A Review of the Literature on Emotional Facial Expression and Its Nature

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ABSTRACT

A Review of the Literature on Emotional Facial Expression and Its Nature

Understanding emotional facial expressions accurately is one of the determinants in the quality of interpersonal relationships. The more one reads another’s emotions correctly, the more one is included to such interactions. The problems in social interactions are shown in some psychopathological disorders may be partly related to difficulties in the recognition of facial expressions. Such deficits have been demonstrated in various clinical populations. Nonetheless, with respect to facial expressions, there have been discrepant findings of the studies so far. The purpose of this article is to review the topic of emotion, emotional facial expressions since ancient ages, to emphasize the strengths and weaknesses of the related studies, to compare their results and to pay attention to this novel issue for Turkey.

Keywords: emotion, emotional facial expressions, emotional facial recognition, facial recognition related disorders

ÖZET

Duygusal Yüz İfadeleri ve Doğası Üzerine Literatür Taraması


Anahtar Kelimeler: duygular, yüzdeki duygusal ifadeler, yüzsel algılama, duyguların okuma ile ilgili bozukluklar

INTRODUCTION

Philosophical Background of Emotion

Emotions have always been central concern in human beings. The ancient Greeks believed that mind and body were closely interconnected. Hippocrates claimed that emotional states were characterized by brain temperature, aridity, and moisture and he was the first philosopher to establish a relationship between brain functioning and emotion (Plante 2005). Similarly, Plato (427-347 BC) proposed a “Three State Theory” which was composed of Pleasure, Pain, and Neutral States. Aristoteles (384-322 BC) maintained a scientific emphasis and felt that certain distinct emotional states including joy, anger, fear, and courage affected the functioning of the human body. Indeed, he
unwittingly claimed that emotions had cognitive roots. Descartes was the first philosopher to propose the separation of mind and body. He claimed that there were six fundamental emotions, which were love, hatred, sadness, joy, desire, and lastly wonder (Oatley and Jenkins 1996 p15). Lastly, one of the most important 17th century philosophers Spinoza assumed that love was the main emotion; however, there were other subsequent emotions such as envy, resentment, or passion (Frijda 1986 p265).

**Perspectives on Emotion Peripheral and Central Perspectives of Emotion**

In 1884, William James proposed the first important physiological theory of emotion. James argued that emotion is rooted in the bodily experience. According to him, first, we perceive the object then bodily response occurs and lastly emotional arousal appears (Kowalski and Westen 2005 p347). For instance, when we see a stimulus such as a bear, we have a pounding heart, we begin to run and than we fear. We do not run because of fear, we fear because of running. When his Danish colleague Carl Lange independently proposed a similar view in 1885, since then this theory has been known as James-Lange theory of emotions (Kowalski and Westen 2005 p348, Candland et al 1977 p87).

Walter B. Cannon (1927-1931) proposed an alternative theory suggesting that emotions are cognitive rather than physiological state of arousal. He perceived the sequence of events as external stimulation followed by neural processing followed by physiological reactions. Philip Bard expanded Cannon’s theory by showing the thalamic structures for the expression of emotion; this general theoretical position came to be referred to as the “Cannon-Bard Theory”. This novel theory included that emotion-inducing stimuli simultaneously elicit both an emotional experience, such as fear, and bodily responses such as sweating (Candland et al. 1977 p87-88, Kowalski and Westen 2005 p348).

**Cognitive Perspectives**

During the past decade, interest to the role of emotion in cognition and in behavior has increased dramatically although the relationship between cognition and emotion seemed to be based on the 5th century. In terms of the nature of emotions, many cognitive theorists believe that emotion depends on the interpretation or appraisal system. Appraisal can be defined as a kind of personal meaning of an event, which includes the evaluations of the significance of the facts for personal well-being (Leon and Hernandez 1998). Similarly, Eich et al. (2000 p88) suggested that people have a perceptual-interpretive system that analyzes and evaluates environmental stimuli for their emotional significance. This environmental stimulus is interpreted based on cognitions and then the appropriate emotion arises. First, the facts must be appraised for personal benefit and harm, and then an emotion occurs. The way people respond emotionally depends on the appraisals they make, in other words, their inferences about causes of the emotion and surely, their own bodily sensations are crucial in emotional experience (Leon and Hernandez 1998).

