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p56

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Other foci of current and past research are various topics such as affective computing, the future of work, and interaction with agentive technologies (i.e., Otherware), both in the form of digital and tangible artifacts. He publishes on the mentioned research and design areas in relevant national and international conferences and journals (peer-reviewed). His work has been published and discussed in various national and international journals, blogs, books (e.g., Evgeny Morozov's bestseller "To Save Everything, Click Here."), and magazines such as the New York Times, Wired, Fast Company, and the R&D Salon of the Museum of Modern Art, New York. Moreover, his work is part of the Deutsche Museum's permanent collection, the world's largest science and technology museum.

Friction as a means of choice

ORIGINAL VERSION / VERSIÓN ORIGINAL

The wish to change something is a fundamental human characteristic. People strive, for example, to spend more time with their loved ones, engage in physical activity, eliminate bad habits such as excessive consumption of sweets or alcohol, or do good for the environment. This drive is interrelated with individuals' self-actualization, progress, adaptability, or the capability to adapt to new circumstances.

One way to change is to change everyday choices and practices. For example, in the evening, one is faced with the choice of giving in to a craving for something sweet like chocolate (just thinking about it makes me crave chocolate) or acting rationally and choosing an apple (because, as everyone knows, "An apple a day keeps the doctor away"). This conflict

between immediate gratification through chocolate and choosing an apple for long-term health, which represents an abstract, future-oriented, and rather uncertain state poses a challenge. In this dilemma between immediate pleasant gratification and future abstract goals (see also discounting, e.g., Samuelson, 1937), lies one of the challenges in making changes.

And as if it wasn't exhausting enough, this challenge is accompanied by another difficulty –the fight between two systems – in psychological theory they are defined as two-system models. Hofmann et al. (2009) explain that these models assume two structurally different information processing systems: a reflective system that makes slow decisions using many cognitive resources and an impulsive system that uses learned and often repeated behavioral routines. Resisting an impulse (such as consuming chocolate) and consciously choosing an apple instead (a reflective choice) requires self-control, which is, unfortunately, a limited resource that gradually depletes with frequent use. At the end of the day (quite literally), impulses win the battle for our behavioral control, and we find ourselves, for example, on the couch with a chocolate bar. Thus, change largely involves resisting the many immediate temptations (i.e., impulses) in favor of long-term abstract goals, which is challenging when the resource for resistance, namely self-control, is limited.

In this challenging struggle, some external support can help people pursue their future abstract goals in the long term.

In HCI, a dominant strategy for behavior change through interactive technologies is using appeals (also see Persuasive Technology by, e.g., B.J. Fogg [2003]). Appeals are rhetorical approaches based on the widespread belief that change is based on insight. For example, sports trackers or smart electricity meters inform individuals about inadequate physical activity or high power consumption. Although they are interactive technologies (in the form of a smartwatch or smart home appliance), they are merely personalized appeals that do not influence impulsive behavior. They can never prompt a person to change their behavior in a specific situation, such as taking the stairs instead of the elevator (e.g., beneficial for daily step count) or taking shorter showers (e.g., beneficial for saving electricity in everyday life). Appeals assume that individuals may not know that chocolate is not ideal to achieve their goal of eating healthier or losing weight and that this is why they consume a chocolate bar in the evening. It becomes clear that this assumption may not be entirely true. Even when individuals know that they should take the stairs more often, that chocolate is unhealthy, and that they should consume less electricity, integrating these changes into daily life is challenging. Rhetorical appeals appear to be too weak in this regard. Instead of appeals, what is needed are effective alternative routines that can be implemented in daily life. The question then is, how to disrupt old routines and implement new goal-directed routines in everyday life?

Another approach in HCI, known as situational interventions, offers many advantages in this regard. They aim to change behavior by disrupting routines and presenting alternative courses of action in specific situations. Situated interventions can change the context and materialize behavior, for example, through nudging [Thaler& Sunstein, 2008]. By offering behavioral alternatives, situated interventions question established behaviors and ultimately break routines. However, such interventions that interrupt actions come with resistance from individuals.

In contrast to neutral and informative appeals, interventions take an active stance. One specific approach for such situational interventions, we introduced in HCI, is the Aesthetics of Friction (AoF) [Hassenzahl & Laschke, 2014]. The products of such an AoF are called "Pleasurable Troublemakers" (see both boxes on Keymoment and ReMind). The AoF is an approach to designing interactive technologies for behavior change. Such an AoF must consider two aspects: the friction itself and its acceptance.

