows, 1997a, 1997b; Featherstone and Burrows, 1995; Hayles, 2005). RFID operates not only in the realm of such technological-managerial practices as the identification and tagging of products but also in what Nigel Thrift has called the technological unconscious, working in subtle ways to change the relation of humans to their environments. It is constituted through ‘the bending of bodies-with-environments for a specific set of addresses without the benefit of any cognitive inputs’ (Thrift, 2004: 177). While epistemological concerns about surveillance and privacy can (and should be) addressed through such tactics as regulation, disclosure, and informed consent (Cuff, 2003; Kang and Cuff, 2005), ontological issues concerning how human subjectivity is being reconfigured by context-aware technologies are more difficult to assess and address. Epistemological issues lend themselves to strategy and tactics (from sophisticated counter-surveillance techniques to brute force methods like smashing RFID tags

with a hammer or frying them in a microwave), but how do we understand the ontological effects of animate environments?

For these concerns, fictional explorations of near-future worlds not only let us imagine what such societies might look like but also engage us on other levels as well, including embodied affectivity and the unconscious. Precisely because narratives (unlike databases) always mean more than they explicitly state (Hayles, 2007), they can address ontological questions as well as epistemological issues. Moreover, as linguistic artifacts, narratives have a vested interest in the operations of language, including interfaces between computer-mediated symbolic code and the so-called ‘natural’ languages native to humans (Hayles, 2005). Like computational technologies, narratives operate through decoding and encoding procedures, and these similarities provide potent analogies to layered RFID communication protocols (the importance of protocols for these systems is emphasized by Alexander Galloway, 2004).

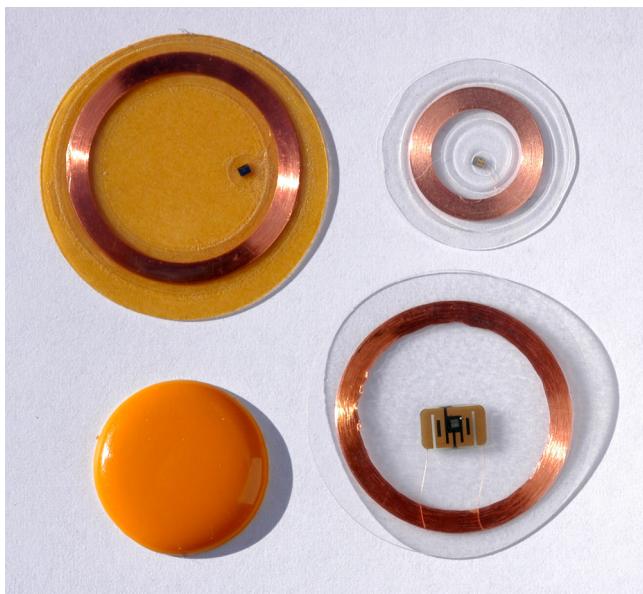
As my tutor texts, I will focus on David Mitchell’s contemporary experimental novel *Cloud Atlas* (2004) and Philip K. Dick’s visionary and hallucinogenic novel *Ubik* (1991[1966]). Foregrounded in these works are questions about human agency and autonomy when things (seem to) come alive and clamor for attention. While *Cloud Atlas* emphasizes a politics of epistemology, *Ubik* presents complexities irresolvable in a traditional world-view and hence forces a confrontation with ontological questions. Both *Cloud Atlas* and *Ubik* are deeply concerned with the relation between capitalism and the politicization of animate environments, but whereas *Cloud Atlas* uses logical extrapolation from present conditions, *Ubik* makes inferential leaps that work through metaphor and image, as if designed to engage directly with the technological unconscious.

In a perhaps surprising conjunction, both works evoke the divine, connected by subterranean flows to animistic environments that, functioning like RFID in some respects, nevertheless resist reductive explanations that would account for them solely through technological mechanisms. The trope of the divine, I will argue, brings to the fore the ontological dimensions of RFID; in these texts it is employed to urge the necessity for accountability and progressive action in the face of changing relationships of humans to their world. In the conclusion, I will return to the challenges that RFID poses to conventional ideas about information, proposing a model of information processing more adequate for the distributed cognition of RFID and better suited to understand human interactions with animate environments. To prepare for these arguments, let us briefly review how RFID technology works.

### **RFID: Tags, Sensors, Databases and Distributed Cognition**

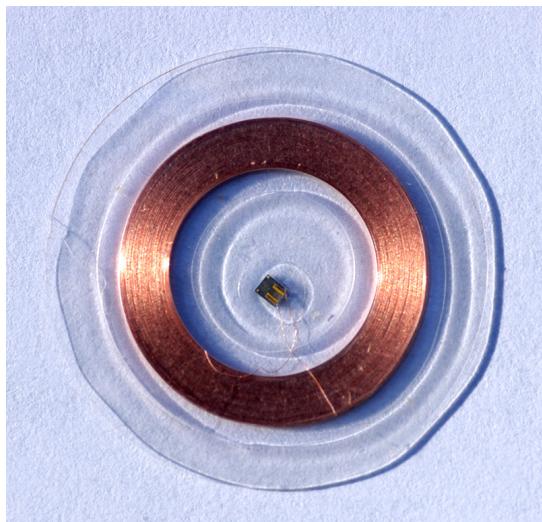
RFID tags come in two moods, active and passive (for an introduction, see Bhuptani and Moradpour, 2005; Glover and Bhatt, 2006). They are comprised of a computer chip with an integrated circuit, onto which information is encoded, and an antenna for receiving and transmitting radio

frequency waves. Passive chips backscatter a signal sent from a reader, after modulating it with a 10-digit identification number (Electronic Product Code, or EPC) that uniquely identifies the object to which it is attached (the 96-bit EPC can generate  $2^{96}$  different numbers, enough to code 80.000 trillion objects, more than sufficient to identify every man-made object on the planet). Active chips have a power source and can send as well as receive radio waves. Passive chips are as cheap as 1–3 cents and can be as small as a grain of rice (now much smaller tags, measuring considerably less than the diameter of a human hair, are being developed by Hitachi). Active chips are larger and correspondingly more expensive, from \$3 to \$10. The passive tags have a reading range of a few inches, while the active tags can transmit signals for up to a mile. Currently, the primary use for the tags is to trace objects as they move in time and space through integrated systems that include readers, middleware, and backend databases, making them a flexible technology platform (Lenoir and Giannella, 2007). Many commentators believe these integrated systems will revolutionize the ways that products are manufactured, delivered, stored, and inventoried. Already two behemoths of supply and demand, Wal-Mart and the US Department of Defense, are requiring their vendors to attach RFID tags to their merchandise (Gilbert, 2004; Polsonetti, 2004), a practice that virtually ensures the rapid proliferation of RFID technology throughout the US and other developed countries.



