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A Grey Relational Analysis Between Some Selected Affective Factors and English Test Performance

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Abstract

With Grey relational analysis (GRA), the paper examined the sensitivity of eight variables influencing test performance at branch level. The eight variables involved included language proficiency, test anxiety, self-esteem, achievement motivation, achievement goal, English proficiency test anxiety (EPTA), state anxiety and trait anxiety. Results showed that: (a) Besides language proficiency, motivation-to-avoid- failure was most sensitive to English test performance; (b) Trait and state anxiety were more sensitive to English academic performance than general test anxiety as well as the four branches of the EPTA; (c) Compared with the other three branches of the EPTA, EPTAS-listening was most intimate to English test performance; (d) All the affective concepts involved in this study were quite sensitive to English academic performance at branch level because their comprehensive grey correlation degree values were all over 0.50. This research has practical implications for English teachers and students seeking to enhance their performance in English proficiency test.

Key words: English test performance; English proficiency test anxiety; Grey relational analysis; Performance-approach goals

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INTRODUCTION

Over the past 50 years, great effort had been put on exploring factors that influenced students' test performance. As a result, a large number of factors came into view, including language proficiency (Bachman & Palmer, 1996), test anxiety (Seipp, 1991), self-esteem (Liu, 1998), achievement motivation (Arkinson, 1964; 1977), achievement goal (Elliot, 2005), English proficiency test anxiety (Dong, 2010), state anxiety (Zeidner, 1998) and trait anxiety, to name just a few. However, so far, study about their sensitivity to test performance was relatively few.

That is mainly due to the limitation of traditional statistical methods. As we all know that statistical methods-such as correlation analysis, regression analysis, ANOVA and Principal component analysis- requires a large sample size and normal distribution of samples, which can rarely be satisfied in real world, especially in English teaching and learning researches. Different from them, GRA, which is based on Grey Theory，is able to crack the hard nut. GRA is immune to small sample size and irregular distribution of samples. What's more, software specifically designed for dealing with GRA-related calculation has already been devised to simplify the computing process, which makes it easy to handle.

This study conducted a Grey relational analysis between eight selected variables and English test performance, aiming to find out their relative sensitivity to English test performance so as to offer theoretical basis for English teachers and learners to improve their teaching and test performance.

1. THEORETICAL STUDY

To proceed with GRA, firstly, evidences about how the eight selected factors and their branches are related to test performance must be collected since GRA demands

that all the negative association must be converted into positive one via mathematical method.

According to Dong's (2010) study, EPTA was positively correlated to test anxiety (α=0.53, n= 229, p<0.01, 2 tailed), a factor which was believed to be associated with underachievement (z=-.23, Hembree, 1988; r=-.21, Seipp, 1991).

Researches based on Chinese college students indicated that state anxiety presented negative correlation with students' English academic performance (Wang, 2009, n=252; Hao, 2001, n=101). Endler, Kantor and Parker (1994) proved that trait anxiety was a negative predictor of academic performance.

EPTA was negatively related to test performance (r =-0.34, n = 343, Dong, 2010). Gao (2010) pointed out in his survey that both trait and state anxiety negatively impacted students' CET-4 performance.

Studies indicated that self-esteem was closely correlated to students' academic performance. Top students tended to have higher self-esteem than their weak counterparts (Liu, 1998).

Evidence showed that performance-approach goals were positively correlated to high academic achievement, while performance-avoidance goals led to poor academic performance (Elliot, 2005). Both mastery-approach and mastery-avoidance goals promoted academic performance (Ames & Archer, 1988). On the other hand, both motivation-to-avoid-failure and performance-avoidance goal are factors that debilitate test performance (Gao, 2010; Elliot, 2005).

Atkinson (1964, 1977) distinguishes two kinds of motivations, achievement motivation to succeed (Ms) and Achievement Motivation-to-avoid-failure (Mf). Gao (2010) demonstrated in his research that higher Ms could bring about higher CET-4 scores, while higher Mf may only contribut to lower CET-4 achievement.

