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This essay presents a review of *Thoughtful Interaction Design: A Design Perspective on Information Technology* by Jonas Löwgren and Erik Stolterman, (The MIT Press, Cambridge, Massachusetts, 2005, 198 pages).

Over the last 50 years information and communication technologies (ICT) have grown to become one of the most significant transformative forces reshaping our lives and worlds. Since the middle of last century the power of computational devices has increased and their size decreased to the point where recent developments in ubiquitous and pervasive computing are integrating information and communications technologies into everyday objects and environments. The goal of this endeavour is captured in the vision statement of the MIT Oxygen Project, which aims to bring "abundant computation and communication, as pervasive and free as air, naturally into people's lives." This trajectory from main-frame computers to abundant, ambient computation

and communication has lead to the emergence of a community of designers who directly focus on "designing interaction with (and habitation within) computer-based systems" (Winograd 1997), which has become known as Interaction Design (ID).

In *Thoughtful Interaction Design* Jonas Löwgren, (Professor of Interaction Design, Malmö University Sweden) and Erik Stolterman (Professor and Director of Human Computer Interaction Design, Indiana University, USA) set out to "stimulate discussion on how to design digital artefacts and how to think about the design process and designed product." (1) This is a discussion that is much needed within the field of Interaction Design, especially considering the role ICT plays in shaping our lives, which the authors acknowledge at the outset saying that "to design digital artefacts is to design peoples lives." (1) It is in this context that they attempt to "elaborate on what it means to assume that interaction design is a design discipline." However, this elaboration is not without its problems.

Do Interaction Designers really play such a significant part in the shaping/designing of peoples lives and their habitation with and within ICT systems? Interaction Designers, or advocates for Interaction Design, often make claims about the importance of their role in 'designing peoples lives' without seriously questioning these claims and the implications of such claims. Assuming Interaction Design as a discipline involves more than outlining how digital artefacts are designed, it requires not only a questioning of the nature of design praxis but also an understanding of design as knowledge construction. It is this focus that sets *Thoughtful Interaction Design* apart from the plethora of texts on "engineering the human computer interface".

Yet as will be discussed, Interaction Design has not yet reached a stage of maturity where there is a discourse that addresses the ontological design(ing) of the field, its methods, techniques and products. This is seen by the fact that Interaction Design as a field has yet to seriously address the subject of sustainability or question how unsustainability is structurally encoded into the processes, products, conditions and history of the field. This is a particularly significant point as sustainability has become a central problem that many designers working in a range of disciplines are currently addressing in a direct manner. Evidence can be seen in the curriculum of design programs for the built environment.[1]

Before considering what it means for Interaction Design to be a discipline, and the problem of ID and sustainability, it will help to understand what is actually meant by the term and what is the focus of designing in the field. In one of the cornerstone text books used in teaching Interaction Design and Human-Computer Interaction (HCI), *Interaction Design, Beyond Human-Computer Interaction* (Preece et al. 2002), ID is described as being "fundamental to all disciplines, fields and approaches that are concerned with researching and designing computer systems for people". (8) This

focus on 'designing' the interface between humans and machines, in this case ICT, situates ID in a genealogy that includes other interdisciplinary fields such as Human Factors; Human-Computer Interaction (HCI); and, Computer Supported Cooperative Work.

While it is clear that Interaction Design as a field is delimited by its focus on ICT, it is this focus that has resulted in a continued broadening and diversification of ID as ICT permeates more aspects of human activity; and people from increasingly different backgrounds turn their attention to the design and designing of ICT systems. As a result, Interaction Design is commonly presented as existing at the intersection of a range of academic disciplines including: Social Sciences; Computer science; Engineering; Informatics; Psychology; Cognitive Sciences; and, Ergonomics. In recent years this continual spread of ICT has seen ID mobilised to address problems in developing regions where ICT is seen as a way of improving quality of life, or alleviating poverty.

In *From Computing Machinery to Interaction Design* Winograd suggests the relationship between the computer engineer and interaction designer can be understood through a simple analogy, "consider the division of concerns between a civil engineer and an architect as they approach the problem of building a house or an office building." This analogy provides one way of understanding ID, however this is but one perspective.