Creating friction to instill change

As interactive objects, Pleasurable Troublemakers interrupt unreflective routines in specific situations where providing goal-directed behavior and a moment of reflection seems particularly appropriate. A crucial moment in this process is the interruption, which should occur when a choice has been made and can still be changed. Keymoment [Laschke et al., 2014], for example, is deliberately placed as a key rack in the hallway, as this is the place where mobility decisions can be made, considered, and still changed. ReMind [Laschke et al., 2013] is part of the home, providing the opportunity to consider and choose possible activities. Troublemakers are thus highly context-dependent, concrete, and present in moments where choices can still be changed. Moreover, both objects are tangible. While Pleasurable Troublemakers do not have to be tangible objects, there is an immense potential that comes from their tangibility. For instance, ReMind and Keymoment cause objects to fall (the bike key or pucks with goals) to change the users' context. As a result, they inevitably insist, much like Peter-Paul Verbeek's example of a speed bump that shakes the car and the driver, making it immediately apparent that one has been going too fast [Verbeek, 2006]. The resulting friction highlights unconscious, "unwanted" behavior, and the alternative shows a way out of it. The Troublemaker becomes a sort of materialized "implementation intention" [Gollwitzer, 1999] – a simple plan for "better" behavior. However, friction can also evoke negative feelings and even reactance [Brehm, 1966] if not adequately designed.

Easing friction through understanding

Therefore, Troublemakers need to be understanding. They must allow for the conscious disregard of suggested behavior. Perhaps one wanted to make a big grocery shopping trip in the suburbs, or it was pouring rain. There are many valid and less valid reasons to disregard the suggestion of Troublemakers, and Troublemakers should acknowledge it. Troublemakers should never force people to do something. They instead suggest options to choose from. Our approach aims to make decisions more conscious, getting people out of their routines and enabling them to make a more conscious yet situational decision, either in line with their routines or goals. They want to make change more likely but recognize that everyday choices are complex and come with many difficulties. From a design perspective, understanding and easing friction can take different forms. One way is to allow for cheating. Another way could be humor or irony (for both means, see ReMind and Keymoment). Both indicate that, in the end, what to eat or what mode of transportation to take remains the free choice of the individual, not the choice of Troublemakers. While Troublemakers actively facilitate certain changes, they also remain disinterested objects – also a way which might represent naivety and irony. They do not care about health or sustainability and are unaware of such considerations. Alternatives, naivety, humor, and understanding are supposed to make the friction bearable. They transform Troublemakers into what we call "Pleasurable Troublemakers."

Keymoment - A key rack that makes me think

Keymoment [Laschke et al., 2014] addresses the challenge of both contributing to the environment and promoting personal physical activity (Figure 1). The World Health Organization suggests integrating biking into everyday life, for example, on the way to work, to achieve these goals [World Health Organization, 2010]. However, implementing this goal is easier said than done. Keymoment materializes a simple plan to implement this goal. It is a key rack placed in a common place, such as in the hallway or near the front door. It holds the bike key and the car key side by side. This way, Keymoment confronts people with the choice between biking and driving. Taking the bike key, one chooses the alternative that leads to the "desired" goal. However, if one consciously or unconsciously chooses the car key, the bike key falls to the ground, which most people pick up. With both keys in hand, one faces a real dilemma: take the bike or stick with the car. This way, Keymoment breaks the routine of grabbing the car key and encourages people to think. Moreover, Keymoment offers a goal-directed alternative in the form of the bike.

Still, dropping the bike key can be annoying. Finally, one wanted to go with the car, not the bike. While taking the car was initially an easy decision, one suddenly finds themself in a situation where they must internally justify this choice. Keymoment asks individuals to make a thoughtful decision and presents them with a choice. This can cause friction. To make the friction created more bearable, Keymoment includes some design elements. For example, you can take a break by placing your bike key on the Keymoment (Figure 2). The ability to cheat the system is also part of its design (Figure 3).

Additionally, one can exchange the bike key with the car key, which causes Keymoment to suggest the car key, even if the person initially reached for the bike key. However, because it is difficult to cheat oneself, Keymoment creates an ironic moment – a moment that can be humorous and revealing at the same time. Other elements of understanding could also be considered. For example, Keymoment could pause dropping the bike key when it rains.

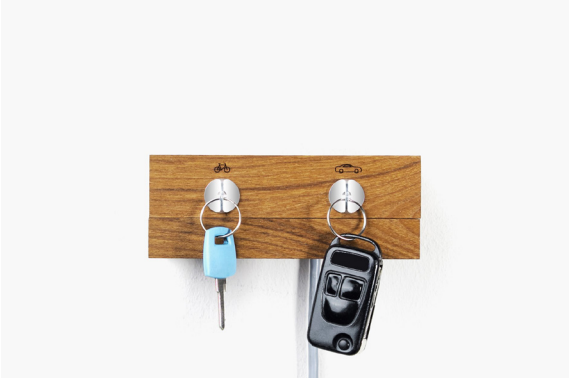

Figure 1. The Keymoment with a bike and car key side by side.

