

Analyzing the Psychology Changes of Overconfidence in Ancient Chinese Corpus Based on CC-LIWC A Case Study of Wang Anshi Before and After the Xining Reform

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Abstract. The objective of this paper is to use the preserved and digitalized ancient Chinese materials for linguistic processing and statistical analysis, with the goal of extracting and scrutinizing the psychological traits of Wang Anshi, a historically controversial politician, during the period of social transformation. Wang Anshi was a famous politician of the Song dynasty, and he have caused considerable controversy for centuries. Overconfidence or self-centeredness is his main characteristic, but historical views differ. The changes in Wang Anshi's overconfidence before and after the transformation are important for us to understand his behaviors and decisions. The methods of this paper involved a word frequency analysis of Wang Anshi's self-narrative text with CC-LIWC and a comparative investigation into 22 categories of words across different stages of psychological development by comparing the multidimensional quantitative data of his overconfidence and self-centeredness. This paper not only provides a new approach to understanding the ancient people's personality, but also contributes to the interdisciplinary field of linguistic psychology and historical analysis with big data analysis.

Keywords: Psychological analysis, Social transformation, overconfidence, self-centered, CC-LIWC, big data mining

1 Introduction

Due to the theory of self-efficacy, Bandura showed that when the external environment changes, it is possible for people to adjust themselves to suit external changes through self-regulation mechanisms [1]. Launching a social transformation has always been an important event in ancient China, so it would obviously have an effect on one's self-efficacy. As self-confidence or overconfidence is a psychological representation of the characters associated with self-efficacy, it is meaningful to study the changes in the self-confidence or overconfidence of the famous Chinese politician Wang Anshi before and after the social transformation in Song Dynasty.

1.1 Wang Anshi has been controversial due to his excessive overconfidence

Wang Anshi was an outstanding politician, literary scholar, thinker and government reformer of the Song Dynasty who implemented the famous social transformation, which had a great

impact on the Song Dynasty and even on China afterward for centuries. Historical perspectives on him differ, as do views on his overconfidence psychological traits, which are mostly based on the expression of his behaviors and the points of others. One view is that he was over confident all the time [2], and this overconfidence did not change significantly before or after the transformation. Liang Qichao also believed that Wang Anshi was a kind of self-confidence in all aspects [3]. There is also a view that the degree of his overconfidence changed, which could be regarded as self-confidence before the transformation and overconfidence after he had begun the transformation [4], and his overconfidence had brought certain negative effects to the transformation, which made him suffer from stigmatization in history [5]. It is important for us to understand Wang Anshi's psychological characteristics of overconfidence before and after the transformation, and it can also help us to understand some of his behaviors and decisions during the transformation more accurately.

1.2 From ancient times to the present day, whether Wang Anshi was excessively overconfidence or self-centered has been a focal point of scholarly debate

Generally, there are two means of overconfidence about him, one is overconfidence and another is self-centeredness in psychology [6,7]; overconfidence is cognitive bias [8], which is related to rational thinking [9], and rational thinking is related to analytical thinking, cognitive thinking processes, and perceptual thinking processes [10]. This cognitive bias can have far-reaching effects for behavior and decisions [11]. Another meaning is self-centeredness, which is highly correlated with narcissism [8, 12].

To date, the evaluation of Wang Anshi's overconfidence has been related to these two views, but the meaning is not the same. Sima Guang, a famous politician and literary scholar of the same period, commented that he was too self-centered and did not listen to others' advice, which led to the failure of some reforms [13]. The criticism of Sima Guang was more about not listening to others and his self-centeredness; modern scholars also believe that his over confident led to some mistakes during the transformation, and James maintained that Wang Anshi's overconfidence was so high that he became arbitrary [14], which is more in the dimension of cognitive bias caused by rational thinking. He was known as the "Niu XiangGong" [15], where "Niu" means being obstinate, stubborn and not listening to others' opinions. The overconfidence of Wang Anshi played a great role in his behaviors and decisions and had a strong correlation with his performance during the transformation, which greatly influenced his personal reputation and judgments from others [16]. Current evaluations of Wang Anshi are mostly qualitative and do not provide a more comprehensive analysis, and there is no evaluation from the perspectives of cognitive bias or self-centeredness in psychology, which may comprehensively and accurately affect our understanding of the psychological meanings behind his behaviors and decisions. This paper attempts to compare and analyze Wang Anshi's overconfidence or self-centeredness before and after the reform by combining multiple dimensions of two psychological meanings: cognitive bias and self-centeredness.

