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Neuroticism and Attentional Biases for Threatening Stimulus

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Abstract

The role of the different dimensions of the personality in the cognitive processing includes some important research areas in the field of cognitive psychology. The present study aimed to investigate differences of attentional bias in individual with up and down neuroticism. For this purpose, 130 subjects (67 people with high neuroticism and 63 people with low neuroticism) were completed word-picture task and the Eysenck Personality Questionnaire. The main and interactive effect and Pearson correlation coefficient were used to investigate the relationship between neuroticism and Attentional bias. The results showed that people with high neuroticism compared to people with low neuroticism perform slower in experimental trials. In addition, the resulting correlation coefficient indicated a positive and meaningful relationship between neuroticism and Attentional bias, it seems that along with increased scores of people in neuroticism, more Attentional bias was showing by them. These findings indicated that the necessity of using treatment strategies tailored to the characteristics of personality was multiplied.

Keywords: Attentional bias, avoid of attention, neuroticism, vigilance to threat

Introduction

In recent years, many researchers have focused on this topic that how individual differences in personality can effect on cognitive processing (Corr, 2004, as cited in Shafiee and Zare, 2012). Since the attention plays the role of mediator in the relationship between personality and cognition, examining Attentional bias has become one of the most important issues in cognitive psychology and cognitive science. According to some researchers, understanding processing style, especially bias in processing information can be helpful in justifying the desire of some people in repeated experience of unpleasant emotional states (Leary Barrett et al., 2015).

This idea that some of personality dimensions are associated with Attentional bias, first time was introduced by Gray (1981). Gray (1981) stated that individual differences in behavioral activation system (BAS) and Behavioral Inhibition System (BIS) lead to creating the different dimensions of the personality, he called dimensions as anxiety (associated with the performance of BIS) and being impulsivity (associated with the activity of BAS) (Figure 1).

Neuropsychology model of Gray (1981) does not emphasize on anxiety as a terminal mood state associated with a set of symptoms such as negative mood but also refers to anxiety as a process with multiple mechanisms of sensitivity to the symptoms and response bias. On this basis, anxious people have bias about the BIS Signal Processing. In other words, compared with normal subjects, are more likely to focus their attention to such symptoms as well as due to increased Nonspecific Arousal System (NAS), more capacity will be allocated to the processing of these symptoms, which occurs when they are less able to postpone their current behavior, their attention to the feedback given by the signs changed and adjust it according to feedback. Gray (1981, cited in Casillas et al., 2003) has linked his model by model of Eysenck (1967) from extroversion and neuroticism. In this model, extraversion reflects the relative strength of BIS and BAS, extroverted people who are

affable, social, active and optimistic have dominant BAS. These people tend to respond more to incentives that are sensitive BAS. On the other hand, people who are the quiet, reclusive and most accurate have dominant BIS, these people tend to respond more to stimulants such as potential threats and unexpected events and are prone to behavioral inhibition against these stimulus. In the presence of BAS input stimulus, an extroverted person experiences a higher level of activity of BAS compared to an introverted person and in the presence of input stimulus of BIS, an introverted person experiences a higher level of activity of this system. In this model, neurotic individuals are identified with NAS reaction. In terms of equality of all factors, neurotic people compared to than stable people experience a higher level of NAS response.

In his view, anxiety aspect is determined with neurotic introspection (BIS strong). Accordingly, neuroticism introverts and other anxious people are prone to interference with the current behavior and paying attention to the punish symptoms.