According to Stanley, Schachter and Jerome Singer (1962) (Schachter-Singer theory) emotion involves two factors, first is the physiological arousal and second is the cognitive interpretation of this arousal (cited in Kowalski and Westen 2005 p361). Specifically, when people experience a state of nonspecific physiological arousal, which could be anger, happiness, or others, they attempt to figure out what these arousals mean for their own sake. Meanwhile, although facial expressions are major source of information about people’s emotions, knowledge about the situation influences (Kowalski and Westen 2005 p362). Shortly, cognitive processes play a central role in interpreting other people’s emotions. However, numerous studies support some degree of Schachter-Singer theory i.e. according to many cognitive theorists; people’s emotions also reflect their judgments and appraisals of the situations or stimuli that confront them not only their appraisal mechanisms (Kowalski and Westen 2005 p361).

Some cognitive theorists prefer to explain emotion profoundly as a process that includes five basic components; first is objects or precipitating events, second is appraisal, third is physiological changes, fourth is action or expression, and final component is regulation (Planalp 1999 p11).

**Emotional Facial Expressions (EFE)**

Human emotions occur without our need to say to ourselves, “this situation is dangerous”, instead we simply feel frightened and take action (Oatley and Jenkins, 1996, p. 258). In daily life, we monitor the emotional reactions of others and prefer reacting and regulating our behaviors based on these expressions. Thus, they constitute very powerful tools in social coordination and interpersonal relationships (Batty and Taylor 2003, Ekman 1992 p177).

According to the authors emotions can be characterized as basic or fundamental in terms of action readiness mode or expressing universal biological rules
handed down genetically through evolution (Frijda 1977 p72, Lazarus p70, Ekman 1992 p173-175). Recently, there are seven universally accepted basic emotions; fear, surprise, sadness, happiness, anger, disgust and nowadays contempt. Each emotion has its own characteristics and appearance figures. Furthermore, there are other emotions such as love, jealousy, hatred, envy, regret, interest, guilt or despair that are spoken in some societies but not in others. These emotions are called as social emotions (Stein and Oatley 1992 p162). Basic emotions are distinguished as negative and positive. Happiness is a positive; Fear, anger, disgust, and sadness are negative emotions and most people do not enjoy them. Contempt is still not known because many people like feeling contemptuous. Surprise is neither positive nor negative (Ekman 2003 p1-19, Ekman and Friesen 1975 p99).

**Happiness**

Happiness is the emotion that most people want to experience. Oatley and Jenkins (1996 p259) defined happiness as the emotion or mood of achieving subgoals and of being engaged in that one is doing. It is used almost synonymous with the pleasure and excitement. However, Pleasure is defined as a product of positive physical sensations that is opposite of the physical sensation of pain. Excitement is defined as the opposite of boredom. Excitement and pleasure are different experiences, which often involve happiness (Ekman 2003 p193, Ekman and Friesen 1975 p110).

**Sadness**

There are many words to describe sad feelings: distraught, disappointed, dejected, blue, depressed, despairing, grieved, helpless, miserable, and sorrowful. According to Oatley and Jenkins (1996 p259), sadness can be described simply as the emotion of losing a goal or social role. As compared with fear that looks toward future, sadness seems to look toward the past (Oatley and Jenkins 1996 p260, Ekman 2003 p83, Ekman and Friesen 1975 p114). Sadness is rarely a brief and passive feeling that includes mostly disappointment and hopelessness. It is one of the long-lasting emotions. (Ekman 2003 p84).

**Fear**

Fear is the emotion of anticipated danger, physical or psychological harm (Oatley and Jenkins 1996 p260, Ekman 2003 p156, Ekman 1992 p184, Ekman and Friesen 1975 p47). Fear renders a mode of readiness to cope with danger. Thus, it promotes vigilance for the feared event that can be an imagined or real.

