



College Students' Political Belief and Atheism Cognition Based on Electroencephalogram Testing Technology

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ABSTRACT

Political belief is a unique way of human spiritual pursuit. It is the source of human spiritual civilization. Political belief and atheism have different characteristics and mechanisms in cognitive basis, establishment process and psychology. Based on Electroencephalogram (EEG) testing technology, this paper studies undergraduates' political belief and atheism from the perspective of cognitive mechanism and makes a comparative study of political belief and atheism. The results show that the college students' atheism dimension is very low, and the degree of atheism of girls is obviously higher than that of boys. Political believers respond to political belief materials faster than other materials and have a higher correct rate of all materials than that of atheists. The attitude of party members in political believers to party words is the same as that of atheists, and they all show positive attitude. As far as this experiment is concerned, the belief of political believers is consistent with that of college students.

Key Words: Political Belief, Atheism, EEG Testing Technology, Atheism Dimension

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Introduction

Both political belief and atheism are determined on the basis of certain knowledge, the basis and means of establishing the knowledge and the influence of such determination on cognition and behavior are different (Boise *et al.*, 2016). Religious belief is one of the earliest social ideologies of human beings. The content of political belief closely surrounds the relationship between people and society and between people and themselves (Nencini and Grant, 2010, Jack *et al.*, 2016). College is a key period for young college students to develop and establish the political concept and their political behavior is influenced by their political beliefs (Mecklenburger, 2013). In constant exploration, Chinese and Western scholars have gradually reduced their differences

in definition of political belief. Political belief should be defined from the perspectives of individual and environment, thus revealing the relationship between man and the world (Smith and Flamm, 2011; Järnefelt *et al.*, 2015). Contemporary undergraduates' political belief education should be based on reality and keep pace with the times, adhering to the principle of "one goal and six persistence", the educational idea keeping pace with the times, the timeliness of educational content, the flexible innovation of educational methods, the overall resultant force and effect of educational environment (Leurent *et al.*, 2013). China is a country with freedom of belief, including political belief, Buddhist belief, Islamic belief, Catholic belief, Christian belief and so on (Agnati *et al.*,

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2017; Jong and Halberstadt, 2017). The existing researches only focus on the concept, function, origin form and activity mode of political belief without deep researches. With the rapid development of EEG testing technology, the cerebral nerve wave of EEG testing technology is used to reveal the essence of political belief, including political consciousness and political emotion (Van, 2016). In real life, apart from the real political believers, there is also an atheism phenomenon, but the consistence between the structure of atheism psychology and the structure of belief psychology have not been studied, and the cognitive mechanism of the political beliefs and atheism has not been studied (Aziato et al., 2016; Slyke, 2017). Based on the EEG testing technology, this paper deeply studies and discusses the cognitive mechanism and brain mechanism of political belief and atheism and makes a comparative study between political belief and atheism.

Investigation of Political Belief and Atheism

Investigation of atheism

Atheism completely negates supernatural things, and reason is invalid in the state of "no god" (Daher et al., 2015). There is also a lot of atheistic psychology among college students. In this section, the investigation of atheistic situation is conducted with college students. The Supernatural Belief Scale is used to screen the subjects in the atheistic group, mainly to distinguish the subjects with political belief. The scale is divided into 7 grades, and ranges from "1", which represents Totally Disagree, to "7", which represents Totally Agree. There is a total of 312 valid questionnaires collected.

Table 1. Scores and total scores of undergraduates in all dimensions of the atheism questionnaire

	N	Min	Max	Mean	S.D
China's unique superstition	312	1	5.00	3.07	1.07
Mental strength	312	1	5.25	3.12	1.12
Magic magic	312	1	5.25	2.75	1.08
Traditional superstition	312	1	5	2.44	1.17
Soul theory	312	1	5.57	2.52	1.1
Other life forms	312	1	6	4.11	1.15
Predict future	312	1	5.25	3.02	1.2
Total score	312	1		3.00	0.84

Table 1 shows the scores and total scores of the students in each dimension of the Atheism Survey Questionnaire. It can be seen that the degree of atheism of college students is at the lower and middle level, and the score of the Soul Theory dimension is the lowest. Through

investigation and research, it is found that 13.8% of college students have higher atheism degree and obvious atheism characteristics. In this study, college students scored low on the traditional atheism dimension, and the atheism degree of female students is obviously higher than that of male students.

