Telepathy☆

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Abstract

Telepathy is a familiar concept in our daily lives. We usually mention it as a hidden connection between people. More precisely speaking, it is transfer of information between people without use of any physical interaction. There are exact papers published regarding this problem and made some arguable results, but we think they did not consider some aspects which can be effective. Usually telepathy is occurred between people with strong common feelings and closed people. In the present study, we tried to consider these aspects. So, we designed a new experiment and collected data from ten pair subjects. The main goal of our study was to reach some new results and facts about telepathy using data analysis methods. As it was predicted, I did not reach appropriate p-value to accept the hypothesis which is that telepathy is existed.

1. Introduction

Telepathy is a phenomenon that you most probably face it in your life. Making connection among people without using any human sensory channels is a good definition for it (1). It is generally interpreted to be pseudoscience because lack of appropriate control of different effects in experiments designed to measure telepathy.Also it can play an important role in mind body debate whether it is proven or disproven. If it is proven, it can start a totally new branch of science and if it is not, it can reject many possibilities in human life.

One of the most famous experiment which is done about telepathy is ganzfeld experiment. The design of their experiment is in this way. At each experiment, two subjects were separated in two different rooms. A movie or a picture is showed to one of them and this subject had to send information to another subject mentally. Another subject had to describe what is received to him. (2).But there were also some problems which scientists said about their experiment.One of the important ones was that the video or photo and generally the stimulus was not generated randomly. So it made biased problems. (3)

In this study, the phenomenon is investigated with different approach and assuming some aspects we think they are important in telepathy study. Analysis are done using data analysis tools. The goal is to find some interesting and meaningful relation between different parameters effecting telepathy. So I first explain how data is collected and then I start to analyze data step by step to see we can find relation or not.

2. Results

2.1. Materials and Methods

At first, I explain detail of experiment design.

2.1.1. Experiment

In an experiment we had a pair of subject that they did not have any physical interaction in a room. Each experiment had two rounds. At each round, there were twelve trials(explained in power analysis section) that one of the subjects(sender) was stimulated by putting

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hand into cold water or warm water. First round one of the subjects became a sender, who was suffering from pain of cold water or calming with warm water and trying to send feelings to another subject, and the other one became a receiver, who was trying to receive another subject's feeling, and had to say current co-subject feeling at each trial. At the second round, vice versa.

For twelve trials, we generated a random sequence of six cold trial and six warm trial(explained in stimuli section).At each trial, sender asked to put one hand in one the cold or warm water according to random sequence for twenty seconds. Then sender could rest for fifteen seconds and put the hand in warm water. Also experimenter asked sender to announce with other hand a number from 0-5 as his pain rate on that trial.(Sender did not talk).

At the end of each twenty seconds trial, another experimenter asked receiver to write current sender feeling. Receiver had to write "+" if sender was calm and "-" if sender was suffered.

2.1.2. subjects

As it was mentioned, we wanted our subjects have common feelings. So we selected 10 pair of subjects from people such as twins and close friends.Range of subjects age were between 19-22 years old(16 male and 4 female). Instructions given to subjects were said in experiment section.

2.1.3. stimuli

As it was mentioned, final stimulus for a round were a random sequence of 6 cold stimulus and 6 warm stimulus. For generating random sequence , we assigned a random number coming from a uniform distribution between 0-1. Then we sorted the 12 stimulus according to their random number.

One of the parameters about stimulus was the temperature. Warm water was 37 degrees Celsius and cold water was zero degree Celsius. Also I said time of each stimulus which was twenty seconds is another parameter

2.1.4. general data

Also we have collected some data about closeness of subjects, their belief about telepathy, common life experience, meditation history and how long they know each other.

As a result, we have collected data with features and now I want to analyze them.

2.2. Results

2.2.1. Power Analysis

Actually, power analysis was done before experimenting and collecting data.In power analysis. Our experiment is like a binomial process. It is made up from trials which they are bernouli process. So I want to find out the power of this process. It means for different value of probability parameter of binomial distribution, how many samples we need to reach the desired confidence interval, which is 95 percent. As it is clear in

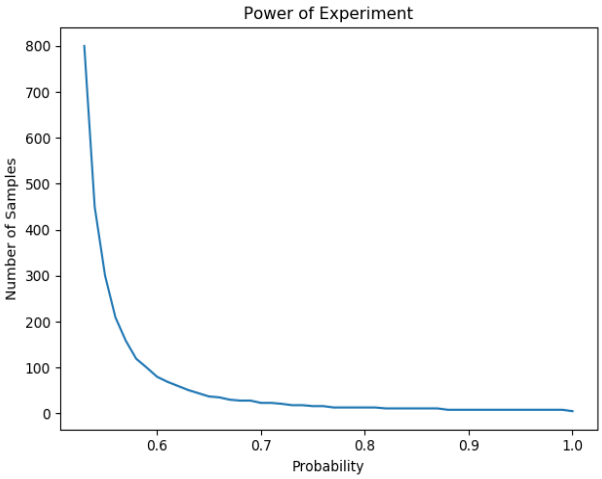

Figure 1: Power Analysis of Binomial Distribution

Figure 1 , for probability=0.5,that is our prior knowledge about each trial, we need huge sample even more than 800. But the interesting thing is that there is a rapid decrease in chart which even leads up only 100 sample around probability = 0.6. So according to our limit of huge sampling, we thought that 12 trials in each round could be good. Off course it is a parameter and it is not assigned rigorously.

