"MTurk social reappraisal training"
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Introduction:

"MTurk social reappraisal training" is a psychological experiment about social emotion regulation by Dr. Noga Cohen (Haifa University), that aims to find out if we can learn how to regulate our emotions better and provide support for others by doing it. The experiment consisted of two types of training, that two different groups underwent:

The Provider group: their training included reading an emotional event, written by another participant, and helping him/her reframe it, in order to make them feel better.

Eventually every subject in the group filled a questionnaire about his own feelings before and after the process of helping someone else.

The Self group: their training included writing about a significant event that happened to them, and then reframing it. Eventually, they rated their emotions again due to their own stories.

Therefore, our Research Question is: To what extent different types of training helps regulate emotion.

The general topic that this experiment contributes to, is how to regulate and control emotions. The experiment tries to solve this by testing two different methods of emotional training and see if they influence on the subjects' emotions during and after the experiment. The specific problem that we concentrate on is how the train type affects the results of the questionnaire and the result of the research question.

The purpose of this project is to see if there are ways to regulate emotions efficiently and to compare the different effects on the groups.

It is important to know how to control our emotions in our daily lives and in many kinds of situations. In addition, it is important to see if people can effectively help others to regulate their emotions and support them.

A difficulty that was risen is that not many studies in the field of regulation of emotions were conducted. Prior research like 'Understanding Others' and 'The neurological bases of understanding others' by Philipp Kanske & Ryan J.Murray has focused mainly on the impact of extrinsic emotion regulation (EER) on the recipient. Yet, according to the article 'On the benefits and costs of extrinsic emotion regulation to the provider: Toward a neurobehavioral model' by Noga Cohen & Reout Arbel, the assumption is that EER may also have emotional and physical consequences for the provider : "Understanding who benefits from helping others regulate their emotions and under what conditions is crucial in understanding the mechanisms that reinforce well-being and social ties."

We expect to witness positive outcomes in both experiments, because recognizing one's feelings, understanding them, and writing them down could increase the personal awareness of their feelings towards the event, and a desire to improve them. We base our assumption recording to the article 'Cognitive emotion regulation: a review of theory and scientific findings' by Kateri McRae: "One commonly used, and largely adaptive strategy is cognitive reappraisal, which involves changing the way we are thinking about a situation in order to change how we feel. Research indicates that this strategy is generally more adaptive than other strategies, such as expressive suppression (in Western cultures) and under certain circumstances, distraction."

Therefore, we believe that the provider group will present better outcomes than the self-group, and that's because in our opinion the chances of improving your own feelings while helping another person distress is greater than trying to help yourself.

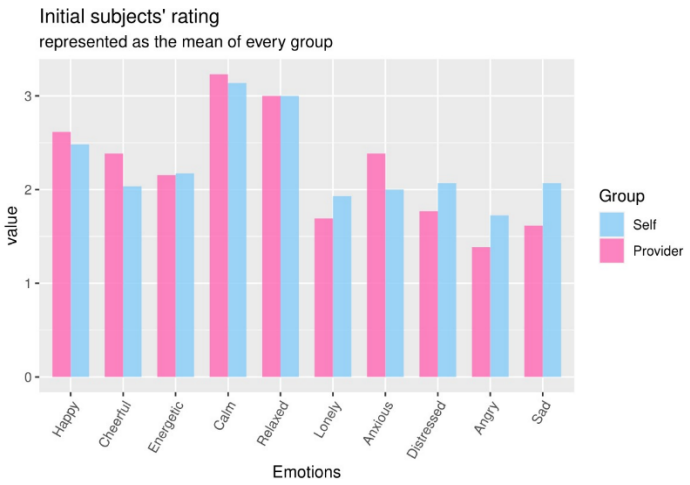
Data overview:

The data contains two entities which are the two groups in the experiment, every group represents the training method. During the experiment, both groups answered questionnaires about their own feelings before and after the reframing process. The participants repeated the process of filling the questionnaires 8 times during the training period, which took 3 weeks.

The training period consisted of writing assignments, as well as pre-training and post-training measures of depression, anxiety, and emotion regulation skills.

each training session of each subject, consisted of an explanation of the emotional event that the subject analyze, his reframing of the event and his emotions and feelings rating on a scale of 1 to 5. The provider group rated their feelings

before the training, after the training and they rated how they think their study partner feels (after reading their answers). In addition, they rate their own emotions and questions about their self-esteem. As well as the provider group, the self-group rate their feelings about their own events before and after the training, in addition to self-esteem questions after the training.As part of the examination of the data, we wanted to compare between the two groups' initial filling of the questioner, so we could know that the groups are not different emotionally.