Winograd continues to argue that successful ID requires a shift in focus from the machinery of ICT to the lives of people who use ICT. As a result, ID draws upon the knowledges of established design fields including: visual design; industrial design; architecture etc. This is most evident in the design of ID curriculum, which involves classes run in studio settings with an emphasis on the design process and developing the ability to create and critique the suitability of design solutions. This is where *Thoughtful Interaction Design* is distinguished from other texts as it directly covers these topics in two chapters titled, The Process and The Design. While the coverage is general, it is suitable for students who are entering the field. This makes *Thoughtful Interaction Design* a viable choice as a text book for an introductory course on the subject, particularly if the class is situated with a traditional IT study program.

The authors have methodically organised the text to cover the central elements of design including chapters on: The Process, The Designer, Methods and Techniques, The Product and Its Use Qualities, and The Conditions for Interaction Design. In just under 200 pages this is a large amount of material to cover, and as a result the text does not go into any great depth which may leave some readers (e.g. from a creative arts or design background) wanting more.

It is worth noting that despite Winograd's engineer/architect analogy, and the inclusion of sustainability in the curriculum of many design programs, there are very few courses in Interaction

Design that address the question of sustainability and design in any detail. In part this can be attributed to the fact that ID is most often constructed as being focused on the design of immaterial aspects of ICT systems and artefacts, if they can be called artefacts at all considering their functional complexity and networked nature.

Löwgren and Stolterman actually describe ID as being about the shaping of digital artefacts, which they define as "artefacts whose core structure and functionality are made possible by the use of information technology." This definition encompasses an ever-increasing number of artefacts as more and more everyday objects include micro-controllers, network connections and display devices. Such developments are cited as the ground for what is commonly referred to as the "internet of things", which is characterised by ultra-connectivity and ultra-disseminability of information. (Araya, 1995) This imagined world of surveilable things, of ubiquitous computing, was critiqued by Araya in the mid 1990's in response to Weiser's scenarios for the future of ubiquitous computer. (Weisner, 1991, 1993, 1994) In one of the few critiques of the ubiquitous computing agenda Araya characterises it as "an attempt to obliterate the otherness of certain aspects of the world in such a way that we are no longer aware of the obliteration." (Araya 1995: 235) Space does not permit a detailed exploration of this statement, however it is worth contemplating in relationship to ID, which is a design activity that leads to the embedding of ICT into tools, tasks and environments which form our lifeworlds, and establish ways of revealing the world to us, the 'end users'.

It is this changing nature of things which is at the core of ID, where much design energy is expended on working out how to present the highly complex functionality of a digital artefact to the so called 'end user'. In his keynote address at the Association of Computer Machineries Special Interest Group in Computer Graphics and Interactive Techniques (SIGGRAPH) conference in 2004 Bruce Sterling named these complex digital artefacts "spimes". This was one of the very few addresses at an ICT conference which advocated a complete revision of the cycles of production and consumption of the material objects of ICT, and argued that designers need to focus design energies on developing solutions to the voracious nature of the ICT industries' consumption and waste of materials, and the associated by-products and impacts.

So while Löwgren and Stolterman suggest that ID is focused on the "process that is arranged within existing resource constraints to create, shape and decide all use-orientated qualities (structural, functional, ethical, and aesthetic) of a digital artefact for one or many clients" (5) there is little critical reflection in their text upon the material resources upon which the practice of ID stands. This is a discussion that is inevitable in an age of globalisation, where the burdens of a large human population on the environments that support life have come into sharp focus. Any design field that

describes itself as concerned with "designing peoples live" has a responsibility to address the sustainability of its design(ing).