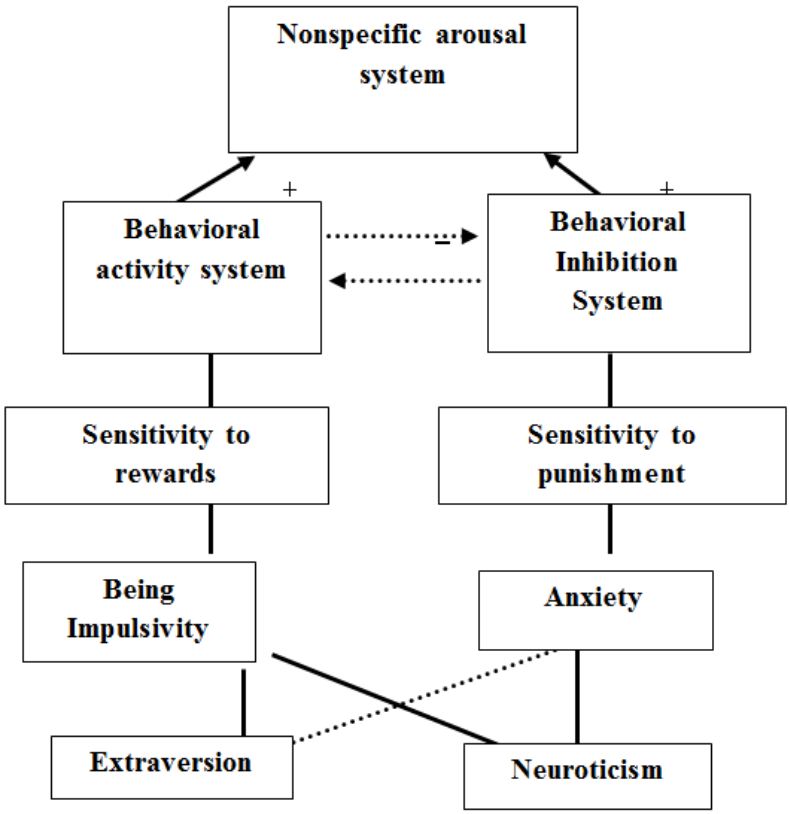

Figure 1. The relationship between the various systems of Gray model and personality dimensions of anxiety and being impulsivity

Rusting's approach (1998, cited in Eysenck and Keane, 2000) suggests that personality traits and mood states on emotional processing in people affected in three ways:

- Personality traits and mood states have separate and independent impaction on emotional processing (the traditional approach).
- Obvious impact of personality on emotional processing is indirect, and personality affects mood states and mood states influences emotional processing. In other words, the fixed

traits of personality are affected by the emotional processing through a temporary mood states (moderate approach).

- The impact of mood states on emotional processing is influenced by personality traits. Thus, in this approach against moderation approach there is significant interaction between trails and moods in determining emotional processing (Mediation approach).
- According to Pedersen and Denollet (2003) each person according to his traits and personality structure in the face of stressful events shows the especial emotion and behavior. These emotions in confronting with a stressful event not only provide the field of mental diseases but also affect the development and progression of the physical disease.

Seeks to provide such models, some of researchers have investigated the relationship between different dimensions of personality and Attentional bias. For example, Derryberry and Red (1994) used a reaction time task to examine the personality influence on subtle change of attention In their task, target stimulus has positive, negative, or neutral value. These researchers found that extraverts have trouble in their abilities to change attention from the positive stimulus location and introverts have trouble in their abilities to change attention from negative stimulus location.

Research results of Amin, Constable and Canli (2004) by using prob dot task showed that people who gain higher scores in extroversion at the time of providing neutral - negative paired stimulus significantly show faster reaction time compared to the neutral stimuli and in total, extroversion is associated with avoid of attention from negative stimuli.

Rijdijk et al. (2009) in examining the association between neuroticism and reminded percentage of pleasant and unpleasant words and reaction time to stimulus found that there is a positive correlation between neuroticism and reminded unpleasant words, and this relationship only is identifiable on high level of neuroticism. Moreover, these researchers concluded that this relationship is more than genetic factors influenced by environmental factors like parental disciplinary style.

Shafiee and Aghayousefi (2012) found that very optimist subjects toward angry faces, avoiding attention and subjects with low optimism toward same faces, show vigilance. These researchers observed no effect of attention bias on joyful emotional faces.

Shafiee and Zareh (2012) in examining the relationship between extroversion - introversion and Attentional bias to emotional faces in adolescents of 11 to 15 years old found that introversion-extroversion personality dimension is predictive of Attentional bias toward joyful emotional faces so that by increasing the amount of extroversion in adolescents their vigilance attention is increased to joyful face. Results of this study suggest that personality systematically influences the perceptions of people of emotional faces.

