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The influence of implicit theories of personality on processing strategy of person impressions

CUI Yichen^{1,2}, WANG Pei^{1,3}, TAN Chenhao¹

1. School of Education, Shanghai Normal University, Shanghai 200234, China;

2. Environment and Development Research Center of Jiangsu Province, Nanjing Forestry University, Nanjing 210037, China;

3. School of Psychology, Nanjing Normal University, Nanjing 210097, China

Abstract: The individuals can be divided into two categories in accordance with implicit theories of personality: the entity theorists, who believe that the personality and character are inherent, and the incremental theorists, who believe that the personality and character change gradually. As a significant individual difference, ITPs affect the mechanism of cognitive processing of social perception and impression formation of others. Although some studies on the individual difference about impression formation infer the existence of ITPs by the difference of behavioral outcome, there is no research to investigate the influence of impression formation to others by ITPs and it's unclear whether exists the effect of impulsive-reflective system or not. In light of this, the aim of the research is to test whether different presentation forms can cause different processing strategies of impression formation to others and elucidate how ITPs affect the impression formation to others by observing entity theorists and incremental theorists. Three assumptions can be given in this research: (1) The ITPs of individuals can affect "top-down" and "down-top" on linkage effect as a kind of mental representation. So we can study the information judgment of person impression is instant or memory-based. (2) Entity theorists and incremental theorists perceive others in different ways that entity theorists adopt heuristic processing while incremental theorists analytic processing. (3) Through heuristic processing, entity theorists form impressions by real-time judgments while incremental theorists by memory-based judgments form through analytic processing. The experiment includes two stages. (1) Preliminary stage: 120 participants are selected as participants to be experimented with the adapted fairytale. As a result, 42 entity theory participants and 48 incremental theory participants are distinguished. (2) Experiment stage: 90 college students selected in the preliminary stage as participants who have different ITPs and directional situations to judge the information of behavior are designated to record the discrepant dates of free recall and frequency estimation through illusory correlation effect which includes mere exposure effect and co-occurrence memory judgment effect. The results of experiment lead to two conclusions. (1) Fairytale Test is capable to distinguish effectively the implicit theories of personality of participants which means the entity theory is opposite to incremental theory, and they are two extremes. Moreover, different personalities have the same implicit theory. (2) The ITPs can affect "top-down" and "down-top" on linkage effect as a kind of mental representation and then guide the social perception of people. Impression formation adopts real-time judgment under the influence of entity directional situations while memory-based judgments are adopted to form impressions through incremental directional situations. Comparing with entity theorists, the participants of incremental theorists use less initial information to build expression and there exist deviations of impression and consciousness when they are memorizing and judging. As a result, incremental theorists need more effort to form individual evaluative impression. In short, the individuals who have different implicit theories of personality adopt different information processing ways to perceive others. Entity theorists take heuristic processing and incremental theorists use analytic processing. When taking heuristic processing, entity theorists form impressions through real-time judgments while incremental theorists take memory-based judgments to form impressions through analytic processing, and finally person impression is formed by means of situational information. According to the research, the situational factors have effect in the intensity of the ITPs of individuals but don't change inherent ITPs from research. And the information processing ways and ITPs have obvious interaction under the influence of different directional situations. So, the separation effect which is caused by processing methods of social cognition on the representation of ITPs, as a kind of important individual variables, has effect in individual emotion, attitude and behavior. As a result, combining the situations of real life, it has theoretical and applied values for us to discuss the basic issue that how the ITPs affect the processing strategy of impression formation. The ensuing research will enlarge the age range of samples and trace the physically and mentally changes of different types of object so that we can find the separation effect caused by processing methods of social cognition which includes automatic processing and controlling processing on the representation and brain

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First authors: CUI Yichen and WANG Pei

Corresponding author: WANG Pei, E-mail: wangpei1970@163.com

mechanism of ITPs. Furthermore, whether Fairytale Test can test effectively the generality and difference of ITPs needs to be traced down by recording the real performance of participants in order to increase the repeatable verification and extrapolation efficacy.

Keywords: implicit theories of personality; person impression; real-time judgment; memory-based judgment; illusory correlation effect

1 Introduction

People tend to unconsciously apply peculiar human knowledge and personal construct in their own brain, and these knowledge eventually formed a kind of implicit theory of personality (ITP) (Dweck et al., 1995; Levy et al., 2001; Plaks et al., 2009). The individuals can be divided into two categories in accordance with implicit theories of personality: the entity theorists, who believe that the personality and character are inherent, and the incremental theorists who believe that the personality and character change gradually (Ziegler & Stoeger, 2010). Different from the study focusing on the interaction between personality traits (Heslin et al., 2006), implicit personality theory (Chen & Pajares, 2010) focuses on beliefs about fixity and plasticity of personality traits. Therefore, this theory is also called “static versus dynamic theory” (Leith et al., 2014; Plaks & Halvorson, 2013; Yeager et al., 2013).

ITP is not general sense of personality theory, but a simple theory of mental representations of others' basic characteristics in the process of interpersonal communication (Heslin et al., 2006; Reinhard et al., 2011; Rydell et al., 2007; Strack & Deutsch, 2011). As an important individual difference, ITP results in the formation of different social cognition models, and then it regulates and constrains the individual's understanding and response to the behavior of himself and others (Molden et al., 2006). In general, influenced by different ITPs, individual forms different perception models (categorization processing–individual processing), impression deviation (primacy effect–recency effect), attribution model (internal attribution–external attribution), reasoning model (intuitive reasoning–formal reasoning) and judgment model (intuitive judgment–rational judgment). These social cognitive models allow individuals to eventually form a stable, meaningful behavioral trend (Blackwell et al., 2007). In recent years, personality psychology and social psychology's discussion of implicit theories of personality has become a research focus and trend (Molden et al., 2006; Ziegler & Stoeger, 2010), and it is gradually found that implicit theories of personality often affect the social perception and cognition processing strategy of person impressions (Molden et al., 2006; Yorkston et al., 2010). The so-called “person impressions” refers to the research objects' summary and synthesis of several meaningful personality traits of people except them, and forming a meaningful trait (Johansen et al., 2010; Sherman et al., 2009).