Table 2. Scores and differences of subjects with political beliefs and atheism in personality measurement questionnaire

	Religion	N	Mean	S.D	t	df	Sig.
Introverted-extroverted	Faith	40	11.40	5.27	0.24	70	0.801
	Superstition	40	11.90	3.65			
Nervous	Faith	40	10.73	5.43	2.03	70	0.045
	Superstition	40	13.66	5.68			
Psychoticism	Faith	40	7.76	2.29	-1.12	70	0.223
	Superstition	40	6.92	2.09			
Conceal	Faith	40	9.70	3.14	0.54	70	0.578
	Superstition	40	10.26	2.02			
Internal control	Faith	40	23.54	8.98	4.71	70	0.000
	Superstition	40	31.84	3.83			
Opportunity	Faith	40	17.08	8.20	2.41	70	0.013
	Superstition	40	21.66	5.82			
ICP total score	Faith	40	56.75	55.61	4.12	70	0.000
	Superstition	40	75.11	10.52			

Investigation on the Personality of College Political Believers and Atheist

In recent years, the polarization trend of college students to political belief and atheism has been increasing year by year, and personality characteristics are important factors that influence college students' political belief and atheism. Neuroticism, spirit and extroversion of personality characteristics are important factors that influence psychological characteristics (Mandhouj et al., 2012; Katarzyna et al., 2017). Through the investigation of atheism, it's founded that there are 40 college students with atheism psychology and 40 college students with political beliefs recruited voluntarily, and the personality characteristics of the subjects are tested by the Eysenck Individual Scale, which has many dimensions such as introversion-extroversion, neuroticism, psychoticism, internal control and opportunity. Table 2 shows the scores and differences of subjects with political belief and atheism in the personality measurement questionnaire. It can be seen that there are significant differences in the dimension of internal control. It is also found that the dimension of atheism has an extremely significant positive correlation with the dimension of opportunity in the personality scale. There is also a significant positive correlation



between the dimension of neuroticism and traditional secular atheism.

Study on the Cognitive Characteristics of Political Believers and Atheists

Implicit attitude test of political believers and atheists

Political belief and atheism are homogeneous in epistemology, with the same psychological root and social origin (Massey & Higgins, 2011, Papazisis *et al.*, 2013). Among college students, political believers and atheists have distinct personality differences (Schumann *et al.*, 2014). From the existing inference, it is found that political belief is a theoretical and systematic world view, and atheism is a low-level social psychology, but it's difficult to measure the unconscious cognition with the traditional method. EEG technology can be used to test the complex psychological changes of the subjects. The response time can be used to measure the reaction time of the subjects before and after the stimulation. Under the rapid reaction condition, it is difficult to control the response of the subjects to the stimulation through consciousness. The EEG test experiment is based on the EEG recording and analysis system of German Brain Products Company. 20 college political believers and 20 atheistic college students are selected to test the atheistic vocabulary, political vocabulary, positive attitude vocabulary and negative attitude vocabulary.

Table 3 and Table 4 respectively show the correct rate and reaction time of political believer group and atheist group under various conditions. It can be seen that under compatible conditions, the correct rate of atheism vocabulary is obviously higher than that under incompatible conditions, and the correct rate of political vocabulary is almost the same but the response time is obviously less than that under incompatible conditions. However, that reaction time is obviously less than the intolerable condition. Figure 1 is a general plan view of the political believer group at the electrode sites of FC1 and FC2 under different conditions. There are significant differences in wave amplitudes of 0-150ms, 150-350ms and 400-800ms induced under different conditions. Figure 2 and Figure 3 are topographic maps of atheistic words and political words of the political believer group, respectively. The subjects show a greater difference in 400-800ms, and the atheists show a potential difference in the condition of political

words. Therefore, it can be concluded that political believers have a positive attitude towards political vocabulary and a negative attitude towards atheistic vocabulary, while atheists have a positive attitude towards political vocabulary, but ambiguous attitude towards atheistic vocabulary.

