Cognitive Mechanism and Behavior Law of Trust among Partnership Entrepreneurship Partners Based on Event-Related Potential

Jindong Hu1*, Ning Tian2

ABSTRACT
The purpose of the study is to understand the neural mechanism behind trust cognition and behavior. The model is used to test and the model is further modified through the discussion of path coefficient and experimental study. The interview and demonstration not only make up for the deficiency of the experimental research, but also strongly support the results of the experimental research. As a result, a model of cognitive mechanism and behavior law of trust between partnership entrepreneurship partners with scientific significance and practical significance is obtained, which is supported and compensated by experiment and demonstration. Countermeasures to promote long-term and stable development of trust among partnership entrepreneurship partners have been put forward so as to promote the development of partnership enterprises. Conclusions have been drawn that risk preference has an influence on the decision-making process, and partners' behavior has an influence on both the cognitive process of trust and the decision-making process.

Key Words: Partnership Entrepreneurship, ERP, Cognitive Mechanism

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Introduction
At present, the global economic development is still in a downturn full of crisis (Eckel et al., 2004). Different countries are facing severe pressure of employment. According to statistics, the number of college graduates in China reached 6.8 million in 2012, and the trend is increasing. How to expand the quantity of employment, enhance the capability of independent innovation, and quickly change the way of economic growth become the key to get rid of this crisis.

The turbulent and changeable economic situation increases the investment risk, which imperceptibly impedes the undertaking of entrepreneurial activity. Empirical analysis shows that entrepreneurial activity in China presents a very unbalanced situation of regional development, and the overall entrepreneurial activity presents a downturn (Fetchenhauer et al., 2009). The main reason for this is that people are afraid of taking actions under the influence of resources and the turbulent economic environment, which increases the risk expectations of entrepreneurs. Therefore, a form of partnership entrepreneurship that effectively disperses risks and integrates resources has become the choice of many people with entrepreneurial intention (Li et al., 2005). Partnership entrepreneurship has become the main way to realize the entrepreneurial economy under the specific environment. However, a survey of partnership entrepreneurship in recent years shows that more than half of entrepreneurship teams are unable to survive in

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their partnership entrepreneurship. Why does the form of entrepreneurship that seems to be the most advantageous will eventually end in “disbandment” and why is the partnership entrepreneurship so difficult? Through extensive literature review, we find that in partnership entrepreneurship, people tend to pay more attention to the exchange of tangible benefits but ignore the exchange of intangible trust that is equally important (Aryee et al., 2002). At last, it is the breakdown of trust relationship that leads to the failure of partnership entrepreneurship. Trust is neither a cooperative behavior among the investors in partnership entrepreneurship nor a choice of being willing to take a risk, but a potential psychological state which directly determines the behavior of the investors in the process of partnership entrepreneurship, as shown in Figure 1.

Figure 1. Trust-behavior dynamic system

However, the cognitive mechanism of mutual trust in partnership entrepreneurship is a complex dynamic system. Trust is a kind of complex and intangible psychological activity produced by the processing of information by the brain under external stimulation. In the process of partnership entrepreneurship, trust reflects the specific behavior law of the entrepreneurs. Scholars in different scientific fields hold different viewpoints for the formation of general trust. Thus, there are different generating mechanisms. At present, many scholars at home and abroad have been engaged in study on trust mechanism among partners of partnership entrepreneurship, summed up a large number of factors affecting trust, and described development process of trust to different degrees (Wang et al., 2010).

This study uses trust game experiment and Event-Related Potential (ERP) to analyze cognitive process and decision-making process of trust, providing behavioral data and physiological data, as well as providing theoretical basis for the construction of relation model of influence factors. Through the above analysis, we find that there is a complex relationship between the cognitive mechanism and behavior law of trust among entrepreneurs in partnership entrepreneurship. These influence relations will ultimately determine the success or failure of partnership entrepreneurship. Therefore, a study is conducted on the cognitive mechanism and behavior law of trust in partnership entrepreneurship in China to find ways to enhance trust and choose reasonable entrepreneurial cooperation behavior so as to make partnership entrepreneurs develop toward a stable cooperative relationship direction. This study will play a role in promoting China’s entrepreneurial activities, and accelerating the pace of China’s economic transformation.

Methods

According to the analysis of the related researches on trust, it is found that there is a very complex relationship between trust and behavior. The degree of trust certainly influences behavior, but the degree of trust cannot only be measured by behavioral expression because the two belong to different categories. In order to study the cognitive mechanism and behavior law of trust among partners, trust game experiment must be used to distinguish these factors. The whole cognitive process can not only be explained by the behavior data of game experiment, but also by the combination of game experiment and ERP. In this way, we can make clear whether trust consideration factor, risk preference and partner behavior are different in the cognitive process of trust or in the process of decision-making (Levin, 2003). Then we can make clear the influence relation of each other, and construct the influence model of trust consideration factor, risk preference, partner behavior and trust, and cooperative decision-making behavior. Based on the previous researches, there is a difference between the results of the game experiment and the actual situation because of the limited control variables, the short experiment time, and some factors difficult to measure. At present, lots of scholars at home and abroad have adopted trust game experiment to discover the influence relation between different factors, but there is a big difference between the experimental results and empirical test results. Therefore, this study further discusses and complements, and empirically tests the relation model constructed by the neural experiment based on trust game.
Trust game experiment method. By means of trust game experiment, we effectively distinguish the trust consideration factor, individual risk preference and partner behavior in partnership entrepreneurship partners, and integrate them into an experiment process. The influence of each factor on trust cognition and behavior partnership entrepreneurship partners is effectively revealed through behavior data.