*Figure 1* Variety of passive tags

Source: Courtesy of Stephanie Strickland and Cynthia Lawson Jaramillo.



*Figure 2* The circular antenna and chip inside the circle are clearly visible in this translucent passive tag

Source: Courtesy of Stephanie Strickland and Cynthia Lawson Jaramillo.



*Figure 3* Examples of active tags containing their own power source

Source: Courtesy of Stephanie Strickland and Cynthia Lawson Jaramillo.

The insider term for RFID tags is ‘aphids’, an apt neologism suggesting they can be pervasively scattered throughout the environment. Coupled with sensors, aphids can record and transmit all kinds of information, from temperature to seismic activity to the presence of warm bodies. Since they are both actual physical devices and virtual presences accessed through databases, Bruce Sterling sees them as the leading edge of a SPIME world (Sterling, 2005). SPIMES are virtual/actual entities whose trajectories can be tracked through space and time; as Sterling conceived the term, however, it implies more than the devices by themselves. SPIME connotes the transition from thinking of the object as the primary reality to perceiving it as data in computational environments, through which it is designed, accessed, managed, and recycled into other objects. The object is simply the hard copy output for these integrated processes. The SPIME is ‘a set of relationships first and always, and an object now and then’ (p. 77); it is ‘not about the material object, but where it came from, where it is, how long it stays there, when it goes away, and what comes next’ (p. 109). In this vision RFID participates in a larger transition to a world where human action is coordinated with complex virtual/actual environments characterized by flows and relations between many different agents, including non-human ones, tied together through distributed cognitive networks (Anne Galloway, 2004).

Both time and space are transformed as they circulate through and between the actual and virtual domains (Anne Galloway, 2004). Space is configured by distinctions between observable domains on the one hand, and on the other blind spots that do not report data back for recording and



*Figure 4* RFID devices such as these were coupled with motion sensors and used by the US military to detect human foot traffic in the Vietnam War  
Source: Courtesy of Stephanie Strickland and Cynthia Lawson Jaramillo.

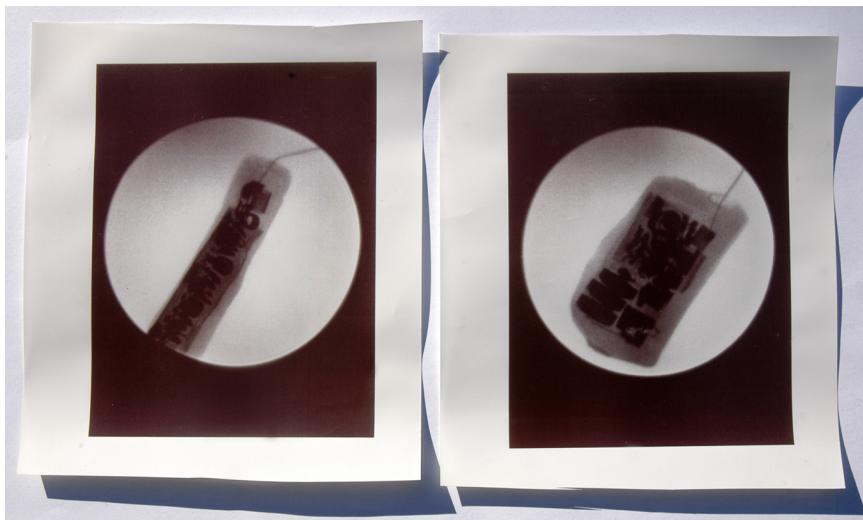


Figure 5 X-ray images of the tags shown in Figure 4, revealing their antennae and internal structures

Source: Courtesy of Stephanie Strickland and Cynthia Lawson Jaramillo.

accessing (Crang and Graham, 2007; Graham, 2005); time changes from uniform clock measurement to digital recording of the always temporary instantiations of material objects (Sterling, 2005). Transformed also is the lynchpin of capitalism, private property. Whereas private property is traditionally understood as the legal possession of tangible (and intangible) assets, in an RFID world property is defined by two interpenetrating but distinct systems: one based on possession of the material object, and the other on data about the object. A consumer may buy an object – say, a bottle of wine – without owning the database entries that record the sale, link the consumer's credit records with that particular bottle through its unique RFID number, track its recycling into another glass bottle, and continue to follow its new instantiation through space and time (see Andrejevic (2003: 137) for a discussion of the consumer's 'second self' in databases). Like virtual objects sold for real money in Second Life, virtualized data about the object have market values that amount to considerable percentages of the value of the material commodities to which the data correspond (judging by the typical discounts offered by loyalty cards, somewhere between 20 and 30 percent). As Sterling observes, 'My consumption patterns are worth so much that they underwrite my acts of consumption' (2005: 79).

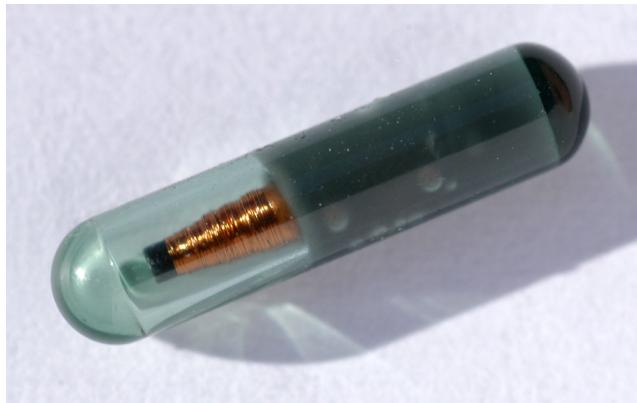
RFID and related technologies thus enable significant cost savings for corporations and offer flexibility in designing for an open-ended future in which data management facilitates sustainability practices; they also raise serious concerns about surveillance and privacy (Albrecht and McIntyre, 2005; Bajc, 2007). Tags can be embedded in objects and read without

needing a clear line of sight, including cars, clothes, purses, wallets, and shoes, all of which can be used to track people as they move through RFID-embedded terrain. RFID tags are now mandatory for passports in the US and the 27 countries with which the US has visa waiver agreements (Evers, 2006); in addition to encoding the passport number and the holder's name and address, the tags will soon include biometric data such as fingerprints and retinal scans. With RFID spreading to driver licenses and credit cards, unauthorized reading leading to identity theft is also a concern (Lyman, 2006).