2. RESEARCH DESIGN

2.1 Research Questions

There are three research questions to be answered:

(a) Among the factors involved in this study, which is most sensitive to English test performance?

(b) Are EPTA more sensitive to English test performance than test, state and trait anxieties?

(c) Is it true that EPTAS-listening is most closely related to English test performance than the other three branches of EPTA?

2.2 Subjects

20 undergraduates of a typical university in western China were selected at random as samples of this study. They were all non-English majors and all of them had reported anxious experiences in CET-4 and CET-6. Among them, 10 were boys and 10, girls.

2.3 Tools

The questionnaire used in this study was a combination of the following 6 existing scales, which are briefly introduced as follows:

a) State-Trait Anxiety Inventory (STAI), revised in 1983 and developed by Charles Speilberger and his colleges, is consisted of 38 items and divided into two parts, the State anxiety inventory (S-AI) and Trait anxiety inventory (T-AI). The test-retest reliability of STAI is 0.54 for S-AI and 0.86 for T-AI (Spielberger, 1983).

b) English Proficiency Test Anxiety Scale (EPTAS), devised by Dong Mei in 2010 and improved in 2012 (Dong, 2010; 2012), is used to measure the debilitating anxiety degree of test-takers in the context of English proficiency test. The scale has four sub-scales, which are EPTAS-listening, PTAS-speaking, EPTAS-reading and EPTAS-writing. Their Cronbach alpha coefficients were 0.91, 0.92, 0.89 and 0.91 respectively. Their test-retest reliabilities were 0.84, 0.88, 0.78 and 0.85 (Dong, 2012).

c) Westside Test Anxiety Scale, designed by Richard Driscoll, is used to identify students with anxiety impairments in test situations (Driscall, 2004). Using the correlation between anxiety reduction measured by the scale and performance improvements as the validation criteria, Doctor Driscall finds that their correlation is 0.44 (p<0.01), indicating a strong correspondence between anxiety-reduction and objective test gains. Such a test is repeated twice based on different samples and their respective correlation are 0.49 and 0.40 respectively (p<0.01). The renowned Cognitive Test Anxiety Scale by Cassady and Johnson (2001) attains 0.25 correlations to test scores, accounting for 7%-8% of the test variance.

d) Achievement Motivation Scale (AMS) was designed in 1970 by T. Gjesme and R. Nygard, two Norwegian psychologists from Oslo university. It is consisted of two sub-scales, the Ms and Mf.. The Chinese version AMS is a result of the cooperative translation made by Ye Renmin, a Chinese scholar, and K. A. Hegtvet, a Norwegian scholar, in 1988. It was revised after being distributed to college and middle school students in 1992. Studies demonstrate that the Cronbach alpha coefficients are 0.83 for Ms and 0.84 for Mf.

e) Self-Esteem Scale (SES) was drawn out by Rosenberg in 1965 and localized by Ji Yifu and Yu Xin in 1993 based on Chinese samples. It is now the most commonly used tool for measuring self-esteem in China (Tian, 2006) with sound validity and reliability (Cronbach's Alpha = 0.79). SES is significantly correlated to S-AI (r = -0.389, n = 216, Tian, 2006).

f) Achievement Goal Inventory (AGI) was designed by Elliot and McGregor in 2001. The inventory contains four subscales, which are grasp-approach, grasp-avoidance, performance-approach and performance-avoidance.

g) In this study, CET-6 scores of the sample students are used to represent their language proficiency data, while their CET-4 scores represent their English test performance.

2.4 Research Processes

Firstly, 20 sample students were arranged in one classroom. Teacher in charge of this study read directions for filling in the questionnaire as well as the significance of the study. Secondly, the sample students completed the questionnaire within one hour. 20 valid answer sheets were collected. Thirdly, data was input and saved in Excel form. The average values were calculated and saved in Excel form together with sample students' CET-4 and CET-6 scores, which were used to represent English test performance and language proficiency respectively in this study. Thirdly, since all the data collected were of different unit, they were initialized and turned into dimensionless numbers. The way to achieve this was to divide each data in a column by the first data. Results were shown in Table 1, 2 and 3 in the Attachment. Fourthly, as for factors which are negatively correlated to test performance, their inversed values were calculated via making 1 to divide those data seriatim (see Table 4 and 5 in Attachment). Finally, with specific software, the grey correlation coefficient of each variable was worked out (see Table 6).

