



ОЦІНКА НАВИЧОК РОЗПІЗНАВАННЯ ЕМОЦІЙ НА ОБЛИЧЧІ У ДІТЕЙ З АУТИЗМОМ



Жихал Докур, Октай Таймаз Сарі, Ататюркський факультет освіти, Університет Мармара, Стамбул, Туреччина

Дослідження мало на меті виявлення здатності дітей з аутизмом до ідентифікації 5 основних емоцій (радість, смуток, гнів, здивування і страх) з картинок з виразами обличчя та вміння розпізнавати й ідентифікувати причини чужих емоцій на фоторепортажі. Було досліджено 30 дітей з аутизмом (у віці від 5 до 17 років, 6 дівчаток і 24 хлопчики). Встановлено, що діти з аутизмом не мали труднощів з визначенням емоції на картинках, однак мали труднощі з ідентифікацією причин емоцій інших людей на фоторепортажі. Результати показали, що вони визнали емоції радості, смутку, страху і здивування за виразом обличчя, рота, а гнів за мімікою чола.

Ключові слова: аутизм; міміка; емоції; визнання.

Жихал Докур, Октай Таймаз Сарі, Ататюркський факультет образования, Университет Мармара, Стамбул, Турция

ОЦЕНКА НАВЫКОВ РАСПОЗНАВАНИЯ ЭМОЦИЙ НА ЛИЦЕ У ДЕТЕЙ С АУТИЗМОМ

Целью исследования было выявление способности детей с аутизмом к идентификации 5 основных эмоций (радость, грусть, гнев, удивление и страх) из картинок с выражениями лица и умение распознавать и идентифицировать причины чужих эмоций на фоторепортажах. Было исследовано 30 детей с аутизмом (в возрасте от 5 до 17 лет, 6 девочек и 24 мальчиков). Установлено, что в то время как дети с аутизмом не имели трудности с определением эмоции на картинках, они испытывали трудности с идентификацией причин эмоций других людей на фоторепортажах. Результаты показали, что они узнали эмоции радости, грусти, страха и удивления по области рта, а гнев по области лба.

Ключевые слова: аутизм; мимика; эмоции; признание.

Zihal Dokur, Oktay Taymaz Sari, Marmara University, Istanbul, Turkey

AN EVALUATION OF THE FACIAL EMOTION RECOGNITION SKILLS IN CHILDREN WITH AUTISM

This study aims to determine the ability of children with autism to identify the five basic emotions (happiness, sadness, anger, surprise and fear) from pictures of facial expression, the facial regions involved in the process of recognition, and their ability to recognize and identify reasons for other people's emotions from picture stories. Thirty children with autism (6 female and 24 male; aged 5-17 years old) were investigated. While children with autism had no difficulty identifying emotions from pictures, they had difficulty recognizing and identifying the reasons for others' emotions in the picture stories. Our findings also showed that they recognized emotions of happiness, sadness, fear and surprise from the mouth region and anger from the brow region of the face.

Keywords: autism; facial expressions; emotion; recognition.

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In 1943, Kanner argued that children with autism were born with an «innate inability» to form the usual, biologically provided affective contact with people (Frith 2003). Impairments in understanding, expressing and responding to emotions are pervasive in children with autism and often compound their difficulties with building interpersonal relationships (Travis and Sigman 1998). Emotional competence refers to an array of skills that facilitate the quality of interpersonal relationships and personal adjustment (Whitman et al. 2011). Although studies have shown that children with autism have difficulty understanding and expressing emotions, these difficulties are considered to be the result of a more general problem of perception (Travis and Sigman 1998). Children with autism may seem disconnected from their social environment and have calm, inexpressive, fixed facial expressions. This lack of emotional expression is sometimes interpreted as displaying lack of fear in dangerous situations or lack of interest or curiosity towards others in pain. In some situations, children with autism may laugh or show extreme fear for no apparent reason as well (Frea and Vittimberga 2000). According to families, these children are perceived as showing more negative emotions such as fear, sadness and anger and less positive emotions such as happiness and interest (Sigman and Capps 1997).