1.3 This study employs cc-liwc to conduct a big data analysis of ancient Chinese language corpus, and examines Wang Anshi's psychological traits

At present, although cognitive bias and self-centeredness can be obtained through psychological testing, we cannot have these tests performed on Wang Anshi, but we can use the literature to analyze mental representations to identify the characteristics related to his cognitive bias and

self-centeredness to conduct a psychological profile analysis, which is a more effective way to study the psychology of the ancients. Our group has extended the function of ancient literary analysis on the basis of LIWC, which can cover most ancient texts for word frequency analysis and can provide intuitive results based on statistical analysis of word frequency and semantics [17], such as the psychological change analysis of Su Shi before and after the Wutai poetry case [18] and the psychological semantic differences of Zhang Juzheng before and after the DuoQing event [19]. Wang Anshi's self-narrative material that can be collected is also abundant, and the CC-LIWC word frequency analysis of Wang Anshi's corpus can examine the differences in cognitive bias and self-centered psychological changes from a quantitative perspective [10, 20].

Word frequency and statistical analysis of Wang Anshi's self-narrative material were conducted using CC-LIWC, and quantitative analysis of rational thinking, that is, cognitive bias, was analyzed based on the results in three dimensions: analytical thinking, the perceptual thinking process, and the cognitive thinking process [10, 20], while according to Nicholas S. Holtzman's word class related to narcissism, one can derive a degree of change in terms of self-centeredness [21].

2 Method

2.1 Data material

The data used in this paper come from Wang Anshi's self-narrative documents. The Collected Works of LinChuan compiled by Wang Shuizhao contains documents in a variety of literary styles, such as commentary, memorial/petition, note/memorandum, discussion, miscellany, written work and preface, which are based on personal expressions of political views and emotions and narratives of scenes, which are the main resources of this paper. According to the characteristics of Song Dynasty literary styles [22], special functions such as eulogy, funeral oration, stele, tombstone biography, record of person and epitaph, as well as regular script such as imperial edict, internal/external governance, memorial and edict, are not included. Daily Records of the Xining Reign records Wang Anshi's views and discussions with the emperor Song Shenzong and other government officials on important events and personalities; therefore, it is also included in this paper. The chronology of Wang Anshi's works was selected from 1042, the year he first entered government, to 1076, the year of his second dismissal, which was referenced to Liu Guocheng's *A Chronicle of Wang Anshi's Life*, and Yang Zhongliang's *The Long Chronicle of The Royal Song Dynasty* for the addition of some important events.

2.2 Data Process

Wang Anshi launched the reform from 1069 to his second dismissal in 1076, which lasted for nine years, but he had been in politics for more than 20 years since 1042, which was a long period of time, and he had different stages of development in his thoughts and personal experiences [23]. Generally speaking, the social transformation started in 1069, but because Wang Anshi had already mentioned the relevant reformation ideas with the emperor Shenzong in 1068 when he wrote a ten thousand-word letter, the whole ideological system was consistent, so this paper divides 1068 into the beginning of the transformation as well. Therefore, the overall time division before and after the transformation starts from the beginning of his career to the second dismissal of the prime minister, according to Wang Anshi's personal development experience,

with reference to Liu Chengguo's division method in the development of Wang Anshi's academic thought [24]. Wang Anshi's political career is divided into the following five groups: the Huainan tenure, from 1042 to 1046; the Yin County and Suzhou tenure, from 1047 to 1054; the Capital tenure, from 1055 to 1063; the Jiangning career, from 1064 to 1067; and the privy councilor, presiding over the reform from 1068 to 1076.

2.3 Research Procedures

In their related paper on LIWC, Yla R. Tausczik and James W. Pennebaker pointed out that certain indicators of rational thinking are associated with cognitive biases that can be effectively represented [10], where conjunctions, prepositions, and tense words as well as negation, insight, and causation words are used in combination to demonstrate the writer's analytical way of thinking, such as integrative thinking, complex thinking, and differential thinking. The analysis of word categories related to the degree of self-centeredness is positively correlated with sex words and expletive words and negatively correlated with anxiety words and perceptual process words [21]. CC-LIWC has achieved high consistency with LIWC in ancient texts [17], so this paper compared the psychological changes of Wang Anshi's overconfidence and self-centeredness before and after the reform in these word categories for analysis.