In real life, when individuals face perceptual objects with

particular identities or roles, they tend to be influenced by their implicit theories of personality and form a particular processing strategy of person impressions (Kammrath & Dweck, 2006). Embodied in: implicit theories of personality directly affects the individual's information extraction of others—the entity theorists mainly extract characteristic information quickly based on intuition, and the incremental theorists mainly extract behavior information based on memory (Levy et al., 2006). Compared with incremental theorists, the entity theorists encode external information in a more evaluative way (such as affixing “positive” or “negative” labels to information) and often come to the conclusion using generalized, holistic, rigid processing strategy, thus contributing to the classification of evaluate traits (Miller et al., 2007; Petrocellia et al., 2010; Yeager et al., 2011).

According to the above findings, researchers began to think about the question: as a kind of mental representation, whether the implicit theories of personality have the effect of internal and external connection, thus affecting individuals' processing strategy of person impressions (Burnette et al., 2013; Rattan & Dweck, 2010). In this regard, some researchers think implicit theories of personality as link network between self-conception and personality traits. The representation of individuals, groups and their attributes is stored in the link library in the form of conceptual connections (Plaks & Chasteen, 2013; Strack & Deutsch, 2011). In this link library, implicit theories of personality are driven by different personality traits and activate different self-concepts (that is the psychological sense of self-perception, such as the independent self-dependent self). Thus, the corresponding thinking and behavior habits are displayed temporarily. Obviously, this interpretation shows the flexibility and regulatory of processing system of person impressions (Awh et al., 2012). Strack and Deutsch (2011) believe that there are two ways that individuals can process person impressions from the link library: One is making explicit representation (refer to representation that can be aware and controlled by consciousness) by reflective system, directly accessing others' behavior information based on fact and value judgments, namely, analytic processing. The other is making implicit representation (refer to representation that cannot be aware and controlled by consciousness) by impulsive system. Individuals indirectly access others' trait information through emotional and motive orientation, that is heuristic processing. These two representations lead to significant differences in the individual's processing strategy of person impressions: Analytic processing allows individuals to suppress the trait judgment of

others by means of explicit representation, or to divert attention from clues related to traits. Heuristic processing allows individuals to get instant judgment based on others' trait information by the impulse system (Beer & Brooks, 2011). Beer and Brooks (2011) further point out that heuristic processing is more dependent on intuition, less psychological resources, faster processing, and the use of automated closed parallel operation, susceptible to rigidity; analytical processing is more dependent on rationality, more psychological resources, lower processing, and the use of non-modular operation, not susceptible to rigidity.

Other researchers believe that the perceiver's consistent psychological expectations of others' behavior are the main reasons for the individual differences in person impressions formation. Implicit theory of personality is the key to the psychological differences (Heslin et al., 2006). That is to say, processing strategy of person impressions is influenced by implicit theories of personality in perceptual clues and judgment types. Subsequent studies have found that under limited cognitive resources, the entity theorists allocate more attention resources to categorical information and form person impressions by real-time judgment. The incremental theorists focus more attention on individualized information and form person impressions by memory-based judgment (Aldrovandi et al., 2009; Plaks & Chasteen, 2013). The so-called "real-time judgment" means that perceiver tends to make a quick and rigid traits judgment of others from limited behavioral information. Memory-based judgment refers that perceiver process person behavioral information based on memory and tends to make dynamic, cautious judgment about others (Plaks et al., 2009). Researchers also find that when people's explicit behavior deviates from the implicit theories of personality, they usually produce processing deviation on behavioral information, thus protecting their inherent implicit theories of personality (Leith et al., 2014; Plaks & Chasteen, 2013). In general, the entity theorists tend to accept the behavioral information of stable traits and carry out local, static heuristic processing from traits. This heuristic processing is consistent with real-time judgment, and the impression of others is characterized by "rigidity", "globality", "chronicity", etc. (Reinhard et al., 2011; Rydell et al., 2007). The incremental theorists tend to accept behavioral information which reflects traits changes and proceed a comprehensive, dynamic analytical processing from the situation. The analytical processing is consistent with the memory-based judgment, which makes person impressions be affected by the situation and clues and appear "slow processing speed, more psychological resources occupied, following the logic and rules", etc. (Mathur et al., 2013).

Influenced by dual-process model (Knee et al., 2003; Satpute & Lieberman, 2006), Keyser et al. (2010) put forward the opposite view. They believed that a certain perceptual clue could influence the implicit theories of personality from the bottom up when forming person

impressions. For example, the entity theorists prefer to select, organize and code the consistency information which can confirm initial traits judgment, requiring less psychological resources. The incremental theorists are restricted by perceptual situation, and can extract situational information from other people's behavior at any time to make judgments, requiring more psychological resources. The research of Hoyt and Burnette (2013) further confirm that the implicit theories of personality are influenced by processing strategy of person impressions. The real-time judgment of an individual's perception of others is automatically maintained for a longer period of time and is less susceptible to context. This process contributes to the formation of the entity theorists. On the contrary, the individual obtains new information through the continuous contact with others to form a memory judgment. This process is conducive to the formation of the incremental theorists (Heslin et al., 2006; Tam et al., 2010).

As mentioned above, the dual system model of implicit theories of personality explains the difference of individual's processing strategy of person impressions from two kinds of representation methods. Based on the difference, two theoretical viewpoints on the implicit theories of personality have been formed. First, individuals' processing strategy of person impressions is controlled by their own ITPs. Second, a certain perceptual clue and processing strategy of impressions affect the formation of ITPs, and rely on the mediating effect of ITPs to influence person impressions information. In addition, the study of individual differences in impression formation tends to infer whether there is an implicit theory of personality effect from differences in behavioral results (Job et al., 2010; Yeager et al., 2011). There is no direct investigation into the influence of implicit theories of personality on the impression formation process of others and whether there is a difference between the "impulse-introspection" dual system (Burnette et al., 2013). In view of this, this study looks at different processing strategies that may be taken by different types of implicit personality theorists (the entity theorists and the incremental theorists) in forming impressions of others. The purpose of this paper is to examine whether the two methods can form different processing strategies of person impressions through different representational states, and further clarify the role of implicit theories of personality in the impression formation of others. The specific research assumptions are: (1) The ITPs of individuals can affect "from top to bottom" (the entity theorists) and "from bottom to top" (the incremental theorists) on linkage effect as a kind of mental representation further determining whether the information judgment of person impression is instant or memory-based. (2) Entity theorists and incremental theorists perceive others in different ways that entity theorists adopt heuristic processing while incremental theorists adopt analytic processing. (3) Through heuristic processing, entity theorists form impressions by real-time judgments while

incremental theorists by memory-based judgments form through analytic processing.