Infants can not only recognize and discriminate between the emotions of other people during the first six months of life (Herba and Philip 2004), they can also respond in meaningful ways to these emotions (Montague and Walker-Andrews 2002). They can alter their own affective states and expressions in response to emotional signals from others (Meltzoff et al. 1999). Newborns were shown to imitate facial expressions (sad, happy and surprised) in the first 36 hours of life (Field et al. 1982).

Many studies have shown that persons with autism are inattentive to the use of facial cues such as movement of the lip and eyes and facial mimicry in understanding and interpreting facial expressions (Deruelle et al. 2004; Weeks and Hobson 1987). Persons with autism usually have difficulty discriminating and identifying emotional expressions, as well as understanding the significance of emotion. One of the reasons for their difficulty in recognizing facial emotional expressions is that they fail to develop or have a very limited use of social schema. Another reason for this difficulty is that they attend to a narrow range of features when they are reading the face (Gross 2004). Persons with autism may not accurately judge facial expressions because they direct more of their attention to non-feature areas of the face than to core features such as the nose, mouth and eyes (Pelphrey et al. 2002). While typically developing adults process the overall configuration of the face, persons with autism show a tendency towards a segmental approach to face inspection, relying primarily on individual features of the face (such as mouth, nose or eyes) (Buron et al. 2008).

Many studies on basic emotion recognition skills have shown that persons with autism perform almost equal to their peers (Adolphs et al. 2001; Boucher et al. 2000; Castelli 2005; Gepner et al. 2001; Golan and Baron-Cohen 2006; Grossman et al. 2000; Heerey et al. 2003; Loveland et al. 1997). Other studies on basic emotion recognition skills in autism, however, found contradictory results whereby persons with autism were shown to perform differently and worse than the control group (Boraston et al. 2007; Celani et al. 1999; Deruelle et al. 2004; Dyck et al. 2001; Hill et al. 2004; Hobson 1986a and 1986b; Macdonald et al., 1989; Njiokiktjien et al. 2001). Many persons with autism also have difficulty or inability to enter into emotional relationships. Although persons with autism may identify the emotions in pictures, they have difficulty understanding the reasons for those emotions.

This study aims to determine the recognition level of five basic emotions (happiness, sadness, anger, surprise and fear) in 30 (6 female and 24 male) children with autism aged 5 to 17 years. With this aim, we investigated the children's ability to identify the five basic emotions from pictures of facial expression, the facial regions involved in the process of emotion recognition, and their ability to recognize and identify the reasons for other people's emotions from picture stories.



Methods

Participants

Participants were 30 (6 female, 24 male; aged 5 to 17 years) children with diagnosis of autism. Diagnoses were confirmed at Guidance Research Centers, public institutions that act as first points of notification for special education, guidance and psychological counseling, supervised by the Ministry of Education in Turkey. All children received special education services at a rehabilitation center (two hours of individualized tutoring per week). In addition to a diagnosis of autism, participants had «expressive language» skills (able to engage in meaningful conversations in the form of question and answer, talk about pictures, and understand spoken language) as evaluated by their teachers, could fully look through pictures, as evaluated by both teachers and parents, performed at a level of two thirds when looking at the face, mouth and eyes of another person, and had the receptive vocabulary level of at least a 3-year-old as measured by the Peabody Picture Vocabulary Test.

A pilot study was conducted with 40 (22 female, 18 male; aged 3 to 5 years) typically developing children to validate the pictures and the picture stories prior to the start of the study.

Data Collection Tools

Data form

Mothers of the participating children were asked to complete a demographic data form prepared by the researcher.

Peabody Picture Vocabulary Test

The Peabody Picture Vocabulary Test (Dunn 1959) was adapted for use with children in Turkey by Katz et al. (1974). The test provides age-appropriate developmental screening of the receptive vocabulary skills of children aged 2 to 12 years. Items consist of four pictures on a single card and a word spoken by the researcher. There are a total of 100 cards with a matching word each. For each of the items, the child selects a picture that best represents the word spoken. One point is awarded for each correct word-picture pair. The test is terminated if the child answers 6 consecutive questions incorrectly. The test is individually administered, and takes approximately 10-15 minutes to complete for typically developing children and 20-25 minutes for children with autism.

Pictures of Facial Emotion

Pictures consisted of five drawings of posed facial expressions, each containing one of the five basic emotions (happy, sad, angry, surprised, and scared) that the participants were asked to identify. Each emotion was drawn on a piece of 10x10 cm paper, on the face of a male character named Ali. Picture stories were also based on the same character (Ali is a widely used male name in Turkey).