Table 1
Initialized Data (Part 1)

CET-4 score	State anxiety	Trait anxiety	Test anxiety	Self-esteem	Language proficiency (CET-6 score)
1	1	1	1	1	1
0.99	0.95	0.96	1.15	0.86	0.98
1045	1.45	1.17	2.31	0.69	0.97
1023	1.2	1.26	2.08	0.97	1.1
1.07	1.1	1.13	1.85	1	1.03
1.07	1.15	1.13	1.77	0.69	1.07
0.97	1.2	1.13	2.23	0.69	0.83
0.96	1.15	1.13	1.15	0.55	0.93
0.84	1.4	1.04	1.77	0.97	0.80
1.45	1.05	1.17	1.77	0.79	1.02
0.93	1.2	0.87	1.54	0.76	1.29
1.04	1.15	1.17	1.92	0.86	0.90
1.09	1.05	1.09	2.46	0.93	1.04
1.08	0.95	0.83	1.77	0.59	1.14
0.79	1.55	1.26	1.85	0.93	1.07
1.11	1.1	0.78	1.38	0.34	0.98
1	1.1	0.87	1.62	0.69	1.12
0.98	0.9	0.61	1.23	0.86	1.18
0.97	1	1	2.23	0.97	1.19
1.10	1.15	1.04	0.77	0.59	1.02

Table 2
Initialized Data (Part 2)

EPTAS-listening	EPTA-speaking	EPTA-reading	EPTA-writing	Ms
1	1	1	1	1
1.05	1.24	1.04	1.13	1.02

To be continued

Continued

EPTAS-listening	EPTA-speaking	EPTA-reading	EPTA-writing	Ms
1.87	1.68	2.45	1.88	0.7
1.74	1.73	2.04	1.66	1.02
1.56	1.51	1.95	1.44	0.97
1.39	1.40	1.63	1.22	0.89
1.56	1.62	1.77	1.72	1.3
0.98	0.89	1.31	0.91	0.65
1.72	1.64	1.72	1.25	1
1.50	1.60	1.49	0.94	1.13
1.61	1.44	1.81	1.94	1.05
1.53	1.44	1.77	1.82	0.97
1.72	1.53	2.09	1.63	1.11
1.37	1.40	1.31	1.57	0.84
1.50	1.20	1.91	1.51	1.02
1.21	1.11	1.18	1.72	0.7
1.19	1.20	1.59	1.38	0.76
0.92	0.93	1.36	1.44	0.86
1.47	1.55	1.88	1.97	1.02
0.61	0.63	0.72	0.66	1.46

Table 3
Initialized Data (part 3)

Mf	Grasp-approach	Grasp-avoidance	Performance-approach	Performance-avoidance
1	1	1	1	1
0.71	0.67	0.83	0.63	0.43
0.81	0.33	0.33	0.27	0.43
1.29	0.83	1	0.73	1.58
1.14	0.75	1	0.63	1.29
0.86	0.92	0.67	0.73	1.15
1.48	0.33	0.33	0.27	0.43
0.81	0.58	0.5	0.46	0.43
1.24	0.67	0.83	0.54	1.72
1.14	0.67	0.67	0.54	1.15
1.05	1.08	1	0.27	1.29
1.19	1	1	0.54	1.15
1.33	1	0.83	0.82	1.29
0.95	0.83	0.83	0.82	1.15
1.24	0.25	0.83	0.63	1.58
0.95	0.83	0.33	0.54	0.57
1	0.75	0.67	0.54	0.72
1	0.92	1	0.54	0.72
1.24	0.5	1.33	0.63	1
0.95	1	1	1.09	1.15