This research first uses the projection technique of fairytale test to separate the individual's implicit theories of personality, and then with experimental paradigm of illusory correlation effect, analyzes the representation of the implicit theories of personality through the investigation of others' behavioral information type to further deduce processing strategy of person impressions. Compared with the self-report inventory, the projection test can effectively measure the universality and dimension of the implicit theories of personality across different personality attributes (McConnell, 2001), and detect whether the participants react unabashedly, deeply and unconscious problem of the reaction (Hofmann et al., 2005). Common illusory correlation effect includes mere exposure effect and co-occurrence memory judgment effect (Eder et al., 2011; Mussweiler, 2003). The former indicates that the more frequent the external stimulus is, the better the individual's preference for the stimulus is, and thus the less cognitive resources to be used in the perceptual information, which is similar to the heuristic processing; the latter shows the relevance of memory to judgment, that is, if the individual makes a judgment on the basis of memory, the resulting impression should reflect the contents of its memory, which can be seen as an analytic processing changed with situation (Reinhard et al., 2011).

2 Method

2.1 Participants

Totally 120 students were selected from Northwest Normal University, of which 68 undergraduates, 52 college students, half male and half female, aged from 17 to 26 years (averagely 20.5 ± 1.24 years), respectively from departments of education, Chinese, history, mathematics, foreign languages, physics and psychology. All subjects were right-handed, naked eyes or corrected visual acuity of above 1.0, no serious physical and mental history. The participants would be given a reward after the experiment. Using the fairytale context test (see 2.3) to analyze implicit theories of personality of subjects, 42 entity theorists (correction points > 0 , T points ≥ 60) and 48 incremental theorists were selected (correction score < 0 , T points ≤ 40) (Note: Considering the T threshold of the entity theorists and the incremental theorists is 50, 30 subjects whose $40 < T < 60$ are excluded). The selection rate is 75%. Among them, 46 science students, 44 liberal arts students, aged from 20 to 24, and had not participated in the relevant experiments. The 90 participants were randomly matched to two groups of 45 people according to the key characteristics of ITPs, gender and major (The entity theorists subjects were 21, 11 males and 10 females; the incremental theorists were 24, 13 males

and 11 females).

2.2 Experiment design

The experiment adopted 2 (ITPs: the entity theorists vs. the incremental theorists) \times 2 (ITPs directive situation: the entity theorists cognition vs. the incremental theorists cognition) \times 2 (cognition object: Q vs. W) \times 2 (behavior statements serial position: first 12 vs. last 12) mixed design. Among them, the first two factors were between-subject factors, and the latter two factors were within-subject factors. The cognition objects were represented by the letters "Q" and "W". Q represented a virtual cognition object with much contact with the subjects. W represented the virtual cognition object with little contact with the participants (See section "2.3 Experimental Materials" for a description of Q and W).

2.3 Experimental materials

Development of measurement tools

Fairytale context test hypothesis: the entity theorists make implicit representations through the impulse system (Tending to "projec" others' behavior based on traits, thinking of the traits in fairytale as stable, and showing a trait judgment tendency to understand, infer and predict behavior). The incremental theorists make explicit representations through introspective system (Believing the characteristics of people are changing, tending to attribute the behavior of the fairytale to the unstable factor, and expecting that the behavior will not appear again or difficult to predict whether it appears again). According to the hypothesis, the fairytale test with projection properties was developed. The test was matched by two sets of tests, with different plots, matching structure and matching words (86 ± 4 words). Each test consisted of five sub-tests, which involved personality, ability, character, temperament and emotion. Among them, five personality attributes' division basis was in accordance with the *Chinese Personality Adjective Scale* compiled by Wang and Cui (2005), 110 Northwest Normal University undergraduates (58 males and 52 females, from departments of mathematics, Chinese, economy, electronics, education and psychology, aged from 18 to 25 years, averagely 21.3 ± 1.19 years old, no serious physical and mental history, naked-eye or corrected visual acuity was normal, normal hearing) were randomly divided into two groups based on gender, age and profession to finish two types of tasks: The first group was tested for the importance of 122 adjectives and ranked them in a seven-point scale, remaining 36 adjectives with mean point $M \geq 5$. The second group of subjects made a quick classification of the selected adjectives according to their own criteria within 10 min. Multidimensional scaling was used for clustering and dimensionality analysis. The results showed that the fitting degree of the two-dimensional model (stress = 0.056, RSQ = 0.843) was better than the three-dimensional model (stress = 0.332, RSQ = 0.579). The

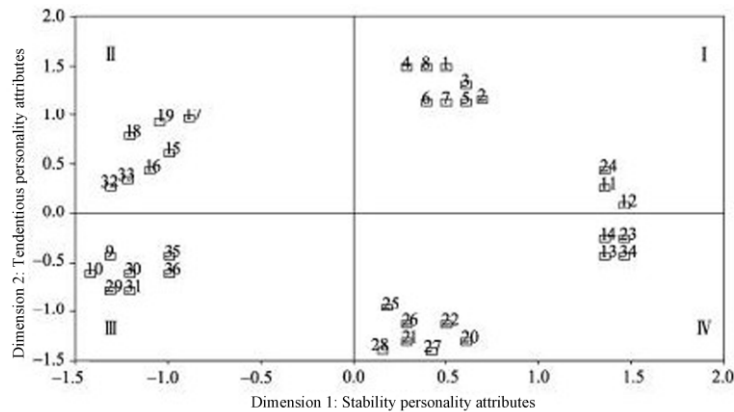


Fig. 1 Two-dimensional scale clustering of 36 personality traits

Source: Cui Yichen and Wang Pei (2015)

coordinate dimensions (explaining 84% of the total variation in personality attributes) and numbers (representing 36 personality traits) in Fig. 1 were named according to the results of MDS analysis. And personality (the first quadrant), temperament (the third quadrant), ability (the fourth quadrant), character (the first and fourth quadrant), emotion (the second quadrant) five personality attributes could measure the implicit theories of personality. All participants had not participated in similar experiments. After the experiment, they were given a small amount of reward.

