# The Influence of Emotional Intelligence and Prototype Location on Scientific Problem Solving under Stress

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## Abstract

*This study explores the influence of emotional intelligence and prototype position on the solution of scientific problems by using the two-stage experimental paradigm of "learning multiple prototypes - testing multiple problems" with scientific inventions as experimental materials. The results show that: (1) The correct effect of the prototyping position is significant, and the correctness rate of the scientific problem solving of the prototype is significantly better than that of the pre-stress prototype learning. This shows that the knowledge of the prototype after the stress may be transformed into a stress Memory or emotional memory, so extraction is easier. But this prototype position effect is only reflected in the high emotional intelligence group. (2) At the correct rate, the adjustment of the emotional effect of the emotional intelligence on the prototype position is mainly embodied in the three dimensions of the emotional adjustment (ERO), the emotional evaluation (AES) and the emotional adjustment (ERS). (3) Emotional intelligence main effect was significant, low emotional intelligence group scientific problem solving response was significantly longer than the high emotional intelligence group when the scientific problem was solved. (4) The interaction between the prototype position and the emotional intelligence has an effect on the response of the scientific problem. Under the condition of low emotional intelligence, the scientific problem solving reaction of the prototype group is significantly longer than that of the post-prototype learning group. Under the condition of high emotional intelligence, the post - prototype learning group was significantly longer than the former model of the scientific problem solving reaction. (5) The interaction between the prototype position and the emotional intelligence is mainly embodied in the four dimensions of the emotional adjustment (ERO), the other person's emotional evaluation (AEO) and the emotional evaluation (AES) and the emotional use (UEPS).*

**Keywords*:*** stress; prototype position; prototyping; scientific problem

## *1 Introduction*

Scientific problem solving is the process that an individual creates the social product of novel and practical value for the first time. For example, the invention of a new machine, the new development of science and technology, and the new creation of literature and art belong to the process of solving scientific problems. Creative thinking is a decisive factor in the solution of scientific problems and the full development of human creativity. As an important factor that affects the development of creative thinking, emotion has always been the focus of many researches (Hu Weiping, 2015). Emotions mainly refer to the individual's attitude toward people and things that they experience during their activities. They have the dual nature of physiological reactions and their processes and influence the individual's creative performance (Zhu Jixian, 1989; Frijda, 1993; Yeh, Yat, 1997; 2007). However, due to the extreme complexity of emotion and creation, the academic community has not yet got a unified understanding about the relationship between the two. Some researchers even contradict each other's conclusions (Eastwood, Frischen, Fenske, & Smilek, 2012). In particular, negative emotions have very different effects on creativity.

Some researchers think that negative emotions inhibit and discourage creativity (Lu Jiamei, He Wen, Liu Wei, Lu Shenghua, 2005; Isen, Daubman, Nowicki, 1987) while others think that negative emotions can promote the improvement of creativity Feist, 1998; George, & Zhou, 2002; Carlsson, Wendt & Risberg, 2002; Madjar & Oldham, 2002; Gasper, 2003; Akinola & Mendes, 2008). A recent study using mixed experimental design, through different emotional stimuli, to further explore the different emotional states on the creative ability to ask scientific questions, the results showed that: different negative emotional state of creativity for creative ability to ask different capabilities, anger is not However, fear has a significant inhibitory effect on the ability of presenting creative scientific problems. Fearful emotional state has more inhibitory effect on the closed-ended subject form than on the open-ended subject form (Hu Weiping, Wang Xingqi, 2010). Psychological stress, as a special kind of negative emotion, has always been a hot spot of concern to researchers. However, due to differences in stressors and differences in creative measures, previous studies have not come to a conclusion. Studies have shown that there is a positive correlation between psychological stress and creativity, time pressure experienced by scientists and engineers (Andrews, Farris, 1972) and stress (Nakagawa, Inoue, & Koshimizu, 2016) A series of behavioral findings show that the greater the time pressure, the higher the individual creativity, but only under the high expected conditions (Wang, Qia, & Yu, 2017). There is also evidence of a negative correlation between the two, with internal and external stressors significantly reducing individual creativity (Shanteau, Dino, 1993; Alexander, Smith, Tivarus, & Beversdorf, 2007). In addition, Lee, Lee, & Jo (2013) found no significant relationship between stress and creative thinking. The reason for this is that some researchers think that the difference between psychological stress and creativity is due to the different use of cognitive resources. When the cognitive resource benefits are better, the negative influence is reduced, and the psychological stress is positively correlated with the creativity. When the cognitive resource benefits are poor, the negative impact is increased, and the psychological stress is negatively correlated with the creativity. Moreover, the previous studies mainly used the method of questionnaire survey, lacking the further verification of related experiments.