Among the effects of RFID are changing advertising and consumption practices (Andrejevic, 2003). Coupled with mobile devices such as RFID-enabled cell phones, tags can deliver location-specific information to a passerby who may, for example, receive on a cell phone the menu of the restaurant she is strolling past (Fitzpatrick, 2007). Moreover, RFID tags, coupled with backend databases, can lead to sophisticated 'behavior inferences' that predict how people will act in a variety of situations (Albrecht and McIntyre, 2005). RFID participates in a paradigm shift in which the focus shifts from present and past actions to the *anticipation* of future actions – yet another way in which RFID leads to different constructions of time. Military proponents see RFID as part of a comprehensive strategy of surveillance in which massive amounts of data allow 'behavior inferences' about insurgents or terrorists who mix invisibly with urban populations (McCue, 2005; Pruett, 2006).

RFID has biopolitical implications as well. RFID implants are now standard for companion and meat animals; it is estimated that 15 million animals in the US alone have them (as reported by EZID Animal Verification Systems). RFID tags are used in a variety of biological applications, from tagging the semen of a prize bull so that it can be authenticated to human-edible tags used to diagnose gastric disorders (Fox, 2007). Scott Silverman of VeriChip Corporation has also proposed that RFID implants be required for immigrants; he confirmed that VeriChip is pitching implants to the military as well (Jones, 2006; Komp, 2005; McIntyre and Albrecht, 2007). RFID bracelets and anklets are already being used to track the movements of prisoners, either under house arrest or in minimum security facilities (Swedberg, 2005a). In the Yokohama district of Tokyo, RFID bracelets are mandatory for schoolchildren, allowing them to be tracked as they go to and from school and move within the school perimeter (Swedberg, 2005b).

Given these possibilities, it is not surprising that anti-RFID activism is spreading in Europe and gaining momentum in the US, as well as in other developed countries (Albrecht and McIntyre, 2005). The technology's scary potential is perhaps most evident in the 'Combat Zones that See' program launched by the US military that envisions using video cameras, RFID and related technologies to monitor civilian populations (see DARPA (2003) for the call for proposals; Crang and Graham (2007), Shactman (2003) and Crandall (1999) for analyses and critique). Although the military proclaims that the technology is intended for use abroad, notably Iraq, its usefulness



*Figure 6* RFID tag in glass capsule intended for implantation in a domestic animal (or, as Silverman suggests, a human)

Source: Courtesy of Stephanie Strickland and Cynthia Lawson Jaramillo.

for tracking and surveillance makes it likely that similar applications will also be deployed against domestic populations, as was clearly the case in Scotland Yard's monitoring of major highways in the recent search for terrorist suspects (Dana Cuff (2003: 47) reports that by 2001 the average British citizen was photographed 300 times a day). Any car with an EZPASS tag that enables it to pass through freeway gates without stopping is already RFID responsive, making it vulnerable to surveillance for other purposes as well.

Important as these concerns are, and as necessary as it is to craft well-designed legislation to curb potential abuses (Kang and Cuff, 2000), we should not over-state the danger. Passive tags can be read only within distances of a few inches, limiting their usefulness for surveillance purposes. Moreover, for every technology counter-technologies are likely to emerge; already such products as wallets lined with aluminum foil to defeat unauthorized reading of RFID-encoded cards are on the market. Other proposals are being advanced to protect consumer privacy, for example by having the chip embedded in a tear-off label that can be detached at the point of purchase. The technology can also be used to 'bite back', for example by having information compiled by activist groups sent to RFID-enabled cell phones, so that as the consumer strolls down the aisle she can see warnings about unsafe, environmentally unfriendly, or otherwise undesirable products whose RFID labels are detected as she passes them (Kang and Cuff, 2005). Many art projects in Europe and the US perform resistance by redeploying the technology or changing its signification through interventions and subversive practices (see Crang and Graham (2007) for a discussion of some of these projects).

My focus here will be on literary narratives and what they suggest about the possibilities for ethical action in environments made animate

through embedded sensors, communicators, and actuators. As indicated earlier, the issues are both epistemological and ontological, affecting not only what we know and how we know it but also what we conceive ourselves to be. As Sterling comments in an optimistic reading of an RFID world, humans are viewed ‘as processes: a process of self-actualization based not on what you are but what you are becoming’ (2005: 52). David Mitchell’s *Cloud Atlas*, especially the powerful section entitled ‘An Orison of Sonmi-451’, presents a darker view. In this future world, the dystopian possibilities of an RFID world are fully realized, whereas the utopian potential is a fragile seed desperately trying to grow. Let us turn now to explore this representation of a future world.

### **Sonmi’s Orison: The Politics of Epistemology**

Extrapolated from present trends, Sonmi-451’s world represents the convergence of corporate capitalism, government, and theocracy, a fusion denoted by the neologism ‘corporacy’ (with a transparent pun on hypocrisy). In Nea So Copros (which we gradually realize is the future instantiation of Korea), ‘Enrichment Statutes’ dictate that consumers must ‘spend a fixed quota of dollars each month, depending on their strata. . . . Hoarding is an anti-corpocratic crime’ (p. 227). The official government creed, significantly called Catechisms, includes the pronouncement that ‘A Soul’s value is the dollars therein’ (p. 325), where the traditional meaning of ‘soul’ as an indwelling spirit is overlaid by the denotation it has in Nea So Copros, an implanted RFID chip that identifies a citizen with a unique ID number. A person’s Soul bestows on him certain rights such as the ability to operate automated machinery like elevators (a development anticipated by Roger Burrows and Nick Ellison (2004: 334) when they write about using ‘a recast definition of social citizenship [that] points[s] to potential new categories of social inclusion and exclusion’). A citizen’s Soul also registers whatever his bank balance is at the moment, enables him to purchase goods, and, of course, makes him vulnerable to pervasive surveillance by Eyes, the RFID readers ubiquitously employed at checkpoints.