Fairy tales adapted from those of different countries (Italy, Germany, China, India, Myanmar, Japan, etc.) were used as materials. After defining the operational definition and scoring rules for the entity theorists and the incremental theorists, the blind analysis method was used, and five trained scorer coded and scored the characteristics of the test samples and counted their weight results (the product of the positive and negative weighting with the weakness weighting) (Yuan, 2013). Scorers had a higher degree of scoring consistency (Kendall $W = 0.87$, $\chi^2(4) = 138.26$, $p < 0.001$, $r_{\text{equivalent}} = 0.65$).

The coding and scoring procedure of the test is: (1) Feature points calculation. Scorers are asked to see the word, tone as a small unit and focus on the structure of the whole answer. According to the feature items of each sentence, one feature item is recorded as a one score and no feature item is recorded as zero. Four feature items are totally 4 scores. Among them, the entity theorists' feature items (positive score) include four key points: personality attributes like personality and ability are usually fixed, not obtained by learning and not cultivated by environment, and hard to change. The incremental theorists' feature items (reverse score) include four key points: personality attributes like personality and ability are usually changing, obtained by learning and cultivated by environment, and can be changed if making effort. A sentence can be recorded by several different features at the same time, but a feature can only be remembered once. The total score should be no more than 4

points. (2) Weight points calculation (the formula is "Weight points = The positive and negative weighting \times The strong and weak weighting"). In addition to the "quantity" difference, the "quality" is also needed to be explained when scoring the feature items. That is analyzing the positive and negative weighting (The entity theorists' feature item is recorded as the positive weighting number. The incremental theorists' feature item is recorded as the negative weighting number) and semantic weakness weighting ("Sadness" is more weighted than "lonely"). In addition, the weight of 0 point is based on: Some characteristic words have the entity theorists and the incremental theorists feature literally, but in the whole context, the semantic intensity is not reflected, so scored 0. (3) Score conversion. Original points = Characteristic points + Weight points; Correction points (Z points) = Original points / Total number of words $\times 100$.

On this basis, 70 participants were randomly selected to finish fairytale reason and end completion test (Kast, 2001). The participants are from Northwest Normal University, majored in Chinese, foreign languages, history, education, mathematics, biology, half male and half female, aged from 17 to 25 (averagely 20.1 ± 1.35 years old), right-handed, no mental or neurological disorders history, normal naked-eyes or corrected visual acuity, and normal hearing. All participants had not participated in similar experiments. After the experiment, they were given a small amount of reward. Because two participants misunderstood the operation, the actual effective participants were 68 (33 males). A group paper test was conducted at the same time (about 60 min). The guide in the questionnaire was: "Please guess how the following situations arise, i.e., the cause of the story. What is the ending of the story?" The experimenter guide stressed: "Please use your imagination, try to write it in detail." During the test implementation, the test environment, the intervention of the participants by experimenters, the guidance languages were consistent. After the interval of two weeks, the retest reliability ($r = 0.63$, $p < 0.01$) and

Table 1 Content analysis of fairytale situational test

Sub-test	Fairytale situation	Familiarity	Personality attribute(%)				The character of the protagonist (The frequency of the first 3)	
		<i>M ± SD</i>	Character	Temperament	Ability	Morality		Emotion
Sub-test I	Situation 1(T1)	1.87 ± 1.35	84.2	2.7	4.9	0	8.2	Naive,lively,naughty
	Situation 2(T2)	1.92 ± 1.28	9.1	5.3	85.6	0	0	Clever,Profound,Whimsical
	Situation 3(T3)	1.84 ± 2.61	2.6	1.9	3.2	88.5	3.8	Kind,Filial piety,Perseverance
	Situation 4(T4)	1.93 ± 1.21	10.4	78.9	6.7	0	4.0	Suspicious,Nervous,Gaffe
	Situation 5(T5)	1.75 ± 2.23	3.3	2.6	0	2.4	91.7	Sad,Sentimental,Negative
Sub-test II	Situation 6(T6)	1.82 ± 2.09	84.0	6.1	0	6.3	3.6	Eccentric,Not easy to communicate,Autistic
	Situation 7(T7)	1.76 ± 1.50	2.1	2.4	87.5	8.0	0	Silly,Confused,rigid
	Situation 8(T8)	2.03 ± 1.42	4.3	3.9	0	89.6	2.2	Cold,Vicious,Arrogant
	Situation 9(T9)	1.89 ± 1.74	6.3	79.5	0	0	14.2	Love vanity,Tacky,Shallow
	Situation 10(T10)	1.99 ± 2.65	1.7	3.8	12.6	5.2	76.7	Fickle,Free of charge,Hard to figure out

Source: Cui Yichen and Wang Pei (2015)

replica reliability ($r = 0.52, p < 0.05$) of this test were higher. Verified by multi trait-multi method matrix approach, the correlation average of heterogeneity ($r_{\text{difference-similarity}} = 0.17, r_{\text{difference-difference}} = 0.07$) was less than the average correlation coefficient of homogeneity ($r_{\text{similarity-difference}} = 0.86$), indicating that the structural validity (convergence validity and discriminant validity) of the test was better. “Whether the participants think that test scores can be improved through efforts”, the “yes” and “no” groups were significantly different in the test scores ($M_{\text{yes}} = 72.51, M_{\text{no}} = 57.69, t(68) = 15.82, p < 0.001, d = 0.853$), indicating that the test had a higher standard of relevance validity and empirical validity.

Randomly selected 40 undergraduates of Northwest Normal University (half male and half female, majored in physics, education, chemistry, aged from 18 to 24 years old, averagely 19.7 ± 1.16 years old), no serious physical and mental disorder history, normal naked-eyes or corrected visual acuity, normal hearing). They were tested for familiarity and personality. The familiarity degree and percentage of personality attribute were counted (see Table 1), thus verifying the two-dimensional (the entity theorists-the incremental theorists) characteristics of implicit theories of personality.

