

# The Influence of Haptic Sensations on Prosocial Behavior

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**Abstract.** The studies of prosocial behavior have been wide and various, but few researchers use embodied cognition theory to study prosocial behavior. As important sensations to individuals, the influences of haptic sensations on cognition have rarely been studied. In this study, embodied cognition theory is used to study prosocial behavior, to find out if haptic sensations influence prosocial behavior.

In this study, participants were separated into two groups. In one group they were asked to hold a light book, and in another group they were asked to hold a heavy book, so they can experience light or heavy haptic sensations. While participants were holding the book, they were also asked to finish questionnaires to evaluate the weight of the book and their prosocial behavior.

The result shows that there is a metaphor connection between haptic sensations and the concept of importance, which means that haptic sensations will influence individuals' judgement of specific things' importance. However, the relationship between haptic sensations and the concept of importance might not be a linear relationship, but a U-curve relationship instead. In other words, individuals may consider something more important when they have very light and heavy tactile experience. The result can't prove that haptic sensations have influence on prosocial behavior, but it doesn't mean that there is no relationship between them.

## 1. Introduction

Prosocial behaviors are those behaviors that are conducive to society and others in social interaction. Whatever the motivation, any form of behavior beneficial to society and others can be considered as prosocial behavior. Its characteristics are high social desirability, social interaction, self-interest, altruism and reciprocity. Pro social behavior helps individual behavior conform to social rules and moral orientation, and helps individuals adapt to society, establish good interpersonal relationships with others, and be conducive to individual physical and mental health. Prosocial behavior is conducive to the development of the whole society and individuals. It has always been one of the hot topics in psychology research.

The current research proves that the factors affecting prosocial behavior can be divided into three categories: helpers, the ones who seek help and situational factors. The factors of helpers include gender and age, region, cognition, personality traits, empathy, and values. The factors of the ones who seek help include appearance attraction and similarity attraction. In addition, there are some situational factors that also affect prosocial behavior, such as Cunningham's study which indicates that people tend to make prosocial behavior in sunny days compared to cloudy days [1]. The presence of spectators will also reduce prosocial behavior. B. Latane and J. M. Darley explain this phenomenon with the theory of "responsibility diffusion"[2].

The rise of the research on embodied cognition provides a new way of thinking for the study of traditional psychology. Embodied cognition theory emphasizes that cognition is closely related to body perception, and cognition is inseparable from the feeling and experience of the body. Human body structure, state, and the environment where body stays will have an important impact on the results of cognition. Cognition is the product of the interaction between the brain, the body and the environment, not a process of symbolic processing that occurs in the brain, so the mind-body dualism is not the right theory to explain cognition, which means considering cognition without body. Many studies have confirmed the theory: people in the upright position tend to be more proud of their work than those in a paralyzed state[3]; when people touch hot coffee cups, they tend to judge others to be

more enthusiastic, and when they touch a cold coffee cup, they tend to judge others to be more indifferent[4]; After recalling immoral events, people tend to clean the body to "cleanse" this sense of guilt, so as to restore moral confidence[5].

Under the background of embodied cognition, Conceptual Metaphor Theory (CMT) is proposed. The essence of metaphor is that people use familiar and specific experience to construct unfamiliar and abstract concepts. The metaphorical process from concrete concepts to abstract concepts is realized through the conceptual structure of "scaffolding"[6]. Through metaphorical architecture, people can map concrete conceptual structures associated with physical experience to abstract conceptual structures that are not associated with physical experience. In the process of forming this abstract conceptual framework, physical perception experience related to specific concepts is also an indispensable part. CMT subverts traditional semantics' interpretation of how abstract thinking forms, and links abstract thinking with bodily experience. Many studies have confirmed the rationality of this theoretical hypothesis.