Based on the results of CC-LIWC, this paper introduces TWC, the total word count of the article; LWC, the number of LIWC words in the article; LCR, the LIWC coverage rate of the article to show the data situation of Wang Anshi's materials. The analysis is also grounded in word categories related to overconfidence and self-centeredness [10,21] for the following word categories: sex words like "sexual," dirty words like "swear," anxiety as "anx," perceptual process words as "percept" (see "see", hear "hear", feel "feel"), cognitive process words as "cogproc" (insight as "insight", cause as "cause," gap as "discrep," hesitation as "tentat," exact as "certain," difference as "differ"), "tense" as "tensem" (the past tense marker as "focuspast", the present tense marker as "focuspresent," "focusfuture", "progm"), "conj," "prep," and "negate." In addition, "fool" is usually a derogatory term for others, but in many of Wang Anshi's letters or memorials to the throne, he often used the words Certain self-referential appellations related to the word 'fool' are used to express modesty, and do not have the meaning of scolding here, so they are removed from the list(ref Fig. 1).

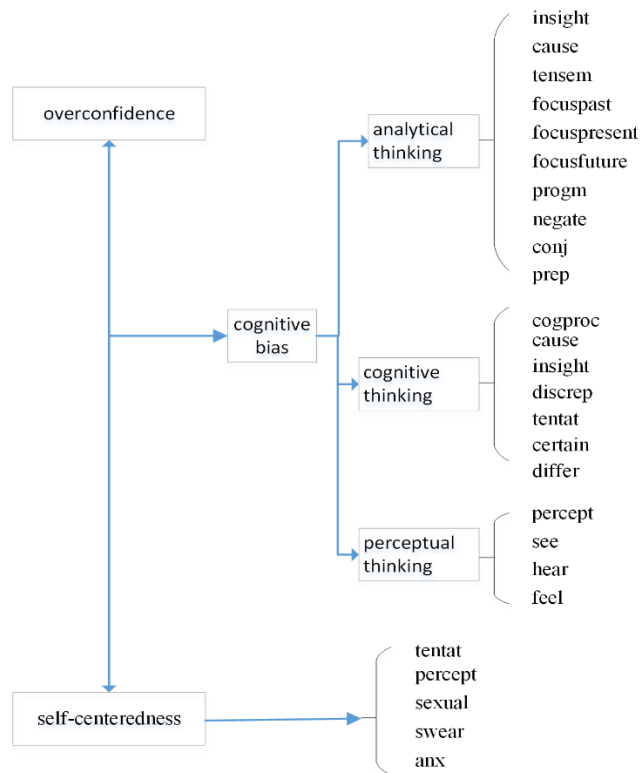


Fig. 1. Words dictionary of overconfidence and self-centeredness

And the process as **Fig. 2.** Data processing is mainly deal with the original data file, including data filtering and data classification. Then CC-LIWC can finish the words count and static analysis.

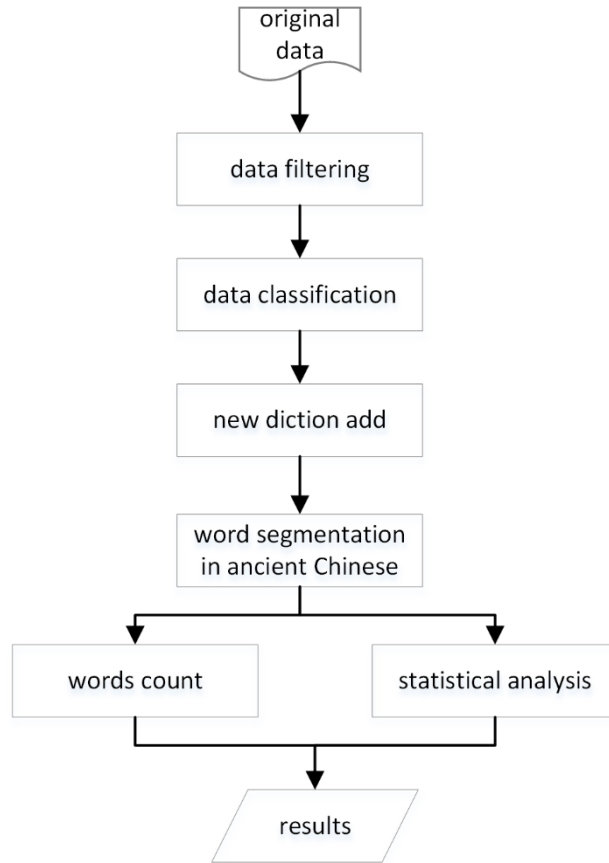


Fig. 2. Data Flow

3 Results

Using the CC-LIWC, this paper analyzed the differences in words representing Wang Anshi's rational thinking as well as his level of narcissism in different development stages. **Table 1** presents the word counts and the CC-LIWC cover rate (LCR) of each group corpus. **Table 3** shows the ANOVA and FDR results for the differences between means of frequencies of each word category in overconfidence and self-centeredness. **Table 2** shows the variability and statistical outcomes of the word categories with significant and marginally significant differences before and after the reform according to the LSD post hoc test.

