
Inconvenient Interactions: An Alternative Design Approach to Enrich our Lives

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Abstract

While most traditional user interfaces are designed to pursue convenience by eliminating user operations and by automating tasks, some new categories of HCI, such as health support, may require explicit human participation and effort to achieve long-term benefits. For these areas, interfaces that require interactions that force users to perform activities, rather than interfaces that solely perform tasks on behalf of users, are becoming increasingly important. We refer to these new interactions as “inconvenient interactions”. In this note we discuss why carefully designed inconveniences can enrich our lives, and provide some preliminary but concrete examples. We also explain our initial guidelines for the design of these interactions.

Author Keywords

Interaction design; Inconvenience; Healthcare; Facial feedback hypothesis

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Design, Human Factors

Introduction

In general, the goal of user interfaces is to provide convenience to users. A good user interface attempts to minimize human labor and increase efficiency. A good interactive system often replaces human operations by automating them. These goals are largely assumed during the design of a new user interactive system. We can also evaluate the quality of a system by counting (or by measuring) the number of eliminated human operations (or the reduced time of operations) during use.

Thus, the commonly agreed goals of these normal user interfaces is the elimination of all human operations to the extent of the system's ability, as well as the achievement of users' intentions. In other words, the desired status for these systems is that systems perform all tasks while users remain inactive.

However, for new application fields for human computer interactions, such as health maintenance by the use of interactive systems, this assumption is no longer valid. In these applications, systems should motivate, encourage, or even force people to perform

certain tasks, rather than performing tasks for people.

We propose the introduction of the term, "Inconvenient Interactions," to describe these new types of interactions. An Inconvenient Interactive system would encourage, require, or may be force a user to perform some actions, even though these actions may not provide an immediate benefit to the user. However, in the long run, the benefit will be returned to the user. Table 1 summarizes the differences between traditional user interfaces and our proposed Inconvenient Interactive user interfaces.

For example, a good physical fitness system would motivate users to continue performing physical exercises by the provision of good feedback, provision of a game-like point system, or by connecting people who share the same goal. Some systems might require that users perform exercises before they can receive results. These human efforts provide no immediate benefits. Thus, it might be said that these systems introduce inconvenience to users' lives. However, these efforts may be beneficial in the long run. On the other hand, systems designed to support health that perform physical exercises on behalf of users would provide no benefits.

Of course, we must note that these new inconveniences in interactions greatly differ from meaningless inconveniences that confuse us and require the performance of unnecessary operations without the provision of value. Those interactions often result from bad user interface designs. However, we believe there should be another type of inconvenience that might be described as "meaningful inconvenience," that will eventually provide benefits to users.

| | Traditional Interactions | Inconvenient Interactions |
|---------------------|--------------------------|----------------------------|
| Design goal | Reduce human operations | Encourage human actions |
| Self-awareness | Less cared | Enhance self-awareness |
| Long-term benefit | Less cared | Increase Long-term benefit |
| Evaluation criteria | Efficiency | Affluence |

Table 1. Comparisons between traditional interactions and Inconvenient Interactions.

