

Study on Facial Expression Processing of Emotions in Children with Autism

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Abstract

Faces are special visual stimuli with salient social and biological meaning, within the last 2 decades, there has been an upsurge of interest in face processing abilities in autism which has been generated a lot of empirical demonstrations. In this paper, based on the existing research, the definition and diagnosis of autism spectrum disorder was summarized. It also introduced the main theories facial expression processing of emotions. Then this paper discussed the social cognition and facial expression processing of ASD based on the former study.

Keywords

Facial Expression Professing; Autism; Face Recognition.

1. Introduction

The facial expression recognition is an important part of social cognition, it facilitates people's feedback in a social interaction through the procedure from sensing and recognizing others' facial expression to understanding the transmitted affect and intention. The facial expression recognition of children with autism spectrum disorder(ASD) is now a hot topic in the fields like special education, cognitive science, developmental psychology and neuroscience. Recent years, the World Health Organization(WHO) and the American Psychiatric Association (APA) incorporated facial expression as one of the diagnostic criteria for ASD. Autism spectrum disorders (ASD) are referred to as pervasive developmental disorder (PDD), characterized by pervasive deficits in social intention, social communication, as well as unusual repetitive or restrictive behaviors and interests, the deficits in reciprocal social interaction is the core specific symptom[1]. Autistic disorder (AD) is the most severe symptom in the spectrum. The increase in ASD prevalence highlights the urgency of paying close attention to early identification, diagnostic assessment, and well-founded interventions. Identifying impairments that distinguish young children with autism from typically developing children is very important to the early identification and the reveal of the nature of this disorder. The most significant social cue is human face, which must be successfully recognized and interpreted as communicative signals. Therefore, the research on the features of face processing in young children with autism is very important to the identification and diagnosis of the autism spectrum disorder.

2. The autism spectrum disorder (ASD)

2.1 The definition of ASD

Since the first case of classical autism was diagnosed in 1943 by Kanner, more and more subgroups of autism was found and reported. Nowadays, the autism spectrum disorder (ASD) is considered as a comprehensive development obstacle, including the autism, the Asperger syndrome, and the PDD-NOS. It happened before the age of three, refers to the developmental disabilities with qualitative barriers of social interaction and communication as the main characteristics. The autism children always accompanied by the restricted behavior and stereotyped patterns. Different kinds of ASD can be divided according to the seriousness of one or more dimensions based on the neurobiological mechanisms[2].

According to the previous research, although there are many kinds of differences on intelligence and symptom among individuals with ASD, people with autism spectrum disorder all have difficulties on the emotional awareness of others in social interaction. A lot of early social barriers of ASD, such as the eye contact, common looking, response to emotions, and the facial expression process, are all associate with the lack of facial expression information process capability.

2.2 The diagnosis of ASD

There are two diagnostic criteria of children's ASD: the diagnostic and statistical manual of mental disorders (the 4th edition) from the American Psychiatric Association and the ICD-10 classification of mental and behavioral disorders clinical descriptions and diagnostic guidelines from the WHO. Most commonly used diagnostic tools at present are established according these two diagnostic standard. The autism diagnostic interview-revised (ADI-R) and the childhood autism rating scale (CARS) are commonly used in foreign countries as the diagnostic tools of ASD and the Chinese classification and diagnostic criteria of mental disorders (CCMD-3) is widely used in China. Those diagnostic tools have considered the obstacles of facial expression, body postures and gestures in to the autistic spectrum condition[3].

The tools of early ASD children screening are very limited. Among the commonly used screening tools of ASD children behavior problem, the checklist for autism in toddlers (CHAT) and the screening tools for autism in toddlers (STAT) are special tool for the diagnosis of 1.5-2 years old children. While the modified checklist for autism in toddlers (M-CHAT) is widely used for the screening of children in 16-30 mouths[4]. Those tools can be used to screening children with obvious ASD behaviors.

3. The main theories facial expression processing of emotions

Facial expression is a non-verbal stimulus which contains rich information. As a kind of visual stimulation both have biological and social meaning, the facial expression contains information about gender, age and identity. There are a lot of similar and fixed characteristics of human face, but the change of light, action, hairstyle can lead to big differences on the vision. Ekman and Frisen researched the cultural universality of basic expression, and put forward five kinds of basic facial expression: happy, sad, surprise, fear, anger and disgust. Nowadays, the study on the facial expression processing of emotions can be divided into five main theories.

3.1 The theory of integrity

The theory of integrity is a kind of theory about the way of face recognition processing. It considers that the face recognition is different from the recognition of other general object, which has characteristics of integrity and constitutive property. The face recognition is as a whole to processing and characterization, there is no specialized coding for parts of face. The parts of face formed a whole rather than a simple arrangement.