The central insight informing the narrative is its portrayal of the contradictions that riddle the corpocracy. Many of the previous era’s developed countries have become ‘deadlands’, wastelands rendered uninhabitable by environmental toxins, predatory capitalism, and resource depletion. We can infer that the US is one of these from a reference to the ‘Merican Boat-People Solution’ (p. 220); so is Britain and most of Europe. So far Nea So Copros has survived, but only because it started further behind on the (over)development curve. Perhaps the most devastating of its internal contradictions is the distinction the official ideology draws between ‘pure-bloods’, womb-born citizens, and ‘fabricants’, clones tailored for specific tasks in the economy and destined for execution as soon as their usefulness for work has been exhausted. They are fed chemicals designed to keep them largely without memory (‘amnesiads’), devoid of curiosity, and with a strictly limited consciousness so repressed it is not capable of generating an interior

monologue. Male fabricants are used up working as ‘militiamen’ and ‘disastermen’, genetically engineered to be relatively toxin- and fire-resistant. Female fabricants are destined for work as domestics and laborers in the service industry; such is Sonmi-451, a server at ‘Papa Song’s’ (which we gradually realize is the future instantiation of McDonald’s). In a pointed satire underscoring how the corpocracy works, the semi-deity delivering each day’s sermon to the fabricants is a hologram of their ‘Logoman’ (Ronald McDonald), who preaches that loafing is ‘time theft’ and that a disobedient fabricant ‘denies Papa Song’s love for us and cheats His Investment’ (p. 191).

The naming system for fabricants is significant. The given name (Sonmi) refers to a genotype of supposedly identical units, whereas the number (451) indicates where the fabricant comes in the manufacturing order. The play between the name (traditionally connoting an individual) and number (indicating a mass-produced object) points to how the human/thing dynamic is destabilized in an RFID world. When each object has a unique identity, objects begin to seem more like individuals, and individual people become susceptible to being constituted as objects. Officially, all the clones of a given genotype are identical, but as Sonmi later asserts (and makes good in her actions), ‘even same-stem fabricants cultured in the same wombtank are as singular as snowflakes’ (p. 187). The official ideology holds that fabricants lack Souls, an assertion rendered tautological by denying them Soul implants and controlling them instead with electronic collars and identity chips implanted in the neck designed to explode on contact with air, thus ensuring that any fabricant who attempts to alter her identity will not survive.

In a performance that may or may not be scripted by unseen powers, Sonmi gradually begins to ‘ascend’, rising to full consciousness and experiencing for the first time an interior monologue. As she reports in her Testimony to the Archivist, ‘A voice spoke in my head. It alarmed me greatly, until I learned that no one else could hear this voice, known to purebloods as ‘sentience’ . . . my language evolved . . . my curiosity about all things grew acute . . . my sense of futility grew . . . but most of all, I was afraid’ (p. 198). After her ascension and escape from the disciplinary spaces that controlled her, Sonmi becomes part of an elaborate plot masterminded by the Union, the resistance movement trying to foment a revolution against the governing party, Unanimity. When she is captured, Unanimity displays Sonmi in a show trial as an aberration of nature and denounces her *Declarations* (counter-Catechisms laying the ground for ethical actions capable of resisting the evils of corpocracy) as ‘the ugliest wickedness in the annals of deviancy’ (p. 347). To make good this claim, however, they must reveal the *Declarations*’ content, thus inadvertently publicizing the very reasoning that is the most potent weapon poised against them. Sonmi’s Testimony (the question-and-answer dialogue constituting the narrative we read) is given to an Archivist and electronically recorded for future generations; as such, it embodies a similar contradiction. Torn between wanting Sonmi consigned

to oblivion (her execution awaits her when she finishes her Testimony) and needing to publicize her as an object lesson, Unanimity bows to pressure from genomicists to allow her Testimony to be recorded. The Archivist himself embodies another kind of contradiction. Shocked to the core by some of Sonmi's revelations, he nevertheless insists upon an accurate record, for 'a duplicitous archivist wouldn't be much use to future historians' (p. 189).

Sonmi's ascension was catalyzed in part by her exposure to Yoona 939, who opened a crack in the seamless world of mindless time and disciplinary space that was Sonmi's lot in the corporacy, destined for a life of slavery 12 storeys down in an underground Papa Song's. The insidious tool Yoona used to pry open this world was a concept so potent, Sonmi tells the Archivist, that the corporacy would do well to fear it: a *secret*. Thus the text initiates a politics of epistemology. Actually Yoona reveals a series of secrets to Sonmi, starting with the revelation that Seer Rhee, the overseer who governs their servitude, is anything but a panoptic all-seeing presence. Addicted to Soap, the food/soporific that keeps the fabricants alive and repressed, Seer Rhee pigs out on it every night, falling into a sleep so deep it resembles a coma. With the Seer seeing nothing, Yoona slips past him and discovers a storeroom, and within it a fairy tale book some child has left behind. She mistakes the book for a 'broken sony', as she mistakes its images of princesses and dwarfs, castles and elves, for an accurate picture of the world outside.

Poignant and pathetic, these misapprehensions initiate a series of events that leads to Yoona's doomed escape attempt. Without resources, knowledge, or a tactical plan, she grabs a pureblood child and runs for an elevator, only to return as a bullet-ridden corpse. The incident unleashes the nightmare specter the corpocracy had been denying and repressing all along: the possibility that the supposedly docile fabricants may ascend to full consciousness and rebel. Echoing how many Americans felt after 9/11, Sonmi pushes the Archivist's buttons by articulating his reaction to Yoona's rebellion: 'You felt the corporocratic world order had changed, irrevocably. You vowed never to trust any fabricant. You knew that Abolitionism was as dangerous and insidious a dogma as Unionism. You supported the resultant Homeland Laws dictated by the Beloved Chairman, wholeheartedly' (p. 195). The politics of fear thus reinforces the politics of consciousness, in which the *degree* of consciousness a subject possesses becomes a basis for discrimination so violent that it amounts to slavery. Moreover, the politics of consciousness is based on a tautology. Fabricants 'deserve' their enslavement because they have limited consciousness, and because they are enslaved they can be forcibly fed the suppressants that deny them full consciousness.