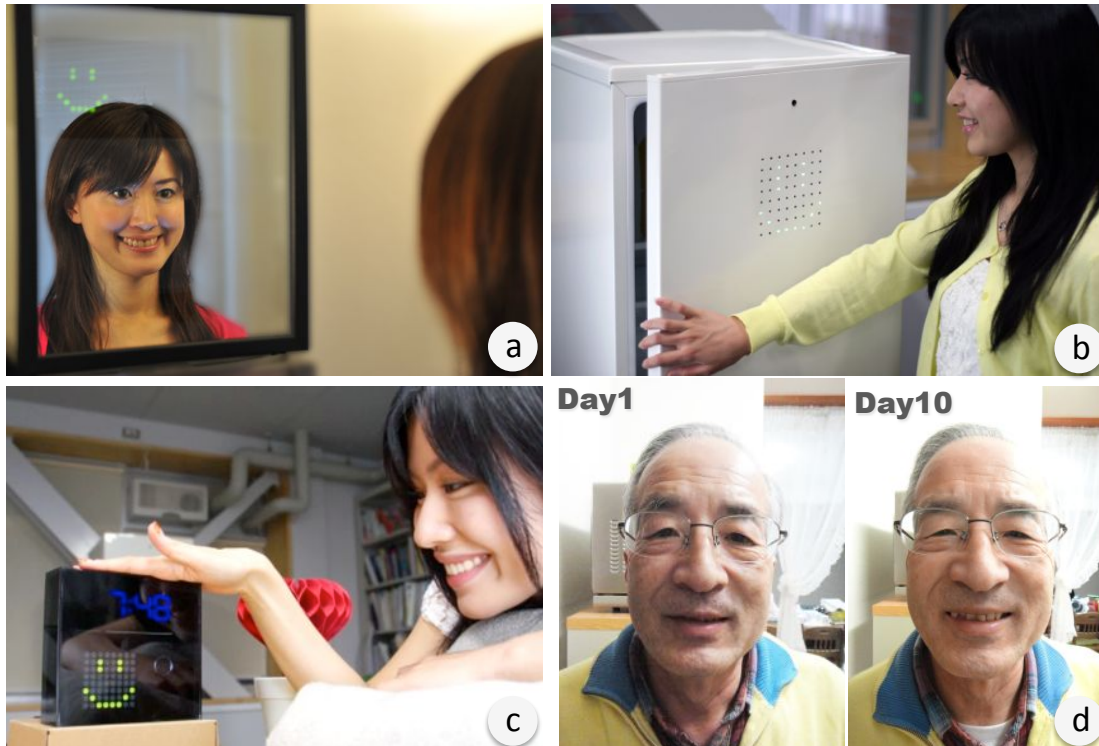


Figure 1. HappinessCounter encourages people to smile in daily life: (a) a dressing mirror that contains a smile-awareness feedback icon, (b) a refrigerator that will not open until the user smiles, (c) an alarm clock that stops when it recognizes a smiling face, and (d) an example of a 10-day trial: people smile more naturally after they use this system.

In this paper, we discuss the value of these types of “inconvenient interactions,” describe their key features, and discuss their importance.

The next section examines actual examples of inconvenient interactions we have designed.

Examples of Inconvenient Interfaces

HappinessCounter

HappinessCounter consists of a series of digital appliances that facilitate individuals’ acts of smiling during their daily lives [11, 12]. Each device includes a camera and a computer that recognizes people’s faces and smiles by extracting and classifying facial features. They are based on very simple feedback methods that include sounds and low-resolution LED matrix displays.

This system is based on the theory known as the Facial Feedback Hypothesis [1, 2, 7, 9, 10]. This theory claims that, when we smile, our mental state becomes more positive. Although it is generally believed that our facial expressions result from our internal mental states, this hypothesis posits that facial expressions can also cause our mental states.

HappinessCounter includes a variety of design variations. The simplest design consists of a dressing mirror that contains an embedded smile recognition unit (see Figure 1 (a)). When an individual smiles in front of this mirror, HappinessCounter acknowledges the smile with a simple smile icon and a feedback sound. This system is designed to increase individuals’ awareness of their own smiles. This could be considered modestly inconvenient because it requires individuals to make limited additional efforts to concentrate on their faces. Without this system, individuals might simply ignore whether or not they are smiling.



Figure 2. The Inconvenient Microwave requires the user to perform physical exercises during operation. The number of LED dots (shown in the circle) indicates the time remaining until the microwave turns off. Time automatically decreases when the user does nothing. It increases when the user performs a step aerobic exercise.

Another design variation consists of a refrigerator that cannot be opened until the user who stands in front of it smiles (see Figure 1 (b)). This variation introduces a more direct form of inconvenience than the previous design. It challenges the individual user to smile. Another similar example consists of an alarm clock that requires the user to smile to stop the alarm sound. It is intended to provide the user with a happier morning experience (see Figure 1 (c)).

HappinessCounter can be considered useless or inconvenient from the standpoint of traditional user interface design. It does not eliminate operations, nor

does it improve efficiency. Instead, it requires users to take action (i.e., smile), or to perform an activity (i.e., open the refrigerator door; stop the alarm).

On the other hand, HappinessCounter may potentially encourage people to develop and maintain positive dispositions. We conducted a 10-day user study experiment with senior families. We wanted to discover whether people who used this system would increase smiling (see Figure 1 (d)). The results of our user experience survey were quite positive. Thus, HappinessCounter can be considered a design that will embed small amounts of inconvenience in a variety of activities during daily life. However, it will also eventually improve our mental states.

Inconvenient Microwave

The “Inconvenient Microwave” is another trial design that aims to make our lives initially inconvenient. However, it eventually makes our lives enrich. This microwave oven functions normally. However, once it is turned on, it requires the performance of a simple physical exercise to maintain its functioning (see Figure 2). For example, if a user wants to heat a cup of milk, the user must perform step aerobics during microwave operation until the milk becomes hot. If the user fails to perform the exercises, the microwave automatically shuts off. To detect the status of aerobics performance, pressure sensors are installed in a step stool.

