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Essay Two

Each day, millions of people wake up, brush their teeth, shower, and grab a cup of coffee. They then either read, watch, or listen to the news in some fashion. Some mornings, people are pleasantly surprised to find some joy in the news; however, in most cases, the news only reports on tragic events. A proposal for an experiment would be to measure people's moods throughout the day, based on the first piece of news they consume in the morning. This is an interesting experiment due to the ability to potentially create a "happy" population by introducing people to some good and lighthearted news at the beginning of their day. Thus the question posed is: *can reading an upbeat and pleasant news article to start off one's day help improve their general feeling of happiness throughout the day?*

Examining this experiment mathematically, we first consider the possible groups of people. Let $D = 1$ represent people who receive positive news in the morning, and let $D = 0$ represent all other people. The potential expected outcomes are also binary, with $Y(1)$ being that a person is happy throughout the day, and $Y(0)$ representing anything that is non-happiness. Thus, the experiment aims to see if $E[Y(1)|D = 1] >= E[Y(1)|D = 0]$.

This is an interesting experiment because it could cause a positive effect on society as a whole. People could potentially be happier and thus it could help prevent or alleviate depression or sadness in some way. It is also a straightforward experiment to conduct because the subject pool can be quite vast. Anyone who is able to read a news article on their phone is a potential candidate to participate in the experiment. Coworkers, classmates, and relatives are all prime and readily available candidates for the experiment. At first, a form will be sent out asking if someone would like to participate in a study (perhaps with an incentive of a $5 Starbucks gift card). They would need to provide their phone number and email in order to register as a potential candidate for the experiment.

Participants will be exposed to a positive news article sent to their phone at 6 AM PST. They will then be asked to send a reply back saying "read" to confirm that they have indeed read the article (if there is a way to have "Read" receipts, this would also work). Ideally, participants can read the article on their phone (it will be a short article) quickly and without much hassle. At 12 PM, an email or text will be sent out asking to fill out a quick survey consisting of one question and a Likert scale. The survey will have a question such as "How would you rate your mood right now?" This would then be followed by a 1-10 scale in which participants would be able to rate themselves a higher number like 10 which would signify very happy or a low number like 0 which would denote how sad they are. The median of 5 will signify "alright". Additionally, the survey may also have a text box that states "Describe your day in a short sentence." The subject's sentence will allow us to also gauge happiness depending on how positive or negative the sentiment of the sentence is.

It is expected that the majority of applicants will have clustered responses that around the middle of the scale; however, any deviation or variation in clicks toward "happy" would be meaningful. Another survey will get sent out at 6 PM with the same question and check boxes; however, the participant will be required to fill out another text question with a quick sentence on how their day went. Researchers would look for keywords like "work", "school", or "relationship" in order to potentially account for externalities to the subject's mood. This would allow the researchers to track any outside influence that may skew results in some way.

Those in the control group will be exposed to a neutral article sent to their phone at 6 AM PST. The same responses will be sent out to them asking for their feedback and thoughts throughout the day. One of the potential challenges is finding neutral news articles. The researcher might conduct a search on Arxiv in order to find a random study and then send that as a "neutral" article.

An interesting challenge will be varying the treatment. For a subset of the participants in the treatment group, two or three uplifting news articles could be sent out before the surveys are sent. Thus, these subjects will be exposed to pleasant articles throughout the day and researchers will be able to monitor the impact of these articles directly by the survey sent after. Another possibility would be to vary the articles sent to each participant. A participant would randomly receive a neutral article throughout the process and the survey would allow the researchers to determine the supposed effect of the article on that participants general happiness.

Randomization will be done throughout the experiment. The first time randomization occurs will be during the selection of the treatment and control group. Amongst those who sign up, candidates will be blocked out by gender and age. The researchers will then randomly sort the participants from each bucket into treatment and control groups. This will ensure that each "demographic" has a likely chance of participating in the treatment group. The study may chooses to implement blocking techniques for either gender or age (or both) of participants, since this may be a factor of happiness. Perhaps some genders are happier than others, or some elderly people are happier than younger students. Blocking will allow researchers to account for this difference when calculating the average treatment effect. Since happiness is generally universal, there will be no need to apply clustering techniques. After the randomized selection, variation to the treatment group will be done at random. At a random day, a participant in the treatment group may receive a neutral article. Another instance is randomly, a participant will receive multiple upbeat articles throughout the day. This will allow for random chance variation in the treatment group. Finally, upon conducting the analysis, randomization inference will occur when calculating the average treatment effect for the groups. The `sample` R function will be used to generate "randomized trials" and then analysis will be conducted on the shuffling. Replication will occur in this analysis at least 10000 times.