Table 3. The correct rate of the political believer group and the atheist group under various conditions

	Compatibility positive	Compassion christ	Compatibility negative	Compatibility superstition
Political believers	0.93±0.03	0.96±0.03	0.95±0.03	0.94±0.02
Atheist	0.94±0.02	0.95±0.03	0.89±0.05	0.90±0.07
	Not allowed positive	Not allowed christ	Not allowed negative	Not allowed superstition
Political believers	0.89±0.08	0.96±0.03	0.89±0.08	0.89±0.04
Atheist	0.94±0.02	0.82±0.09	0.94±0.02	0.95±0.04

Table 4. The reaction of the political believer group and the atheist group under various conditions

	Compatibility positive	Compassion christ	Compatibility negative	Compatibility superstition
Political believers	723±152	699±130	737±150	780±184
Atheist	744±67	829±73	886±74	878±122
	Not allowed positive	Not allowed christ	Not allowed negative	Not allowed superstition
Political believers	903±247	846±181	901±272	916±273
Atheist	805±105	985±166	821±104	811±174

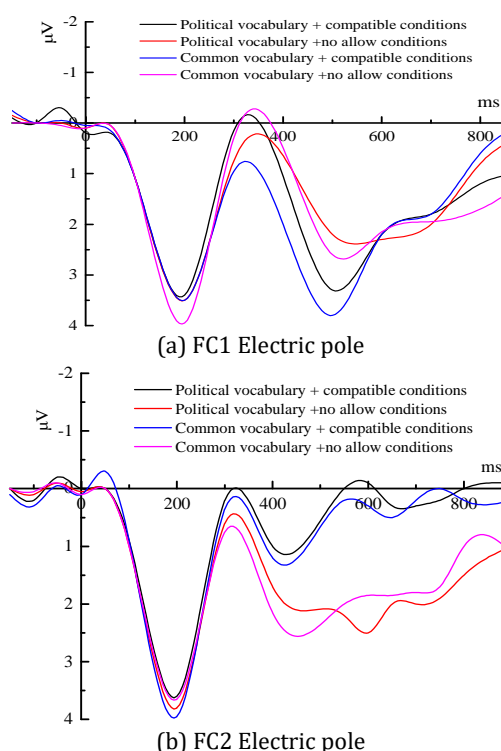


Figure 1. Political believer group in different conditions under the general plan



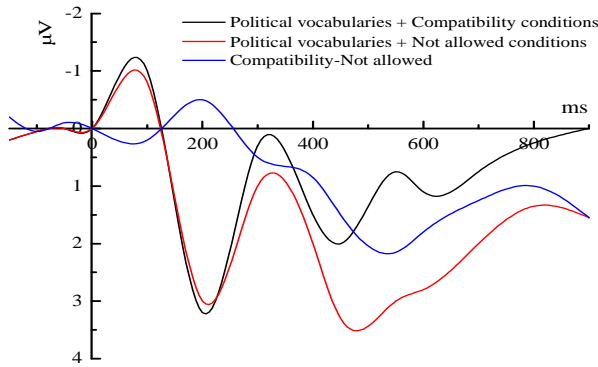


Figure 2. Political believer group topographers in the political vocabulary

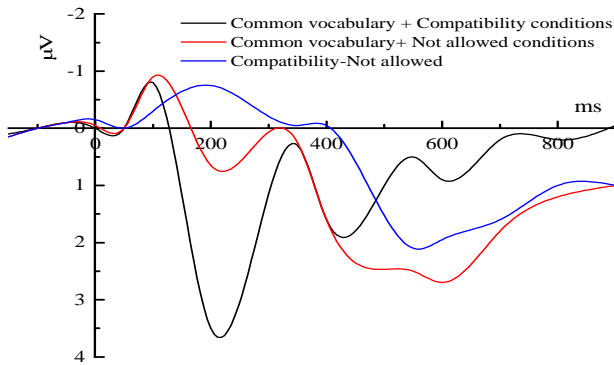


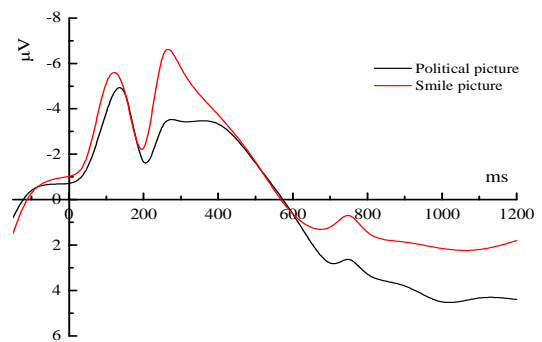
Figure 3. Topographic maps of subjects of political believer group in common vocabulary