Sonmi's ascension enables her fully to comprehend these tautologies and contradictions. Spirited away by Union operatives, she is covertly taken to witness the atrocities at Papa Song's Golden Ark, the vessel that supposedly transports fabricants who have fulfilled their 12 years of servitude to

‘Xultation’, a life of ease and happiness in Hawaii. Actually it is a killing ship, as Sonmi tells the scandalized Archivist, bound to the ‘economics of corpocracy. The genomics industry demands huge quantities of liquefied biomatter, for wombtanks, but most of all, for Soap. What cheaper way to supply this protein than by recycling fabricants who have reached the end of their working lives? Additionally, leftover “reclaimed proteins” are used to produce Papa Song’s food products, eaten by consumers in the corp’s dineries all over Nea So Copros. It is a perfect food cycle’ (p. 343).

This horrific revelation, which can be taken as a viciously satirical demonstration of Alliez and Feher’s claim that ‘individuals are enslaved by, or rather, *incorporated into capital*’ (1987: 317, emphasis added), is superseded by yet another secret, Sonmi’s gradual realization that her ‘rescue’ by Union operatives is in fact part of Unanimity’s strategy to control the pure-blood population as well as the enslaved fabricants. ‘Union preexists me’, she tells the Archivist, ‘but its *raison d’être* are not to foment revolution’ (p. 348). Reminiscent of tactics employed by the CIA during the Vietnam (and Iraq?) war, Union activists operate as provocateurs, attracting social malcontents and keeping them ‘where Unanimity can watch them’, meanwhile providing the corpocracy ‘with the enemy required by any hierarchical state for social cohesion’ (p. 348). Against this strategy, the tactics of evasion, identity counterfeiting, running and hiding that Sonmi and her supposed protectors practiced are of limited usefulness, suggesting that the dystopian aspects of RFID technology cannot be defeated by evasive tactics alone.

Something more is needed – something with the heft and potency sufficient to set the world on another track, an idea so compelling that it can contest and defeat the fused religious, political, and economic ideology of the corporacy. Sonmi, realizing this all too well, initiates what she calls ‘the game beyond the endgame’ (p. 359). She knowingly follows the script that has been prepared for her because it gives her an opportunity to set her *Declarations*, their ‘logic and ethics’ (p. 347), free in the world. Mitchell mostly withholds from his readers the text of Sonmi’s *Declarations*, leaving us to construct for ourselves their content by considering what could best counter the corpocracy’s ideology. We are given instead Sonmi’s Testimony, a dialogic narrative that vividly and compellingly challenges us to imagine what a better future might be and speculate on how we can help bring it about.

As a literary text, the narrative works both on the explicit level of plot events and implicitly through structure and language. Sonni’s ‘Orison’ is narrated in two parts, placed so that it bookends a narrative set in the far future, ‘Sloosha’s Crossin’ an’ Ev’rythin’ After’. This narrative, strategically placed to intervene between Sonni’s escape and her subsequent adventures, reveals that Nea So Copros and indeed almost the entire world has fallen into darkness, with civilization hanging by a thread in the gentle trading culture of the Valley people in Hawaii, the promised land that Sonni would never reach. Although the record of Sonni as an actual

historical person has been lost to the Valley culture, she survives for them as a local deity inhabiting certain places where, their religion holds, they are able to communicate with her and receive visions. Thus the RFID technology of Sonmi's world (and ours), embedded pervasively to create context-aware and animate environments, is transformed through a series of historical contingencies back into an animistic religion that, for the Greeks and early western culture, was perhaps the original version of animate environments.

The Valley people get from the Prescents, precarious inheritors of high technology who themselves are about to fall into oblivion, a 'silv'ry egg' that they learn to call an '*'orison'*' (p. 309) When they warm it in their hands, a 'beautsome ghost-girl' appears 'in the air an' speaks in an Old-Un tongue what no un alive und'stands nor never will, nay' (p. 309). Unable to decode Sonmi's Testimony and helpless to make the connections that would enable them to realize this is the historical instantiation of their local deity, they nevertheless are inspired by the ghost-girl's 'hov'rin'n'shimm'rin' (p. 309). The message as language is lost, but the mediating technology allows the Valley people tenuous contact with the historical precedents for the ideals they hold dear – support one another, prefer trade to murder, hope for a better life.

At once a prayer and a technology, the orison bequeaths to us, readers who have the context the Valley people lack, the urgent necessity for imagining the strategies that will open for us and our descendants a different kind of future. This is made very clear by the performative gesture that concludes the dark vision of 'Shoosha's Crossing' an' Ev'rythin' After', when the narrator invites us to 'Sit down a beat or two./Hold Out your hands./Look' (p. 309). When we turn the page, we encounter the second half of 'An Orison of Sonmi-451', which concludes, as we have seen, in an open-ended fashion that challenges us to arrive at a different place than the corporacy, the impetus toward which is all too apparent in the ideology of George W. Bush's New World Order.

Realizing the utopian possibilities of RFID and minimizing its dystopian features thus requires more than regulation, evasive tactics, and progressive legislation, useful as these may be in the short term. Also necessary are analyses that probe the technology's deep entanglement with economic structures and political ideologies, and strong counter-visions that articulate a future worth fighting for. Without such inspirations, we are left in defensive postures that can respond to the technology's abusive uses but are helpless to imagine how it might be directed in other, more positive ways. The better we understand how RFID changes the rules of the game, the more we can imaginatively engage with it to exploit its positive potentials. An example is Bruce Sterling's *Shaping Things*, which I admire (notwithstanding its significant short-changing of the technology's abusive potential) because it succeeds in articulating a positive agenda for designers that effectively challenges them to use data-intensive environments to actualize a better future.