Table 1. The number of different groups of Wang Anshi's corpus and the results of statistical analysis before and after the social transformation

Data groups	Period	Number of works	TWC	LWC	LCR
Group 1	1042-1046 Appointment in Jiangnan	14	3881	3226	0.83

Group 2	1047-1054 Appointment in Yin County and Shuzhou	57	15058	12067	0.8
Group 3	1055-1063 Appointment in Capital	71	25798	21156	0.82
Group 4	1064-1067 in Jiangning	25	15976	12914	0.81
Group 5	1068-1076 Prime minister, Implement the reform	76	94774	71495	0.75

Table 2. Five-group statistics with significantly different and marginally different words

Data groups	conj		negate		cause		insight		differ		feel	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Group 1	0.099*	0.029	0.04	0.016	0.021	0.017	0.037	0.015	0.048	0.015	0.008	0.006
Group 2	0.088	0.032	0.045*	0.021	0.017	0.009	0.035*	0.02	0.045	0.02	0.011	0.011
Group 3	0.092*	0.032	0.041*	0.017	0.023	0.012	0.041*	0.018	0.047*	0.017	0.008*	0.009
Group 4	0.095*	0.03	0.043*	0.016	0.026	0.015	0.041*	0.02	0.046*	0.02	0.008*	0.007
Group 5	0.076	0.033	0.035	0.019	0.022	0.015	0.049	0.026	0.036	0.021	0.011	0.011

^a*p <0.05

^b M-Mean value; SD - Standard Deviation

As we can see from **Table 1** the five LRC groups are divided into 0.83, 0.80, 0.82, 0, 81, and 0.75, all greater than or equal to 0.75, and the statistical analysis of word frequency is more satisfactory.

The results of the analysis of the 22 categories of words are shown in **Table 3**, including the results of the one-way ANOVA as well as the FDR adjusted results. From the results, it can be seen that after FDR correction, only the conjunction has significant changes, and the others are too small, so this paper directly analyzed the results of the one-way ANOVA, in which there are significant differences are conjunction conj ($F=4.378, p=0.002$), negation negate ($F=2.968, p=0.020$), insight ($F=3.008, p=0.019$), difference ($F=3.509, p=0.008$), and marginal significant differences are the causative word cause ($F=2.329, p=0.057$) and the sensory word feel ($F=2.024, p=0.092$). **Table 2** shows that in analytic thinking there is a significant decrease in conjunction words, Group 5 decreased compared to Groups 1, 3 and 4, negation words in Group 5 decreased compared to Groups 2, 3 and 4, and causative words in Group 5 increased compared to Group 2 but decreased compared to Group 4. All changes in causative words were marginally significant, difference words decreased significantly compared to both Groups 3 and 4, insight words increased significantly compared to Groups 2, 3 and 4, but the cognitive process words cogproc indicate there was no significant change in the analytical results. The feel words had a significant increase compared to Groups 3 and 4, but perceptual process words did not change significantly.

It is clear that Wang Anshi's overconfidence changed significantly and marginally significantly before and after the reform with cognitive bias but not with self-centeredness.

Table 3. Twenty-two types of word analysis differences before and after the social transformation

Words	ANOVA	FDR
swear	0.407	0.813
sexual	0.209	0.511
anx	0.125	0.392
tentat	0.574	0.903
prep	0.137	0.392
conj	0.002*	0.043*
negate	0.020*	0.139
tensem	0.771	0.943
focuspast	0.775	0.943
focuspresent	0.807	0.897
focusfuture	0.433	0.813
progm	0.811	0.887
cogproc	0.602	0.903
insight	0.019*	0.139
cause	0.057	0.25
discrep	0.655	0.895
certain	0.482	0.816
differ	0.008*	0.092
percept	0.651	0.895
see	0.904	0.904
hear	0.328	0.722
feel	0.092	0.337

*p <0.05

4 Discussion

This paper compared the overconfidence and self-centeredness of Wang Anshi's changes at different development stages before and after the social transformation using CC-LIWC; it analyzed a total of 22 categories of words related to rational thinking associated with cognitive bias and the level of self-centeredness. The results show significant or marginally significant changes in analytical thinking, cognitive thinking, and perceptual thinking, which had an impact on cognitive bias; however, self-centeredness did not change significantly before or after the transformation.