Participants were shown pictures of faces one at a time, and asked to identify the emotion expressed in Ali's face (What does Ali feel?). One point was awarded for each correct answer, while no points were deducted for wrong answers. Depending on the answer, the researcher asked the child «How did you understand Ali was? From his mouth, eyes, brows or his face as a whole?», simultaneously pointing to the mouth, eyes, and brows, and drawing a circle around the character's face with her fingers. If the child failed to give an answer within one minute, the researcher repeated the question. If the child said «joyful, smiling» instead of happy, or «unhappy» instead of sad, or «excited» instead of surprised, the answer was accepted as correct. All answers were immediately recorded on a registration form prepared by the researcher.



Picture Stories of Emotion

Twenty stories (4 stories for each emotion) were created by the researcher in order to measure the recognition skills of the child for the emotion in the story and the situation leading to that emotion. Storylines were written by the researcher, and the stories were illustrated by an artist. Picture stories were sent for review to 15 experts in the relevant departments of the university. They were consecutively re-illustrated and finalized by another artist integrating experts' feedback on storylines and the pictures.

Stories were also based on the same main character named Ali. Storylines were independent of each other. All picture stories were illustrated in color. Ali always wore clothes in the same color and style in the picture stories, but Ali and the other characters were without facial expressions. Pictures were drawn on A4 size paper. In each story, the researcher asked the questions «What might Ali feel? Why?».

1st story: For a long time, Ali wanted to have a ball. Ali's mother bought him a ball on his birthday. What might Ali feel? Why? (Answer: Happy)

5th story: When Ali came back from school, his mother told him that his cat ran away. Ali looked everywhere in the garden, but he could not find his cat. What might Ali feel? Why does he feel...? (Answer: Sad)

9th story: When Ali and his friend were playing together, Ali's friend took Ali's toy out of his hands by force. What might Ali feel? Why does he feel...? (Answer: Angry)

13th story: Ali saw his grandfather in the school's garden, and he had not seen his grandfather for a long time. What might Ali feel? Why does he feel...? (Answer: Surprised)

17th story: When Ali was walking on the road, suddenly he saw a car coming towards him. What might Ali feel? Why does he feel...? (Answer: Scared)

Stories were administered in a room where only the researcher and the child were present, within a span of approximately 30–35 minutes. The researcher first introduced herself to the child, and prepared the child for the session by saying «Now, we are going to look through some pictures and stories with you». For a better view of the pictures, the child sat to the left of the researcher. The pictures lay open in front of the child as the questions were asked, and the researcher pointed to the pictures with her finger as she narrated the stories. The pictures of the five emotions were placed beneath the picture of each story. If the child failed to give an answer within 5 seconds – with or without looking at the pictures of the emotions, the researcher repeated the question. All answers were recorded on a registration form prepared by the researcher.

Each story consisted of one question on emotion recognition and one question on the situation leading to the emotion. Emotion recognition questions (What might Ali feel?) were designed so that the child could give an answer quickly. Answers were coded as correct and incorrect. Question inquiring about the situation leading to the emotion required the child to understand the emotion of another person, so it was worded as «Why does he feel ...?». The answer was accepted as correct when the child made a statement that described the situation in the story. For example, in the story where Ali's mother bought him a ball on his birthday, the answers «Because his mother bought him a ball; because she bought a ball; she bought a ball» were all accepted as correct. One point was awarded for each correct answer, while no points were deducted for wrong answers.

Results

As shown in Table 1, the lowest age equivalent score of the children with autism was 7 years according to the mean scores on Peabody Test (table 1).



While all children (100 %) correctly identified the «happy face», 29 (96.7 %) children correctly identified the «sad face», 29 (96.7 %) the «angry face», 26 (86.7 %) the «surprised face», and 23 (76.7 %) the «scared face» (Table 2). These findings show that the children with autism most successfully recognized the facial expression of happiness followed by sadness and anger, respectively, and they recognized the facial expressions of surprise and fear less successfully than the others (table 2).

While children with autism recognized expressions of happiness, sadness, surprise and fear from the mouth region, they recognized the expression of anger from the region of brow (table 3).