Research on the memory recognition of political believers and atheists

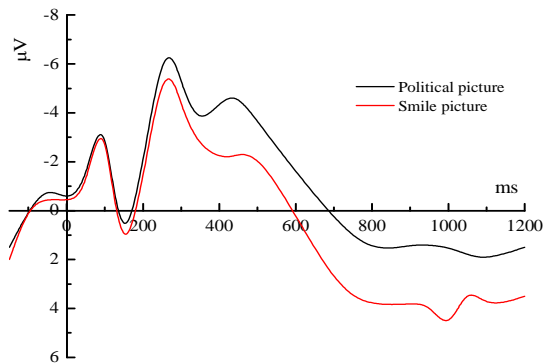
The attitude of political believers to political vocabulary is the same as that of atheists, and they all show positive attitude. From the analysis of the personality characteristics of political believers and atheists, these atheists may be better able to follow the path of political beliefs than between atheists and believers. The political believers have the strong emotional color, which also is an important symbol different from the atheism. In order to understand the different characteristics of college student party members' memory recognition of political pictures, 120 political pictures and 120 smile pictures are selected to conduct behavioral test and EEG test on 40 subjects. Table 5 shows the average of subjects' recognition and falsification of political pictures and smiling faces. It can be seen that the rate of correct recognition of political pictures by political believers is significantly higher than that of atheists, and the former's the rate of falsification is significantly lower than that of atheists.

According to the EEG test results, Figure 4 is a general plan of brain potential of political

believers and atheists under two groups of conditions. The difference appears after 200ms: within 400-500ms and 600-1000ms, for atheists, smile pictures induce one more corrected component compared to the political pictures; while within 200 - 400ms and 600 - 900ms, for political believers, political pictures induce one more corrected component than smile pictures. Table 5 shows the difference wave of political believers in seeing the two pictures. It can be seen that in 150-250ms, the political pictures are more correct than the smile pictures; in 600ms-900ms, compared with the smile pictures, the political pictures induce a corrected component, but the difference is not obvious.



(a) Political believers



(b) Atheists

Figure 4. Political believers and atheists' total ERP average under two conditions

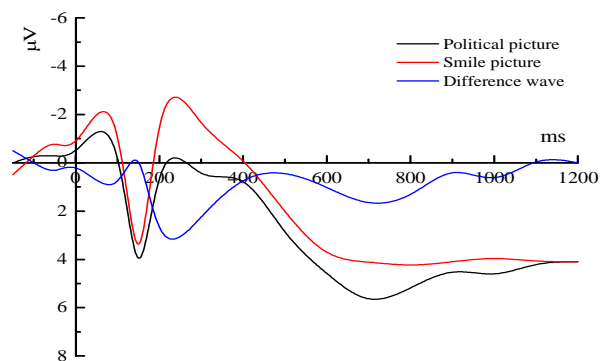


Figure 5. Political believers look at the difference between two types of pictures



Table 5. The average number of recapitulations and false reports of Christ pictures and smiley pictures

	Christ picture recognition	Christ Picture False report	Smile Picture recognition	Smile Picture False report	Total recognition	Total false
Political believers	13.99	0.64	12.74	0.74	26.73	1.38
Atheist	12.16	1.36	12.39	0.86	24.55	2.22

Comparative Study of Political Believers and Atheists

Exploration of the brain mechanism of political believers and atheists

Political belief and atheism are determined on the basis of cognition, while believers and atheists have different attitudes towards their own "definite" cognition. This experiment uses the above 40 college students to carry on the test, stimuli are political belief materials, ordinary materials, believed true propositional materials, and believed false proposition materials, which are the lie-detecting materials. Table 6 shows the choice and response time of the subjects of political believer group and atheist group on different propositions. It can be seen that the response time of believers to political belief materials is obviously faster than that of other materials, and believers' correct rate of political belief materials is higher than that of atheists. Figure 6 shows EEG patterns of believers in political belief judgment and belief judgment. It can be seen that the EEG component of a political believer induced by judging belief in a true proposition is not significantly different from the EEG component of an atheist induced by judging an ordinary proposition and believing in a true proposition. On the other hand, the EEG of the political believers in the judgment of political belief proposition in 400-800ms is more correct than those of the above three late EEG components. The difference appears in the late component of EEG test. From 200ms, the political believers have obvious EEG difference in judging the different materials, so we can find that the political belief proposition induces the corrected late component.