2.2.2. First Look

At the first step of my work, I want to use the data of each round(19 rounds totally, one experiment done just

one round) not each trial. So I sum number of corrects and average the pain rate.

Now I want to check in this state, which features have significant correlation with correctness.First, I use linear regression between averaged pain and correctness(number of True in each round). It can be seen in Figure 2. There are some outlier points in the regression. To be more rigorous, I draw correlation heatmap.

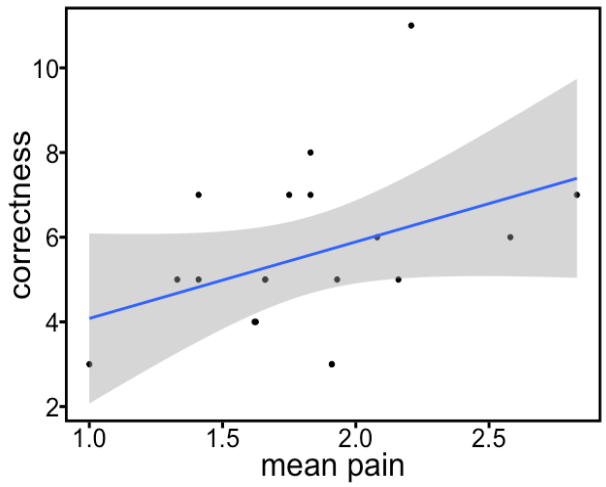

Figure 2: Linear Regression between correctness and mean pain in averaged state

As you see in Figure 3, num.of.True or correctness seems to have a good correlation with pain rate which is interesting for us. So I want to check significance of this correlation. I used cor.test in R to calculate the p-value. The result of p-value became 0.09 which is so close to significance level, but it is not significant.(I considered 0.05 as significance level.)

Note that correlation between correctness sum and average pain rate in this state that we averaged for each round, is not equal to correlation between pain rate and correctness in the dataset with all trials together. Actually I wanted to check if there is something meaningful in the averaged state, which we see that there is not. So I go forward and look at first dataset with each trials in the whole experiments.

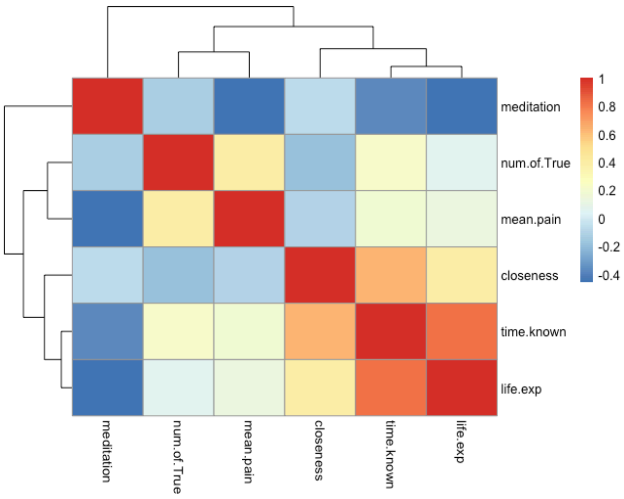

Figure 3: Correlation heatmap in averaged state

2.2.3. *Principal Component Analysis*

Now I want to use the whole dataset with all features collected from all of experiments. At first step, I look at correlation heatmap between all features. As you see in Figure 4, there are some obvious correlation that it is not related to our goal. Now I want to use principal component analysis and find out if there is any interesting relation or cluster in our samples.The figure of points in a space of 2 basis, PC2-PC1 is like Figure 5

In the Figure 5 is seen almost 5 clusters if we don't consider the outlier point. Now I want to the meaning of this figure and find the common features that make these clusters. So I draw features based on Principal component 1 and principal component 2. That is Figure 6. It seems that there is nothing meaningful in them. It might be this way because of the variation of third component also was high and I did not consider that in my study.