## ***Ubik: The Technological Unconscious and the Ontology of an RFID World***

For Joe Chip, an animate environment is nothing but trouble. Perpetually short of cash, Joe must negotiate with the coffee pot, toaster, and even the door of his ‘conapt’ to get them to perform routine services for which they demand instant payment (pp. 19–24). The demands of these animated devices are all the more annoying to Joe because they can *talk* (and reason to a limited extent). Breaking the monopoly of human ‘natural’ language, the animate devices go beyond the context-awareness of RFID and become characters in their own right (necessarily so, because characterization is implicit in the vocabulary, syntax, and content of the utterances that Dick fashions for them – in the case of the door, quite a litigious and testy character). Although there is no explicit connection between the scenes that establish the animate environments and the novel’s main events, the scenes are much more than window-dressing for a futuristic world. They connect to a deep-seated fear that Dick inscribed into many of his most powerful works: a fear that as things became animate, people tend toward the inanimate.

The fear has deep roots in Anglo-American culture, from Karl Marx’s evocation of a dancing table in his discussion of commodity fetishism to Donna Haraway’s prescient comment that ‘Our machines are disturbingly lively, and we ourselves frighteningly inert’ (Haraway, 1991: 152). For Dick, the fear is overlaid with the private iconography of the ‘tomb world’, a fictional/literary representation of the clinical depression that plagued him throughout his life. The tomb world is depicted in several of his novels as a state of living death in which time slows to a crawl, decay is pervasive, and the poor unfortunate soul stuck there must endure eons of purgatory before he is able slowly and painfully to crawl out. At the same time, the tomb world is not merely personal, for it is consistently linked with destabilizing the dynamic between human/animal/machine (notably in Dick’s best-known novel, *Do Androids Dream of Electric Sheep?*, on which the film *Blade Runner* was based). In *Ubik*, the emphasis shifts to the dynamic between human/thing, making this text especially appropriate for an exploration of the ontological implications of RFID. At the novel’s heart is the idea of *vitality*: who (or what) has it, who can steal it, who is losing or gaining it. Embedded in a capitalist economy, the *things* that make Joe Chip’s life miserable are the tip of the iceberg; the problem that looms much larger is the overall destabilization of the boundary between human and thing, accelerated in our world by the use of distributed cognitive systems such as RFID.

Although the date of *Ubik*’s publication (1966) pre-dates the huge explosion of personal computing then in its infancy, Joe Chip’s name evokes the computational technologies with which Dick likely had at least some familiarity. The first silicon chip was invented in 1958; by 1961 it was used in Minutemen missiles and subsequently in television electronic circuits. IBM introduced its 1400 series computers in 1961, and the first chip to be

used solely in computational devices, Intel's 4004, was released in 1971. More relevant to Dick's text is Boris Artzybasheff's famous illustration of an animated computer, Mark III, oozing personality on the cover of *Time* magazine (23 January 1950), which Dick almost certainly would have known. Unlike many hard science fiction writers, however, Dick's interest was not primarily in the technology as such but rather in its ontological and epistemological effects. When he needed a certain technology to carry out an idea, he inscribed it with hand-waving pseudo-explanations that often sounded technically impressive but had no actual scientific basis.

Such is the invention of half-life in *Ubik*, the cryogenic suspension of people (housed in institutions appropriately called moratoriums) who have only a spark of life left but have been revived from complete oblivion and hooked up to an apparatus that allows them to communicate with the outside world. Every time a half-lifer is revived, some of his small remaining stock of life force is depleted. As a result, families who have put their loved ones in half-life face a cruel dilemma: they can access the half-lifers and so for a brief time again have contact with them, but at the cost of accelerating their final demise. During the communication sessions, the half-lifers remain frozen and inert, communicating thoughts without apparent bodily engagement. They have effectively become data, living in an illusory dream-world constrained by real-world energetics but otherwise disconnected from reality.

From this context arises the novel's central mystery. Joe Chip is employed by Glen Runciter, who runs a business lending out employees who have psionic capabilities: precognition, telepathy, psychokinesis and, most importantly, inertials who can offset other psionic abilities. Lured to Luna by a business rival, Runciter and his entire crew are blown up by a bomb. Joe Chip thinks that Runciter was killed in the explosion and rushes him back to earth before it is too late to revive the small spark of life that is half-life; gradually the suspicion grows, however, that it was actually Joe Chip and his associates who were killed, and Runciter who is trying to communicate with them while they are in half-life. Insofar as the novel engages in the politics of epistemology, questions about who knows what center on finding out who is really alive, and who is already in the deep twilight of the half-life world.

More pressing are ontological questions about the nature of the strange world in which Joe Chip finds himself. Traveling with his colleagues back to Des Moines, Iowa, ostensibly to attend Runciter's funeral, Joe begins to encounter a temporal regression of objects. First manifesting as stale cigarettes and curdled coffee cream, the regression soon takes the form of objects transforming back to previous instantiations. Push-button elevators regress to cages requiring operators; spray cans to medicinal salves; automobiles to versions manufactured 20, 30, and then 40 years earlier; airplanes to biplanes. In a world of data where objects have only virtual existences, the temporal trajectory tracing their movements through time and space can arc backward as well as forward. Half a century before

Sterling observed that in a SPIME world the emphasis falls not on the object as a material entity but rather on its always-changing instantiation, Dick intuited that in a world of data, time (and space) would be radically destabilized. Objects would cease to be stable matter and become instantiations vulnerable to time's backward flow.

Time's destabilization affects the humans as well, although ironically in another way, moving them not toward infancy but toward the inanimate state that, in Freud's reading of the death drive, is the ultimate origin to which the psyche secretly yearns to return. The impersonal pronoun used to describe Wendy Wright, first of the group to die from the regression, testifies to this destabilized boundary of the human/thing: 'On the floor of the closet a huddled heap, dehydrated, almost mummified, lay curled up. Decaying shreds of what seemingly had once been cloth covered most of *it*, as if *it* had, by degrees, over a long period of time, retracted into what remained of *its* garments' (p. 97, emphases added). Already frozen in the deep inertia of half-life, Joe Chip and his companions experience an irresistible force moving them toward *thinghood*.