This provides an additional example of inconvenience. Rather than eliminating operations, the device requires the user to exert extra effort to achieve a task. However, the intention of these interactions is to embed physical exercises in some daily activities, and especially, in activities related to food consumption.



Figure 3. The Communication Grill is an interactive art system that requires participants to continue chat conversations to provide heat to cook meat. By analyzing chat logs, this system can motivate participants to start conversations even though they have just met for the first time [8].

The device mediates users' health by forcing them to burn calories before they consume calories.

Similarly, we could design an alternative "Sports Bar." This bar would not be designed solely for watching sports games. Rather, this bar would require the performance of small amounts of exercise before users could actually order food or drinks. Exercise machines located in the bar would contain counting systems that would provide users with tokens (either physical or electronic tokens) that could be used to order food and drinks.

Communication Grill

Communication Grill is an interactive artwork that provides participants with inconvenience [8]. It appears to be a traditional meat-baking grill. However, it requires participants to enter chat sentences to maintain the grill's heat. Viewers of this artwork are invited to sit near the grill. A computer terminal is provided to allow visitors to enter chat sentences (see Figure 3). Even though the group of visitors shown in the illustration met for the first time during the exhibition, they had to maintain chat conversations to heat the meat.

This represents another example of an inconvenient system. An analysis of chat logs created during the artwork exhibition revealed that conversation topics gradually shifted away from the system itself (e.g., "Let's say something or the meat will get cold") and towards other subjects. This tendency suggests that the act of forcing people to continue chatting (to keep the meat warm) may also exert a positive effect on visitors' abilities to maintain real conversation.

Discussions

In the previous section, we introduced three typical examples of inconvenient systems. All of these systems require users to perform tiny extra efforts before the devices actually meet users' needs. Users' engagement in these efforts will eventually result in long-term benefits (see Figure 4). We believe these kinds of long-term benefits would not be achieved solely by the simple subrogation of human operations.

In addition to these examples, many areas maintain relationships with inconvenient interactions. In the following section, we provide a brief discussion of the

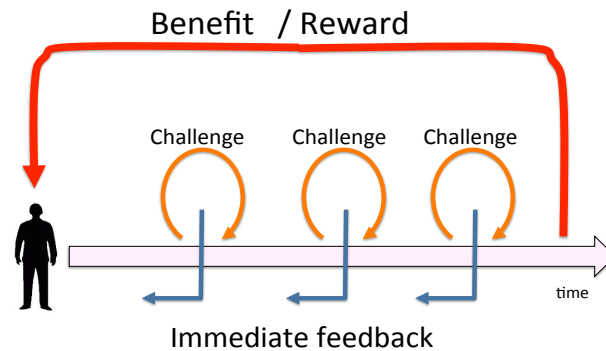


Figure 4. Challenges (designed inconvenience) and long-term benefits.

value of inconvenience in the manual systems field, games, rituals, and architectures.

Manual vs. Automatic Systems

Some individuals prefer manual systems over automatic systems, even though the manual systems require more concentration and effort, and even though they impose inconvenience. For example, some individuals enjoy driving manual transmission cars because these cars are more controllable and they provide satisfaction. Even though these systems require more human efforts, proficiency, and attention, such features provide more satisfaction. It might be related to the emotional aspect of interaction design [5].

Similarly, creating objects can provide more satisfaction than purchasing objects. For example, many people enjoy cooking even though similar food can easily be obtained at restaurants and food shops. Other people enjoy drawing pictures, even though cameras and printers are commonly available.

Games and Inconvenience

(Computer) games are another good example of interactions in which inconvenience works successfully. In fact, games should never be considered just convenient. For example, that would mean that the user's activation of the start button would achieve the user's goal. Rather, a good game should include a number of challenges, a good story, and good feedback. To reach his/her goal, a player must maintain certain skill levels and exert a certain amount of effort. Those features and requirements suggest factors that might be required in the design of good inconvenience.

Although most games do not offer real-world value, recently, the idea of inserting game-like interactions into real-world activities has gained significant attention. This concept is frequently referred to as "gamefication" or "gamefulness" [4]. For example, if tedious daily tasks, such as remembering foreign language words, or performing physical exercises, can be transformed into games, people might be more willingly to perform them.

J. McGonigal, a game designer and Director of Game Research & Development, summarized the essential features of games [4]: the goal, rules, feedback system, and voluntary participation. These features could also be used as helpful guidelines in the creation of good inconvenient interfaces.

However, one notable difference exists between games and inconvenient interactions. Although most games are designed to achieve player attraction, the time available prior to the development of players' loss of interest is not endless. Once players achieve their goals, or simply lose interest in them, they might move on to other games. On the other hand, we hope to

provide interactions that might be less attractive, or that might inhibit performance of normal tasks, that individuals must perform prior to the satisfaction of necessary actions.

