
Material Awareness: Promoting Enduring Product Relationships through Reflection

James Pierce
School of Informatics
Indiana University at Bloomington
piercejj@indiana.edu

Abstract

This paper argues for both the experiential desirability and critical importance—in terms of environmental sustainability—of designing for reflection on our experiences with material objects themselves. First, this paper motivates and proposes a reflective design perspective of *material awareness* as an area for reflective and sustainable interaction design and HCI research. Second, this paper grounds the theoretical discussion by reporting on a series of conceptual design proposals and prototypes currently being explored and implemented by the author.

Keywords

Sustainability, Reflection, Experience, Design

ACM Classification Keywords

H5.m. Information interfaces and presentation

Introduction

In this paper, I argue for both the experiential desirability and critical importance—in terms of environmental sustainability—of designing for reflection on our experiences with material objects themselves. In what immediately follows, I (i) briefly discuss relevant

work in the areas of reflective and sustainable design, (ii) introduce a reflective design perspective of *material awareness*, and (iii) report on a series of conceptual design proposals and prototypes I am currently developing.

Reflective approaches to design

Following Sengers et. al, this paper defines *reflection* "as referring to **critical** reflection, or bringing unconscious aspects of experience to conscious awareness, thereby making them available for conscious choice." [9]:50. Readings of the literature related to reflective approaches to design—which includes reflective design [9], critical design [3], ludic design [4], and technology as experience [6]—suggest three general ways of interpreting designs that provoke reflection. We can view reflective designs as (i) **practical products**—which satisfy relatively well-established needs or desires and, consequently, may be more readily adopted and accepted into everyday routines, (ii) **critiques**—which serve as critical discourse for designers, scholars, industry or the general public, or (iii) **probes**—which are used as a tools to provoke thoughtful responses from users, which may inspire, support or otherwise inform future design work. A reflective design may fit within more than one of these characterizations and they are presented here primarily to help frame the discussions in this paper.

Sustainable design and consumption

Sustainability has emerged as a key area of interest for interaction design and HCI. Recent work in HCI and interaction design has successfully used reflection as a design strategy to promote more sustainable attitudes and behaviors. In particular, there is a nascent and

growing body of research and design work in the area of energy awareness that emphasizes aesthetic experience and critical reflection, which I have surveyed and discussed in [7, 8]. However, the design of reflective interactive products aimed at promoting more sustainable consumption has focused almost exclusively on electricity and other resources consumed by products (e.g. water), rather than the high replacement and disposal rates of technology products themselves. The importance of design approaches that address the rapid replacement and disposal rates of technology has been discussed within the context of HCI and interaction design by Blevis [1], Huang & Truong [5] and others.

Designing for enduring artifice has been proposed as an alternative to approaches such as life-cycle analysis (LCA). Critical of such approaches, Verbeek Kockelkoren write: "*Life Cycle Analysis may make it possible to design products that are friendlier to the environment, but leaves a fundamental problem unaddressed: the short lifetime of our products. We live in a throwaway culture. We discard products while they are still in good shape. It is not enough to make less polluting products, however important that may be, when they are replaced at high speed because people throw them away too soon. The environmental crisis is not only a technological problem, but a cultural problem as well. Therefore, according to [the Netherlands-based industrial design collective] Eternally Yours, we should not only strive for sustainability, but also for durability, by designing products in a way that stimulates longevity.*" [10]:29.



Figure 1. *Table that Counts* displays the total number of heavy objects that have been placed on it during its lifetime.

Material awareness

Motivated by work in reflective design and sustainable design, I propose a *material awareness* design approach to more sustainable material consumption. I am here defining *material awareness* as reflection on material objects—and our everyday experiences with unique and particular objects themselves—in aesthetic and provocative ways, thereby encouraging more meaningful, enduring and sustainable relationships with particular objects or discouraging thoughtless consumption of objects in general. In particular, this perspective is concerned with the utilization of digital technology to enable and encourage material awareness in everyday life. Designs that encourage reflection on materiality, consumption, and experience with technology—as *criticism*, *product* or *probe*—are here conceived as both means towards enduring and sustainable relationships between people and objects, as well as ends defined in terms of the individual aesthetic experiences resulting from reflection.

In order to more concretely investigate the potential for material awareness in everyday life, I am developing a series of redesigned familiar domestic products. These designs are intended primarily to be used as *probes* to elicit thoughtful responses from users, which in turn may inform the design of enduring reflective *practical products* that people may more readily adopt and integrate into their daily routines. These designs employ two primary strategies, namely (i) amplifying the histories of objects, and (ii) amplifying the agency of objects. I discuss each of these strategies in turn.

Amplifying the histories of objects

An heirloom chair is irreplaceable because of its unique

materials and signs of use accumulated over time. How might digital technology be used to amplify perceptions of the unique histories of particular objects—and our experiential histories with them—over time in order to encourage attachment to these objects? In order to investigate this question, I am developing a series of products augmented with small numerical displays—or *counters*—and various sensors in order to record and display simple histories of use. Several of these *Objects that Count* are presented here.