According to the "prototype inspiration" theory (2004, 2005) proposed by Zhang Qinglin and his team based on the thinking mechanism of creating invention in real life, the author thinks that the creative thinking in real life is mainly realized through the prototype. Prototypes may exist in the form of long-term memory of the subject has been stored on the issue of a train of thought, the subject may also be based on the test provided by the "source problem" in the minds of the characterization may also be the subjects in the solution Awareness of incidental issues that are incidentally discovered during the question. The key to solving creative problems is the ability to extract the relevant prototype events correctly. In this regard, Zhu Haixue et al. (2012) took the scientific invention and creation as the experimental material and the "one-to-one" experimental paradigm to discuss the influence of the prototype position on the activation of prototype events and the solution of scientific problems. The results showed that post-prototype performance was significantly better than the first prototype. The archetypes "before" and "after" produce different representations of the archetype, one with question representation (post-archetype) and one without question representation (archetype), and the result shows that while the total think time The same, but with the problem of characterization prototype (post-prototype) is more conducive to problem solving. This may be related to the characterization of the different properties of the prototype resulting from the different positions of the prototypes. Specifically, under the condition of presenting the scientific problem first and then the prototype (the latter prototype group), after the emergence of the scientific problem, the subject will form a problem representation in the brain and form a cognitive problem on the key technical issues, And produce a "mental need" or "attention-oriented" accordingly. This state of psychic preparation affects the characterization of the prototypical material immediately following it, and prototyping under such psychological preparation is easier and more directional with the goal of highlighting the scientific principles that are relevant to problem-solving ideas ), And it was just related to the previous problems in the brain. The subjects were able to quickly find a solution to the problem, so the correct rate was higher and the reaction time was shorter (Zhu Haixue, Luo Junlong, Yang Chunjuan, Qiu Jiang, Zhang Qinglin, 2012 ). It is noteworthy that, after the first stress, the impact of learning on memory has the opposite result. Some studies suggest that stress impairs memory (Elzinga, Bakker, & Bremner, 2005; Kirschbaum, Wolf, May, Wippich, & Hellhammer, 1996; Payne et al., 2007) and other studies suggest that memory enhancement (Schwabe, Bohringer , Chatterjee, & Schachinger, 2008; Smeets, Giesbrecht, Jelicic, & Merckelbach, 2007). Prototype extraction is the key to solve scientific problems, then the relationship between psychological stress and creativity Prototype location (first prototype after stress; first prototype stress) will also affect the prototype activation?

Emotional intelligence refers to "the ability of an individual to monitor his or her own emotions and emotions, and to differentiate them, using this information to guide their thoughts and behavior" (Salovey & Mayer, 1990). Some studies examined the relationship between emotional intelligence and creativity by using the measurement method and found that emotional intelligence was significantly associated with creative tendency. Emotional intelligence had the highest explanatory power of creative tendency in the emotional intelligence dimension, and the creative emotional orientation scores of the high emotional intelligence group were significantly higher than those of the low Emotional intelligence group. At the same time, the laboratory research method was used to investigate the influence of emotional intelligence on creative problem-solving under the condition of unconscious emotion-induced price. The results showed that the level of emotional intelligence had a significant effect on the creative problem solving, and the high emotional intelligence problem solving efficiency was significantly higher than the low Emotional Intelligence; Unconsciousness Emotional potency has a significant impact on creative problem solving. Unconscious negative emotion has the greatest impact, unconscious positive emotion followed, and unconscious neutral emotion has the least impact. Emotional Intelligence and Unconscious Emotions Have a Significant Interaction with Creative Problem Solving (Liang Feng, 2014). Stress as a highly emotional state of tension, emotional intelligence and stress can also have a significant impact on the creative problem solving it?