It can be argued that Interaction Design plays a role in many of the practices that degrade the quality of ecosystems, environments and human lives, and that from within the field of ID there is very little discussion on how ID acts to defuture. (Fry 1999) One example is the emergence of the phenomena of e-waste, which undermines the rhetorics of the weightlessness of information, and was far from the minds of the designers of each generation of Graphical User Interface (GUI) requiring faster, better, bigger, smaller, shinier computer systems to run. E-waste is basically the material waste produced by the ICT industry – discarded computers, TVs, mobile phones etc. Much of this waste flows along the lines of economic and regulatory least resistance and ends up polluting ecosystems and blood streams. The Basel Action Network revealed the extent of the flows of e-waste in their report *Exporting Harm: The high tech trashing of Asia*. (Puckett et al. 2002)

While Löwgren and Stolterman highlight the need for responsible and ethical design, there is limited discussion on how interaction designers understand ethics and how ethics come into play in the design process beyond references to "meta-advice of establishing ethical awareness." (53) They neatly delimit ethics, aesthetics, ideology and politics, presenting these aspects of design in a non-relational manner. This acts to simplify the complex nature of design activity and conceal the design agency of ID. This can be remediated by following questions related to ethics, politics and so forth out into the cited texts and their annotated bibliography (the provision of which makes this text a valuable reference).[2]

The authors' call for a reflective and thoughtful Interaction Design while not fully realised within the pages of this short book, does introduce a range of ideas with potential to be extrapolated by connecting to design theorisations presented from the broader domain of design literature.

In their chapter on Methods and Techniques it becomes clear that Interaction Design involves imagining the future via the creation of images/representations of design solutions. Building on this, the authors introduce techniques like 'future workshops', thus establishing a potential connection between Interaction Design and Future Studies. But unlike the more developed approaches in fields like Future Studies, the coverage of methods and techniques in *Thoughtful Interaction Design* is without a substantial critical dimension. Little is provided to help interaction designers understand the importance of methodological decisions, such as how a chosen method or technique shapes the design outcomes; or how a particular methodology may involve assumptions regarding politics, ideology, or the construction of knowledge and what constitutes the objects of reality. Likewise the selection of methods and techniques also involves ethical decisions.

One of the most challenging aspects of the text is the authors' description of ICT as a material without qualities (inspired by the title of Robert Musil's early twentieth century novel *The Man without Qualities*) and their outline of the use qualities of digital artefacts. In the description of the product and its use qualities, the authors move towards understanding digital artefacts as processes. Their development of 18 use qualities can be understood in the light of Winograd's call to see ICT not as machinery but in the context of the lives of people who use ICT. The 18 use qualities are divided into groups focusing on: user motivation; the experience of handling and perception; the social context and setting; structural qualities and engineering ideals; and user's construction of meaning. The overall character of a digital artefact is the result of a dynamic gestalt that emerges over time through interaction with a user. Here it becomes obvious that ID is configured towards understanding 'digital artefacts' in terms of functionality, signification, meaning, and aesthetics, yet not as material objects. This perspective has been questioned, for example in Redström's paper 'Technology as Material in Design' which points to the importance of the physical object in an age where design is moving away from the physical. Likewise this focus on immaterial use qualities privileges the transmission of information in certain registers over other levels of interaction, for example the biophysical, kinetic and chemical interactions that occur between users and the materials of ICT.

Despite the rhetoric, material things are not being replaced by the immaterial or by communications and information as many would have us believe. ICT systems and digital artefact, are as material as any other preceeding artefacts. Computers, mobile phones, servers, routers, fibre optic cables, satellites, mobile phone towers, and so forth are all material/physical objects that exist in and shape our physical world. They are the part of an industrial ecology that begins in the minds of designers and engineers, leading to the extraction and processing of resources, the exertion of energy during manufacturing and use, and inevitably, the handling of as waste. While these objects are not the focus of Interaction Design they form an almost unquestioned environment of 'background technologies' that are pre-conditions for ID as it is currently configured. And more importantly, ID plays a role in sustaining the cycles and flows of this underpinning industrial ecology.