The remainder of the novel centers on the question of what – or who – is causing this regression. It would have been easy for Dick to explain it through the natural ebbing of the life-force to which Joe and his half-life companions are inevitably bound. Interestingly, he chose to insinuate that the cause is not simply the second law of thermodynamics but a conscious, volitional agent. At first Joe suspects Pat Conley, whose scary psionic talent is an ability to travel back into the past and create a new present by changing a single decisive event. Linked by her talent to time's destabilization, Pat is nevertheless shown to be as much in thrall to the regression as her compatriots. The culprit, revealed at the novel's climax, is the teenaged Jory, another half-life resident who eats up the life-force of others to feed his own voracious appetite. Again, however, Dick declines the obvious route of making Jory the villain; rather, the struggle between him and Joe Chip is cast as an epic battle between the thinghood of the tomb world and the forces of vitality.

The nature of this battle becomes clear when Joe encounters Ella Runciter, Glen Runciter's wife, who has been consigned to half-life; her vitality almost exhausted, she is preparing to be re-born into another life cycle. When Joe tells her 'Maybe I can defeat Jory' she comments, 'Maybe in time you can learn ways to nullify him. I think that's really the best you can hope to do; I doubt if you can truly destroy him – in other words consume him – as he does to half-lifers placed near him at the moratorium' (p. 207). When Joe objects that he can denounce Jory's predations to Glen and have him moved, Ella explains that Jory's relatives pay handsomely for the moratorium owner to keep him near the others. 'And – there are Jorys in every moratorium', she adds. 'This battle goes on wherever you have half-lifers; it's a verity, a rule, of our kind of existence' (p. 207). The fight, in other words, cannot be waged through strategy and tactics alone; rather, it is primarily and fundamentally an ethical struggle that continues as long as

life in any form exists. ‘You’ll have to take charge, Mr. Chip, after I’m reborn’, Ella tells him. ‘Do you think you can do that? It’ll be hard. Jory will be sapping your strength always, putting a burden on you that you’ll feel as’ – she hesitated, ‘The approach of death’ (p. 207).

The talismanic object Ella creates to aid in this struggle is Ubik, the mysterious substance for which Joe Chip desperately searches. If he can find it in a spray can before it regresses into a useless salve, he can douse himself with it and stabilize, for the moment, his own regression into thinghood. Half-life, as a phantasmatic space, can thus be understood as playing out in metaphoric fashion the complex relation between the technological unconscious and the destabilized dynamic between human/thing. Dick’s fine insight is to make Ubik profoundly ambivalent, associated both with the worst kind of hucksterism for predatory capitalism and with the divine force that, its name suggests, is ubiquitous and eternal.

These characterizations of Ubik come in the epigraphs of the final chapters. The penultimate chapter, for example, begins with an advertisement for ‘Ubik toasted flakes, the adult cereal that’s more crunchy, more tasty, more ummmish. Ubik breakfast cereal, the whole-bowl taste treat! The invitation to eat more and more is vitiated by the follow-up warning (no doubt mandated by regulation): ‘Do not exceed recommended portion at any one meal’, suggesting that this ‘taste treat’ is also a poison. In sharp contrast is the epigraph of the final chapter: ‘I am Ubik. Before the universe was, I am. I made the suns, I made the worlds. I created the lives and the places they inhabit. I move them here, I put them there. They go as I say, they do as I tell them. I am the word and my name is never spoken, the name which no one knows. I am called Ubik, but that is not my name. I am. I shall always be’ (p. 215). The startling contrast between these two versions of Ubik suggests that the force it represents can be appropriated for good or evil. Ella, after all, does not simply discover Ubik but *invents* it, enrolling it in her efforts to enhance life over death through strenuous and unremitting effort. If Ubik is eternal, as the final epigraph suggests, its declaration of ultimate agency must nevertheless be seen in terms of human interpretation and human ethical action.

At stake is how the destabilization of time and space by data-intensive environments will be interpreted and employed; as time and space become more malleable, will this flexibility be used for to enhance and amplify human life, or to drive humanity closer to thinghood? Capitalism alone, Dick’s novel suggests, cannot be trusted to bring about salutary results. In a concluding master-stroke, the narrative performs a final inversion that throws the struggle back to us. Joe Chip first suspects that he might be in half-life when his money displays not the conventional historical figures but the profile of Glen Runciter. In the novel’s final moments, just when we think we have everything figured out, Glen Runciter discovers that *his* money is now displaying the profile of Joe Chip, a development designed to subvert the neat closure otherwise achieved by drawing a firm line between the phantasms of half-life and the ‘real’ world that Glen Runciter

(and we) inhabit. The implication, of course, is that normal life has begun to operate by the same rules as half-life; with the boundary between them destabilized, we are left to draw the obvious conclusion. Our world is no more secure from the threat – and promise – of data-intensive environments than Dick's fictional creation. It is up to us to face the epistemological and ontological challenges they represent and imagine how they can be used to fashion a better world. Like Joe Chip, we inherit the ethical imperative of *Ubik*: will ubiquitous computing be co-opted as a stalking horse for predatory capitalism or can we seize the opportunity to use it for life-enhancing transformations?

### **A Modest Proposal: Reconnecting Information and Meaning**

As William Mitchell comments, RFID and related technologies 'change the fundamental mechanisms of reference – the ways in which we establish meaning, construct knowledge, and make sense of our surroundings by associating items of information with one another and with physical objects' (Mitchell, 2003: 120). A framework is needed capable of building bridges between human agency and an RFID world without collapsing distinctions between them. Such a framework would allow us to shed the misconception that humans alone are capable of cognition (a proposition already deconstructed with respect to animals and growing shaky with regard to distributed cognitive systems). The way forward, I want to argue, should not be to beat a retreat to traditional liberal humanism but rather to re-think the ways in which human cognition is like RFID technologies in that it is multi-layered, context-aware, and capable of generating novel meanings and interpretations. Nevertheless, human cognition remains distinct from thinghood because it arises from embodied contexts that have a biological specificity capable of generating consciousness as an emergent phenomenon, something no mechanical system can do. The politics of consciousness dramatized in 'An Orison of Sonmi-451' shows that the traditional view equating the human with the ability to formulate conscious thoughts can lead to radical social inequalities. Moreover, the politics of consciousness is not confined to fictional scenarios; whenever a group of people is stigmatized and repressed, the charge is leveled that the people are deficient in consciousness (or reason, consciousness's handmaiden). The challenge *Cloud Atlas* and *Ubik* together present is to arrive at a fuller, richer, and more adequate view of human cognition without making humans vulnerable to being reduced to thinghood.