A study of the EEGs of political believers

There are great differences between different believers. In order to understand the cognitive characteristics of the political believers, 25 college students are recruited with payment to conduct the behavior and EEG test. Test materials include party materials, believed true proposition materials, and believed false proposition

materials, which are lie-detecting materials. Table 7 shows the choice and response time of college student party members on different propositions. It can be seen that the response of political belief materials is much faster than the speed of believed true propositions.

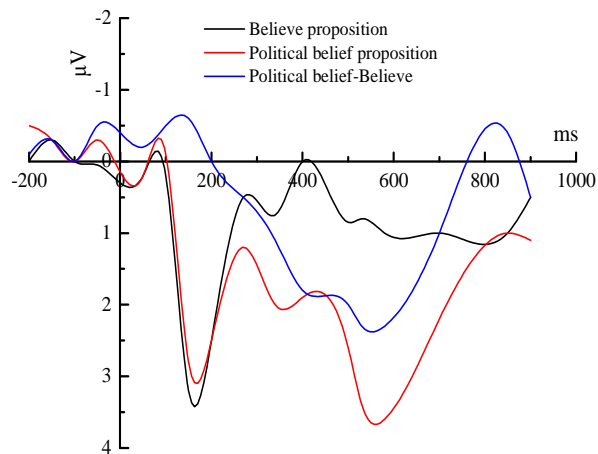


Figure 6. The electroencephalogram of believers in political belief judgment and belief judgment

Table 6. Political believers and atheists' choice and response in different propositions

	Political beliefs/atheism		Believe true proposition		Trust false propositions
	Correct rate	Reaction time	Correct rate	Reaction time	Correct rate
Political believers	97.1±1.0	879±105	94.4±4.4	960±121	91.7±1.7
Atheist	82.3±7.6	1046±202	90.0±2.5	943±138	88.0±7.9

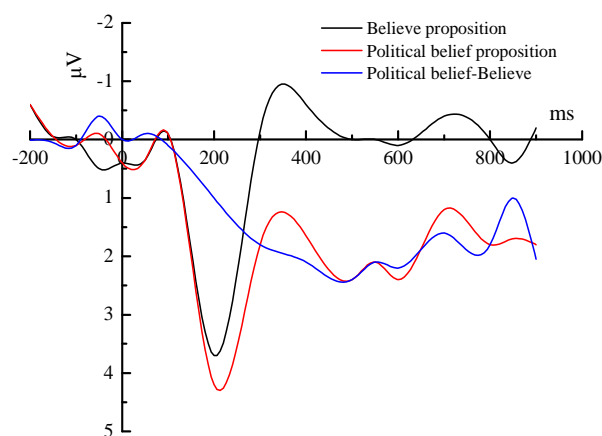


Figure 7. The EEG of college student party members in political belief judgment and belief judgment

Figure 7 is the EEG topographic map of political belief judgment and belief judgment of college student party members. The difference between the two types of EEG amplitude reaches the maximum from 400ms to 800ms. The results of this section are the same as those of Section 4.1,



showing that the belief of political believers to party belief is consistent with that of college students.

Table 7. College student party members' choice and reaction in different propositions

Political beliefs/atheism	Reaction time	Believed true proposition	Reaction time	Trust false propositions
93.1±0.99	834±95	90.6±4.4	920±101	90.2±1.3

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Conclusions

Based on the EEG testing technology, this paper deeply studies and discusses the cognitive mechanism and brain mechanism of political believers and atheists, and makes a comparative study between political believers and atheists. The concrete experimental conclusions are as follows:

(1) Among college students, political believers and atheists have distinct personality differences. The degree of atheism of college students is in the middle-low level. College students have low scores on the traditional atheism dimension, and the degree of atheism of girls is obviously higher than that of boys.

(2) The political believers are positive to the political vocabulary and negative to the atheistic vocabulary, while the atheists are also positive to the political vocabulary but ambiguous to the atheistic vocabulary.

(3) There are great differences among different believers, but political believers are identical in cognition. This study finds that political believers are identical with college students in cognition to political belief.

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