Therefore, we designed HappinessCounter to provide extremely minimal feedback that consists solely of acknowledging sounds and low-resolution smile icons provided by the LED matrix. We also included a small challenge (e.g., the refrigerator door will not open until the user who stands in front of it smiles).

Ritual as Inconvenience

In our daily lives, we follow a set of actions prescribed by traditions that must be performed primarily for their symbolic values. This set of actions is often referred to as a "ritual" or a "manner." Rituals are inconvenient because they introduce additional efforts and require redundant actions that might be eliminated if satisfaction of individuals' needs are the final goals.

However, these redundancies could also serve as good examples of inconvenient interactions. For example, a Japanese tea ceremony is typically an inconvenient way to drink a tea. If an individual's only hopes to drink tea, then all manners and rituals contained in the tea ceremony are redundant and time consuming. However, when they follow these (unnecessary) actions, people can experience sophisticated atmospheres and they can become more aware of the taste and aroma of the tea. Social connections among tea party participants become strengthened and more intimate. (One of the original purposes of the tea ceremony was to provide a place for discussions that could occur across social class hierarchies.)

Ettore Sottsass, a designer and an architect, also mentioned rituals: "... You have to know that you are taking these objects [glass] and using them. It becomes a deliberate motion, makes you aware of your actions and the rituals of life ..." [6]. Similarly, if a wine glass created with very thin glass includes a delicate stem, we must take extra care when we use it. We must eliminate any reckless motions. As a result, an atmosphere filled with elegance may be created. Therefore, a delicate wine glass is difficult to handle (inconvenient), but this difficulty is important because it contributes to a graceful experience.

Inconvenient Architectures

Similar to traditional user interfaces, normal physical architectures are designed to increase human movement efficiency, increase ease of use, and allow barrier-free use. However, some architects intentionally create inconveniences in their work by claiming that these inconveniences attract human attention, increase the sense of being living, and, eventually, create a sense of satisfaction and longevity.

The architect, Shusaku Arakawa, believes in this type of architecture. He advocates inconvenience and claims that it serves as the key to longevity. The flats he has built "require their residents to exert themselves physically and mentally, which ... will help extend their lives" [3].

Although Arakawa's approach remains extreme, we recognize that many irrational features of physical space are important. For example, unevenness in room lighting helps create a richer atmosphere. The heaviness of a door evokes solemnity in a room.

Design Guides for Inconvenient Interactions

In this section, we list important features required in the creation of meaningful inconvenience:

CONNECT LONG-TERM BENEFITS WITH INCONVENIENCE:

For example, the acquisition of physical health often requires humans to make physical efforts. If an act of overcoming inconvenience were to correspond to a user's efforts, then the user would eventually receive long-term benefits.

CONNECT EVERYDAY NECESSITIES WITH INCONVENIENCE:

For example, if a small inconvenience is embedded in an everyday activity (e.g., the user must smile before he/she can open the refrigerator door), the required behavior will soon become a natural habit for the user.

CREATE A GOOD BALANCE BETWEEN NECESSITY AND DIFFICULTY:

If designed inconvenience is too difficult for users, they will abandon the use of the objects. Thus, this balance must be tailored to each user's ability level. For example, the amount of required exercise embedded in the Inconvenient Microwave can be controlled based on the user's physical skill level and age. Similarly, the smile detection threshold for HappinessCounter can be adapted to each user.

PROVIDE GOOD FEEDBACK FOR INCREASED SELF-AWARENESS AND IMMEDIATE SATISFACTION:

This is similar to features of good games. Individuals will become more self-aware when they overcome inconveniences.

Conclusions and Future Directions

In this paper, we discuss the importance of inconvenience as a new principle for interaction design. Because this study represents the first trial to attempt a serious examination of the value of inconvenience in the domain of human-computer interaction, we admit that our discussion is rather premature. Much more investigation is required. We hope this paper will trigger fruitful discussions and the performance of future system studies within the HCI community.

The concept of the promotion of inconvenient interactions appears to be almost a denial of traditional user interfaces that include convenience and efficiency as clearly agreed-upon goals. However, this was not our intention. A good user interface should eventually provide different types of benefits for users. In addition, we would like to mention that some types of benefits, such as health, self-awareness, satisfaction, and sophisticated atmospheres, cannot simply be acquired by the replacement of human operations with computers.

Charlie Chaplin's famous movie, "Modern Times," caricatures a world that sought ultimate rationalism and automation. That world was not appealing. Yet, we do suggest thoughtful consideration of the inclusion of inconvenience to create more meaningful lives.

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