Among the various personality dimensions, neuroticism dimension had the most of all with theoretical and clinical importance. Because the results of many studies have shown that people who gain higher scores on this scale are at greater risk for developing to emotional disorders (Clark, 1994; Trull, 1994 and Waring, 1990cited in Osorio, 2003).

Wallace and Newman (1997) stated that (1) neuroticism is associated with the facility of auto orientation of attention, (2) and this attention process may have unfavorable effects on a person's ability to engage in evaluation and correction of problematic cognitive and behavioral tendencies, and (3) negative mood and psychopathology along with neuroticism come from the disruption in these assessment and improvement processes. These researchers (1998) in a study in this context concluded that neurotic women have weak performance than stable women in the presence of making distraction symptoms, and this issue implies on capturing people's attention of neurotic by making distractions.

Research results of Noguchi et al. (2006) showed that neuroticism and pessimism have relationship with paying attention to negative information and optimism to positive information.

On the contrary, Chan et al. (2007) found no relationship between neuroticism and performance of individual in prob dot task by using the social words and threatening faces.

Cussen and Mench (2014) in evaluation of the role of personality in predicting individuals' differences in Attentional bias found that neuroticism has significant correlation with Attentional bias. According to these researchers, increasing vigilance has costs for people because it makes them significantly poorer performance in asked tasks and ultimately, they concluded that the Attentional bias is the reasonable candidate of cognitive states that come into being by the personality differences.

In general, although various research literatures suggest the relationship between some personality traits and Attentional bias, there is little information in the field of other important traits such as neuroticism personality and its relationship with Attentional bias.

This is despite the fact that neuroticism as a relatively inherited trait is an important factor in vulnerability to some disorders and its predictive role has been approved in the initiation and continuation of mild and severe depression (Ormel et al., 2004). In addition, this dimension of the personality is associated with ways to deal with stressful situations (Kendler et al., 2003) and changes the effect of stressors and increases the person's risk of depression (Ormel et al., 2001).

Therefore, the present study is seeking to achieve the answer to the following questions:

- Is there a significant difference between people with high neuroticism and low neuroticism in terms of response time to threatening stimulus in experimental trials?
- Is there significant correlation between dimension of personality neuroticism and Attentional bias?

Methodology

Participants

The sample of the present study included 130 subjects with age ranging from 18 to 57 years old (M = 28.44; SD = 6.05), which separately included 67 people with high neuroticism and 63 people with low neuroticism. These two groups in terms of age, sex and education level were matched with each other. These individuals were selected by available sampling method. Research plan was the correlation type to examine the relationship between personality dimension of neuroticism and Attentional bias.

Data collection tools

Eysenck Personality Questionnaire

Eysenck personality questionnaire contains 90 questions and three scales of introversion, neuroticism and psychosis and Lie Detector scale.

In order to assess the reliability and validity of this test, Shapourian and Hojjat (1985) conducted the Persian version of the Eysenck Personality Questionnaire on the 232 Iranian students (156 males, 76 females) who were studying in American universities and 305 Iranian students (168 men, 137 women) that educated in Iranian universities. Data separately were analyzed for each group. A significant correlation between the scores of each question of questionnaire was acquired with total score of their relevant scale. Internal consistency estimate (Cronbach's alpha) for the scales of extraversion and neuroticism in both two groups was more than 0.80, these estimates were 0.69 and 0.53 for psychosis and 0.74 and 0.70 for the Lie Detector scale respectively. In group of 1 and 2, Test-retest reliability for extroversion, neuroticism, psychoticism and lie detector scale, was obtained 0.81, 0.79, 0.79 and 0.84 respectively.

Picture- Word task

Picture - Word task, created by Gernsbacher and Faust (1991), include 36 trials, half of these trials involve comparing two words to determine the relationship or lack of relationship between the two words and the other half consists of comparing the two pictures. Trials start with the sentence “Pay attention to the picture” on the picture trials and the sentence "Pay attention to the word" on the word trials. Each trial has three parts, including Context Display, Test Display, and Correct Answer. Before the beginning of each trial, a warning stimulus in 1000 milliseconds prepares the participants to focus on the picture or word. Then, the context display is shown for 700 milliseconds and after an interval of 50 or 1000 milliseconds, test display is shown on a computer screen as long as participants respond or 2000 milliseconds pass.