By focusing on information and the immaterial, the discipline removes itself from the most obvious issues of sustainability – those related to materials. However, when viewed relationally, or from a wider perspective, ID is as structurally coupled to the unsustainable which begs the question, what responsibility does an interaction designer have in relationship to sustainability? In most situations the problems of sustainability tend to be offloaded to other disciplines that are directly concerned with the materials. Here we see evidence of what Hayles describes as the culture of

virtuality, which is the perception that material and information are separate and that information is more fundamental and important. (Hayles, 1999) Hence, for as long as ID remains squarely focused on immaterial use qualities alone, sustainability will be marginal. That said, sustainability is not just a question of the materiality of the designed, it is also causally related to the self, our ways of life, and our cultures. In this respect Interaction Design, which is described as "designing people's lives" becomes directly implicated in the problem of sustainment. For example the ways in which ID and consumerism are interrelated provides a focus for questions related to ID's agency in the creation of ways of life that are unsustainable. Bowers in *Let Them Eat Data* suggests that ICT plays a significant role in the current ecological crisis, in part through the way it displaces local knowledges with digitised information, hence eroding cultural diversity and the knowledge of local environments which he argues is key to sustainable modes of dwelling.

However, this discussion about the spilt between information and material may all end up becoming historically moot as the visionaries of ICT proclaim and actively design, new futures where ICT is increasingly capable of manipulating the material world. Significant here is the increasing interest in computer controlled fabrication and research into nano-technologies, specifically nano assemblers and replicators. A future is being envisioned in which ICT becomes capable of reconfiguring its own materiality. Many voices in the Bright Green design movement hold out hope that a suite of new technologies underpinning this emergent "internet of digital artefacts' can be mobilised to redesign cycles of production, consumption and waste following a cradle to cradle approach.

Another aspect of the problem of assuming ID is a design discipline lies in the telling of its history. Löwgren and Stolterman address the history of ID in a chapter titled Conditions for Interaction Design. Refreshingly, parts of this chapter are written from a Scandinavian perspective. They clearly identify ID as growing out of the field of Human Computer Interaction (HCI) however due to the brief coverage they do not address the range of influences which have been integral to the formation of ID, such as the role played by creative arts and Cybernetics.

Cybernetics in the post WWII period, and through the MACY Conferences, set out to formulate a theory of communication and control that could be applied to humans, animals and machines alike, thus equating humans to information processing units. Hayles notes that the intention of the key protagonist, Norbert Weiner, was not "to dismantle the liberal human subject … but fashioning human and machines alike in an image of self autonomous, self directed individual." (Hayles 1999) It is here that cybernetics and its progeny become aligned with values that since the Enlightenment have presented science (and technology) as objective, value

neutral, and the claim that the true knowledge produced by science (and technology) inevitably results in progress towards a 'better' future. It is not hard to observe these ideas in the claims associated with new ICT developments proffered by research centres to advertisers; this litany includes increased freedom and greater social participation through to economic prosperity and alleviation of poverty. However, these visions of better, brighter futures breakdown when one looks beyond the end user period of digital artefacts, or by simply asking "for whom?"

The trajectory of ID has also been significantly influenced by the creative and performing arts, an influence not directly discussed in *Thoughtful Interaction Design*, but included by way of selected examples. These include Auto Illustrator, commonly categorised as new media art and Macromedia Director, a significant software application in the development of interactive media through the underpinning theatrical metaphors employed in its design but also because it enabled a range of artists and designers who were not computer engineers to create interactive media products. The theatrical metaphor which underpins Macromedia Director at first may seem slightly out of place however there are many voices that argue that ID, being primarily related to the construction of experience, is related to performance and storytelling.

For example Shedroff argues that "interaction design (in essence, story creating and story telling) is at once both an ancient art and a new technology" (Shedroff 1999: 267) and as such argues that "the best sources for learning skills critical to the success of any interactive project or presentation are the performing arts … including dance, theatre, singing, storytelling, or improvisation." (282) Shedroff attributes the success of people from these backgrounds to the fact that these disciplines aim to communicate through the creation of interesting and wonderful experiences*.* In 1991 Laurel revolutionised the practice of HCI with her *work Computer as Theatre*, which explores the performative nature of the human computer interface though the development of an Aristotelian poetics to the design of human computer interfaces. More recently, a range of designers and artists working in the field have turned to knowledges from the performing arts, for example Frasca's use of Boal's Theatre of the Oppressed to the design of simulation games, discussed in his thesis *Video Games of the Oppressed.* (Frasca 2001)

The significance of the arts should not be overlooked in favour of fields that are perceived as being more rigorous, as listed by Preece et al. (2002). Of specific interest here is the emerging connection between creative fields, like those listed by Shedroff, and traditional research as listed above. This can be observed in the makeup of staff and programs at leading international centres. The encyclopaedic *Information Arts* (Wilson 2002) presents a vast range of examples, in the form of actual projects, where there is

a mixing of creative and design practice with the more traditional academic research in science and technology.