We can see that there are minor differences between the groups but overall, they have a similar starting point.

Methods and results: We chose to focus on analyzing the positive emotions to see the effect of the experiments on the participants and thus conclude which experiment had a better effect.

The process of creating 2 multiple regression models :

Each model is built by a different data table (Self or Provider). There are 5 independent variables that represent the five positive emotions and a dependent variable that is the average of the positive emotions at the end of the experiment. The models were built by a training set of 70% of the participants from each table and 30% as the test set. The models predict the average positive emotions of each participant in the test set at the end of the experiment. We performed tests to check the coefficient of the models and calculated the MSE to examine the models' error.

Self-group regression model :

We created a multiple regression model according to the positive emotions of the participants in the self-group :

$$\hat{y}_{self} = 1.6162 + 0.6026 * happy - 0.4931 * cheerful - 0.6258 * calm + 0.6670 * relaxed + 0.1090 * energetic$$

First, we calculated the MSE to examine the error of the model:

$$mse_{self} = 0.0007795524$$

then, we wanted to check the coefficients of the emotions, using R we found the Confidence Intervals for the model parameters (in confidence level of 0.95 %):

	2.5 %	97.5 %
(Intercept)	0.28588086	2.94647659
mood1_2_happy	-0.09566067	1.30087725
mood1_5_cheerful	-1.07879762	0.09256433
mood1_6_calm	-1.28585465	0.03435421
mood1_8_relaxed	-0.02846495	1.36252577
mood1_10_energetic	-0.31958149	0.53756672

As we can see, all parameters are significant and fall in their confidence intervals.
In conclusion, the model is significant.

Provider group regression model :

We created a multiple regression model according to the positive emotions of the participants in the provider group:

$$\hat{y}_{provider} = 0.4399 - 0.4554 * happy + 0.4979 * cheerful - 0.2635 * calm + 0.7744 * relaxed + 0.2673 * energetic$$

First, we calculated the MSE to examine the error of the model:

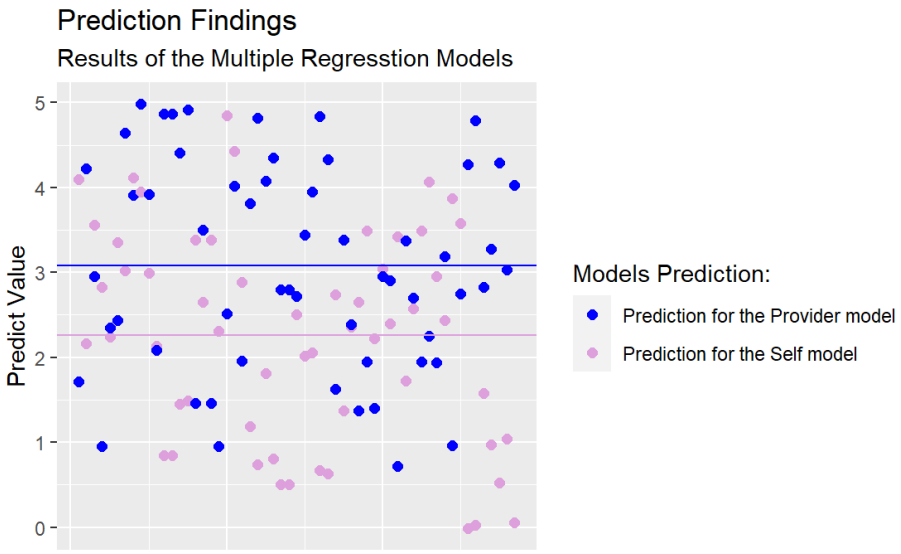
$$mse_{provider} = 0.005956294$$

then, we wanted to check the coefficients of the emotions, using R we found the Confidence Intervals for the model parameters (in confidence level of 0.95 %):

	2.5 %	97.5 %
(Intercept)	-0.95883499	1.8386005
mood1_2_happy	-1.05522480	0.1444512
mood1_5_cheerful	-0.16920737	1.1650173
mood1_6_calm	-0.92430073	0.3972243
mood1_8_relaxed	0.09936537	1.4493808
mood1_10_energetic	-0.08337272	0.6179468

As we can see, all parameters are significant and fall in their confidence intervals.
In conclusion, the model is significant.

In order to compare the models, we sent a survey identical to the one conducted in the experiment to our classmate's. We entered the results of the survey into the two models in order to see the difference between the models and thus the different between the treatments. That is to say, each record was tested on each model and two results were obtained.



