Technology for Habit Change

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Abstract

Much of modern habit change stems from two disjoint approaches. Behavioral biologists study habits using brain imaging and rigorous tests, and often propose low-tech proposals for habit change. Designers build technological solutions with little behavioral grounding and test their solutions against naïve control groups. Habit change remains difficult and the time is overdue to merge the technological solutions of designers with the rigorous theoretical foundation built by behavioral biologists. This paper describes my own attempts to design behavior intervention devices and how I, too, fell into the trap of designing without considering the underlying biological processes.

Introduction

Throughout history humankind seems to have struggled to eliminate the divide between who we are and who we want to be. The self-help industry has capitalized upon this struggle to the tune of billions of dollars a year. While reading books of this nature feels good because it allows us to feel we are making progress towards changing ourselves, there has been considerable habit research demonstrating that it is very difficult to change our habits! This project proposes and explores ideas on how technology might assist us in habit change.

Related Work

There is much work on technology assisted habit change. Many of these interventions are targeted towards a specific domain such as weight-loss [Kidd, 2008] or exercise [Consolvo, 2008]. However, these technological interventions often do not incorporate the latest behavioral research on habit formation. They tend to design a product from a theoretical perspective and then measure changes against a control group.

This project is most similar to B.J. Fogg's principle of *kairos*, the opportune moment to persuade [Fogg, 2009]. Fogg argues that it is most effective for devices to target these moments in which we have the resources to commit to the decision.

I have recently become aware that Fogg has a habit creation program called Tiny Habits [Fogg, 2013]. Tiny Habits is a five day program to help participants create three new habits. Tiny habits must obey three criteria: performed at least once daily, take less than 30 seconds, and require little effort. Fogg further works to make habits stick by attaching new habits to existing habits. Fogg requires that participants formulate new habits into the format of "After <old habit>, I will <new habit", for instance, "**After** I brush, **I will floss one tooth**" and "**After** I pour my morning coffee, **I will text my mom."**

Fogg does a good job of designing a low-tech solution around current behavioral biology research, but we still lack technological solutions. Much of current behavioral biology research is summarized in [Duhigg, 2013] which looks at habit change through fields as diverse as advertising gurus who attempt to create new habit patterns for product use and Alcoholics Anonymous who try to break bad habit loops:

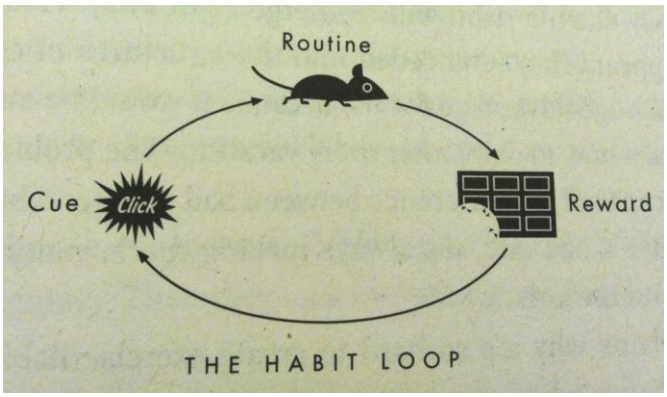

Figure 1: Habit loop as presented in [Duhigg, 2013]

Early prototype

Some of the early prototypes I designed fell into the trap of trying to change behavior without considering the habit loop. For instance, I began by trying to build a corpus of daily behavioral rules used by influential individuals. I imagined this to be a free database of intelligence, so that you can learn daily intelligence from others by adopting their "program" for yourself.

I approached academics in CSAIL and Media Lab to ask them for rules that have "helped to define who you are." More than twenty people sent in their rules and the compiled list is available here: https://dl.dropboxusercontent.com/u/22304894/csail%20and%20media%20lab%20rules.txt Many of these rules did not seem meaningful enough to enact life changes. I found it difficult to transfer rules to other people. I was not inspired to adopt a few scattered rules from one person and others from another person.

I thought that it might be more motivating to adopt all the rules belonging to one person, thereby dramatically "reprogramming" myself. This approach attempted to dig up intrinsic motivation for change by tapping into admiration that the user might hold for these mentors.

I pulled rules from an email by Marvin Minsky, rules described in Surely You're Joking Mr. Feynman by Richard Feynman, and the Poor Richard's Almanac by Benjamin Franklin into a new corpus that had multiple rules from each of these respected people. I built out a program to randomly insert reminders to execute a habit directly into a user's Google Calendar. Each day, a user could choose which mentor she would like to emulate. The program would insert mentor habits to execute at random times throughout the door. The program would then rely upon Google Calendar's notification system to send text message reminders to a user's phone. This project attempted to test the hypothesis that users might be more willing to execute habits if they belonged to someone they respected than if they were random habits.