Although the influential factors of prosocial behavior have been discussed by many researchers, few studies discuss prosocial behavior from the perspective of embodied cognition. A study has shown that physiological cold experience affects prosocial behavior, but there is very little research on tactile experience [7]. Sense of touch is one of the earliest sensory forms in the process of development, which has a direct effect on external information acquisition, perception formation, and has a significant influence on the cognitive process[8]. For example, people usually need more physical strength to deal with heavy objects, so people often associate weight tactile experience with psychological efforts. There is metaphorical connection between heavy tactile experience and the concept of "importance". Individual weight tactile experience will map abstract judgments of importance. In the experiments of Ackerman and Nocera et al., the subjects who held heavy planks were more inclined to judge that a particular job seeker was more suitable for a job [9]. Recent studies have also considered "secret" as a psychological burden and psychological weight. In the study of Slepian and Masicampo et al., the subjects who recalled or repressed important secrets considered the mountain steeper and judged the distance farther than those who recalled the ordinary secret [10]. Besides the light and heavy tactile differences, soft and hard touch perception experience is related to the cognition of others' personality, such as "tough" attitude and "weak" personality. The study of Ackerman, Nocera and Bargh found that the subjects who touched the hard objects tended to judge the personality of others to be more rigid, strict or stable than the subjects who touched the soft objects, which indicates that the touch experience affects the cognition of the personality of others[9]. In addition, this study also found that the participants who collaged rough jigsaw puzzle tended to judge the specific social situation to be more difficult, and showed less cooperative tendency, which indicates that the rough and smooth tactile perception has an influence on difficulty judgment and social interaction[9].

To sum up, because haptic experiences have an impact on social cognition such as social interaction and social decision making, the purpose of this study is to explore the impact of tactile experience on prosocial behavior. Previous studies have shown that the importance of events has a significant impact on altruistic behavior. More important the event is, the subjects are more inclined to make altruistic behavior [11]. According to the metaphorical cognitive theory, there is a metaphorical connection between the heavy tactile experience and the concept of "importance", and the heavy tactile experience makes the individual tend to judge a particular event more important. Therefore, this study suggests that the light and heavy tactile experience will affect the subjects' prosocial behavior. With the heavy tactile experience, the subjects will tend to make prosocial behavior.

## **2. Method**

### **2.1 Research purposes**

The study is to explore the impact of tactile experience on the individual's prosocial behavior. It is assumed that the touch can induce metaphorical cognition. The heavy tactile experience will stimulate

the “important” metaphorical cognition of the subjects, and then increase the performance of prosocial behavior.

## 2.2 Subjects

108 students from Guangzhou University were selected randomly. Because there are only few male subjects, male participants and 11 subjects with incomplete questionnaires were eliminated, and I finally obtained 92 (85.2%) effective subjects. All the subjects participated voluntarily. The subjects were randomly divided into two groups, 45 participants were distributed to the heavy tactile group, and 47 participants were distributed to the light touch group. Before the experiment, all subjects did not participate in similar experiments.

## 2.3 Experimental materials

A thin book, A large book, Weight assessment scale, Prosocial tendencies measurement scale, prosocial situational problem scale.

## 2.4 Experimental procedure

Subjects were randomly divided into two groups. Participants in one group were asked to hold a thin book to have light touch experience; participants in another group were asked to hold a large book to have heavy tactile experience.

At the beginning of the experiment, participants were told to use the sub-dominant hand to hold the book and fill in the questionnaires with the dominant hand. Not until participants finished all the questionnaires can they leave the book.

First, the subjects were asked to fill in an irrelevant scale (the college students' mobile phone addiction scale), so that they could feel the weight of their books.

After that, the subjects were asked to fill in the weight assessment questionnaire to evaluate the weight of the books. The questionnaire was scored by 6 points scale (1-6), of which 1 was very light and 6 was very heavy. Then, through the four questions, such as, "To what extent you think life is important?", find out whether the heavy tactile experience stimulates the "important" metaphorical cognition, using the 6 - point scale (1 - 6) to score as well, in which 1 is the lowest, and 6 is the highest.