3.2 The theory of innate mechanism

The theory of innate mechanism is a kind of theory about the explanation of the facial cognitive ability. Human is born with the ability of identifying the structure information contains similar visual features which the information of human face is the most important. While the information processing ability also needn't certain stimulation to gain experience.

3.3 The theory of expert

The theory of expert emphasizes the characteristic of face, considers that the special of human facial recognition is the classification of the sub-category to expert level from a relatively homogeneous object category. The expert theory emphasizes that the brain's face reaction area responds to all objects, not born with a certain mechanism of face recognition.

3.4 The theory of function model

The function model explains the process of face recognition processing; it considers the face recognition has two parallel routes, one for face feature information coding, one for information processing of the face expression, the functions of those two are relatively independent. And the cognitive neuroscience research strongly supports the rationality of the parallel independent processing model from the perspective of brain sciences.

3.5 The interactive processing and structure reference hypothesis

This hypothesis thinks that the potential structure of a face will determine the way the face express emotions. Based on the hypothesis, the following inferences can be made that identities are easier and faster to distinguish than expression. And the inference has already examined by the experimental results. The study of the relationship between gender recognition and identification also rejected the classical function model.

4. The social cognition and facial expression processing of ASD

The social cognition is a complex neural psychology category. From the evolutionary perspective, the social skills of recognition the intention and emotion of friend generation have developed since the homo species. The challenges human faces on a great extent need the corporative of individuals from a certain social group, therefore it is very important for the adaptability to human to get the information of intention and emotion from others[5]. However, the children with ASD show the disorder of social contact.

In the early observation of ASD, the most prominent and specific fundamental obstacles of ASD group is that they are not able to establish contact with others and the environment in the right way from the beginning of their life. A lot of studies find the whole autism spectrum disorder shows serious social-cognitive deficits, even the high functioning autism and the Asperger's Syndrome. The problems of recognition and expression of other's thoughts and feelings seriously damage the social ability of autism and is closely related to their speech communication difficult. Although the problem of face processing and recognition haven't been listed in the core overt symptoms of ASD, but it is closely linked to many shortcomings of ASD. The disorder of face processing of ASD mainly includes the high spatial frequency information, the reduce of face configuration processing, the abnormal of the way of paying attention to face feature area or the reduce of the attention to the eyes, and respond to familiar and unfamiliar faces in a different way.

4.1 The selective faces attention of children with ASD

From the moment of birth, human is naturally having attention bias on the face. The social importance of faces also prompts researchers to pay attention to the face processing exceptions of autism spectrum disorders. A large number of studies suggest that children with ASD can't reaction differently with faces and other non-faces, can't distinguish the facial identity and expressions and understand the social meaning of face expressions[6]. The children with ASD do not regard the face as something special, they pay more attention to the non-facial objects than the face itself. A lot of children diagnosed as ASD express the behavior of "face avoidance".

The attentive tendency of social stimulating like faces and person is an important expression of social attention, although this disorder of social attention is not a diagnosis characteristic of ASD, but more and more researchers classify it as the core symptoms of ASD. Normal people have the attention bias to others, while the bias are missing or weak when it comes to the people with ASD. Autistic children pay attention to the objects for a long time while a short time to people, their line of sight often change from people to other objects. The ability of autistic children's memory to the objects is not damaged, they can memorize animate and inanimate. But the ability of memory faces is significantly weaker than normal person. In short, the normal children's memory is preferring the faces to the other kind of objects, but the children with ASD are not.

4.2 The face recognition and processing of children with ASD

After the faces being distinguished from other objects in the same environment and get attention, individuals begin to process the information of facial stimulate. The process can be divided into two aspects: one is face identification and processing, the other is Face expression recognition and processing. People can easily identify the same faces in different expressions, also can identify the same expressions on different faces.

The ability of identify faces is deficiency in children with ASD, the autistic children may consider the face just as a complicated object. According to the experiments about the ASD, the face identification of autistic children is damaged in the normal functional vision system. For normal person, when they look at people's faces they mainly look at the eyes. While for the autistic children, they pay less attention to the internal features of face, especially the eye area. In the natural setting, the autistic children pay more attention to the area of mouth instead of the eyes.

5. Conclusion

The researches about the face processing of ASD have many branches. Some researchers think the ASD has obstacle on the facial identity and processing, the eye area processing ability of area autistic children is weak than normal people. However, there exist other researchers who doesn't agree with this theory, they think the looking behavior of autistic children is similar to normal children, especially for the familiar faces. These inconsistent results may be caused by the following reasons: firstly, it may be caused by the differences of the subjects group; secondly, it may be impacted by the training of emotion the autism education institutions give to the autistic children; another possibility is that the differences of the nature of irritants during experiments caused the differences between results. What's more, the research must pay attention to the importance of test paradigm itself which can affect the accuracy of the test.

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