Preparation of “person impressions”

A total of 50 undergraduates of Northwest Normal University (28 boys, 22 girls, have not participated in a similar survey) were selected randomly to finish the open survey of “person impressions” materials. Totally 46 valid questionnaires and the effective recovery rate was 92%. The questionnaire asked the participants to fill in: Five Chinese cities that are considered to be well-known (except provincial capital and municipalities). Describe a person’s popular and unpopular behavior with 5 statements (about 10 words per sentence). Select 12 cities (frequency higher than 85%). Describe the behavior of virtual cognitive object statements (frequency higher than 85%). Considering that “person” is a

generic term, participants can’t directly impose a specific impression on them, so the use of virtual cognitive objects refers to “person”. The virtual cognition objects are represented by the letters “Q” and “W”. On one hand, participants can form a stable impression and memory when receive other people’s behavior. On the other hand, through manipulating the frequency and popularity of Q and W, whether the participant’s person impression has a pure contact effect or co-occurrence memory judgment effect is measured. That is whether to make a heuristic or analytic processing when forming person impression. Therefore, Q is the virtual cognition object with a lot of contact with the participants. W is the virtual cognition object with less contact with the participants. The frequency ratio of the two appears to be 2:1. The ratio of describing Q and W’s popularity (16 sentences describing Q, 8 sentences describing W) and unpopularity (8 sentences describe Q, 4 sentences describe W) is 2:1. Totally 60 undergraduates of Northwest Normal University were chosen randomly to evaluate Q and W’s personality traits after reading these sentences. The results showed that the core traits of Q and W were significantly correlated ($r = 0.82, p < 0.001$).

2.4 Program

Using E-prime 2.0 programming, the experimental instruction was presented on 17 computers with screen resolution of 1024×768 . The screen was about 55 cm from the screen and the screen was black.

The experiment was divided into five phases: (1) ITPs directive manipulation of context. Two groups of participants were randomly assigned to two ITPs directional cases according to gender, age and participant, respectively. Each case was composed of 21 entity theorists’ participants and 24 incremental theorists’ participants. One situation was to allow participants to read a text: “Most of our personality has been fixed as gypsum after 10 years old, which will

never be soft. Studies have found that people's life is not changing, people's basic personality traits are very stable." In another context, the participants read the text as follows: "People's personality is not as hard as rock, which will be changing, and people can change themselves through strong will and great efforts. Studies have found that people's life changes greatly, people's basic personality traits have considerable flexibility and plasticity." (2) Cognitive stage. The instructor informed the participants to read the statements displayed one by one in the center of the screen and then take memory test. Randomly represented 12 city names and 36 statements (5 s for each sentence, interval 1.5 s), and repeated sentences describing the same cognitive object (Q/W) was no more than three (5 s for each sentence, interval of a white box as masking stimulus) (ISI as 1 s). (3) Delay stage. The participants were asked to write the city names they had seen in 4 minutes to eliminate their short-term memory effect on behavioral statements. (4) Test stage. Free memories of others' behavior: let participants list sentences describing the behavior of Q and W as many as possible within 8 minutes. Judgment of unpopular behavior to others: Ask the participants to judge sentences that describe Q and W behavior after free recall (confirm the number of unwelcome sentences). Evaluation of others' popularity: participants are asked to evaluate the popularity of Q and W at nine-point scale (1 is very unpopular). The free recall (free recall of statements), sequence position of the free recall (free recall of the first 12 sentences and the last 12 sentences) and frequency estimation (judgment of unpopular behavior and evaluation of popularity of Q and W) are taken as dependent variables. (5) The test of ITPs directive situation. Participants are asked to evaluate whether people's personality is stable in a nine-point scale (1 is very unstable and 9 is very stable).

3 Results

3.1 Free recall effects of different ITPs

Totally 30 Northwest Normal University undergraduates in different majors were asked to evaluate participants' free recall scores (right answer: 1 point, wrong answer: 0 point, full marks: 36 points) of Q and W behavior statements and scorers had a good reputation, $r = 0.95$, $p < 0.001$. Results showed that there was no significant difference in recall performance between the entity theorists and the incremental theorists ($M_{\text{incremental}} = 6.71$, $M_{\text{entity}} = 6.48$, $t(43) = 0.39$, $p > 0.5$). It was suggested that the entity theorists group and the incremental theorists group had comparability, and the recall method could be used in this study. The three or four interactions of the independent variables were not significant. They were: ITPs, ITPs directive situation and cognitive objects [$F(1, 82) = 2.68$, $p > 0.05$], ITPs, ITPs directive situation and behavior statement sequence position [$F(1, 82)$

$= 1.88$, $p > 0.1$], ITPs cognitive object and behavioral statement sequence position [$F(1, 82) = 1.41$, $p > 0.1$], ITPs directive situation, cognitive objects and behavioral statement sequence position [$F(1, 82) = 1.74$, $p > 0.1$], ITPs, ITPs directive situation, cognitive object and behavioral statement sequence position [$F(1, 82) = 1.69$, $p > 0.1$]. In the interaction analysis of the independent variables, the interaction between the cognitive object and the sequence position of the behavioral statement was not significant [$F(1, 42) = 1.01$, $p > 0.1$], which indicated that the primacy and recency effects of memory did not directly affect the formation of person impressions. Then, the main effect and two interaction effects of the other variables were analyzed.

Free recall

The covariance analysis was carried out using the ITPs of the participants as the independent variables, and the covariates of 12 cities were covariates (After testing, the regression slope of each group was equal). The main effect of city name recall was not significant, $F(1, 42) = 0.51$, $p > 0.1$. The main effect of ITPs was significant, and the entity theorists participants were tried to recall more behavioral statements about cognitive objects than the incremental theorists participants, $F(1, 42) = 8.96$, $p < 0.005$, $\eta_p^2 = 0.116$. There was no significant interaction between the city name recall and the ITPs, $F(1, 42) = 1.67$, $p > 0.1$. Presumably, the incremental theorists are more likely to form a memory judgment than the entity theorists.

Sequence of free recall

The covariance analysis of 2 (ITPs) \times 2 (sequence position) was performed by the amount of memory of the behavioral statements as covariates (by the test, the regression slope of each group was equal). The main effect of ITPs was not significant, $F(1, 42) = 0.59$, $p > 0.1$. The main effect of the sequence position was not significant, $F(1, 42) = 0.02$, $p > 0.5$. The main effect of the behavioral statement recall was not significant, $F(1, 42) = 1.58$, $p > 0.1$. The interaction between the statement recall and the sequence position was not significant, $F(1, 42) = 1.73$, $p > 0.1$. The interaction between ITPs and sequence positions was significant, $F(1, 42) = 20.89$, $p < 0.001$, $\eta_p^2 = 0.390$. The simple effect analysis showed that the entity theorists recalled more information of first 12 than last 12 [$F(1, 42) = 7.26$, $p < 0.001$, $\eta_p^2 = 0.543$], showing obvious primacy effect. The primacy effect of the incremental theorists was not significant, $F(1, 42) = 1.83$, $p > 0.1$. The results showed that the entity theorists' participants were more likely to use instant judgment to process others' information.