Finally, fill in the prosocial behavior questionnaires, which is divided into two parts. The two parts are randomly presented. One of the questionnaires is prosocial tendencies questionnaire revised by Cong Wen Jun [12]. The other questionnaire is the self-compiled situational problems of prosocial behavior. There are 10 questions. Subjects were required to read the situation carefully and assume that they are in such a situation as far as possible, then determine the extent to which they will make prosocial behavior, that is, the participants show their willingness to make prosocial behavior according to the situation. They were required to fill in the score in each situation. The higher average score of the 10 questions, the higher the willingness of the subjects to do prosocial behavior.

During the experiment, each subject was arranged in the same closed room, and the independent variables such as environmental impact were controlled to the greatest extent.

## 3. Results

A total of 108 questionnaires were collected. Because there are only few male subjects, male participants and 11 subjects with incomplete questionnaires were eliminated. The total number of effective questionnaires was 92 (85.2%), all of which were women. The collected data were input into SPSS20.0 for statistical analysis. Descriptive statistics are shown in Table 1.

Table 1. weight scores and cognitive metaphorical scores in the two groups

	Tactile experience	N	Means	Standard deviation
Weight scores	Heavy	45	3.7778	.92660
	Light	47	2.4468	1.34824
Cognitive metaphorical scores	Heavy	45	4.5444	.56981
	Light	47	4.6117	.70095

In order to test if the light and heavy books have obvious discrimination, an independent sample t test was carried out on weight experience scores of the two groups of subjects. The result shows that the weight experience between two groups was significantly different [ $t(90)=5.54$ ,  $p<.001$ ]. This shows that the weight operation of the experiment is successful, and different groups of subjects can feel different weight. Next, whether the difference of the weight causes the difference of metaphorical cognition is tested. First, test the reliability of the four questions of metaphorical cognition, and the alpha reliability coefficient is 0.625. Secondly, the independent sample t test of metaphorical cognition scores between different weight groups shows that there is no significant difference between the "heavy" group and the "light" group in the metaphorical cognition score [ $t(90)=0.504$ ,  $p=0.62$ ]. That is to say, the scores of metaphorical cognition of subjects did not change with the change of objective weight.

In order to further test whether the subjective weight experience affects the subjects' cognition, the "heavy" weight group is combined with the "light" weight group, then take the subjective score of the weight as the independent variable and the "important" metaphorical cognitive score as dependent variable, using one-way ANOVA to analyze. It is found that the difference of "significant" metaphorical scores are marginal significant under different subjective weight [ $F(4,87)=2.27$ ,  $p=0.068$ ]. From the descriptive statistics of the metaphorical cognition score of different weight scores (Table 2), we can see that except when the weight score is 1, the mean value of "weight" metaphorical cognitive score is the highest (4.84), when the weight score is 2-5, the mean value of the "weight" metaphorical cognitive score increases as the weight score increases, which conforms to the embodied metaphorical cognitive theory. Besides, according to the multiple comparison results, the metaphorical cognition scores of weight score 2 and 5 are significantly different ( $p=0.035$ ). When the weight score is 1, the subjects felt that the books were the lightest, and they were likely to have a relaxed feeling and felt that there was no psychological burden, and it was easier to bring a pleasant experience to the subjects in this way. The subjects may evaluate certain things more "important" under this case, so the score of "important" cognitive metaphors may be higher. Therefore, in this experiment, the relationship between the weight touch experience and the "important" metaphorical cognition is not a linear growth, but it may be a U type curve.

In order to test whether the light and heavy tactile experience had an impact on the prosocial behavior, an independent sample t test was performed on the scores of prosocial tendency scale and the scores of prosocial behavior test. There was no significant difference in the scores of prosocial tendency scale scores [ $t(90)=0.891$ ,  $p=0.423$ ] and prosocial behavior test scores [ $t(90)=0.021$ ,  $p=0.122$ ] between the participants with heavy and light tactile experience.

