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# Four Factors of Change – Adaptations of Everyday Design

**Ron Wakkary**

School of Interactive Arts and  
Technology  
Simon Fraser University  
Surrey, BC, Canada  
rwakkary@sfu.ca

**Leah Maestri**

School of Interactive Arts and  
Technology  
Simon Fraser University  
Surrey, BC, Canada  
rwakkary@sfu.ca

**Abstract**

This paper is a follow up study of a 2005-2006 study of everyday design. This follow-up study is an opportunity to gain insights into the social evolution of everyday design systems in the home. We report on changes to five systems and discuss how these changes occurred over the last four to five years. We identify four factors related to the changes 1) shared intent 2) mutual intelligibility, 3) materiality-substitutability, and 4) fit.

**Keywords**

Everyday design, evolution, sociality, uniquely situated systems, mutual intelligibility, ownership.

**Introduction**

This paper reports on a preliminary study that looks at understanding the nature of *change* in “systems” created by families, what we refer to as *everyday design* (9). The concept of everyday design is that everyone is a designer and that design occurs on an everyday basis through use or, *design-in-use* of everyday objects. Over time, often incrementally artifacts are appropriated, modified or reused and

combined into unique and situated systems. We refer to these as an *everyday design system*. These systems exist in and adapt to evolutionary and complex environments, which in the case of our study is family life. In this paper, we focus on how everyday design systems adapt to changes in family life.

In light of these observations, we seized the opportunity to conduct a follow up study on several systems observed in 2005 and 2006. We first published the results of this study in the Creativity & Cognition conference in 2007 (9). The goal of this study is to understand how these systems changed over the last four to five years.

It is important to note that our observations of systems are exclusively made up of analogue objects and their use in combination with each other. The aim is to draw principles from the design-in-use of analogue objects over time to inform the design of interactive and digital objects and systems.

In this paper we describe observed changes in five everyday design systems. We analyze the relationship between system changes and social and familial changes within the home. We also discuss four factors that help explain these changes and their design implications: *shared intent*, *mutual intelligibility*, *materiality-substitutability*, and *fit*.

### Our Study

This study is based on findings from the everyday design project, which began in 2005 and involved ethnographic studies of four families over the span of two 5-month periods (9, 10). We described patterns of design actions and systems, and described how

everyday design systems evolved from ad-hoc appropriations to routines to systems. For example, we observed Lori (a single mother of one) and her resourceful use of objects in the home to create a "reminding system" that included a chalkboard, a three-tiered hanging basket, sticky notes, her wallet (to store notes in) and the frame of her front door (to stick notes on.)

The present study includes interviews with members of two of the original families from the 2005-2006 study. In addition to interviews, we conducted video-walkthroughs with participants. Key informants were asked to describe the current state of their everyday design systems, as well as describe how they've changed (if at all), and why.

### Related Work

Similar interests occur in other research but to our knowledge none have examined the changes over time and how these changes occurred. Studies have looked at the domestic setting for informing the design of interactive technologies (2, 3, 8). Other studies look at how certain artifacts maintain their longevity in the home through the attribution of quality, meaning, and experience of use (1, 7). Additionally, researchers have also examined appropriation in interaction design (4,6).

### Changes

Here we briefly describe the degree of change in each of the everyday design systems observed in this study. (See Table 1.)

#### *Unchanged*

Recipe Book: Cate is a teacher with a teenage son. She created a recipe book that consisted of a binder,

Table 1. Degree of change

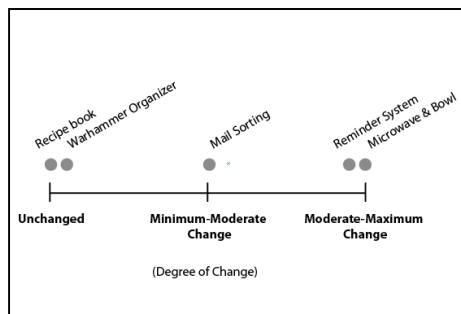




Figure 1. Cate's Recipe Book

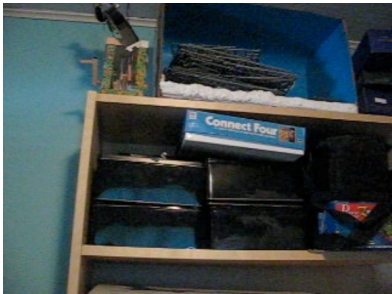


Figure 2. Alec's metal tins for organizing Warhammer game

generic dividers and 3-hole punched construction paper. As was her method four years prior, Cate collects "recipes she can actually make" and "recipes that are ambitious and will never make" that she stores these in self-made pouches in the binder. (See Figure 1.) The binder is more full now but the system remains unchanged. Cate's methods for searching and collecting recipes have remained the same, as she is the sole contributor to its design-in-use but her son Alex looks for recipes in the book. As for Cate's partner, Paul, he doesn't cook and has no real impact on this particular system. As the binder is quite full, Cate indicated that she will start a new binder with the same system.