Table 4
Inversed Values of Trait Anxiety, Test Anxiety and the Four Branches of the EPTA

Traitanxiety	Testanxiety	EPTAS-listening	EPTA-speaking	EPTA-reading	EPTA-writing
1	1	1	1	1	1
1.04	0.87	0.95	0.81	0.96	0.89
0.85	0.43	0.53	0.6	0.41	0.53
0.79	0.48	0.57	0.58	0.49	0.60
0.88	0.54	0.64	0.66	0.51	0.69
0.88	0.56	0.72	0.71	0.61	0.82
0.88	0.45	0.64	0.62	0.56	0.58
0.88	0.87	1.02	1.12	0.76	1.10
0.96	0.56	0.58	0.61	0.58	0.8
0.85	0.56	0.67	0.625	0.67	1.06
1.15	0.65	0.62	0.69	0.55	0.52
0.85	0.52	0.65	0.69	0.56	0.55

To be continued

Continued

Traitanxiety	Testanxiety	EPTAS-listening	EPTA-speaking	EPTA-reading	EPTA-writing
0.92	0.41	0.58	0.65	0.48	0.61
1.20	0.56	0.73	0.71	0.76	0.64
0.79	0.54	0.67	0.83	0.52	0.66
1.28	0.72	0.83	0.90	0.85	0.58
1.15	0.62	0.84	0.83	0.63	0.72
1.64	0.81	1.09	1.08	0.74	0.69
1	0.45	0.68	0.65	0.53	0.51
0.96	1.30	1.64	1.59	1.39	1.52

Table 5
Inversed Values of Mf, State Anxiety and Performance-Avoidance Goal

Motivation-to-avoid-failure	State anxiety	Performance-avoidance goal
1	1	1
1.41	1.05	1.20
1.23	0.69	3.03
0.78	0.83	1
0.88	0.91	1
1.16	0.87	1.49
0.66	0.83	3.03
1.23	0.87	2
0.81	0.71	1.20
0.88	0.95	1.49
0.95	0.83	1
0.84	0.87	1
0.75	0.8	1.20
1.05	1.05	1.20
0.81	0.65	1.20
1.05	0.91	3.03
1	0.91	1.49
1	1.11	1
0.81	1	0.75
1.05	0.87	1

3. RESULTS

As it could be seen from Table 6, language proficiency presented the most intimate relationship with the English test performance, which in a way, actually proved the legitimacy of this study. What ranks No.2 and 3 are two avoidance-oriented factors, namely, motivation-to-avoid-failure and performance-avoidance goal.

Table 6
Results of the Grey Relational Analysis

Variable	Ranking	Comprehensive grey correlation degree
Language proficiency	1	0.996
Motivation-to-avoid-failure	2	0.874
Performance-avoidance goal	3	0.709
Trait anxiety	4	0.640
Motivation to approach success	5	0.607
State anxiety	6	0.591
Grasp-avoidance goal	7	0.580
EPTAS-listening	8	0.540
Grasp-approach goal	9	0.538
EPTAS-writing	10	0.537
EPTAS-speaking	11	0.531
EPTAS-reading	12	0.530

To be continued

Continued

Variable	Ranking	Comprehensive grey correlation degree
Self-esteem	13	0.529
Test anxiety	14	0.528
Performance-approach goal	15	0.527

Based on Table 1, all the three research questions of this study can be answered now: (a) Language proficiency is most sensitive to English test performance among the factors involved in this study; (b) Trait and state anxiety are more sensitive to English test performance than EPTA, however, EPTA is more sensitive than test anxiety; (c) EPTAS-listening is more closely associated with the English test performance than the other three branches of EPTA.

In fact, all the affective concepts involved in this study and their branches are fairly closed to English test performance as the values of their comprehensive grey correlation degree are all over 0.50.