**Anger**

Ekman and Friesen (1975 p76) claimed that anger is very likely the most dangerous emotion. When people are angry, they hurt others purposefully. However, according to Lazarus, although anger is commonly classified as negative emotion, people often report feeling good about their anger. Nevertheless, he added that when anger is acted out, it can have harm-

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<tr>
<td>Weniger et al (2004)</td>
<td>Facial recognition in schizophrenia subtypes, major depression and controls</td>
<td>Anger, Sadness Surprise, Disgust Happiness, Fear</td>
<td>18 residual, 21 paranoid, 6 disorganized, 21 major depressed, 30 controls 21 major depressed, 36 anorexia nervosa, 32 controls</td>
<td>All groups better at happy, worst at fear and surprise. No significant differences between groups.</td>
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<tr>
<td>Mendlewicz et al (2005)</td>
<td>Facial recognition in major depression, anorexia nervosa, and healthy controls</td>
<td>6 expressions</td>
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ful social or physiological consequences, especially when it is not managed (1991 p5).

**Surprise**

Ekman and Friesen indicated that surprise is the briefest emotion (1975 p34, Ekman 2003 p148, Frijda 1986 p18). It is sudden and if you have a time to think about that event, you will not feel surprised. Surprise is triggered by both unexpected and/or misexpected events. Almost anything can be surprising: a sight, smell, taste, touch and surely, the greater the unexpected thing, the more surprised you will be (Teigen and Keren 2002).

**Disgust**

Disgust is a feeling of aversion and is the emotion of revulsion and avoidance of anything that makes one sick (Ekman 2003 p172-173, Ekman and Friesen 1975 p66). People can feel disgust from any taste, a smell, a sight, a touch or a sound or even an idea. Disgust usually involves getting-rid-of and getting-away-from responses. Removing the object or oneself from that object is a goal. Generally, nausea and vomiting accompany with disgust but not compulsory (Ekman 2003 p174, Ekman and Friesen 1975 p66).

**Contempt**

Contempt is only expressed about people or the actions of people instead of foods, smells unlike in disgust. In contempt there is an element of condescension toward the object of contempt. Acting in a proud manner toward others, scornful in disliking the persons or their actions, you feel superior to them (Ekman 2003 p181).

**MOOD DISORDERS, ANXIETY DISORDERS, RECOGNITION OF EMOTIONAL FACIAL EXPRESSIONS AND REACTION TIMES: THE LITERATURE REVIEW**

Most of the studies have demonstrated that mood or emotional states influence the way people make judgments, inferences, and predictions as well as memory. Beck’s (1976) schemata theory and Bower’s (1981) network theory proposed that in both anxiety and depression, cognitive biases operate through information processing (mood congruency hypothesis). The main difference between anxiety and depression in terms of information processing system is about the content of bias (cited in Persad and Polivy 1993). Namely, anxious individuals selectively perceive threatening information (attentional vigilance/hypervigilance), whereas depressed individuals have a bias for information related to sadness, loss and failure (evaluative bias) (Mogg et al 2000, Mogg and Bradley 2006, Rohner 2002). Several studies about the existence of attentional biases in anxiety disorders, in order to obtain ecological validity, nowadays facial expressions have begun to use instead of stroop task and probe detection task (Mogg and Bradley 2006, D’Argembeau et al 2003, Leppanen et al 2004, Surcinelli et al 2006, Philippot and Douilliez 2005, Mendlewicz et al 2005, Wener et al 2004). (See, Tables 1 and 2).