4.1 Analytical decrease in rational thinking

Wang Anshi's integrative thinking decreased significantly when the reform started, while complexity thinking also had a marginally significant decrease. Both integrative and complexity thinking are forms of analytical thinking, and **Fig. 3** indicates that the frequency of the use of analytical thinking words before and after Wang Anshi's reform greatly exceeded that of cognitive and perceptual thinking, which means that his overall analytical thinking is positive in integrative, complexity, and causal inference, demonstrating a high level of analytical thinking. This is the same point that can be obtained in numerous biographies of Wang Anshi [2], and it is just because he was highly educated, had a sound system of thought, and was more adapted to the needs of the development of the Song Dynasty at that time so that these characteristics made him better in problem-solving. His proposal of reforms was deeply approved by the emperor Shenzong [25], which also shows that Wang Anshi's analytical thinking was more integrated, complex, and causal in nature. The results imply that Wang Anshi's integrative and

complex thinking is still significantly less than that of the other groups before the reform; the reasons for this should be analyzed together with Wang Anshi's other aspects of performance.

Wang Anshi was a great thinker, and his analytical thinking is specifically reflected in the formation of his entire ideological structure. His ideas formed a whole theoretical system before the reform, during which the integration of his ideas was also increasing [24]. The reform was only the practical part of his theoretical system [26]. It was the stage of theory formation before the reform, and it was the process of using theory to guide practice after the reform [26]. Therefore, the high development of his integrative and complex thinking reflects the stages of his development in his thought system.

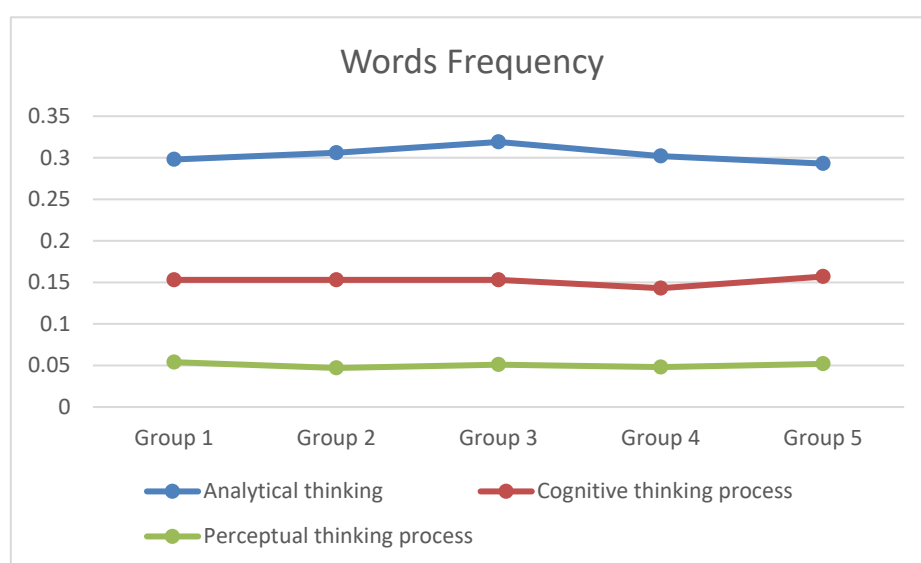


Fig. 3. Trend of change in thinking style in different periods

4.2 Cognitive processes are complex

Insightfulness, causality, and difference are three subcategories of cognitive thinking, while insightfulness and causality also reflect the narrator's reflective nature. It is clear from the results that Wang Anshi's reflexivity increased after he launched the reform, which facilitated rational behaviors and decisions, and in fact, Wang Anshi's reform was guided by these rational behaviors and decisions and achieved very objective results [27]. Moreover, in terms of insightfulness, matters related to the reform when he heard reasonable suggestions were also taken seriously and dealt with immediately; for example, he paid attention to Su Che and Lu Dian's opinions on the new law, and the relevant new law was reinvestigated [28].