*Warhammer Organizer:* Warhammer is a role-playing game that Alec, Cate's son, used to play. Because the game had multiple pieces and was usually left all around the house, Cate created a system out of metal tins that she labeled to keep the pieces organized and put away. Alec was reluctant at the time to use the system. He still keeps his Warhammer pieces in these metal tins. Alec explains: There's still a bit of it [in my room]. It really hasn't changed, I just don't use it anymore... [The tins] are still labeled although I doubt that's what's actually in them. (See Figure 2.)

As Alec states, the organizing system has been abandoned completely since he has grown out of playing with Warhammer (he is now 15 years old). His interests have changed and the system has been abandoned.

#### *Minimum-Moderate Change*

*Mail Sorting:* Five years ago, Cate organized her mail by sorting it into distinct groups in three locations around her front door: a treasure chest to left of the

door (see Figure 3.), a small shelf to the right of the door, and on the floor at the top of the stairs for her tenant. In our follow-up study the treasure chest was replaced with a hutch, she no longer has a tenant so mail is no longer placed at the top of the stairs, and a recycling box replaced a bag hanging on the wall for recycling junk mail.

The family situation has changed as well. Paul (her common-law partner) has since moved into Cate's house, and has, in Cate's words, been 'trained' to sort out the mail in the same way she has always done. The lack of a downstairs tenant has simplified the system since the mail only needs to be sorted as either Paul's or Cate's, or as recycling. We consider this system as having moderate change as there were changes from a materials aspect - the recycling bag has since been changed into a formal blue recycling bin under the kitchen counter, and the original hutch has been changed into a shelving unit which stores various electronics.

#### *Moderate-Maximum Change*

*Reminding System:* As mentioned earlier, five years ago, Lori used a chalkboard, a hanging basket and other items in her home to help remind her, her son, and her live-in boyfriend at the time. Since then, Lori has removed both the chalkboard and the hanging basket from the home and has replaced them with a bowl that she places on top of the microwave next to where the hanging basket used to be. Now the bowl serves as part of the reminding system - replacing the hanging basket as a place to put lists and notes. The microwave serves as a place to put the bowl, keeping the bowl both visible and accessible but away from the surface of the kitchen counter, similar to the basket.

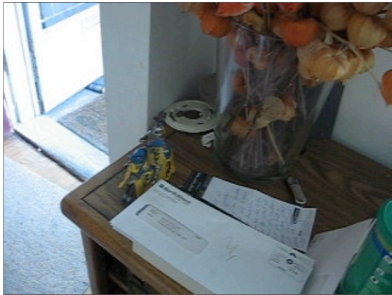


Figure 3. Cate's Mail Sorting systems



Figure 4. Microwave and bowl that replaced chalkboard and hanging basket.

Lori informed us that the hanging basket was taken down, as it just 'didn't fit' anymore. Lori explains: *...functionality changes. People's lives go through phases and I don't think you can say this piece [the basket] is going to have the longevity that you think it might have. Especially reminder systems - people's lives change, responsibilities change, even who's growing up around you changes.*

*Microwave and Bowl:* This is related to the *Reminding System* and now serves as part of it. In 2005, Lori placed her microwave to one side on her kitchen counter thinking about getting rid of it because she did not like cooking with it. We identified the placement of the microwave as a *cocoon* pattern (8) since she did not know what to do with the microwave but did not get rid of it. It is now part of the reminding system since it serves as a place to put the bowl that replaced the hanging basket and keeps it away from the surface of the kitchen counter. (See Figure 4 and 5.) For Lori, many of the changes that occurred to the systems in her home were 'forced'. Lori's life naturally revolves around her son Jason, who was now 10. He now heats his own meals in the microwave and is tall enough to reach the bowl on top of the microwave. Jason's needs shifted priority to the microwave and bowl over the hanging basket.

### Factors

As a result of our follow-up study, we see everyday design systems as adaptive to changes in family life and development. Broadly, speaking it evolves with social change. Based on our analysis of the data from this study we propose four factors that help explain why everyday design systems might change and how this adaptation is supported.

### Shared Intent

In our observations, the families held shared intentions with almost all of the changed systems. For example, with Cate's mail sorting system, Paul learned from Cate the intent of the system. He valued Cate's design-in-use and so the approach continues to exist and moderately changes over time. However, with the Warhammer Organizer we can see how Alec did not share Cate's intention of using the metal tin cases for organizing his game pieces. Despite growing out of the game, dating back to our original study, the organizer never had buy-in from Alec. The lack of shared intentions and interest led to no change. Ultimately this led to the end of its use or, design-in-use. In this respect, shared intent can be seen as a minimal necessity for the ongoing life and evolution of an everyday design. While shared intent is critical, we do see how the intent may change over time albeit collectively.