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<tr>
<td>Surcinelli et al (2006)</td>
<td>Relationship between recognition of facial expressions and trait anxiety</td>
<td>Anger, Sadness, Surprise, Disgust, Fear Neutral, Happy, Angry Faces</td>
<td>19 nonclinical high-trait, 20 low-trait</td>
<td>High-trait anxiety better at fear</td>
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<tr>
<td>Philippot and Douilliez (2005)</td>
<td>Attentional bias in social phobia</td>
<td>Anger, Sadness, Happiness, Disgust Fear</td>
<td>21 social phobics, 3 OCD, 13 panic disorders with agoraphobia, 4 GAD, 39 controls</td>
<td>No significant differences among all groups. Fear &amp; Anger &lt; disgust and sadness, &lt; happy for all groups</td>
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significant differences could be found between anxiety disorders and control group in terms of EFE decoding accuracy. The authors believed that these unexpected results were due to several methodological limitations such as small sample size. Even though it can be expected a statistical significance between healthy controls and any group of anxiety disorders, it should be considered that social phobia is generally associated with evaluation and criticism of people around them. Perhaps, if the authors used contempt faces additional to others, then it might represent a socially threatening stimulus which might have caused a different result. Because contempt expression includes a scornful or arrogant look, social phobics may react more sensitive to these expressions because of their high sensitivity of criticism and rejection.

In order to examine the attributional style of depressed patients, Leppanen et al (2004) conducted a study in which recognition of different facial expressions were compared in patients with moderate to severe depression. The findings of Leppanen et al (2004) have focused processing of neutral expressions differently from previous studies. The depressed individuals tend to attribute neutral faces to sad faces. This result can be interpreted as depressed individuals need more time to think neutral faces. The authors could not confirm the mood congruency theory. They did not find any increased recognition of sad faces related to their negative mood or impaired reading of happy expression. On the contrary, depressed people have a happy face advantage like other disorders and healthy controls. However, this result confirms that depressed individuals have some impairment on recognition of neutral expressions due to their attentional bias towards negativenss. Mendlewicz and his colleagues (2005) designed a study to investigate the recognition of facial expressions among female adolescent inpatients with major depression and female adolescents with eating disorders. They also compared these two inpatients groups with the healthy control group. As a result of this design, they did not find any significant differences between eating disorder group and controls in their facial expression recognition. Only depressed patients demonstrated less accuracy rates in decoding angry expression than inpatients with eating disorders and control group. Equal ratings of eating disorders inpatients and healthy controls were divergent from previous studies. This discrepancy can be explained by participation of only female participants rather than mixed-gender sample and participation of only anorexia nervosa rather than all eating disorders. Nevertheless, this study supports the existence of decoding impairments of negative emotions in depression. This reminds us the relationship between anger inhibition and etiology of depression.

### VARIOUS PSYCHIATRIC DISORDERS, RECOGNITION OF EMOTIONAL FACIAL EXPRESSIONS AND REACTION TIMES: THE LITERATURE REVIEW

The deficits in social interactions are shown in some psychopathological disorders may be partly related to difficulties in the recognition of facial expressions. Such deficits have been demonstrated in various clinical po-

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<td>Martin et al (2005)</td>
<td>Recognition, identity matching in schizophrenia</td>
<td>20 schizophrenics and 20 controls</td>
<td>More impaired, more slowly responding in schizophrenics.</td>
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<tr>
<td>Exner et al (2004)</td>
<td>Volume of amygdala and faces in schizophrenia</td>
<td>9 paranoid, 6 undifferentiated 1 disorganized &amp; 16 controls</td>
<td>Reduced volume in schizophrenia. Paranoid subtype worse at all faces.</td>
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pulations (Shayegan and Stahl 2005, Dujardin et al 2004, Mendlewicz et al 2005, Roudier et al 1998, Blair et al 2004). (See, Table 3). The empirical evidences so far have displayed that individuals with schizophrenia have stronger deficits in the recognition of facial expressions. These deficits may be one of the elements of interrupting them to interpret others' intentions, goals, and desires. Martin et al (2005) examined the abilities of patients with schizophrenia in recognition of facial expressions and identity matching. Consequently, performance in patients with schizophrenia was more impaired than controls. As predicted, they were found as less successful on both identity-matching (is the emotion the same or is the person the same)and reading all facial expressions. This study shows that performances in emotion and identity matching were positively correlated. This was defined as a deficit for one area related to deficit for another area. The authors interpret this result as that the severity of negative symptoms; affective flattening, and apathy may co-vary with these deficits in facial processing. How schizophrenic patients do not have any difficulty in discriminating other facial information such as age, gender but the emotions is a very important question to need an answer. Surely, these findings bring new debates on brain structures and damages of Alzheimer's disease especially on linguistics.