The context display includes a picture and a word on the picture. Word and picture are always irrelevant. In picture trials, participants should focus on the picture and ignore the word. For word trials, it is vice versa. In picture trials, test display includes a picture without words and in word trials, it consists of a word without pictures. Participants are asked to click on the word “yes” on the right page if the stimuli are related, and if they are unrelated, click on the word “no”.

In 36 trails of this task, there are 8 experimental trails, 8 comparison trails and 16 filler trails. In experimental trail, the irrelevant secondary symptoms of content display are conceptually relevant with test display while the primary symptoms are irrelevant with test display.

Each of experimental trails is matched with a comparison set of trails, the only difference between these two trials is that the secondary symptoms of content display are irrelevant to display test. In 16 filler trails, the early signs of content display is relevant to test display and the secondary symptom is irrelevant to test display. These trails have been created in order to guarantee equal chance for relevant and irrelevant answers. In this task, despite the neutrality and content of all stimulus are presented to subject, the secondary symptoms spontaneously find the threatening stimulus role because these symptoms cause subject performance degradation and incorrect respond by him. Before testing, the subjects practice 4 practice trials before entering the real test and these trails are not analyzed.

Method of analyzing information

After collecting data mean and standard deviation were used in terms of descriptive statistics. Analysis of variance by repeated measures in the form of a layout of (3 × 2) to investigate the first question and independent t-test were used to determine the location of differences between the groups. Pearson correlation coefficient was used to investigate the correlation between neuroticism and Attentional bias.

Results

Neuroticism and reaction time to threatening stimulus

Table 1. Mean and standard error of response time for two subject groups

Groups	Trails	**Mean of response time**	**Standard error**
Individuals with high neuroticism	Experimental	530.41	11.24
	Comparison	462.03	9.11
	Filler	480.97	10.60
Individuals with low neuroticism	Experimental	493.63	11.60
	Comparison	454.23	9.40
	Filler	477.16	10.93

Analysis of variance with repeated measures (a layout of 3 × 2) was used to investigate the first question about response time of people with high neuroticism and low neuroticism. According to the data in Table 1, in both groups, experimental trails and comparison trails have allocated the highest and lowest number in terms of reaction time respectively.

Table 2 reveals that the value of F for triple levels of trails and also interaction between trails and the group is significant in level of P<0.001. Mauchly's test of sphericity was used to verify the consistency of covariance. The results indicated that Mauchly's test of sphericity is significant means that the assumption of homogeneity of variances is not established. As a result, Greenhouse glycerate test were used to analyze variance with repeated conservative.

Table 2. Intergroup effects for triple levels of trails in two subject groups

Source of variance	Sum of squares	Degrees of freedom	Mean Square	F	P
Trail	191699.54	1.81	106076.57	84.90	*0.000
Trail × Group	21021.11	1.81	11631.99	9.31	*0.000
Error (trail)	289004.24	231.32	1249.38	____	___

*P<0.001

Analysis of the data in Table 3 showed that the amount of F was not significant between the two groups.

Table 3. Between-group effects for triple levels of trails in two subject groups

Source of variance	Sum of squares	Degrees of freedom	Mean Square	F	P
group	25342.65	1	25342.65	1.31	0.254
Error (Group)	2471324.32	128	19307.22	----	----

Paired comparisons were used to determine the location of differences that its results have been listed in Table 4. As can be seen there is a significant difference between the two groups in experimental trail, but this difference cannot be observed in comparison trail and filler trail. Thus, considering to Table 1 and 4, it can be concluded that people with high neuroticism compared to people with low neuroticism showed the longer reaction time than threatening stimulus in experimental trails.