In summary, this study intends to explore the impact of emotional intelligence and prototype position on the resolution of scientific problems under stress and puts forward the following assumptions:

H1: The correct rate of solving scientific problems under the condition of post-prototype learning is higher than the correct rate of solving scientific problems under the condition of prior prototype learning.

H2: The resolution of scientific problems under post-prototype learning is faster than that of scientific problems under pre-prototype learning.

H3: The correct rate of solving high-intelligence intelligence group is higher than that of low intelligence intelligence group.

H4: high emotional intelligence group to solve scientific problems longer response time emotional intelligence group to solve the problem.

**2 Experiment** The Influence of Emotional Intelligence and Prototype on the Settlement of Scientific Problems under Stress Experiments using time-pressure estimation tasks induced psychological stress. Many-to-many prototype learning-science problem test paradigm was used to explore the impact of emotional intelligence and prototype location on the resolution of scientific problems.

### 2.1 Method

#### 2.1.1 Participants

120 students (60 boys and 60 girls, age: M = 21.64, SD = 1.73) from non-psychology and non-economics major in a university. All subjects were right hand, eyesight or correction of normal vision, did not participate in a similar experiment, there is no physical or mental illness, the subjects get some reward after participating in the experiment.

#### 2.1.2 Material

Emotional Intelligence Questionnaire: A revised version of the Schutte Emotional Intelligence Scale referenced by Liu Yanmei (2008). The scale includes five dimensions, 21 questions, that is, ERO (11,12,13,16,30,31); others' emotional evaluation (AEO) (15,18,25,29, 32), self-assessment of emotions (AES) (9, 19, 21, 22), self-regulation of emotions (1, 2, 6), and emotional application (UEPS) Full scale using five points scoring, 1 representatives do not agree, 5 representatives agree. The internal consistency reliability coefficient is 0.843. Estimate the task of stress material: reference stress test materials such as Qi Ming-ming (2012, 2014), write 240 arithmetic questions, each question is less than two 10 and the number with two decimal multiply. Select 200 undergraduates at random and ask them to judge whether the arithmetic result of the arithmetic problem is less than 10 within the limited time, press "1" instead of "2". According to the research results of Qi Mingming et al. (2012,2014), the final formal test material was composed of 120 items with a correct rate between 0.45-0.55 at 1880ms-1916ms for a single single selective reaction, and the reaction time was 1890 . 3 ± 176. 5, the correct rate of 0. 52 ± 0. 19.Scientific Questions Materials: The scientific questions are selected from "Scientific Invent Inventing Problem Materials Library" by Zhang Qinglin and Luo Junlong (2001), and eight questions are selected as the test materials for this experiment. Here are 2 examples of 8 test questions:

Scientific Question 1: Basketball players slip easily on smooth plastic factories and may be injured. How to make the rubber sole of sports shoes with non-slip function? Prototype: Octopus has a lot of concave sucker, the wife can firmly in the object surface, to prevent the fall off. Reference answer: Soles can increase the friction, or have a certain adsorption capacity. You can make nails shoes, or rough the basketball court ground. Science Question 2: The coal seam is full of gas and can easily explode in heat. Ordinary light in the mine produces a lot of heat. How to make the mine lighting difficult to cause gas explosion? Prototype: Firefly body with fluorescein and luciferase, two substances mixed in water, after a chemical reaction, issued biological cold light, does not produce heat. Reference answer: You can use fluorescein and fluorescent enzyme mixed in water, installed in the container for lighting.