ERP method of neuroscience. By monitoring the components of N2 and P3 in ERP, this study analyzes the influence of each factor on the cognitive process of trust or the formation process of decision-making attitude, and provides the basis of neuroscience data for constructing the influence model of cognitive mechanism of trust and behavior law.

**Results and discussion**

Risk preference questionnaires and RPI calculation method are used to calculate the degree of risk preference of the subjects, and results are shown in Table 1.

<table>
<thead>
<tr>
<th>Risk preference</th>
<th>N</th>
<th>Avg</th>
<th>S.D</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man</td>
<td>44</td>
<td>7.73</td>
<td>2.235</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Woman</td>
<td>38</td>
<td>7.65</td>
<td>2.997</td>
<td>2</td>
<td>13</td>
</tr>
</tbody>
</table>

In order to make the comparison of risk preference more obvious, 16 subjects whose scores are close to the median of average score (Md=8) of the 80 subjects do not go to the next round of game. Then the high and low risk preference group is tested. The correlation coefficient P<0.001 of two groups is significant, indicating that the preference group of 66 subjects has better differentiation, as shown in Table 2.

<table>
<thead>
<tr>
<th>Risk preference</th>
<th>Average difference</th>
<th>Standard error</th>
<th>Degree of freedom</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-low</td>
<td>4.416</td>
<td>0.324</td>
<td>66</td>
<td>5.016</td>
<td>***</td>
</tr>
</tbody>
</table>

It can be seen from Figure 2 and Figure 3 that the decision makers will make different investment decisions under different information tips, indicating that the information makes investors have different cognitive expectations for the trustworthiness, namely the degree of profit or loss of partners. The data shows that both high-risk and low-risk preferences are more sensitive to reputation factor. The difference in investment amount under positive and negative information of reputation factor is significantly greater than that of other factors. The difference in investment amount under positive and negative information of economic environment factor is significantly smaller than that of other factors for low sensitivity to economic environment. This suggests that most investors believe that the reputation of their partners is more important to their future returns than to the economic environment (Lin, 2007). Under the condition of similar individual risk preference, the difference of different information stimulation mainly comes from the difference of decision maker’s cognition to different information, which is expressed in the difference of decision maker’s investment amount, and this difference of cognition and attitude will be analyzed in ERP below.

It can be seen from the data in Table 3 that the negative and positive effects of the same factors are different in N2 component. The positive and negative information stimulation of reputation factor show strong significance while that of economic environment show low significance. The interpersonal relationship shows strong significance at the FZ electrode point and shows moderate significance on F2 and FZ electrodes. The amplitude of the three electrodes is not significantly different under the influence of the three types of positive trust consideration while the amplitude under the influence of negative information is significantly higher than that under of the influence of positive information. As can be seen from the table below, there is also a significant difference in the amplitude under negative stimuli of the three types of information.

It can be seen from Figure 4 that there is no difference in N2 amplitude but a significant difference in P3 amplitude for different risk preferences in the face of the same information stimulus. All subjects show differences in N2 and P3 components when they are faced with positive and negative information.
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Figure 3. Differences in low risk preferences for the same type of investment

Table 3. N2 component significance test for different factors

<table>
<thead>
<tr>
<th>Considerations</th>
<th>electrode</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-E</td>
<td>F3</td>
<td>3.545</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>FZ</td>
<td>3.285</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>FCZ</td>
<td>3.258</td>
<td>***</td>
</tr>
<tr>
<td>F-R</td>
<td>F3</td>
<td>3.309</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>FZ</td>
<td>2.112</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>FCZ</td>
<td>2.209</td>
<td>0.013</td>
</tr>
<tr>
<td>E-R</td>
<td>F3</td>
<td>1.724</td>
<td>0.042</td>
</tr>
<tr>
<td></td>
<td>FZ</td>
<td>1.941</td>
<td>0.031</td>
</tr>
<tr>
<td></td>
<td>FCZ</td>
<td>1.413</td>
<td>0.082</td>
</tr>
</tbody>
</table>

Figure 4. Brain activity diagrams with the same information for different risk appetites

Conclusions and outlook

Through combination of trust game experiment and neural experiment, this study conducts stimulation on the subjects by trust consideration factor and individual risk preference. At the same time, the cooperative strategies are designed by computer programming for partners. Through investment decision-making experiment and ERP monitoring in neuroscience, we have studied the influence of trust consideration factor, risk preference and partner behavior on cognition process of trust and formation process of decision-making. From the experiment analysis, it is found that trust consideration factor has influence on the cognition process of trust; risk preference has an influence on the formation process of decision-making; the behavior of partners has an influence on both the cognitive process of trust and the formation process of decision-making. Based on the experimental results, the influence relation between factors is constructed. On this basis, improvement measures for partnership entrepreneurship activities based on individuals are put forward, including comprehensive consideration of partners; rationalization of return expectation; clearness of self-knowledge; moderate degree of investment (Dyne et al., 2000). And improvement measures for partnership entrepreneurship activities based on organizations include routinization of way of communication; scientization of management model, contracting of contribution and harvest.

References


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