3.2 Frequency estimation of different ITP holders

Judgment on the unpopular behavior of others.

The 2 (ITPs) \times 2 (cognitive object) repeated measurement variance analysis showed that, The main effect of ITPs was

significant, $F(1, 43) = 4.51, p < 0.05, \eta_p^2 = 0.197$. The main effect of cognitive object was significant, $F(1, 43) = 5.08, p < 0.05, \eta_p^2 = 0.223$. The interaction between the two was significant, $F(1, 43) = 12.37, p < 0.001, \eta_p^2 = 0.314$. The incremental theorists attribute unpopular behavior to $Q > W, F(1, 43) = 4.22, p < 0.001, \eta_p^2 = 0.629$. However, the correlation effect of the entity theorists was not significant, $F(1, 43) = 0.91, p > 0.1$ (see Table 2). The incremental theorists were more possible to appear illusory correlation effect that were consistent with memory judgments than the entity theorists.

Table 2 Comparison of free recall and frequency estimates of different ITPs participants

Measurement standards	Entity theorists (n=21)		Incremental theorists (n=24)	
	M	SD	M	SD
Recall (total)	12.60	1.90	10.80	2.14
Q	6.73	1.12	6.90	1.26
W	3.96	1.53	5.87	1.06
Sequence position of memory				
First 12	5.10	1.04	3.83	1.09
Last 12	3.05	1.12	3.54	1.10
Unpopular behavior judgment				
Q	6.79	1.59	6.71	1.55
W	6.42	1.67	5.00	1.30
Individual popularity evaluation				
Q	4.67	1.96	3.75	1.65
W	4.76	1.92	4.75	1.73

Evaluation of the popularity of others.

After repeated measurement of variance analysis, the main effect of ITPs was not significant, $F(1, 43) = 0.97, p > 0.1$; the main effect of cognitive object was not significant, $F(1, 43) = 2.90, p > 0.05$; the interaction between the two was significant, $F(1, 43) = 4.36, p < 0.05$, and $\eta_p^2 = 0.162$. It could be seen from Table 2 that the entity theorists' participants showed preference for individuals with more contact, $F(1, 43) = 2.45, p < 0.05, \eta_p^2 = 0.368$; the individual evaluation of the incremental theorists' participants was not affected by the pure contact effect, $F(1, 43) = 0.42, p > 0.5$.

Co-occurrence memory judgment

On the basis of the above test, the two categories of difference scores were further counted: difference value of memory = memory amount of Q - memory amount of W, difference value of judgment = judgment of the unpopular behavior of Q - judgment of the unpopular behavior of W, to infer whether the free recall bias of different ITPs holders was positively correlated with the illusion correlation effect. These two types of difference scores were converted to Z scores and their Pearson correlation coefficients were obtained. The results showed that there was no significant correlation between the memory and judgment of the entity

and incremental theorists ($r_{\text{entity}} = -0.21, p > 0.05$; $r_{\text{incremental}} = 0.18, p > 0.05$).

3.3 Interaction between ITPs directive situation and the implicit theories of personality

Through analysis of variance between participants, the main effect of ITPs directive situation was significant, and the participants who were manipulated by the entity theorists were more likely to adhere to the stability of the personality than participants who were manipulated by the incremental theorists [$M_{\text{entity}} = 6.24, M_{\text{incremental}} = 4.17, F(1, 41) = 19.81, p < 0.001, \eta_p^2 = 0.335$]. The main effect of ITPs was not significant, $F(1, 41) = 2.58, p > 0.05$; the interaction between ITPs and ITPs directive situation was significant, $F(1, 41) = 8.60, p < 0.005, \eta_p^2 = 0.286$. The simple effect analysis showed that the ITPs directive situation consistent with the tested ITPs would play a positive reinforcement role [$F_{\text{entity-entity situation}}(1, 42) = 6.12, p < 0.01, \eta_p^2 = 0.245$; $F_{\text{incremental-incremental situation}}(1, 42) = 4.35, p < 0.05, \eta_p^2 = 0.208$], but the ITPs directive situation, which was inconsistent with ITPs, had no such reinforcement [$F_{\text{entity-incremental situation}}(1, 42) = 1.37, p > 0.1$; $F_{\text{incremental-entity situation}}(1, 42) = 2.21, p > 0.05$]. It can be seen that the situational factors influence the strength of the implicit theories of personality, but not change its inherent implicit theories of personality.

3.4 The influence of ITPs directive situation and the position of statement sequence on free recall

Free recall

F test was performed on the free recall of participants under two ITPs directive situations. The results showed that the participants who were manipulated by the incremental theorists recalled more behavioral statements than those who were manipulated by the entity theorists, $F(1, 43) = 2.69, p < 0.05, d = 0.387$.

Sequence position of free recall

Through repeated measurement of variance analysis, the main effect of ITPs was not significant, $F(1, 42) = 1.95, p > 0.05$; the main effect of the sequence position was significant. participants recalled more information from first 12 statements, $F(1, 42) = 5.74, p < 0.05, \eta_p^2 = 0.213$. The interaction between ITPs directive and sequence position was significant, $F(1, 42) = 6.38, p < 0.05, \eta_p^2 = 0.279$. The simple effect test found that the participants manipulated by the entity theorists had significant primacy effect when in the memory, $F(1, 42) = 3.89, p < 0.01, \eta_p^2 = 0.523$, while the participants controlled by the incremental theorists did not show the primacy effect, $F(1, 42) = -0.22, p > 0.05$.