### 2.1.3 Experimental design

Experiment using 2 × 2 inter-trial design. Independent variable 1 is emotional intelligence, including high emotional intelligence and low emotional intelligence both levels. Argument 2 is the prototype location, which is the location of the prototype learning, including pre-stress prototyping and post-stress prototyping. Dependent variables for college students to solve the problem of correct rate and response time.

### 2.1.4 Procedure

Participants first entered separate rooms, each equipped with a Pentium 2 IV computer, monitor, and chair. Using E-prime2.0 software programming to complete the random presentation of experimental materials and automatically record the reaction time of the subjects. The stimulus presentation process is shown in Figure 1. The whole process includes stress, learning and testing of three stages. Based on emotional intelligence and prototype position, the experiment consisted of four experimental treatment levels, ie First archetypal learning - high emotional intelligence; first archetypal learning - low emotional intelligence; post-archetypal learning - high emotional intelligence; post-archetypal learning - low emotional intelligence. E-prime2.0 program using programming to complete the random presentation of experimental materials and automatically record the reaction time of the subjects. Experiment to take individual test method. According to emotional intelligence scores, participants were divided into four groups, including two groups of high emotional intelligence (M = 4.3211, SD = .19549; M = 4.2081, SD = .24098) and two groups of low emotional intelligence (M = 3.5278, SD = .42750; M = 3.560, SD = .38529). There was significant difference between high and low emotional intelligence group, $F(1,116) = 148.19$, $P < .001$. Each group of subjects were assigned to an experimental condition, constitute the level of four experimental processing, namely, the first prototype learning - high emotional intelligence; first prototype learning - low emotional intelligence; post-prototypal learning - high emotional intelligence; post-prototypal learning - Low emotional intelligence.

Stress-Induced Phase: The subject is informed first of all: the test will compare his estimated response time and correct rate at this stage with those of other participants participating in the experiment at the same time, evaluate their mathematical abilities and give results based on the comparison The corresponding experimental reward. In the computer screen randomly presented (3000ms) prepared 120 difficult arithmetic questions, subjects are asked within a limited time to make the subject of the result is less than 10 judgments, the key reaction to submit the judgment result is "1", not Press "2". Subject disappears, according to the subjects to submit the judgment is correct or not to give the appropriate feedback, including the correct, wrong or time to three kinds of feedback. Prototype learning phase: The "8-to-8" "learning-one-test" paradigm is adopted, in which the subjects test eight scientific questions after learning eight prototype knowledge materials. The screen appears experimental instructions on the subject, the participants understand the guide after the press spacebar; the screen presents a prototype of the text material, the subjects quickly press the space bar after understanding the prototype presentation time limit of 60s, 60s have not yet understood automatically enter the next A prototype of text material. All subjects need to practice experiments before the formal experiment to ensure that they can correctly understand the experimental tasks and familiar with the experimental process. Quiz stage: first in the center of the screen showing the fixation point "+" as a reminder, black and white, the time is 1s, then presented a scientific material (time limit 90s). During this period, the subjects were tasked with reading and understanding the problem quickly and trying hard to think about the solution to the problem. Asked them to think of a solution, immediately press the space bar, the button will appear on the screen after several options for the subjects to choose. Subjects were asked to press the corresponding number keys to select the words that were consistent with the key information contained in the solution they thought of. After the respondent made the corresponding selection button, he then tested the next scientific question.

If the problem material is presented 90s, the subject still cannot think of the solution, did not make any key reaction, the program will automatically enter the next question test. Until all eight science materials have been tested. Under the condition of prior archetype learning, the subjects first conducted archetypal learning, followed by stress tasks in estimation tasks and immediately after stress induction. Under the condition of post-prototype learning, participants were asked to estimate the task-induced stress first, then prototyping and problem testing immediately after the stress was induced.

## *3 Results and analysis*

The result of each scientific solution to the standard answer against the standard score of 5 points, and the average of 8 scientific questions divided by 5 for the correct rate of scientific problems. The average response time of the eight scientific problems recorded in the E-prime 2.0 program is the response time of the scientific problem solving. Statistical analysis of the data was performed using SPSS 21.0.

