

DOI: 10.25696/ELSYS.VC2.EN.3

## PSYCHO-EMOTIONAL STATE MEASUREMENT FOR SENIOR THREE STUDENTS IN A HIGH SCHOOL IN CHINA — BASED ON VIBRAIMAGE TECHNOLOGY

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**Abstract:** Human behavior and emotions have always been of interest to scientists. In order to investigate the grade three students' psycho-emotional state, the vibraimage technology was used to collect data in the senior high school. The mean parameters of all students are within the reference range. 32 students' (89%) maximum in tension is higher than the reference maximum. Girls' stress level is significantly higher than that of the boys ( $p < 0.05$ ).

**Keywords:** senior three students, psycho-emotional state, vibraimage technology.

### Introduction

In recent years, there are more than nine billion high school graduates across China, only 81.13% of these graduates would go to college that means the students face tremendous competition in getting admission to tertiary education. The performance of college entrance examination is crucial for getting admission into one's preferred choice of college or university. Psychiatrists have expressed concern at the emergence of education as a serious source of stress for school-going-children causing high incidence of deaths by suicide [1]. How to diagnose the students' psycho-emotional state quickly and accurately has a profound meaning to these students.

Vibraimage provides information similar to information obtained using point-by-point biomedical methods: EEG, GSR, ECG [2]. The main practical application of the vibraimage technology is the representation of the reflex head movements through the psychophysiological parameters on the basis of the vestibular-emotional reflex [3]. The mental state of a person has a significant effect on the vibraimage of a person, even minor change of a psycho-emotional state almost instantly leads to a change of energy of motion and vibraimage. And the normality of a psycho-emotional state also corresponds to the normal law of vibrations distribution, similar to physiological condition. It was found that a quiet state is characterized by low-frequency vibrations, and the increase in mental energy leads to the increase in the observed frequency of a vibraimage.

Researches on investigating academic stress and mental health of high school students are usually in apply to the emotion measuring method of self-report [4]. A method to use various emotion rating scales and other related questionnaires to fill in the subjects' emotional responses in the near future. It is the easiest and most feasible method. The premise of self-report method is that the subject is capable and willing to report their own emotions [5].

This work intends to use the vibraimage technology to detect the senior three students' psycho-emotional state, it could not only measure the students' emotional state quickly and precisely, but also could detect the underlying emotion.

## 1. Methods

### 1.1. Participants

The study was conducted on a class of grade three students from a senior school in China. It is officially approached. All subjects gave full consent one day in advance. 40 people were tested, including 36 valid data, 22 boys (61%) and 14 girls (39%) aged between 17 and 18 years.

### 1.2. Instruments

Video to vibraimage conversion provides real time determination of integral and local parameters of human head movement associated with functional state of the human body. Initial matrices for integral parameter calculation are represented by amplitude and frequency vibraimages calculated from equations. The vibraimage technology for testing vestibular functions determines real time trajectory of each point of student head in natural equilibrium with maximum accuracy. Virtually any movement of the human body is controlled by the sensory system. To obtain a clear vibraimage, the participant's face should be uniformly illuminated and located in front of the video camera. The software will calculate 10 different parameters to display participants' psycho-emotion state.

### 1.3. Data Analysis

In addition to the descriptive analysis of data, independent-sample t test was applied to ascertain the deference of these parameters between boys and girls. All analyses were conducted using SPSS for Windows 22.0. Statistical tests used were two-tailed with a significance level of  $\alpha = 0.05$ .

## 2. Result

### 2.1. Sample's extremum of 10 parameters

**Table 1**

Sample's score of 10 parameters (n=36)

	bMin	bMax	M(M)	cMin	cMax
Aggression	20	50	38.35	14.53	50.22
Stress	20	40	24.97	20.34	31.66
Tension	15	40	30.79	13.48	45.13
Suspect	20	50	30.73	20.81	37.72

Table 1 (end)

	bMin	bMax	M(M)	cMin	cMax
Balance	50	100	66.86	50.8	81.97
Charm	40	100	79.02	71.15	84.37
Energy	10	50	25.03	10.91	30.71
Self-regulation	50	100	72.91	62.41	81.83
Inhibition	10	25	14.65	11.5	21.67
Neuroticism	10	50	21.85	0.88	27.53

Table 1 shows sample’s score of 10 parameters used in the study. The mean values of the parameters are within the reference range. In terms of the negative part, the sample’ maximum (also seen as cMax) of stress and suspect are less than the reference maximum (also seen as bMax). In terms of positive part, the sample’s minimum values (also seen as cMin) of confidence and self-regulation parameters are much higher than the reference minimum values (also seen as bMin), but the cMax of energy are less than the bMax. In physiological part, the cMin of neuroticism is much lower than bMin of reference norm, and cMax value of neuroticism is less than the bMax of reference range.