4. DISCUSSION

A glance at Table 6 reveals that avoidance is the key word among the top 5 factors. Motivation-to-avoid-failure and performance-avoidance goal, which ranks No. 2 and 3 respectively on the list, is clear evidence. This indicates that the so-called avoidance-oriented psychology may seriously impact Chinese college students' English test performance. Research has proved that avoidance-oriented coping is a predictor of self-reported anxiety (Spira, Zvolensky, Eifert and Feldner, 2004). Students with performance-avoidance goal focus mainly on avoiding from being looked silly and incompetent. Cognitively, they consider English proficiency tests as self-esteem threatening. To them, English tests are aimed at measuring their ability and intelligence, rather than their hardworking and persistence. Therefore, when confronting with failure, they often get extremely depressed and anxious. They are prone to attribute such failure to their lack of intelligence and competence. Thus, they are the students who may easily lose heart and give up.

In fact, avoidance-oriented cognition is fairly pervasive in China since traditionally, instead of impetuous aggression, Chinese people treasure their reputation dearly and significantly emphasize self-protection and mildness. Most Chinese choose to be risk-averse in order to save their personal reputation in difficult situations. The same is true when they are under the context of high-stake English examinations.

Another key word is anxiety. Table 6 demonstrates that trait anxiety is another factor that may influence college students' English test performance. The bad news is that a survey made in 2005 over 1,060 college students from a university in Sichuan province in the Southwestern part of China manifests that the trait anxiety level of college

students are much higher than normal Chinese citizens' and the number is increasing compared with previous records over the past ten years. Trait anxiety has become one of the key reasons responsible for college students' suspension, dropping out of school or even committing suicide in China (Li & Xu, 2005).

Trait anxiety is found to be the consequence of negative evaluation from parents, teachers and peers in people's early years (Spielberger, 1966). Su (2000) who has five years' psychological consulting experiences in universities in China discloses that most of the psychological problems of college students are formed during their middle and high school years and due to improper education and parenting styles.

External negative comments function through an individual's negative self-evaluation and eventually lead to trait anxiety (Spielberger, 1966, 1972). Negative self-evaluation plays a key role in the formation of trait anxiety. People with high level of trait anxiety tend to have more negative evaluation on themselves than their low-anxious counterparts (Kendall & Hollon, 1989). In a word, negative self-evaluation acts as an intermediate factor between external stimulus and trait anxiety. Trait anxiety has also proved to be a factor that adjusts between motivation-to-avoid-failure and motivation-to-approach-success (Elliot & McGregor, 1999).

Actually, the three concepts, namely, motivation to avoid failure, performance-avoidance goal and trait anxiety, ranking No. 2, 3 and 4 respectively in Table 6, are all somehow connected with negative self-comment, which acts as a pivotal element among them and is worth examining in future research.

SUGGESTIONS

Based on the above discussion, it is suggested that Chinese English teachers should help their students set up positive self-evaluation. Positive self-assessment may act as a filter to screen out some negative external stimulus, such as unfriendly comment, rash criticism, irresponsible speech, etc. and makes them meaningless to an individual. Students with positive self-recognition may be more tolerant to failure and more persistent in the whole process of tests. It is recommended that the multi-functionalities of sports can be employed to improve students' psychological well-being. Physical exercises are proved to be able to help students to build up confidence as well as enhance communication and interpersonal relationship (Ma, 1996).

Besides, Chinese English teachers should encourage their students to set up grasp-focused goals, instead of performance-oriented ones. While preparing for an English test, students with grasp-focused goals concentrate on making efforts to learn new knowledge and further their understanding. If failed, they usually attribute it to their lack of efforts and right strategies, while students with performance-focused students often complain about their limited intelligence or inborn incompetency under the same situation. Grasp-focused goals may help students to achieve better test results.

In addition, archives concerning students' psychological state should be established. Information including students' state and trait anxiety, achievement motivation, achievement goal and EPTA level needs to be collected on a regular basis so as to make it possible for teachers to provide hierarchical guidance and treatment.

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REFERENCES

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*, 260-267.