### 3.1 Stress induced results

Single factor analysis of variance on the response time and the correct rate of the four task under the experimental treatment, the results show that the response time of the four groups of estimated tasks are between 1880ms-1916ms, the correct rates are at 0. 45 -0. 55 Between the correct rate and response to the main effect of the group were not significant. Indicating that the stress of the four experimental treatments is effective and there is no significant difference in stress state.

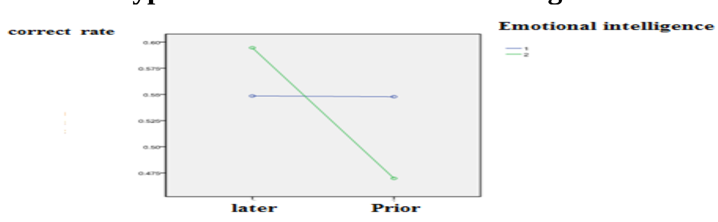
### 3.2 The Influence of Emotional Intelligence and Prototype on the Correctness of Scientific Problems

The 2 × 2 non-repeated measures ANOVA of the correct rate of scientific problem solving showed that the main effect of the prototype position was significant. The accuracy rate of post-prototype learning was significantly higher than that of the prior prototype learning Rate: $F(1,116) = 5.740$, $p < 0.05$, $\eta^2 = 0.047$. In addition, there was significant interaction between prototype location and emotional intelligence: $F(1,116) = 5.612$, $p < 0.05$, $\eta^2 = 0.046$ (Table 1). Simple effect analysis showed that under the conditions of low emotional intelligence, the correct rate of solving scientific problems (M = .5478, SD = 0.16189) and the correct rate of solving scientific problems in post-prototype learning group (M = .5485, SD = 0. 13809) no significant difference. Under the condition of high emotional intelligence, the correct rate of solving scientific problems (M = .5946, SD = 0.1625) in post-archetype learning group was significantly higher than that of pre-archetypal learning group (M = 0.4697, SD = 0 11152, $p < 0.05$) (see Figure 1). The interaction effect between the prototype position and emotional intelligence mainly reflected in ERO, $F(1,116) = 27.786$, $p < 0.001$, $\eta^2 = 0.193$, and the emotional evaluation (AES), $F(1,116) = 6.344$, $p < 0.05$, $\eta^2 = 0.052$, as well as three aspects of emotional regulation (ERS), $F(1,116) = 7.143$, $p < 0.01$ and $\eta^2 = 0.058$.

**Table 1 under different levels of treatment of scientific problems to solve the average accuracy and standard deviation**

| Processing level | M | SD | N |
|---|---|---|---|
| High emotional intelligence - pre-prototype learning | .4697 | .11152 | 37 |
| High Emotional Intelligence - Post-Prototype Learning | .5946 | .16125 | 26 |
| Low emotional intelligence - pre-prototype learning | .5478 | .16189 | 23 |
| Low Emotional Intelligence - Post-Prototype Learning | .5485 | .13809 | 34 |

**Figure 1 Prototype location and emotional intelligence interaction**



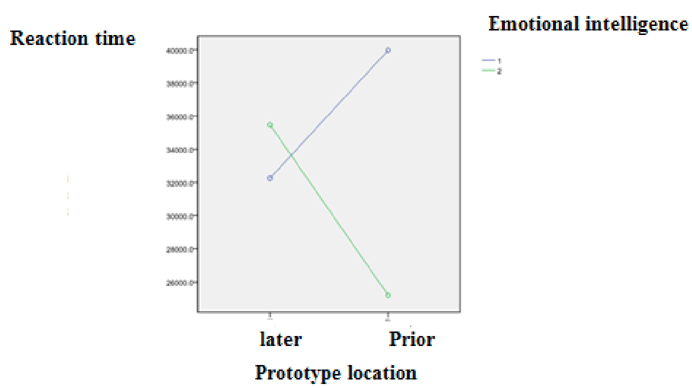
### 3.3 The Influence of Emotional Intelligence and Prototype on the Response to Scientific Problems

