

*This experiment will literally change your life*

How well do you know yourself? Does exercise lower your heart rate; does being productive makes you happy; does a long commute reduces your sleep quality? Usually we learn by hearing about “studies” from the news, articles, and other people. These studies are done on a sample population, usually through randomized controlled experiments. But everyone has different responses and sensitivities; these studies only show that there is *some* change for *some* people. In this assignment, you will perform an  $N = 1$  experiment to change your own behavior, and see if what happens is what you expect by making frequent measurements.

## 1 Experimental Design

Take some time to think about your experimental design: what do you want to change, and how will you measure the results? You will likely be performing what’s called an interrupted time-series quasi-experiment or regression analysis, which means you will manipulate a variable by changing your behavior at least once during the data collection. What are the variables? You decide. *You must have at least one independent variable and two dependent variables.* You may also use some non-personal data like weather and time (time of day, weekend vs weekday), if you think that they may be interesting independent variables (maybe you want to see how weather affects your mood or sleep).

What are your hypotheses? You decide. Your hypotheses should clearly state what you expect to happen (if you make one variable increase does it cause another variable change? In what direction and by how much?). Ideally you will have at least two related hypotheses based on your two dependent variables. You may want to think about how you will show a causal outcome. One way is to change your behavior and change it back (called an ABA design), but watch out for delayed effects. Consider what are the assumptions you are making and what are the possible confounds or biases. How much do you expect the measurement errors to be?

## 2 Collecting Data

You will be using some sort of digital device to track multiple variables about yourself across at least 4 full weeks (28 days). For example, these variables could be:

- location data captured by the GPSLogger app or Google Location History
- mood (e.g. happiness) through a mood tracking app
- heartrate captured by a Microsoft Band
- step count using a Jawbone UP or iOS Health app
- productivity using a time tracking app or in a spreadsheet
- sleep activity data (movement, noise, lighting) captured by the Sleep as Android app
- spending through an export from your bank or with a finance app
- weight measured by a digital scale

You must be able to collect at least one data point per day, preferably even finer resolution data. Spend some time figuring out how you will extract the data from the app or device. Be warned—many apps or devices do not let you export data easily! For example, the FitBit may only give you a daily summary of your steps, and not allow you to export the data. Leave yourself some time at the end to do a final analysis of your complete data. So I'd recommend starting the data collection by February 28 at latest.

### 3 Analysis

The final part is the payoff—analyze your data and/or create visualizations to verify your hypotheses. Do not wait until all your data is collected before you do this.

As you are performing your analysis, ask yourself whether the results matched your expectations. What did you learn? Are the results convincing? How do you know if the outcome was due to random chance or if there was an actual change/difference? You should consider using some statistical techniques to show this. Some basic methods are regression, chi-squared tests, and difference in means tests. For computing effect size for a single subject experimental design, take a look at Hedges'  $g$ , which is a less biased version of Cohen's  $d$ . Don't be afraid to search online for statistical techniques or to use experimental statistics software; many people who run experiments are self-taught in these techniques (especially in HCI).

### 4 Steps

Write the variables you are tracking on this spreadsheet <http://bit.ly/17mC14v>, along with your hypotheses, by February 27. You cannot have the same combination of hypotheses and variables as another student. For the midpoint (March 6), be prepared to describe your experiment and hypotheses in class, and present any preliminary analyses. If you do not get a chance to share in class for the midpoint, email Alexandra noets about what you have done so far.

As usual, **document everything!** Keep a journal of your work as you go. Report your ideas, what procedures you followed, what results were observed, and whether that was expected. A reader should be able to reproduce your experiment. Your assignment handin will be shared with the group assigned to write their group paper based on this assignment.

Together we will learn whether when and how self-experimentation works. Your grade will be based on applying good data collection practices (2 points), coming up with interesting hypotheses with rigorous experimental design (6 points), midpoint progress (2 points), clearly describing assumptions, biases, validity (2 points), providing convincing evidence to support your hypotheses (8 points) for a total of 20 points.