3.5 Influence of ITPs directive and cognitive objects on frequency estimation

Evaluation of the popularity of others

The main effect of ITPs was not significant, $F(1, 43) =$

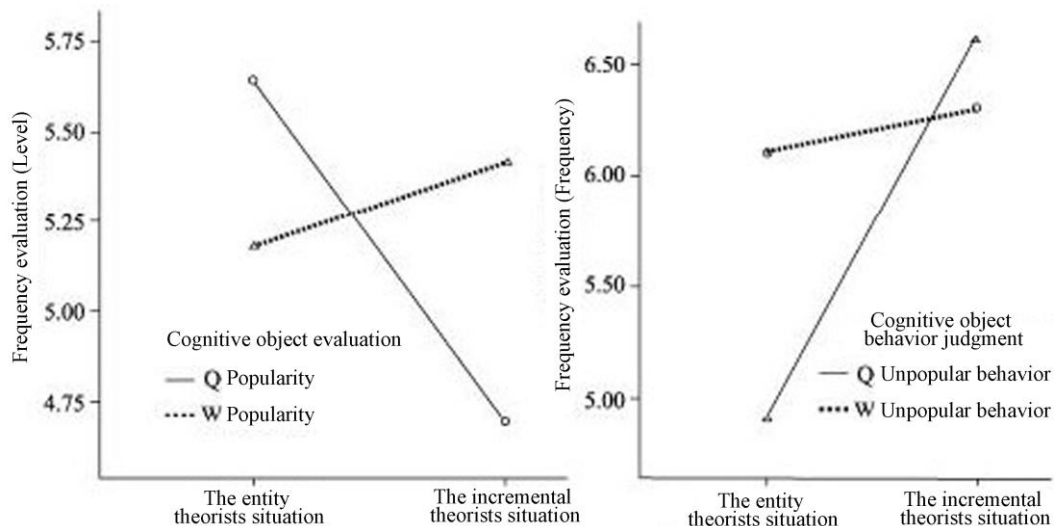


Fig. 2 The influence of directive situation and cognitive object on frequency evaluation

3.61, $p > 0.05$; the interaction between ITPs and the cognitive objects was significant, $F(1, 43) = 12.41$, $p < 0.01$, $\eta_p^2 = 0.309$ (see Fig. 2). By simple effect analysis, participants manipulated by the entity theorists showed a pure contact effect, that is, preference for individuals with more contact, $F(1, 43) = 3.76$, $p < 0.01$, $\eta_p^2 = 0.534$. Participants who were manipulated by the incremental theorists showed co-occurrence memory judgment effect, $F(1, 43) = -2.23$, $p < 0.05$, $\eta_p^2 = 0.381$. It is inferred that participants manipulated by the entity theorists use heuristic processing when perceive others. Through implicit representation, the individual can obtain instant judgments according to other people's traits information. However, participants manipulated by the incremental theorists use analytical processing and form others' memory judgments according to situation information. It can be seen that the psychological mechanism of the two participants is very different when produce illusory correlation effect influenced by different directive situations.

Judgment of the unpopularity of others

The main effect of ITPs was not significant, $F(1, 43) = 2.94$, $p > 0.05$; the interaction between ITPs and the cognitive objects was significant, $F(1, 43) = 8.01$, $p < 0.01$, $\eta_p^2 = 0.283$ (see Fig. 2). The simple effect test found that the participants participated to the incremental theorists considered that the unpopular behavior of Q was greater than that of W, $F(1, 43) = 3.87$, $p < 0.01$, $\eta_p^2 = 0.598$. It is inferred that the incremental theorists use analytic processing to perceive others. The judgment of the characteristics of others is suppressed through the explicit representation of the individual. Obtain the behavioral information of others based on memory to form the memory judgment.

Co-occurrence memory judgment.

The results showed that the co-occurrence memory judgment of the participants who were manipulated by the

entity did not reach the significant level ($r = -0.26$, $p > 0.05$). However, the memory was positively correlated with judgment of participants who were manipulated by the incremental theorists. Obviously, the degree of correlation between the two operating conditions was significant, $t = 3.44$, $p < 0.001$, $d = 0.496$. It is further deduced that participants with different ITPs are different from the illusory correlation effect that occur when they perceive others: participants who are manipulated by the entity theorists usually perform heuristic processing of the traits information of others and the real-time judgment characterized by the first impression. The participants who are manipulated by the incremental theorists perform analytical processing based on behavior information of others and the judgment of the memory as the core.

4 Discussion

4.1 Difference of memory processing strategy of people with different implicit theories of personality

This study validates the predecessors' point of view, that is, the entity theorists prefer to real-time judgments when form the impression and the incremental theorists appear illusory correlation effect consisted with memory easily (Levy et al., 2006). Studies have shown that the people with different implicit theories of personality behave individual differences when carry on free recall and information judgments of person impressions. In contrast to the incremental theorists, the entity theorists show strong primacy effect, and use real-time judgment to process others' information. In contrast to the entity theorists, the information recalled by the incremental theorists is relatively less, no primacy effect, and appear pure contact effect. But their co-occurrence memory judgment does not reach a significant

level, not enough to explain that the incremental theorists extract the information based on memory judgments. These differences illustrate that, as a prerequisite factor, implicit theories of personality influence others' impression processing strategies. Although the entity theorists are inferior to the incremental theorists in adaptability, they sometimes show the advantages that the entity theorists lack. For example, the entity theorists can quickly integrate others' information through a real-time extraction strategy.

The difference between real-time judgment and memory judgment provides an opportunity for people to understand the processing mechanism of impression formation. Studies have pointed out that the implicit theories of personality of perceiver affects person impressions information judgments (Plaks & Halvorson, 2013), but that doesn't mean that the entity theorists only form a real-time impression and the incremental theorists only form a memory-based impression. On the one hand, this study finds that expected others' behaviors of perceiver influence conscious clues and processing objectives, in turn affect the type of judgment on the impression of others is real-time or memory-based. On the other hand, individuals are not affected by their own implicit theories of personality from top to bottom when forming person impressions (Romero et al., 2014). These conclusions don't support the above theory "individuals are not affected by their own implicit theories of personality from top to bottom when form person impressions under different strategies of conscious clues and judgment types" (Leith et al., 2014; Mathur et al., 2013; Plaks & Chasteen, 2013), but at the same time do not fully verify the view 'Individuals use certain cognitive cues and processing strategies to influence their implicit theories of personality from bottom to top when forming others' impressions' (Hoyt & Burnette, 2013; Keysers et al., 2010). Therefore, the implicit theories of personality's processing mechanism and effect path still need to follow up further research.