The analysis of 2 × 2 non-repeated measures ANOVA showed that the main effect of emotional intelligence was significant, and the reaction time of scientific problems in the low emotional intelligence group was significantly longer than that in the high emotional intelligence group when the scientific problems were resolved: $F(1, 116) = 7.617$, $p < 0.01$, $\eta^2 = 0.062$. In addition, there was significant interaction between prototype location and emotional intelligence: $F(1,116) = 18.48$, $p < 0.001$, $\eta^2 = 0.137$ (Table 2). Simple effect analysis showed that under low emotion and intelligence conditions, the number of scientific problem-solving response (M = 39971.383, SD = 9437.2616) in the pre-prototype learning group was significantly longer than that in the post-prototype learning group (M = 32251.779, SD = 10742.3740 ). Under the condition of high emotional intelligence, the post-prototype learning group was significantly longer than the pre-prototype learning group (M = 25197.995, SD = 12290.0423, $p < 0.001$) (M = See Figure 2). The interaction effect between the prototype position and emotional intelligence mainly reflected in ERO ($F(1,116) = 14.88$, $p < 0.001$, $\eta^2 = 0.114$; AEO, $F(1,116) = 9.25$, p (P $< 0.001$, $\eta^2 = 0.108$ and UEPS, $F(1,116) = 4.48$, $p < 0.05$, $\eta^2 = 0.037$ for self emotional evaluation (AES) A total of four dimensions.

**Table 2 under different levels of treatment of scientific problems to solve the average response time and standard deviation**

| Processing level | M | SD | N |
|---|---|---|---|
| High emotional intelligence - pre-prototype learning | 25197.995 | 12290.0423 | 37 |
| High Emotional Intelligence - Post-Prototype Learning | 35472.508 | 11802.2450 | 26 |
| Low emotional intelligence - pre-prototype learning | 39971.383 | 9437.2616 | 23 |
| Low Emotional Intelligence - Post-Prototype Learning | 32251.779 | 10742.3740 | 34 |

**Figure 2 Prototype location and emotional intelligence interaction**




## *4 Discuss*

This study explores the impact of emotional intelligence and prototype position on the resolution of scientific problems under stress conditions. The results show that in the correct rate, the accuracy rate of post-prototype learning is much higher than that of pre-prototype learning. However, this prototype position effect is only reflected in the high emotional intelligence group. Under the condition of low emotional intelligence, the correct rate of solving scientific problems in the first prototype learning group was not significantly different from that of the post-prototype learning group in solving scientific problems. Emotional intelligence modulates the prototype's position effect mainly in three dimensions: ERO, AES, and ERS. In the response time, the responses of the low-emotion intelligence group to scientific problems were significantly longer than those of the high-emotional intelligence groups to solve the scientific problems. And this effect is governed by the prototype's position. Specifically, under low emotion and intelligence conditions, the response times for solving scientific problems in the pre-prototype learning group were significantly longer than those in the post-prototype learning group for solving scientific problems. Under the condition of high emotional intelligence, the reaction time of solving the scientific problem in the post-prototype learning group was significantly longer than that of the former prototype learning group in solving the scientific problems. The interactive effects of prototype location and emotional intelligence are mainly reflected in four dimensions: ERO, AEO, AES, and UEPS.

In terms of the prototype location effect, previous studies suggest that stress is believed to increase attention and alertness, thereby enhancing the coding of stressful experience and enhancing memory consolidation in response to stress. Therefore, when stress is part of the learning environment, stress is thought to improve memory as it occurs during learning. And memory is impaired when stress occurs outside the learning environment (Diamond et al., 2007; Joëls et al., 2006). The post-prototype learning conditions in this study may be stress as part of the learning environment, making the prototype easier to be activated and extracted in later problems. This is also supported by some studies (Schwabe, Bohringer, Chatterjee, & Schachinger, 2008; Smeets, Giesbrecht, Jelicic, & Merckelbach, 2007).