2.3. *Hypothesis Test*

Finally, here I want to check the hypothesis of telepathy existence. The null hypothesis is that telepathy is not existed and so probability of true response from receiver is $\frac{1}{2}$. The alternative hypothesis is that telepathy is existed. To check the hypothesis, I use t-test becuase according to Central Limit Theorem sum of

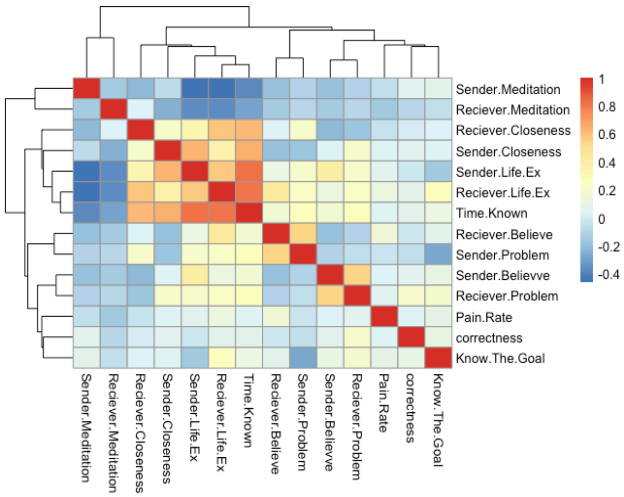

Figure 4: Correlation heatmap in whole data set

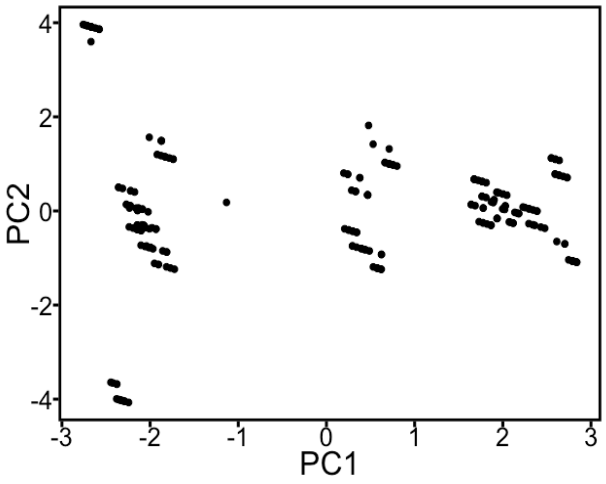

Figure 5: Principal Component Analysis of Data

random variables is normal. The result of p-value is 0.4625551 which shows that we can't refuse the null hypothesis. And the process was random

Another interesting thing that can be checked it is that if being cold or warm of water had an effect on detection of receiver or not. I use fisher test to check this effect. The p-value calculated in this test is 0.89. So it means that coldness or warmjess of water doesn't make difference. Subjects choose totally random.

2.4. Discussion

At this experiment, we tried to repeat telepathy experiment with a new approach. We added some features to experiment like closeness of subjects and the pain that receiver had in each trial. But in my analysis, there were no significant relation between parameters we used. So the hypothesis of existence of telepathy was refused as it was predicted. Even in fisher test it is seen that subjects choose randomly and it doesn't relate to coldness of water at all. But something that we maybe have to care about was that there was a good correlation between averaged pain rate in each round of experiment and sum of correct prediction by receiver. Although it was not significant if we assume the significance level 0.05.

In this experiment, we tried to change some aspects that they were not considered in previous experiments such as having deep common feelings.Also unlike previous experiments, we tried to change the stimulus to something that can make a deep feeling for sender instead of videos and photos which they are very abstract. Our experiment like other experiments could not show the existence of telepathy and could not find any relation between telepathy and a specific parameter. Another common characteristic of our experiment and previous ones is that there are many parameters that the cannot be controlled and the reason is nothing but telepathy itself

Our approach was a simple approach and further research can combine the ideas of subjects with common feelings and previous researches and design a new experiment.A flaw in our experiment was that the number of experimenters during the experiment was high and it made distraction for subjects. Also the stimulus we selected might not be very effective and they can use something that make more deep emotion to subjects. Therefore combining good ideas from different experiments may lead to better outcomes for this problem

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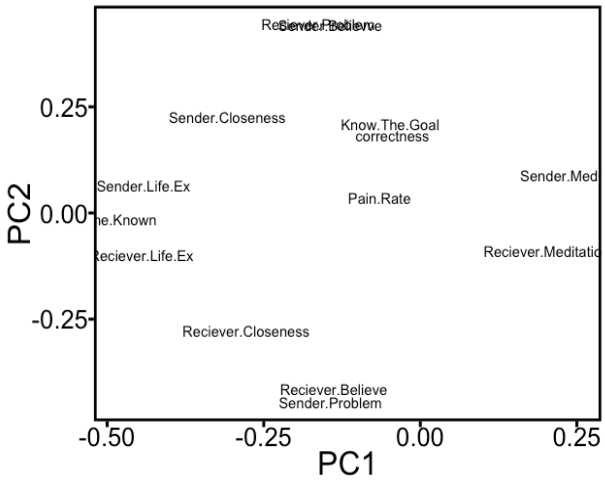

Figure 6: Principal Component Analysis of Features

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[3] R. Hyman, Anomaly or artifact? comments on bem and honorton, Psychological Bulletin.