Table 4. Studies related to emotional facial expressions (EFE) impairments in alcohol dependence

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<tr>
<td>Kornreich et al. (2001)</td>
<td>Recovering alcoholics (RA) and Obsessive Compulsive Disorder (OCD)</td>
<td>Happiness, Sadness, Fear, Anger, Disgust, Contempt, Shame, Surprise</td>
<td>22 alcoholics, 22 OCD &amp; 22 controls</td>
<td>RA least accurate for happy, angry, sad, disgust faces.</td>
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<tr>
<td>Kornreich et al. (2002)</td>
<td>EFE decoding skills in alcoholism (RA) associated with interpersonal relationships</td>
<td>Anger, Sadness, Disgust, Happiness</td>
<td>30 dependents &amp; 30 controls</td>
<td>More errors in all expressions in RA.</td>
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<tr>
<td>Kornreich et al. (2002)</td>
<td>Comparison of alcoholics (RA), opiate addicts (OA), methadone subjects (OM), mixed alcohol-opiate subjects (DAO)</td>
<td>Anger, Sadness, Disgust, Happiness</td>
<td>30 each dependents &amp; 30 controls</td>
<td>RA and DAO &lt; OA and OM Impaired recognition in opiate addiction but less than alcoholism.</td>
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As expected, individuals with paranoid schizophrenia showed a deficit in recognizing all emotional expressions. Furthermore, this study has confirmed that cognitive deficits are more likely to appear in disorganized symptoms. The findings may prove that there is a reduced volume in right amygdala in schizophrenic individuals. That decrease can be associated with the impairment in the recognition of facial expressions. However, some cross cultural studies noted that remitted schizophrenics showed higher performance on facial affect tasks than symptomatic patients. In fact, in order to reach valid results longitudinal studies should be performed. Because it is not clear this emotional processing impairment is specific to schizophrenia as a disorder (state) or it is a trait-like deficit.

Likewise, Roudier et al (1998) investigated the recognition of facial expressions and processing faces identity in patients with Alzheimer's disease (AD). Based on assumption, which is that specific brain lesions affect the ability to discriminate unfamiliar faces, they compared 31 AD patients with 14 control group. The findings demonstrated that AD patients were significantly impaired in discrimination of facial identities, and in naming and pointing emotions. However, unexpectedly, discrimination of facial expression was preserved in AD patients, only verbal identification of emotions significantly impaired. These results suggested that the operations of facial discrimination and facial discrimination are separate issues. Surely, these findings bring new debates on brain structures and damages of Alzheimer's disease especially on linguistics.
tic area. Parkinson’s and Alzheimer’s Diseases are relatively recent studies that still have no firm conclusions. Nowadays, there have been studies with the individuals of personality disorders due to their significant problems in interpersonal relationships which may be associated with facial expression decoding. For instance, psychopathic individuals are accepted as having low level of fear emotion and empathy dysfunction (Patrick, 1994). Because of these features, they display emotional dysfunctions and relationship problems. In order to clarify this assumption, Blair et al (2004) investigated the ability of psychopathic individuals to process emotional expressions. The results displayed that psychopathic individuals did more errors for fearful expressions than other expressions. These individuals considered that fearful faces were the most difficult expression to recognize. This inability may be related to amygdale dysfunction that can be responsible from their fearless antisocial behaviors and their inability to perceive of victim’s distress.