As we can see from the scatter plot, there is a large overlap area between the ranges of the two models, but it can also be seen that the provider's points are grouped more in the upper range compared to the points of the self group which are grouped more at the bottom. From the results we can conclude that the provider treatment would have more positive effect on the participants as the average of positive emotions is higher in the provider treatment model than in the self treatment model, as seen in the graph and in the average lines of each group.
For now, we can recommend using the provider group training methods, even if the change is small between the groups, it better then nothing.

Limitations and Future work:

During our work, we encountered various limitations in our approach due to several reasons: The most significant difficulty is the limited data of the study.
First of all, the experiment contained a small group of participants, an unrepresentative sample of the population, that made it hard to test and train groups of the linear regression models to be accurate. In addition, we had a lack of data about the participants that could help us in the analysis of the study, such as gender, age, place of residence, marital status and more. Thus we found it very difficult to choose the method of analysis and the model type to predict the data. In our attempt to find any differences between the groups and effects of the different train types in the analysis phase, because the data contains small number range rating scales between 1 to 5, it was hard to identify a significant change, , despite the significance of model coefficients.
In order to overcome this limitation, we found an alternative solution by conducting a survey among our classmates, in which the results of that survey were inserted into the linear regression, for comparison of both training types.

Furthermore, if we had extra time we could have conducted another questionnaire for the participants to see their emotional state today.
This questionnaire would have made it possible to test the long-term positive effects of the experiment. It would help us to see if the participants changed emotional attitudes in dealing with day-to-day events. Also we would like to expand the experiment sample to a wider population.
For our experiment, if we had more time we would have created another regression model for the negative emotions and explore the comparison between the negative vs. positive emotion.

Appendix :

resources :

- 'On the benefits and costs of extrinsic emotion regulation to the provider: Toward a neurobehavioral model'
  by Noga Cohen & Reut Arbel
  Cortex publisher: Volume 130, September 2020, Pages 1-15

- 'The contribution of linguistic and visual cues to physiological synchrony and empathic accuracy'
  by Karine Jospe & Shir Genzer
  Cortex publisher: Volume 132, November 2020, Pages 296-308

- 'Understanding Others'
  'The neurobiological bases of understanding others'
  by Philipp Kanske & Ryan J.Murray
  Cortex publisher: Volume 134, January 2021, Pages 351-357

- Cognitive emotion regulation: a review of theory and scientific findings'
  by Kateri McRae
  Elsevier publisher: Volume 10, August 2016, Pages 119-124

Self group multiple regression model :

```
Call:
lm(formula = mean_after ~ mood1_2_happy + mood1_5_cheerful +
    mood1_6_calm + mood1_8_relaxed + mood1_10_energetic, data =
train_self)

Residuals:
    Min      1Q  Median      3Q     Max
-1.1352 -0.4320  0.2045  0.3386  0.7730


Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)         1.6162     0.6158   2.625   0.0210
mood1_2_happy       0.6026     0.3232   1.864   0.0850
mood1_5_cheerful   -0.4931     0.2711  -1.819   0.0920
mood1_6_calm       -0.6258     0.3056  -2.048   0.0613
mood1_8_relaxed     0.6670     0.3219   2.072   0.0587
mood1_10_energetic  0.1090     0.1984   0.549   0.5920


Residual standard error: 0.6759 on 13 degrees of freedom
Multiple R-squared:  0.4473,    Adjusted R-squared:  0.2348
F-statistic: 2.104 on 5 and 13 DF,  p-value: 0.1299
```

Provider group multiple regression model :

```
Call:
lm(formula = mean_after ~ mood1_2_happy + mood1_5_cheerful +
    mood1_6_calm + mood1_8_relaxed + mood1_10_energetic, data =
train_provider)

Residuals:
     Min       1Q   Median       3Q      Max
-0.83555 -0.18472 -0.02829  0.26103  0.51819


Coefficients:
                   Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.4399     0.6183   0.711    0.495
mood1_2_happy       -0.4554     0.2652  -1.717    0.120
mood1_5_cheerful     0.4979     0.2949   1.688    0.126
mood1_6_calm        -0.2635     0.2921  -0.902    0.390
mood1_8_relaxed      0.7744     0.2984   2.595    0.029
mood1_10_energetic   0.2673     0.1550   1.724    0.119


Residual standard error: 0.4608 on 9 degrees of freedom
Multiple R-squared:  0.8641,    Adjusted R-squared:  0.7886
F-statistic: 11.44 on 5 and 9 DF,  p-value: 0.001091
```