Arkinson, J. W. (1977). Motivation for achievement. In T. Blass (Ed.), *Personality variables in social behavior* (pp.47-67). NJ: Lawrence Erlbaum.

Atkinson, J. W. (1964). *An introduction to motivation.* Princeton, NJ: Van Nostrand.

Bachman, L. Y., & Palmer, A. S. (1996). *Language testing in practice*. NY: Oxford University Press.

Cassady, J. C., & Johnson, R. E. (2001). *Cognitive test anxiety and academic performance*. Contemporary Educational Psychology.

Dong, M. (2010). *Anxiety in English proficiency test situation*: *Its measurement, nature and relationship with other kinds of anxiety*. Unpublished doctoral dissertation. Hiroshima Shudo University.

Dong, M. (2012). The measurement of English proficiency test anxiety. *Academic Monthly, 7*, 34-36.

Driscoll, R. (2004). *Westside test anxiety scale*. Retrieved from http://www.amtaa.org/scaleWestside.html

Elliot, A. J. (2005). A conceptual history of the achievement goal construct. In A. Elliot & C. Dweck (Eds.), *Handbook of competence and motivation* (pp.52-72). NY: Guilford Press.

Elliot, A. J., & McGregor, H. A. (1999). Hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 76*(4), 628-644.

Endler, N. S., Kantor, L., & Parker, J. D. A. (1994). State-trait coping, state-trait anxiety and academic performance. *Personality and Individual Differences, 16*, 663-670.

Gao, X. L. (2010). A study of the relationship among test anxiety, achievement motivation and CET-4 test performance. *Journal of Southwest Jiaotong University(Social Sciences), 11*(3), 20-24.

Hao, M., & Hao, R. P. (2001). A research on the correlation among English academic performance. *Achievement Motivation and State Anxiety, 33*(2), 111-115.

Hembree, R. (1988). Correlates, causes, effects and treatment of test anxiety. *Review of Educational Research, 58*(1), 47-77.

Kendal, P. C., & Hollon, S. D. (1989). Anxious self-talk: Development of the Anxious Self-Statements Questionnaire (ASSQ). *Cognitive Therapy and Research, 13,* 583-598.

Li, L., & Xu, J. P. (2005). The undergraduate's state-investigation of idiosyncrasy anxiety and countermeasures. *Sichuan Sports Science, 4*, 60-62.

Liu, M. (1998). Research on the relationship among self-esteem, academic performance and inter-personal attribution style. *Science of psychology, 3*.

Ma, Q. W. (1996). Physical psychology. Beijing: Advanced Education Publishing House.

Seipp, B. (1991). Anxiety and academic performance: A meta-analysis of findings. *Anxiety Research, 4*, 27-41

Spielberger, C. D. (1966). *Theory and research on anxiety.* NY: Academic Press.

Spielberger, C. D. (1972). Anxiety as an emotional state. In C. D. Spielberger (Ed.), *Anxiety: Current trends in theory and research (Vol. 1)*. New York, NY: Academic Press.

Spielberger, C. D. (1983). *Manual for the state-trait anxiety inventory (form Y)*. Palo Alto, California: Consulting Psychologists Press.

Spira, A. P., Zvolensky, M. J., Eifert, G. H., & Feldner, M. T. (2004). Avoidance-oriented coping as a predictor of anxiety-based physical stress: A test using biological challenge. *Journal of Anxiety Disorders, 18*, 309–323.

Su, Q. (2000). To discuss about the misunderstanding of basic education based on college freshmen's anxiety status. *Shandong Education & Scientific Research, 3,* 13-18.

Tian, L. M. (2006). Shortcoming and merits of Chinese version of Rosenberg (1965) self-esteem scale. *Psychological Exploration, 98*(2), 88-91.

Wang, L. J. (2009). *A correlation analysis of self-efficacy, anxiety and academic achievement*. Unpublished master dissertation of Shandong University, P. R. C.

Zeidner, M. (1998). *Test anxiety: The state of the art*. NY: Plenum.