**ALCOHOL DEPENDENCE AND RECOGNITION OF EMOTIONAL FACIAL EXPRESSIONS (EFE): THE LITERATURE REVIEW**

It is well known that alcoholism is characterized by multiple neuropsychological dysfunctions and by profound interpersonal relationship problems as well as social isolation, which are partly related to inaccurately decoding of facial expressions (Kornreich et al 2001). It has been also proved that accurate recognition of facial expressions enables healthy social relationships (Elfenbein 2006). Frigerio et al (2002) revealed that individuals who are less skilled in decoding facial expression display less social competence and are less involved in social interactions. Numerous studies have been designed to examine the association of alcohol dependence with the recognition of facial expressions especially towards negative emotions (e.g., Philippot et al 1999, Kornreich et al 2001, Kornreich et al 2002, Townshend and Duka 2003, Frigerio et al 2002). (See Tables 4 and 5)

In a study of Philippot et al (1999) with alcohol dependent individuals, they found that recognition of facial expressions seemed to be severely impaired in recovering alcoholics. They suggested that particularly alcoholic dependents had a bias in the recognition of angry and contempt. Specifically, according to these authors, alcoholic participants had a systematic bias in interpreting faces expressing disgust as showing anger or contempt. Likewise, the findings of Frigerio et al (2002) study manifested that alcohol dependent individuals did more errors in the recognition facial expressions. However, it was found that alcohol dependent individuals had a specific deficit in recognizing sad faces. Based on the study of Frigerio et al. (2002), alcoholics had a tendency to interpret sad faces as anger or disgust. If so, they may be more sensitive to feelings to threat from faces looking at them and they are more likely to interpret facial expressions as hostile than as sadness.

Kornreich et al (2001) found that recovering alcoholics tended to overestimate the intensity of the EFE for only happiness and anger. As a result of this study

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<td>Foisy et al. (2007)</td>
<td>Alcoholic facial recognition and reaction times</td>
<td>Anger, Sadness, Disgust, Happiness</td>
<td>25 dependents &amp; 26 controls</td>
<td>Being slower to respond.</td>
</tr>
<tr>
<td>Dursun et al. (2007)</td>
<td>Recognition of emotions and reaction times in alcohol dependents</td>
<td>Basic emotional expressions</td>
<td>51 dependents &amp; 50 controls</td>
<td>Less accuracy at disgusted faces. Misinterpretation disgust as anger.</td>
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recovering alcoholics (RA) displayed accuracy deficits especially for happiness, anger, disgust, and sadness but not for fear. Both studies did not find any gender differences in decoding EFE (Philippot et al 1999, Kornreich et al 2001). Townshend and Duka (2003) displayed that alcoholics showed different patterns in responding on anger and disgust but they did not find any differences between experimental and normal control groups in responding on happy, sad and surprised expressions. Kornreich et al (2002) replicated their studies in order to explore that whether impairment in EFE decoding is specific to alcoholism compared with opiate dependence. They found that accuracy scores were significantly lower in alcoholics rather than opiate dependents. Surprisingly, they noted that opiate dependence was also associated with an impaired EFE decoding however less than alcoholism.

Likewise, Dursun et al (2007) conducted a study concerning reading facial expressions in alcohol dependence. The objective of this study was to explore the presence of impairment in the decoding of universally recognized facial expressions –happy, sad, angry, disgusted, fearful, surprised, and neutral expressions—and to measure their manual reaction times (RT) toward these expressions in alcohol dependent inpatients. The hypothesis, that alcohol dependent individuals would show more deficits in the accuracy of reading all expressions, was not supported. Nevertheless, the results revealed that alcohol dependent individuals recognized less but responded faster toward disgusted faces than non-dependent individuals. The authors interpreted these results as that inaccurate identification of disgusted faces might be associated with organic deficits generated from alcohol consumption or cultural factors which play very important role in displaying expressions.

CONCLUSION

To sum up, researches related emotion has been one of the popular issues throughout the history. There have been many perspectives and theories about the nature or causes of emotions. Some has been able to replicate; some has been rearranged based on contemporary findings. Facial expression recognition is a central feature of emotional and social behavior. One of the crucial sources in regulating interpersonal relationships in daily life depends on the ability to perceive the emotional state of other people. It seems obvious that in many psychiatric disorders individuals frequently have severe interpersonal difficulties that may be related to poor or inaccurate perception of emoti-