Apart from the randomization of the sample which will be independently and identically distributed there is no clear way to easily create independence. Ideally the best way for further independence is to have subjects from around the world and then randomize their selection;

however, that does not appear to be feasible. Another way to potentially create independence is to limit the exposure of participants to media. This would allow happiness derived from the article to be measured independent of any other media form. Finally, researchers will look for ties between any two participants before the selection process in order to reduce cross contamination. One's friend, coworker, or significant other may have an impact on their happiness.

The measurement of one's happiness is the primary outcome that this experiment is concerned about. This is also going to be the most difficult metric to measure. The survey is the primary indicator of happiness with a higher score being awarded to the "Happy" category, middle score for the "Alright", and a lower score to the "Sad" category. Ideally, participants would be able to also have a friend submit a "confirmation of happiness" survey that ensures that their friend also notices and experiences the subject's happiness. Happiness is a hard metric to measure since there is no direct biological connection to measure happiness. Heart rate could be measured; however, heart rate is also likely to increase due to an endorphin rush which could be attributed to be happy or euphoria. High heart rate could also be caused by stress, anger, or exercise, thus there are some downfalls with this metric. Additionally, it will be difficult to account for confounding variables like a sudden promotion at work or a death in one's family. One's biological conditions may also play a part in their happiness, thus the researchers will need to control for this in some way. While these variables may skew the study, hopefully the written aspect of the survey will allow researchers to account for these events in some way. An important topic to note is that if a subject's score is low enough, the wall may be broken between the researcher and the subject to ensure that the subject is mentally and psychologically ok. While this might cause the subject to be dropped from the study, the researchers take the personal health of each of the participants seriously.

The secondary outcome that seems most measurable is the reason for a participants sadness. Sadness is also a difficult metric to measure; however, researchers will use the written response in the survey to control for this. If a participant in the treatment group that generally responds well to treatment suddenly responds negatively, researchers look to the text to provide clues. Key words in the written response will be analyzed and weighted using an NLP sentiment algorithm to provide a sentiment. This will allow the researchers to find a common cause for why the participants in the study may be sad despite receiving the positive article.

Other covariates that could be collected is the amount of hours exposed to media. Exposure to social media, news websites, or even regular television sitcoms could have an effect on happiness. Regardless of one's exposure to a positive news article, if the rest of their day is filled with negative news, this will skew their mood. Therefore, a weight could be applied to the categories in order to assess the impact of that medium on one's happiness. Hours on channels such as social media, television, and general online activity can be measured to help provide more indications toward one's current mood. Generally, the primary concern is to receive the "impact" of the happiness article on the treated subject.

This experiment is relatively straightforward to conduct. The researchers can create a databank of "positive" and uplifting news articles and then set up a service like Twilio to send out the text message each morning. This takes out the manual process of sending out a text messages. The duration of this experiment would be two weeks and an automated service would allow for consistency in exposure to treatment. A service like SurveyMonkey will be used to conduct the survey and analyze the results. Python and R have sentiment analyzer libraries that can be used to analyze the sentiment of the subject's written response. These services and analysis can all be automated. The surveys will be sent automatically via text or email, and schedulers will be implemented to conduct the analysis in R or Python once results are received.

It is important to note that there is no experiment on sending subjects negative news articles. The purpose of this experiment is to help increase one's happiness, not decrease it. As stated earlier, researchers are taking great care to ensure that a subject is mentally and emotionally stable so that they are not constantly filling out "sad" survey results. Therefore, due to this concern, the experiment is currently excluding any interventions that may decrease a subject's mental health and overall mood.

Despite the simplicity in conducting the experiment, it will be difficult to determine causality from the results. Happiness is a metric that psychologists and economists have struggled to gauge appropriately, and the researchers of this experiment are using a survey as a best guess in order to measure this metric. This has many faults, top of which is bucketing one's feelings into numerical categories. An obstacle in conducting this survey is enforcing participation and reducing churn. A monetary incentive would be great; however, people may get annoyed and deem a $5 Starbucks gift card unworthy of their time. The research team truly hopes that participants will stick through the experiment because they may be in a happier mood due to treatment. If there is some connection to positive news articles and happiness, perhaps the general media would consider starting off the morning with uplifting news and leaving the tragic news for later on in the day.

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