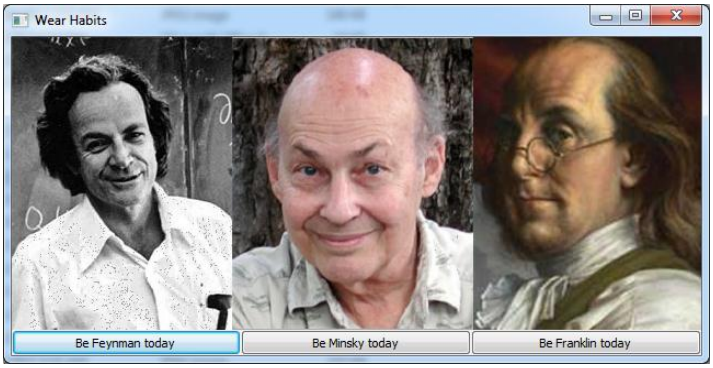

Figure 2a: Screenshot from mentor-based habits

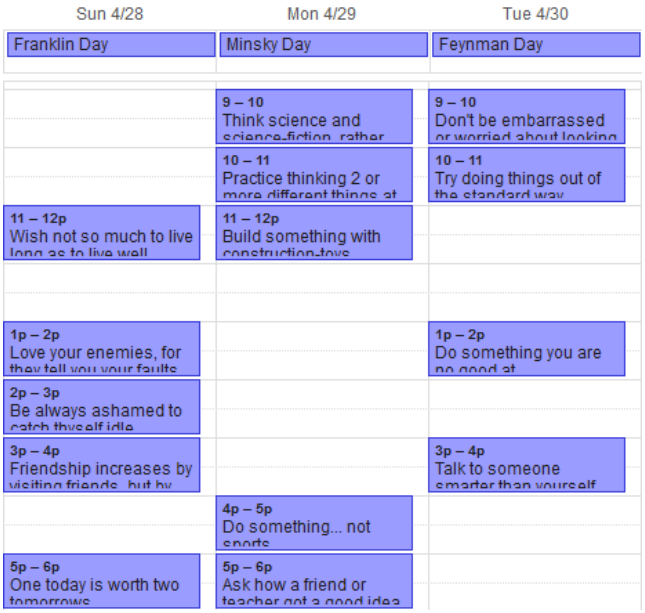

Figure 2b: Screenshot from mentor-based habits

However, after building out the system, I found that I did not actually want to use the system myself. Upon reflection, the program seemed to be too static. The program did not seem to have enough intelligence by itself. For my next iteration, I decided to make several changes:

1) Existing events on the calendar are used to schedule new events
2) Calendar events are dynamic based on personality goals of the day

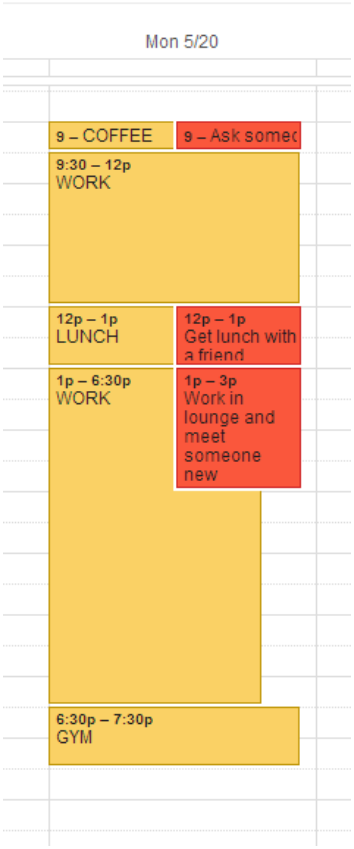

Figure 3: Screenshot from personality-based habits

This second iteration of personality-based habits is not perfect, but unlike mentor-based habits it tries reuse existing cues or triggers in the user's schedule. For instance, the existing habit to get coffee or to get lunch is reused to do execute the desired more social behavior. Personality-based habits still use the Google Calendar backend to provide just-in-time text alerts via the user's phone.

What I learned from this project is that humans are not as programmable as computers. It is very difficult to get humans to change the algorithm that humans use to run their lives. It reminded me that when attempting to change humans, it is important to begin with proven practices rather than theoretical ideas.

Future Work

In the future, to give the program a greater sense of intelligence, I think it is important to include use of a phone GPS. (Side note: A phone was chosen rather than an Android watch because most smartphone users already have habits associated with their phone. When a text message comes in on the phone, most people check it immediately. I experimented with wearing an Android watch that provided similar functionality to the phone, and noticed that I lacked preexisting habits associated with the watch. I found the watch to be bulky and with poor battery life. Using an Android watch would require the adoption of additional habits, and habit change is hard!)

The GPS technology can be used to give suggestions in the same way as the calendar. For instance, when the GPS detects that a user is in the vicinity of the gym, it may give a kairos suggestion to hop in for a few minutes.

However, unlike the calendar, the GPS can additionally be used to monitor compliance. If the GPS has never entered the perimeter of the gym, it is likely that the user has complied with the suggestion. This is useful information that the program should take into account in order to alter suggestions for the next time.

Much of the work in this project has centered on the "cue" component of Figure 1. It may also be interesting to look at technological solutions to the "reward" component of the same figure. One possible solution is to help users build a photojournal of "small wins". Small wins are small tasks that give an immediate feeling of victory in such a way to increase motivation for undertaking more daunting tasks [Amabile, 2011].For instance, it may be motivating for users to document instances in which they execute a healthy habit. When the system suggests eating a salad, the user can snap a picture of the purchased salad. Then the system suggests inviting a friend out to lunch, the user can take a picture of the friend. The aggregated pictures then double as lifelogging and a feel-good photojournal of motivation.

Everywhere Learning

The project relates back to the class theme of "everywhere learning" in that it seeks to change behaviors in crucial moments. It attempts to apply intelligence in the field and assist in the translation of theoretical knowledge to concrete actions, by offering suggestions based on the user's environment. It follows the vision of [Tsumaki, 2012] in which a friend can reside on your shoulder and watch you throughout your day. This project concentrates on daily behavior change, but harkens back to the vision of contextual, in-field, everywhere learning.

Conclusion

Behavior change is a difficult process. When building devices for changing individuals, it is important to be mindful of the human habit loop. Without considering the habit loop, adoption of new devices will struggle since humans perform many actions simply out of old habits. In the same vein as [Xia, 2013], devices can augment our ability to change habits by augmenting any process within the habit loop. Technological devices can intervene in the habit loop by (1) sensing the environment and pointing out cues or (2) offering rewards for entrenching the loop. It may be easier for intervention devices to build upon preexisting habit loops rather than create new habits from scratch.

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