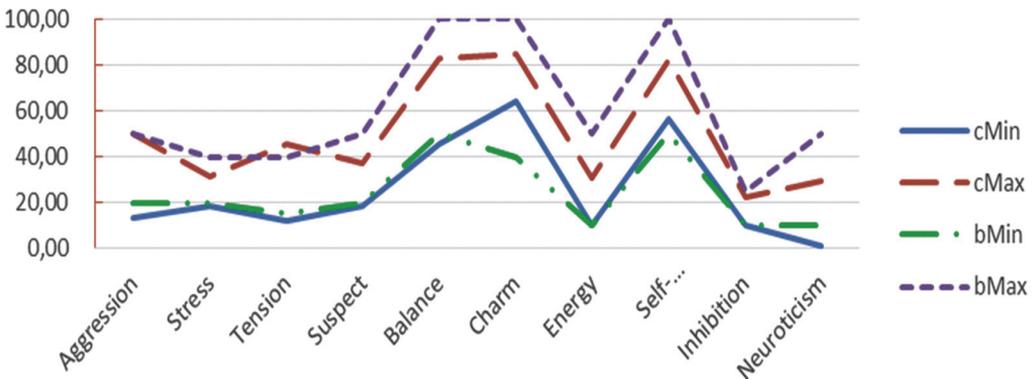


Fig. 2.1. Comparison between sample's extremum and reference range

As can be seen from figure 2.1, the cMin of confidence and self-regulation are much higher than the bMin, the cMin of aggression and neuroticism are much lower than bMin, and cMin of other parameters are basically consistent with bMin. Only the cMax of anxiety is far higher than bMax, the cMax of aggression and inhibition are basically consistent with bMax, and cMax of the other 7 parameters is lower than the bMax.

**2.2. Sample's means of 10 parameters**

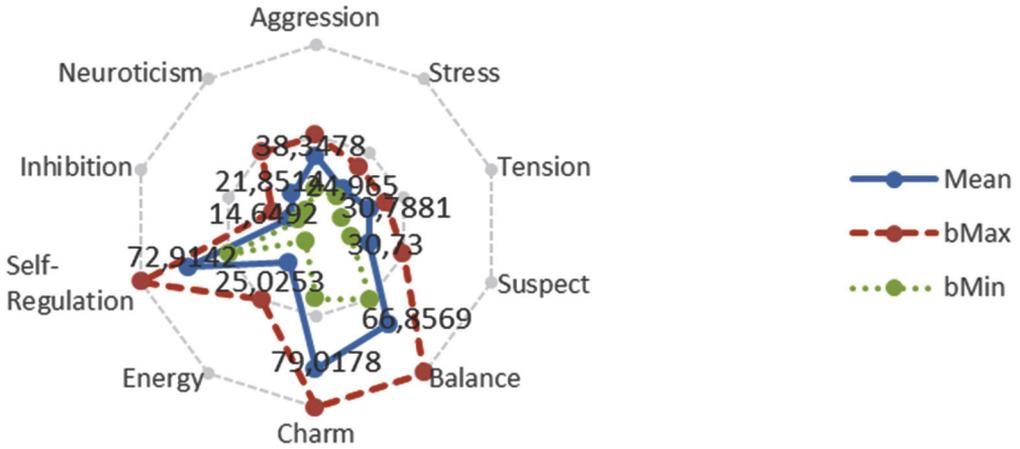


Fig. 2.2. 10 parameters' mean

From figure 2.2, it can be seen that the mean values of the 10 parameters of the sample are all within the range of the reference range.

**2.3. Psycho-emotional state**

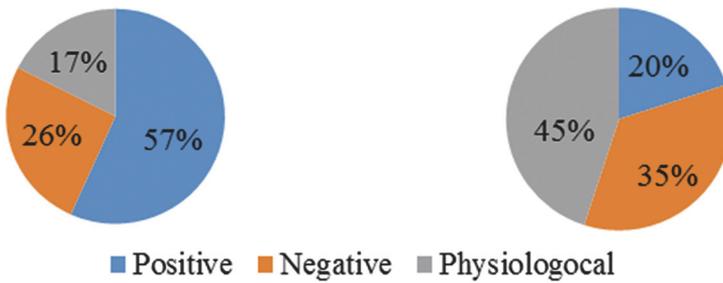


Fig. 2.3. Sample's psycho-emotional state

As can be seen from the figure 2.3, for the mean value of parameters, the students in this class have the largest proportion of positivity (55%), followed by negativity (28%), and the lowest proportion of physiology (17%). For parameter variation coefficient, physiological variation rate is the highest (45%), followed by negative variation rate (35%), and positive variation rate is the lowest (20%).

**2.4 Personality tendency**

It can be seen from figure 2.4 that almost all students are extroverted and stable.