### Mutual Intelligibility

Collectively using and altering a changing system requires a common understanding of the system. Everyday design systems are highly unique and easily overlooked by outsiders (it took us several months of observations to "see" the systems during our study in 2005-06), yet they are understandable to those who actively use it and are involved in its design-in-use. Dourish refers to this as *mutual intelligibility* (5). In Lori's reminding system, both her and Jason understand the various roles and distinct meaning objects are given for leaving reminders around the house. Jason understands that the bowl on the microwave now serves the purpose that the chalkboard and hanging basket used to do – a place to put and find lists, notes and messages. He also contributed to the

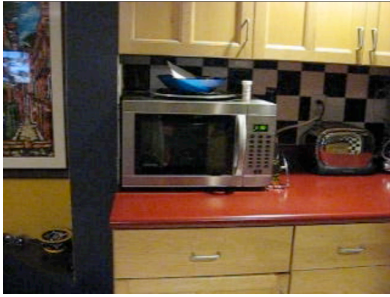


Figure 5. Kitchen area where Lori leaves her messages and notes.

design-in-use through his use of the microwave, which Lori recognized as both a design and use resource. Similar to shared intent, mutual intelligibility can be seen as a necessity for design-in-use within the family.

#### *Materiality-Substitutability*

Material qualities of objects and their substitutability appeared important in the change of systems. By material qualities we mean the physical attributes of objects that are typically simple in functionality and common across everyday objects. For example, the bowl on the microwave readily served as a container for papers and lists replacing the three-tiered hanging basket in the Reminding System. The flat surface of a hutch easily replaced the treasure chest in Cate's mail sorting system. The affinity in shape and form made these substitutions easy. It was also resourceful and opportunistic that the bowl and hutch occupied nearly the same location and height of the elements they replaced. Materials and the ability to substitute elements dictates the degree to which families can act on the changes of intention or carry out necessary adaptations. Without these design possibilities systems can come to an end.

#### *Fit*

Everyday design systems are highly unique – radically so. The adaptations have a quality of uniquely situating within the environment or achieving a "fit". In the case of Lori's reminding system, the microwave, the bowl and the hanging basket had to fit together for all objects to work. In the end, Lori removed the hanging basket altogether and assigned the top of the microwave as a placeholder for reminders. This suggests that "fit" in this case required close proximity to other 'like' activities that happen in tangent. For

Cate, sorting the mail happens near the front door where the mail is delivered through the door. The ability to use the objects around the front door in an integrated way determines the degree of fit of the system. The physical attributes or materiality and substitutability within systems play an important role in fit. The more physical possibilities of a system increase the chances of fitting to the situation. For example, Cate's recipe book demonstrates a simple use of materials (i.e. paper, glue, binder, etc.) that has allowed her to create and adapt a distinct and coherent system for organizing her recipes.

#### **Discussion**

This pilot study shows us that it is important to investigate further how and why everyday design systems change – since adaptation is critical to the life of a system. It may provide more valuable information on the attributes of everyday design and the design actions of everyday users.

The factors within the study open the door to a potential framework for designing digital artifacts and systems that can be incorporated into the design-in-use and appropriations of everyday designers. Some of these factors are outside of the control of designers such as *Shared Intent*. *Mutual Intelligibility* is challenging since it is in tension with the tendency for everyday design systems to be unique. Yet it is reasonable to consider designs that keep things very simple and support incremental changes rather than wholesale change. This is because the mutual intelligibility of everyday design systems emerge over time through minor iterations or easy substitutions that are visible and readily understood through design-in-use.

*Materiality-Substitutability* and *Fit* may be the two most important design factors for digital technologies for everyday design. *Fit* can be regarded as evaluative and a goal for successful design. The degree to which everyday designers achieve fit determines the value of the system and its designed elements. Designers can give significantly more attention to the materiality of our digital designs and consider simplicity in feature and design to ensure substitutability.

Clearly at this stage, these are high level findings that constitute foci for our future research, i.e. specifics on materiality and substitutability. We also want to pursue a framework of factors. The study has focused on the collective and social qualities of everyday design as a result of working with families. The question remains, do these findings apply to individual design-in-use where adaptation is not socially driven.

### Conclusion

We described changes to five everyday design systems based on original findings from a 2005-06 study of four families. We discussed four factors of change that include *shared intent*, *mutual intelligibility*, *materiality-substitutability*, and *fit*. We believe this study positively suggests further research in this area that examines design related factors like *materiality-substitutability*.

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