Figure 2. The bike key on top to pause the mechanism

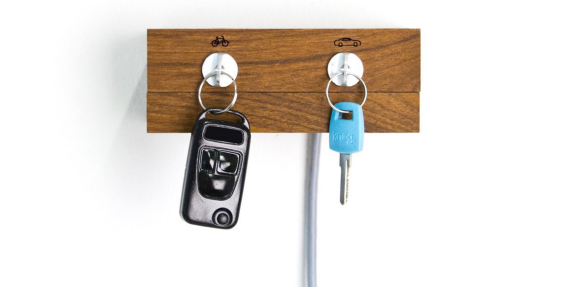

Figure 3. Changed keys enables cheating the system.

Figure 4. ReMind as part of the home.

Figure 5. Writing a goal on a puck.

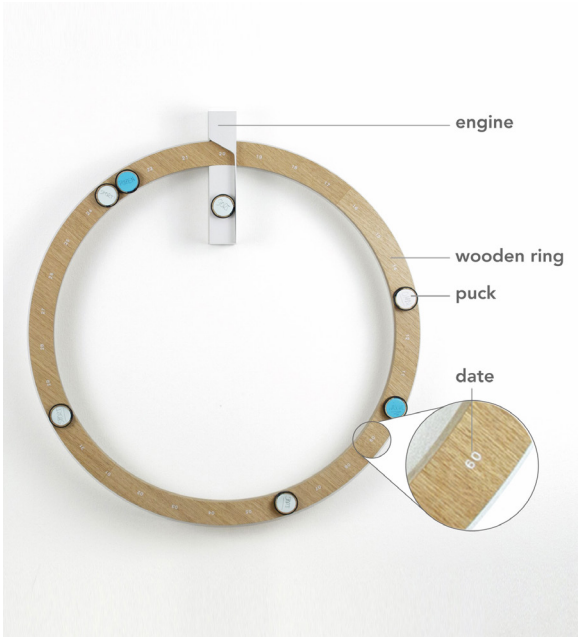

Figure 6. ReMind in its several parts.

ReMind - Get it done, postpone it, or sweep it under the carpet

ReMind [Laschke et al., 2013] is a Pleasurable Troublemaker designed to help people overcome procrastination and make them reflect (Figure 4). It is a wall-mounted hybrid of a calendar and a to-do list that constantly confronts its users with their self-set personal goals [Brechmann et al., 2013]. ReMind consists of a wooden ring (approximately 75 cm in diameter), a rectangular motor at the top, and ten magnetic pucks with Post-it notes (Figure 5). Each puck can be labeled with a personal goal. Since a key recommendation is to set a realistic number of personal goals, the number of pucks is deliberately limited to ten. This facilitates in-depth reflection on the selection of goals to be addressed next. The wooden ring has 31 sections (i.e., days), each with a number. Each section provides space for a single task to be planned for that day. ReMind also supports planning by limiting the period of planning to one month. More extended time periods encourage people to plan tasks very far into the future, which is not particularly helpful.

Over time, the ring rotates one section clockwise each day (for months with less than 31 days, these days are crossed out). At the top of the ring, the current day is always present (Figure 6). Additionally, at the top is a sort of barrier where unattended goals are stacked - just like in real life. When too many goals (i.e., pucks) gather at the barrier, they fall to the floor one by one. ReMind throws (to its user) undone goals on the floor. Picking up a puck from the ground becomes picking up a goal. An opportunity for choice is formed here: The user can complete the goal immediately, postpone it again by choosing a new date, or give up on it - by sweeping it under the carpet. By providing such a (tangible) choice, ReMind creates friction. This is intended to encourage users to think and act [Laschke et al., 2011].

Friction is necessary to bring about change but must be designed thoughtfully. To do this, we adopt three strategies from AoF:

naivety, understanding, and irony/ambiguity. For instance, ReMind is not particularly clever. It does not seem to offer elaborate algorithms to find solutions to the problem of procrastination. It's a to-do list, and its only power over its user is the almost pathetic ability to litter the floor with undone goals.

Moreover, ReMind does not create a choice that requires some superhuman powers to behave perfectly. Furthermore, ReMind allows for cheating by design. It is as easy as pushing a goal over the barrier and putting it off for another 31 days; or sweeping the puck on the floor under the carpet (i.e., out of sight, out of mind). In a sense, ReMind itself embodies procrastination by providing a 31-day time frame. By allowing the very same lapses that it wants to help overcome, ReMind shows some understanding of the complexity of the problem. ReMind becomes a "partner in crime," a mirror of the self. It is easy to cheat ReMind but challenging to cheat oneself.

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proyecta 56

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