Unfortunately this intersection between ICT and Creative Practice is not discussed in *Thoughtful Interaction Design*, and is, from this readers perspective, required in order to understand ID and how ID brings visions for future 'digital artefacts' into existence. This is described in *Beyond Productivity: information technology, innovation, and creativity* which identifies new forms of research, development and design that integrate information technology and creative practice:

ITCP (Information Technology and Creative Practice) can constitute an important domain of research. It is inherently exploratory and inherently transdisciplinary. Concerned at its core with how people perceive, experience and use information technology, ITCP has enormous potential for sparking reconceptualisations and innovation in IT. (Inouye et al. 2003: 9)

Over the last two decades it has been those working at the intersection of arts and technology who have more frequently explored the relationship between humans and computers as they construct interactive media works that unsettle established norms, and ask probing and sometime uncomfortable questions. Thus it is not unusual that Bolter and Gromala (2003) would turn to interactive art displayed at the SIGGRAPH conference in 2001 in order to argue that Interaction Design/HCI's focus on the design of transparent interfaces needs to be reconsidered.

It is difficult for those working with ICT to deeply question ICT itself without being cast as a luddite, or technophobe. But it is this culture of critical questioning and reflection that is visible through its absence in mainstream interaction design. While many Interaction Designers may write off authors such a Ellul as 'old fogies' or anti technology, it is texts like Ellul's *The Technological Bluff* (1990) that highlight the absurdity of the claims made by the advocates of 'new' developments in ICT – required reading even if it is to present a counter balance to the unquestioning promulgation of new ICT designs.

We are told that the new products are more developed and perform better, so we must rush out and get them. It is not just a matter of fashion. The new engine does what the old could not do. But are the new gadgets necessary, or even useful? No one asks this question. Once they are produced and perform better, they are self evidently useful and advantageous.

… the more recent it is, the better it is!" (Ellul 1990: 289–90)

Despite the weaknesses as discussed, *Thoughtful Interaction Design* is a sound and refreshing introduction to Interaction Design which finds itself somewhere between the traditional practices of

HCI and yet-to-be-crystallised design theory/philosophy for everyday ubiquitous computing. From the perspective of sustainment design the text can be found lacking, however it does mark a moment in the development of the field of Interaction Design where there is a change in the discourse, shifting from pragmatics and technology to the proposition of a reflection upon and questioning of what constitutes 'thoughtful' Interaction Design.

That said, *Thoughtful Interaction Design* does nevertheless need to be read in the context of a larger body of design literature and the call it makes for responsible, ethical and thoughtful interaction design can only really be answered by drawing on theorisations of design beyond its own pages.

Interaction Design has matured since its initial naming in the early 1990's, and, as Winograd (1997) has noted:

> Interaction design in the coming fifty years will have an ideal to follow that combines the concerns and benefits of its many intellectual predecessors. Like the engineering disciplines, it needs to be practical and rigorous. Like the design disciplines, it needs to place human concerns and needs at the center of guiding design; and like the social disciplines, it needs to take a broad view of social possibilities and responsibilities.

This text is one step in the development of the field, yet there is still more work that needs to be done.

Notes

1. For example, the foundation year in all Bachelor of Design degrees within the Faculty of Built Environment and Engineering at the Queensland University of Technology includes a class titled 'Introducing Sustainability'. Bachelor of Design course structures that can be accessed via http://www.bee.qut.edu.au/courses/course-major-list.jsp
2. A few key works are missing from the annotated bibliography, one most notable is Coyne's *Design Information Technology in the Postmodern Age* (1995) a seminal work that connects academic theory to practice.

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