Table 4. Summary analysis result of paired comparison tests to compare the response time in the two groups

Trail	Amount of t	Degrees of freedom	P
Experimental	2.28	128	*0 .01
Comparison	0.59	128	0.55
Filler	0.25	128	0.80

*** p<0.05**

Correlation scores of Attentional bias and personality dimensions

Attentional bias is one of the things that is measurable by picture-word task. Calculation formula of Attentional bias has been given below. Positive scores indicate vigilance and negative scores indicate avoidance.

Calculation formula of Attentional bias
Subject 's reaction time in experimental trial - subject 's reaction time in comparison trial
Positive score = vigilance **Negative score = avoidance**

In Table 5, the correlation has been inserted between scores of Attentional bias and personality dimension of neuroticism. Results showed positive correlation between attentional bias and neuroticism dimension (r=0.27) that this value is significant at level of P<0.01. Therefore, it can be concluded that with increasing scores in neuroticism, neurotic people will show more Attentional bias of their own.

Table 5. Correlation between personality dimension of neuroticism and Attentional bias

Correlation	r	P
Neuroticism - Attentional bias	0.27	*.002

*** p<0.01**

Discussion and conclusion

This study sought to examine the relationship between personality dimension of neuroticism and attentional bias, in this respect, the results of the present study indicated a significant difference between the two groups at the reaction time to threatening stimulus, and totally, neurotic people had a longer reaction time than the people with low neuroticism. In addition, analysis of the correlation between personality dimension of neuroticism with scores of attentional bias showed a significant positive correlation between neuroticism and attentional bias, namely, an increase in people scores in neuroticism scale increases the likelihood of attentional bias to threatening information in them. These results are in line with the results of Noguchi et al. (2006), Cussen and Mench (2014), Gray (1981, cited in Caseras et al., 2003) and Wallace and Newman (1997), and are inconsistent with the findings of Chan et al. (2007). In order to justify these findings, on the one hand, according to the view of Gary (1981, cited in Caseras et al., 2003) behavioral inhibition system that is activated almost in neurotic people leads to their increasing attention and too much sensitivity to threat and punishment. According to Wallace and Newman (1998), accompaniment of neuroticism and negative mood may be the reason of its impacts on the information processing system.

On the other hand, people who achieve high scores in neuroticism scale, are usually considered as anxious and stressed people (Hatamloo and BabapourKhairuddin, 2014). Many researchers found that clinical anxious people pay more attention to negative emotional information in the Stroop emotional test, and show dichotic listening and prob dot, for example, they are slower in naming the colors of threatening words. Because the threatening content of words distracts their attention from the initial test of naming color (Coster et al., 2006; Taghavi et al., 2003; Shahamet Deh Sorkh and Salehi Fadardi, 2013)and this dimension of personality is also associated with

anxiety trait. thus, it can be indirectly concluded that attentional bias has been confirmed in neurotic people. From Trait- Congruency Hypothesis, some personality traits caused people looked for and processed information that is congruence with their characteristics and personality dimensions associated with positive and negative mood states are appropriate predictors for selective processing of emotional information (Matthews et al., 2003). Therefore, with considering the special features of neurotic people, obtaining the correlation between this dimension and attentional bias is not unexpected.

Rijdijk et al. (2009) in review on several studies concluded that neurotic individuals are biased in three different areas:

- Attentional bias: People with high neuroticism show more attention to negative or threatening information.
- Bias in interpretation: Neurotic individuals interpret the important data as negative.
- Bias in memory: Neurotic individuals are more reminders than negative or threatening information.

Overall, above results suggest the importance of the personal characteristics of individuals in medical interventions and providing treatment strategies tailored by these features, for example, Wallace and Newman (1998) suggested that neurotic individuals are vulnerable to negative mood and its subsequent psychological damages is modifiable by processes of self-regulation controlled. According to Pickett et al. (2012) the evaluation of different mechanisms of self-regulation and intervention methods with regard to the relationship between personality and psychological trauma may provide important information in clinical situations, and pave the way for psychotherapy interventions such as psychological flexibility to different experiences. Accordingly, it is recommended that in future studies, in addition to other dimensions of personality and cognitive processing, leading role of these individuals in the development of different psychological trauma to therapeutic approaches based on these damages should be referred as systematic and accurate.

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