The *Table that Counts* (figure 1) has a counter embedded in its face displaying the total number of times a heavy object has been placed on the table during its lifetime. Dropping an object on the table or otherwise causing shock to its surface causes the counter to become erratic, gradually returning to its correct count. The numbers on the counter begin to gradually dim if no new objects are placed on the table; eventually, the numbers fade out completely. Placing a new object on the table restores the numbers to the normal brightness level. Will the table encourage people to engage with it or treat it with care? Will its owner think twice about replacing the table when she or he reflects on the number displayed?

The *Lamp that Counts* (figure 2) has a counter embedded in the lampshade displaying the total number of years, days, hours, minutes, seconds and milliseconds the lamp has been lit during its lifetime. Turning the lamp on starts the timer; turning off the lamp stops the timer. Will the user think more consciously about her or his use of the lamp when she or he observes the rapidly increasing number? Will its owner think twice about discarding the lamp when she or he reflects on precisely how long it has been used?



Figure 2. *Lamp that Counts* displays the total number of years, days, hours, minutes, seconds and milliseconds the lamp has been lit during its lifetime (milliseconds not shown in this prototype).

The simple and direct communication of previously inaccessible—and not obviously useful—information (e.g. the number of times an object has been placed on a table) is intended to provoke reflection from users on the possible intentions of these products and encourage exploration into possible uses and meanings. The unnecessarily high degrees of precision (e.g. milliseconds) and unrealistically large capacities (e.g. thousands of years) used for recording and displaying simple histories of use are intended to encourage reflection on the relationship between short term and long term experience with the objects.

Amplifying the agency of objects

We praise or chastise our products based on how they perform. Occasionally, we give a well-loved (or loathed) object a pet nickname. How might everyday objects amplify our perceptions of them as possessing agency—possibly even human-like thoughts or behaviors—in order to increase our attachment to these objects? In order to investigate this question, I am developing a series of products that have been redesigned to (mis)use their functionality to help express their needs and desires. Several of these *Animate Objects* are presented here.

The Animate Chair gets lonely when it hasn't been used in a while and begins to glow, enticing someone to sit in it. However, sitting in the chair for too long will cause it to become uncomfortable and to vibrate slightly and awkwardly. Will individuals give the chair the attention that it begs for or the space that it requests? Will its owner be willing to replace or dispose of the chair when she or he reflects on her or his relationship with the chair as an animate object?

The Animate Lamp tires and begins to dim its light bulb after it has been left on for a while. Jostling its shade causes it to startle and brighten. Gently rocking the lamp's shade comforts the lamp and causes lights woven within the shade itself to glow in aesthetic patterns. After a while, the lampshade lights gradually begin to dim, unless the shade is again gently rocked. The lamp will not grow tired and dim its light bulb if the lampshade lights are illuminated. To what extent will individuals treat the lamp harshly or lovingly? Will its owner dismiss the lamp as a functionally flawed or subversive object or will an intimate relationship develop between lamp and owner?

The Animate Clock (figure 3) occasionally grows bored with showing the correct time and deviates by displaying an incorrect time. This deviation typically lasts only briefly and the clock returns to displaying the correct time. The clock briefly flashes a message—“HA HA”—to indicate it was only joking. Will individuals pay closer attention to the clock or lose trust in it? Will they empathize with it or otherwise relate to it personally?

The *Animate Objects* described here (i) encourage use of their functionality by means tangential to their core functionality (e.g. the chair uses aesthetic ambient lighting to encourage sitting), and (ii) inhibit use of their functionality by subverting their core functionality (e.g. the clock displays the incorrect time to create playful confusion). In doing so, the hope is that users will interpret and reflect on these objects as possessing human-like needs and desires—rather than treating them as purely functional. Such reflection may cause more thoughtful and enjoyable everyday engagement with these objects, as well as more meaningful and enduring relationships to develop with them over time.



Figure 3. *The Animate Clock* occasionally grows bored with showing the correct time and deviates by displaying an incorrect time.

Conclusions and future work

Everyday objects—especially those constructed with digital technology—are typically defined in terms of their functionality. Increasingly, HCI has embraced designing for “non-work, non-purposeful, [and] non-rational” uses of technology [2]:1-2. Still, current approaches to experience design often dismiss the material object itself, viewing it purely as a means towards an (experiential) end. The designs described in this paper explore the aesthetic and poetic potential of functional objects to engage and provoke us in ways that both provide pleasurable and meaningful experiences, as well as encourage more enduring and sustainable relationships between ourselves and the things populating our everyday lives.

The designs presented here are intended to serve as *probes* and *critiques*, rather than *practical products*. Although the designs have not yet been deployed as probes, the critical concepts themselves suggest more practical design directions. Developments in computing technology and interaction techniques—such as artificial intelligence, RFID tagging, tangible computing and information visualization—offer strong potential to amplify both the histories and the agency of objects. For example, I am also exploring the design of *digital-material patinas*, aesthetic data-visualizations that communicate the age of an object and the ways and extent to which it has been used.

In this workshop, I hope to report on work described in this paper, including the results of a pending study investigating how people use and interpret the designs presented here. I hope to engage with researchers working in diverse areas at the intersection of HCI and reflective design, in order to help develop and refine

the role of reflection in the design of technology—including the potential for reflective design to facilitate more enjoyable and sustainable ways of being.

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