Table 2. Differences in subjective weight scores and their "important" metaphorical cognitive scores

weight scores	"important" metaphorical cognitive scores	Standard deviation	N
1.00	4.8382	.78532	17
2.00	4.2708	.51631	12
3.00	4.4167	.61407	21
4.00	4.5750	.58039	30
5.00	4.8125	.55519	12
Total	4.5788	.63757	92

In order to further test whether the subjective weight experience could affect the prosocial behavior, the "heavy" weight group is combined with the "light" weight group. The subjective scores of the weight are taken as the independent variable, and the scores of the prosocial tendency scale and the prosocial behavior test scores are taken as the dependent variable, using one-way ANOVA to analyze. It is found that there is no significant difference in the scores of prosocial tendencies scale [ $F(4,87)=1.169$ ,  $p=0.330$ ] and prosocial behavior test scores [ $F(4,86)=0.318$ ,  $p=0.865$ ] under different subjective weight.

To test whether there is correlation between the score of metaphorical cognition and the score of

prosocial tendency scale and prosocial behavior test, Pearson product moment correlation coefficient between the score of metaphorical cognition and the score of prosocial tendency scale and prosocial behavior test is calculated. The results show that there was no significant correlation between metaphorical cognition scores and prosocial tendencies scale scores ( $r=0.076, p=0.47$ ) and prosocial behavior test scores ( $r=0.113, p=0.286$ ).

#### 4. Discussion

In this study, participants were asked to hold a light or a large book to have different weight tactile experiences. The results prove that there is a significant difference between the two groups' weight experience scores, and the subjects who hold the heavy book had a heavier tactile experience than those who hold the light book. However, there was no significant difference between the light weight group and the heavy weight group in the self-made metaphorical cognition scores. This shows that the objective weight difference may not affect the cognition of the subjects. But when two groups of subjects were merged, then the subjective score of the weight as the independent variable and the "important" metaphorical cognitive score as dependent variable, using one-way ANOVA would be analyze. The result shows that the difference of "significant" metaphorical scores are marginal significant under different subjective weight, which means that when the subject thinks the heavier the book is, the subject will judge the particular thing more "important". From this point of view, there is a metaphorical connection between the subjective weight tactile experience and the abstract importance judgment, which conforms to the embodied metaphorical cognitive theory.

When the weight score is 1, the "weight" metaphorical cognitive score is the highest. It may due to the lightest sense of the book, which brings a relaxed feeling to the subject and makes them feel that there is no psychological burden, and it is easier to bring a pleasant experience to the subjects under this case. The subjects may evaluate certain things more "important" with this experience, so the score of "important" cognitive metaphors may be higher. Therefore, in this experiment, the relationship between the weight touch experience and the "important" metaphorical cognition is not a linear growth, but it may be a U type curve.

There are no significant differences in the scores of prosocial tendencies scale and prosocial behavior test scores under different subjective or objective weight tactile experiences, and there is no significant correlation between the score of weight metaphor and the score of prosocial behavior. That is to say, this study proves that embodied cognition of weight touch has no effect on prosocial behavior. The subjects in this experiment are all females, due to the limited objective condition, so the subjects in this experiment are not comprehensive. There is a difference between the tactile experience of men and women, so this experiment cannot prove that the weight tactile experience has an influence on the prosocial behavior; besides, the embodied cognition experiment has to perceive the physical sensation of the body. The individual difference is large and the physical experience is greatly influenced by the environment. And it is difficult to control all the irrelevant variables, so the experiment did not achieve ideal results.

In general, this study uses a new theory which is the metaphorical cognitive theory to study prosocial behavior. It is a new idea for the study of prosocial behavior. It provides different directions and references for the research of prosocial behavior, enriching the research results in the field of prosocial behavior.

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