4.2 Difference of impression processing strategy based on the implicit theories of personality

This study shows that situational factors affect the strength of individual implicit theorists of personality, but do not change inherent implicit theories of personality; affected by different directive situations, the interaction between the implicit theories of personality and others' perception of information processing is significant. That is to say, as a psychological representation, the implicit theories of personality play a "top-down" and "down-top" on linkage effect and guide people's social perception. Under the influence of the entity theorists' directive situation, person impression processing forms a real-time judgment. While under the influence of the incremental theorists directive situation, person impression processing forms a memory-based judgment. This conclusion further expands the view that 'the implicit theories of personality affect processing strategy of person impressions' (Kammrath &

Dweck, 2006).

This study further validates the previous views, namely the participants manipulated by the incremental theorists involve less initial information of others' impression, which is different from the participants manipulated by the entity theorists. The perception and impression bias associated with memory and judgment appear (Heslin et al., 2006; Tam et al., 2010). Compared with the entity theorists, the incremental theorists need to pay more cognitive effort when forming an evaluative impression of the individual (Hoyt & Burnette, 2013). It is inferred that perceiver's mental function is systematically changed by the inner and outer environment in the process of person impression formation. So do the incremental theorists process the social information actively or not? Studies have shown that the incremental theorists are likely to process information actively, but not for the formation of evaluation impression; instead, the incremental theorists focus more attention on situational information or temporary individual characteristics due to social role needs, rather than focusing on psychological predisposition and memory-based factors (Molden et al., 2006). The implicit theories of personality are both a participant and a dominant factor, and the effects are often achieved by controlling other factors (emotions, motivations, attitudes, cognitive resources, etc.) (Herzmann et al., 2011). In view of this, future research should focus on the extent to which different ITP holders spend cognitive resources on situation factors and evaluative information.

4.3 Fairytale test for applicability analysis of the implicit theories of personality

Previous implicit theories of personality tests did not consider dimensions (That is whether the implicit theory of personality is a single dimension or a double dimension?), but divided the implicit theories of personality in the same dimension, that is higher than a score identified as the entity theorists, and lower than a score identified as the incremental theorists (Chiu et al., 1997; Levy & Dweck, 1998). This approach already prescribes the single dimension nature of the implicit theory of personality, thus it is impossible to actually find out whether individuals who tend to be the entity theorists (or the incremental theorists) are also holding the incremental theorists (or the entity theorists). Fairytale test makes up for the deficiency of the one-dimensional scale, and confirms implicit theories of personality in a certain group. Furthermore, this paper validates the view that Hong et al. (2003) propose that "there are common implicit theories crossing different personality attributes". Nevertheless, the findings of this study need to be further verified. Studies have shown that people's implicit theory is not consistent across all personality attributes, namely individuals believe the ability is fixed and plastic changeable at the same time (Miller et al., 2007). The reason for this conclusion is contrary to the conclusion of this study: on the one hand may be the difference of

research process, on the other hand may be the difference of research methods. For this, follow-up research can carry out longitudinal tracking and cross-sectional investigation around some attribute of the implicit theories of personality. It is worth noting that if we do not consider the five personality attributes of personality, temperament, ability, character and emotion respectively with the premise of “the implicit theory of personality has cross-context stability”. It will be difficult to analyze the cross-attribute consistency problem of implicit theories of personality. Of course, the subjective inference of “implicit theory of personality is cross-context stability” needs to be further studied.

The measurement method of implicit personality theory demonstrates the structural dimension of implicit personality theory from different aspects, however, the correlation between these methods is still lack of effective means of testing, which leads to differences analyzed by different measurement techniques (Cui & Wang, 2015). In this regard, the implicit theories of personality for different social groups in different situations are necessary. The validity and reliability of the fairytale context test is further examined, and the problems such as low external validity, long test time and systematization of scoring rules are solved firstly.

4.4 Mechanism and research prospect of the implicit theories of personality on impression formation

The implicit theories of personality help to explain the difference between real-time judgment and memory judgment, and explain the principle that the entity theorists are more likely to judge others than the incremental theorists from the way of characterization (Beer & Brooks, 2011). Thus, the research on cognitive processing mechanism of social perception and impression is the motivation of personality psychology. In addition, the implicit theories of personality not only affect the formation of the impression of others, but also act as a buffer variable in mediating activation (Ziegler & Stoeger, 2010). The study has found that the perceivers who form memory judgments have different attitudes toward individuals in different situations. Even if the perceptual object is fully consistent in the two situations, the perceiver will have different attitude towards it. This effect can be seen as an example of an inconsistent attitude and behavior (Strack & Deutsch, 2011).

Stimulation coding and information integration is the core of the formation of others (Michel et al., 2010). The encoding and integration of other people’s information is influenced by the implicit theory of personality. It is also mediated by mood awakens and cortical activation (Anzures et al., 2013). The study has found that the central nervous system and the cerebral cortex responsible for sensory information recognition and evaluation play an important regulatory role in causing emotions and subsequent behavioral responses (Giacobbe et al., 2013). So is there a positive emotional experience when the implicit theory of personality

is consistent with cognitive context? Conversely, is there a negative emotional experience? Do different implicit theories of personality cause different activation states of the cerebral cortex? In this regard, combined with the real life situation, the exploration of the implicit personality theory of consciousness, control and brain mechanism and other basic issues will have important application value.

Future studies will expand the age range of the sample to track changes in body and mind over time of different types of participants, aiming to further discover the brain mechanism of implicit personality theory and the separation of social cognitive processing methods (automatic processing and control processing). In addition, whether the fairytale situation test can effectively measure the universality and difference of implicit personality theory, it is also necessary to continue tracking the actual behavior of the participants to improve the repeatability and extrapolation of the test.

5 Conclusion

As a psychological representation, the implicit theories of personality play “top-down” and “down-top” on linkage effect, and then guide people’s social perception. Under the effect of the entity theorists’ directive situation, the real-time judgment strategy is adopted when processing person impressions. Under the effect of the incremental theorists’ directive situation, the memory-based judgment strategy is adopted when processing person impressions. Unlike participants who are manipulated by the entity theorists, participants who are manipulated by the incremental theorists are less likely to be involved in the initial information, and there is perception and impression bias associated with memory and judgment. There is a need for more cognitive effort to develop an evaluative impression of the individual.

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