However, less attention was paid to the differences in the implementation of the new law, which intensified his cognitive bias. Many people have also pointed out that he extended many Yin county governance experiences to the whole country, lacking consideration of other environmental differences. Even Liang Qichao, who called him the perfect man of the ages, said that this was questionable [3]. Even modern scholar Qian Mu, in his commentary on Wang Anshi,

also pointed out this problem; that was, the lack of attention to issues related to the new policy of reform during its implementation caused his failure [2].

4.3 Increase in perceptual thinking

In general, an increase in perceptual process words means an increase in the probability of doing things intuitively [11], and bias occurs when people evaluate and make decisions in a way that is biased toward their own prior views and attitudes [29]. However, in ancient China, many literati used many feeling-like imagery words to express their emotions when they were depressed. Wang Anshi, on the other hand, received a large number of objections from his opponents during the reformation, and because the emperor Shenzong became increasingly mature and independent politically, so the relationship between them became increasingly inconsistent [30], and he was less ambitious about his reform than he had been at the beginning and he became ever more discouraged [31]. The death of his eldest son, Wang Pang, was an even greater blow to him, so he pinned this mixed feeling on his literary works. These all increased the feeling word category. It seems that there is no evidence to prove that the cognitive bias increased only that it expressed his feelings.

4.4 No significant change in self-centeredness

From the beginning of his political career to his eventual dismissal as prime minister, Wang Anshi's self-centeredness did not significantly increase or decrease. Wang Anshi has been consistently accused of being self-centered [32], and the degree of this trait intensified when he began the reform, which also led to his stigmatization [5]. However, the results of this paper show that his self-centered psychological trait words did not change significantly before or after the reform.

When Wang Anshi started the reform, he broke the "law of the ancestors" and caused a lot of discontent, of which the "three deficiencies" spirit represented his personal trait of arrogance, but this view has been corrected by Deng Guangming many times [33]. Although Wang Anshi was not tolerant of people and obstinate in character [34], he was like this from the beginning, and now from the results we can see that he did not change significantly; it looks that it was Sima Guang's imposition of accusations against him and the reform.

One of the most criticized and accused self-centered aspects of Wang Anshi's work during the reformation was the improper use of people such as Lv Huiqing, Zeng Bu, and Zhang Yong, all of whom were written in the Biography of Traitors [28]. However, the situation at that time was that there were so many people in the court who opposed the reform, and the people he could choose to use were greatly limited [28]. Moreover, as Deng GuangMing pointed out, the so called "great traitors" mentioned above played a positive role in some of the reforms [35]. For Cai Jing and others who actually did evil to the court in the name of the new law at the end of the Northern Song Dynasty, there was a group of people who emerged long after he had already left the court, and those who opposed him tied him to all these people they did not like and criticized them together; Qi Xia also judged Wang Anshi and has been stigmatized and wronged for a long time [36]. Moreover, Wang Anshi did not have this self-centered intention, which can also be seen from Wang Anshi's reply to Sima Guang's letter [37], while Sima Guang's accusation of Wang Anshi's overconfidence was mixed with more personal feelings. Then after the

massive misunderstanding and stigmatization of the Song and Yuan dynasties, Wang Anshi bore this name [38].

The above also shows that Wang Anshi, whether he founded the New School or presided with the reform, did not deviate far from his previously demonstrated personality traits and did not change significantly in this respect because of his increasing real power. This can also be explained in terms of his values. According to Ding Qiong'e's description, self-centered values usually lead to the pursuit of self-worth as the ultimate goal and everything to serve the individual [39]. However, from Wang Anshi's pursuit of life, we can see that his goal of self-realization is to do his best for the monarch, to realize the highest pursuit of the ancient literati, "to reach the world" [40], and he wrote, "To worry about the world is not to be concerned with the gains and losses of self, and therefore is called a gentleman" [41].

5 Conclusion

This paper analyzed the different dimensions of Wang Anshi's controversial overconfidence and self-centeredness based on the semantic analysis of ancient Chinese. Quantitative methods were used to examine the changes in his overconfidence and self-centeredness, the former caused by cognitive biases related to rational thinking. The analysis shows that he has different performance characteristics in these two aspects. His reflective thinking increased when he had launched the reform, but the reduction in the differences in thinking caused certain cognitive biases, and there was no difference in self-centeredness. It provides a new perspective for the study of Wang Anshi's psychology.

6 Limits

Although this paper analyzed Wang Anshi's overconfidence and self-centeredness from multiple dimensions using quantitative methods, these dimensions do not summarize all the overconfidence and self-centeredness in psychology but only partially reflect the relevant index characteristics, and more dimensions should be extended for analysis in the future to be more comprehensive and accurate.

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