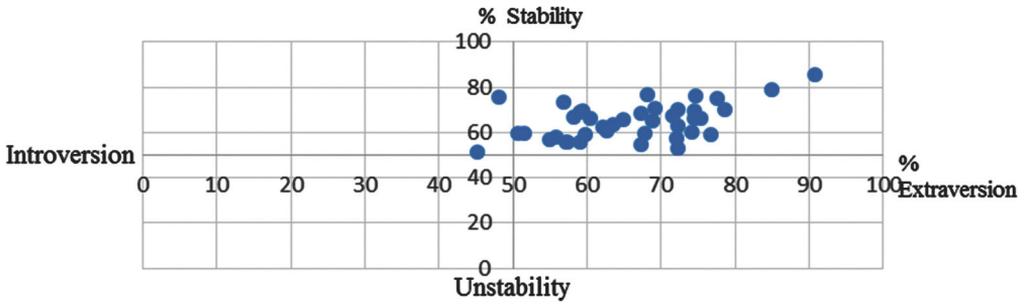


Fig. 2.4. Individual personality tendency

2.5. t test between different gender

Table 2

t test between different gender

	gender	M	SD	t	p
Aggression	boy	37.88	5.18	-0.67	0.06
	girl	39.09	5.39		
Stress	boy	23.29	4.89	-2.69	0.01*
	girl	27.59	4.31		
Tension	boy	30.76	6.8	-0.03	0.98
	girl	30.83	4.12		
Suspect	boy	30.01	4.31	-1.32	0.2
	girl	31.86	3.74		
Balance	boy	66.18	7.43	-0.67	0.51
	girl	67.92	7.73		
Charm	boy	80.39	6.44	1.84	0.08
	girl	76.86	3.99		
Energy	boy	24.46	5.86	-0.81	0.42
	girl	25.91	3.99		
Self-Regulation	boy	73.23	4.97	0.46	0.65
	girl	72.42	5.35		
Inhibition	boy	14.77	2.02	0.5	0.62
	girl	14.46	1.45		

Table 2 (end)

	gender	M	SD	t	p
Neuroticism	boy	22.36	9.79	0.41	0.68
	girl	21.06	8.08		
Positive	boy	61.07	4.67	0.19	0.85
	girl	60.78	4.04		
Negative	boy	30.49	4.09	-1.38	0.18
	girl	32.34	3.64		
Physical	boy	18.56	5.62	0.45	0.66
	girl	17.76	4.65		

As can be seen from table 2, there is a difference in pressure parameters between boys and girl, and the pressure level of girl is significantly higher than that of boys ( $t = -2.69$ ,  $p = 0.01$ ). On the parameters of aggression and confidence, boys and girls have a marginal significant difference. ( $t = -0.67$ ,  $p = 0.06$ ;  $t = 1.84$ ,  $p = 0.08$ ).

### 3. Discussion

It is found that the mean value of every parameters is within the reference range, indicating that the average level of all parameters of this class is at the normal level.

By comparing the maximum value of parameters and the maximum value of reference norm, the measured range of parameters and the range of reference norm, we find that, firstly, the maximum value of anxiety is larger than the maximum value of reference norm, and the change range of tension is slightly larger than the reference norm, indicating that students' anxiety level is relatively high. It may be because the students in this class are in the state of coping with the college entrance examination. In China, the examination has long been valued by students, teachers and parents, and the heavy study tasks have triggered high levels of anxiety among students. Secondly, the minimum value of neuroticism is less than the minimum of reference norm, indicating that the neuroticism level of students is low.

Psycho-emotional states are divided into positive, negative and physiological states. Positivity includes balance, charm, energy and self-regulation, passivity includes aggression, stress, tension and suspect, and physiology includes inhibition and neuroticism. In this study, the average value of the students' positivity is the highest, but the variation rate of their positivity is the lowest. The low variation rate indicates that the intervention on their positive aspect would get little achievements. The mean value of negativity and variation rate of it were in the middle level. The physiological mean value of the students in this class is the smallest, but the physiological variation rate is the largest, so the intervention on the physiological aspect of this class may achieve a significant effect.

Introversion or extroversion of one's personality and emotional stability are direct factors that affect students' mental health. The data shows most students tend to be extroverted and stable. Students with high extroversion are active, proactively participate in and integrate into the group. They are good at expressing themselves in the group and achieving harmonious interpersonal relationship. Moreover, the school education is becoming more flexible and focuses on teaching students in accordance with their aptitude. Finally, parents' liberal parenting style also makes students' personality appear stable in the emotional dimension, which is conducive to the smooth growth of students.

The independent t test of the parameters between genders shows that the stress of girls is significantly higher than that of boys. In terms of aggressiveness and confidence, the differences between boys and girls are marginal significant. The boys and girls experience similar score in the other parameters. The students in this class have excellent academic performance, and the intense learning competition and academic stress make the students face different degrees of pressure. Studies have shown that women tend to respond more emotionally to stressful situations. In terms of aggression and confidence, gender differences are marginal significant, which may be related to the small sample size, and their relationship can be further clarified by expanding the sample size.

#### 4. Conclusion

The results show that all the psychological parameters of senior three students in a middle school in China are well distributed. Some students have a higher tension, it is acceptable in face of such competitive examination. From the perspective of emotional state, physiological variation rate is the 45%, followed by negative variation rate 35%, and positive variation rate is 20%. Almost all students tend to be extroverted and stable.

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