Moreover, this prototype position effect appears only in the high emotional intelligence group. It may be because of the regulatory effect of emotional intelligence on the stress state in prototype learning (Liang and Feng, 2014). Creativity is also different for different stress states (Che Xianwei, Qi Mingming, Guan Lili, Zhang Qinglin, Yang Juan, 2014) Lead to scientific problems to correct different rates. This emotional intelligence effect has also been partially confirmed in other studies. In the past, we used Emotional Intelligence Scale and Williams Creativity Orientation Scale as experimental tools to explore the impact of emotional intelligence on creativity. At the same time, we used the Chinese crossword puzzle and the Chinese emotional picture system (as the experimental material, using the "Prototype Crossword Learning - Threshold Under the Emotional-Question Crossword Test "experimental paradigm further examines the relationship between emotional intelligence and creativity.It is found that emotional intelligence is significantly related to creative tendency, and the scores of creative tendency in the high emotional intelligence group are significantly higher than those in the low emotional intelligence group. In addition, the study explores the dimensions of emotional intelligence in detail, and the adjustment of stress state lies in the emotional regulation of the subject to others (ERO), your own Emotional Emotions (AES), and your own Emotional Regulation (ERS). Although previous studies of creative thinking explored response, however, previous studies did not examine response time in the emotional effects of creative thinking, and the study makes up for this. The present study found that the responses of scientists in the low emotional intelligence group were significantly longer than that of the high emotional intelligence group in solving scientific problems. This may be due to the fact that the lower emotional intelligences are more difficult to adjust to stress and lead to longer responses. Moreover, under low emotion and intelligence conditions, the reaction time of solving scientific problems in pre-prototype learning group was significantly longer than that in post-prototype learning group, which may be due to the difficulty of prototype extraction when solving problems under pre-prototype learning conditions. Therefore, the response time Longer. However, under the condition of high emotional intelligence, although the post-prototype learning group solved the scientific problems more correctly, the response time was longer than that of the former prototypical learning group due to more resources occupied by emotional regulation. The adjustment of prototype position to reaction time is mainly reflected in the subject's emotional regulation (ERO), the emotional evaluation of others (AEO) and their own emotional evaluation (AES) and emotional use (UEPS).

## 5 Conclusion

(1)The main effect of the prototype position is significant, and the correct rate of solving scientific problems in prototypical learning after stress is significantly better than that of scientific problems in pre-stress prototyping, indicating that the prototypical knowledge of post-stress learning may be transformed into a Stress memory or emotional memory, so extract more easily. However, this prototype position effect is only reflected in the high emotional intelligence group.

(2) On the correctness rate, emotional intelligence adjusts the prototype location effect mainly in three dimensions: ERO, AES, and ERS.

(3) The main effect of emotional intelligence is significant. The response of the low emotional intelligence group to scientific problems is significantly longer than that of the high emotional intelligence group to solve scientific problems.

(4) The interaction between the prototype position and emotional intelligence has an impact on the response of scientific problems. Under the condition of low emotional intelligence, the response time of scientific problems of the first prototype learning group is significantly longer than that of the post-prototype learning group. Under the condition of high emotional intelligence, the reaction time of solving the scientific problem in the post-prototype learning group was significantly longer than that of the former prototype learning group in solving the scientific problems.

(5) The interactive effect of prototype location and emotional intelligence is mainly reflected in four dimensions: ERO, AEO, AES, and UEPS.


### Acknowledgments

This research was supported by Project (2016SJD190015) from Philosophy and Social Science Research Project of Jiangsu Universities "Emotional Intelligence Differences between Cortisol Response and Creative Thinking under Stress". Project (MS22016012) from Nantong Science and Technology Program "Generation and Resolution of Doctor - patient Conflict Based on Intergroup Emotion Theory", and Project (201613993015X) from Jiangsu Province Student Innovation Training Program "The Influence of Self - information and Probability on Gender Stereotype" (Xinglin College, Nantong Uni.), *Tao Aihua, corresponding author, E-mail: taoaihua450617@163.com. and there are no conflicts of interest.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