As a contribution to this challenge, I want to conclude by proposing a modification of information theory suggested when I attended a seminar given by Edward Fredkin and heard him utter the following sentence: 'The meaning of information is given by the processes that interpret it' (Fredkin, 2007). Although Fredkin did not develop this idea beyond suggesting that it could, for example, be used to understand the operation of an MP3 player interpreting a digital file to produce music, I think it has great potential for contributing to an understanding of information that is contextual,

processual, and embodied. Such an understanding is crucial for constructively integrating human relationships with the new kinds of situations created by RFID technologies.

As we know, when Claude Shannon formulated information as a probability function, he declared that information in this technical sense had nothing to do with meaning (Shannon and Weaver, 1949). The problem he faced was how to quantify information reliably so that it was suited for calculation, a pre-eminent concern of electrical engineers. Traditionally, meaning has been closely linked with context. However, if information is defined so that it is context-dependent and hence tied to meaning, Shannon understood that its quantification would change every time it was imported into a new context, making calculation an engineer's nightmare. The problem Shannon faced can thus be understood as defining an appropriate context without sacrificing quantifiability. Donald MacKay, in his embodied version of information theory, boldly proposed that information should be understood in the context of the embodied receiver (MacKay, 1969), thus reconnecting information with meaning, but at the cost of failing to solve the problem of quantification.

Fredkin's formulation breaks new ground by crucially changing the meaning of 'interpretation' and (tautologically) the meaning of 'meaning'. Information in this view is inherently processual and contextual, with the context specified by the mechanisms of interpretation. These processes take place not only within consciousness but within sub-cognitive and non-cognitive contexts as well, both biological and mechanical. A computer, for example, gives information one kind of meaning when voltages are correlated with binary code; another kind of meaning is generated with high-level programs such as C++, much easier for humans to understand than ones and zeros; still another when C++ commands are used to generate screen displays and behaviors, which have yet more general meanings to humans. Human cognition, for its part, arises from contexts that include sensory processing, which interprets information from the environment and gives it meaning within this context; the meaning that emerges from these processes undergoes further interpretation and transformation when it reaches the central nervous system; these meanings are transformed yet again as the CNS interacts with the neo-cortex, resulting in conscious thoughts.

MacKay had already envisioned a series of hierarchical and inter-related contexts that included sub-cognitive processes when he insisted that the meaning of a message 'can be fully represented only in terms of the full basic-symbol complex defined by all the elementary responses evoked. These may include visceral responses and hormonal secretions and what have you' (MacKay, 1969: 42). Fredkin's formulation adds to this vision a way of understanding meaning that extends it to mechanical non-human processes. Indexed to local sub-cognitive and non-cognitive contexts, 'interpretation' ceases to be solely a high-level process that occurs only in consciousness. Rather, interpretation becomes a multi-layered distributed activity in which the 'aboutness' of intentionality (traditionally used by

philosophers as the touchstone of cognition) consists of establishing a relation between some form of input and a transformed output through context-specific local processes. By breaking the overall context of reception into many local contexts, Fredkin's formulation makes the processes at least partially amenable to reliable quantification. Many of these local contexts already have metrics that work: measuring voltages, processing speeds, and bits/second in computers; in humans, measuring neural responses, fatigue rates and the like. The important point is a shift of vision that enables us to see these sub-cognitive and non-cognitive processes not just as contributing to conscious thought but *themselves* as acts of interpretation and meaning.

This vision of meaning-creation is especially well suited to understanding human cognition in the context of RFID technologies, in which context and relationality play central roles. Context awareness is achieved when RFID tags are connected with embedded sensors and location-specific technologies such as GPS-enabled cell phones; relationality is achieved through the communications of the tags among themselves and, more widely, also through the relationality central to the operation of relational databases. When human cognition is identified solely with consciousness, it seems to operate in a qualitatively different way than these technologies. If we understand high-level consciousness to be emergent from lower-level distributed cognitive processes (as Daniel Dennett (1995: 401–27; 1996) argues), we have a way to connect human cognitive and sub-cognitive processes to distributed mechanical cognition in a number of ways. Everything does not have to go through the needle's eye of conscious awareness. This means that RFID can interface with human cognition well below the threshold of consciousness through embodied actions such as gesture, posture, and the habituated motions that give rise to and embody unconscious presuppositions, a proposition Nigel Thrift (2004; 2005) has explored in positing the technological unconscious.

Moreover, these interactions can now properly be said to be *meaningful*, in the precise sense of that term: full of meanings generated by context-specific processes of interpretation that occur both within and between human and non-human cognizers. Consciousness in this view loses its prerogative to be the sole arbiter of meaning; but this loss (if it is such) is more than offset by a richer contextual and processual view of how meanings are generated. RFID technologies in this view cease to be alien to the human condition and instead become part of the distributed cognitive systems that have, for millennia, extended and amplified human cognition (as Clark (2004) and Hutchins (1996) have demonstrated). Of course, this conceptual configuration of RFID technologies does not alone guarantee that they will be used to enhance human lives rather than diminish, coerce, and endanger them. That is why the ethical imperatives that emerge from the epistemological and ontological explorations of texts like *Cloud Atlas* and *Ubik* are so important. The idea that meaning and interpretation can occur across and between human and mechanical phyla

contributes to an expanded sense of ethics necessary when the contexts for human actions are defined by information-intensive environments and include relational and context-aware technologies such as RFID. Such an ethics would emphasize context over generalization, processes over static objects, embodied and distributed systems over hierarchical abstract ones, and a full range of cognitions over a sole focus on consciousness. Not coincidentally, this ethics has much in common with the Deleuzian ethics that has catalyzed contemporary work in the social sciences and humanities. When we understand that humans are not the only cognizers who can interpret information and create meaning, we are free to imagine how a world rich in embodied contextual processes might be fashioned to enhance the distributed cognitive systems that surround us and that we ourselves are.

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