As shown in Table 4, children with autism recognized the emotion of happiness (90 – 100 %) more successfully than the emotions of sadness (73 – 96 %), anger (70 – 86 %), surprise (43.3 – 76.7 %), and fear (40 – 53.3 %), respectively. These findings show that while the children with autism most successfully identified the emotion of happiness, they also recognized emotions of sadness and anger better than surprise and fear (table 4).

Children with autism also most successfully identified the reasons for happiness (53.3 – 70 %), followed by sadness (50 – 60 %), fear (40 – 53 %), surprise (30 – 53 %), and anger (30 – 50 %), respectively (Table 5). These findings show that children with autism can identify situations that lead to happiness better than the other four emotions (table 5).

Table 1

Peabody Picture Vocabulary Test scores of children with autism

Peabody Picture Vocabulary Test scores of children with autism (n = 30)		
	Children with autism	
	Mean	SD
Peabody Picture Vocabulary Test total score	62.433	22.167
Peabody Age equivalent	10.597	18.031

SD: Standard Deviation

Table 2

Frequency and percentage of the emotion recognition skills for five basic emotions identified from pictures of facial emotion

Frequency and percentage of the emotion recognition skills for five basic emotions identified from pictures of facial emotion (n = 30)			
		Frequency(n)	Percentage (%)
Identifying happiness	C	30	100
Identifying sadness	C	29	96.7
	I	1	3.3
Identifying anger	C	29	96.7
	I	1	3.3
Identifying surprise	C	26	86.7
	I	4	13.3
Identifying fear	C	23	76.7
	I	7	23.3

C: Correct; I: Incorrect



Table 3

Frequency and percentage of the facial regions used for recognition of five basic emotional expressions

Frequency and percentage of the facial regions used for recognition of five basic emotional expressions					
	Happy	Sad	Angry	Surprised	Scared
Mouth	26	25	8	25	18
Eye	3	2	1	1	7
Brow	0	0	18	0	1
Whole	1	3	3	4	4
Total	30	30	30	30	30

Table 4

Frequency and percentage of the emotion recognition skills for five basic emotions identified in the picture stories

Frequency and percentage of the emotion recognition skills for five basic emotions identified in the picture stories (n = 30)				
		Frequency (n)	Percentage (%)	
Happy 1	C	28	93.3	
	I	2	6.7	
Happy 2	C	30	100.0	
Happy 3	C	30	100.0	
Happy 4	C	27	90.0	
	I	3	10.0	
Sad 1	C	29	96.7	
	I	1	3.3	
Sad 2	C	26	86.7	
	I	4	13.3	
Sad 3	C	23	76.7	
	I	7	23.3	
Sad 4	C	22	73.3	
	I	8	26.7	
Angry 1	C	26	86.7	
	I	4	13.3	
Angry 2	C	21	70.0	
	I	9	30.0	
Angry 3	C	22	73.3	
	I	8	26.7	
Angry 4	C	21	70.0	
	I	9	30.0	
Surprised 1	C	23	76.7	
	I	7	23.3	
Surprised 2	C	17	56.7	
	I	13	43.3	
Surprised 3	C	13	43.3	
	I	17	56.7	
Surprised 4	C	18	60.0	
	I	12	40.0	
Scared 1	C	14	46.7	
	I	16	53.3	
Scared 2	C	20	66.7	
	I	10	33.3	
Scared 3	C	12	40.0	
	I	18	60.0	
Scared 4	C	16	53.3	
	I	14	46.7	

C: Correct; I: Incorrect



Table 5

Frequency and percentage of skills for «correctly identifying the situation leading to the emotion» in the picture stories of emotion

Frequency and percentage of skills for «correctly identifying the situation leading to the emotion» in the picture stories of emotion (n = 30)			
		Frequency (n)	Percentage (%)
Reason for happiness 1	C	21	70.0
	I	9	30.0
Reason for happiness 2	C	21	70.0
	I	9	30.0
Reason for happiness 3	C	21	70.0
	I	9	30.0
Reason for happiness 4	C	16	53.3
	I	14	46.7
Reason for sadness 1	C	18	60.0
	I	12	40.0
Reason for sadness 2	C	16	53.3
	I	14	46.7
Reason for sadness 3	C	15	50.0
	I	15	50.0
Reason for sadness 4	C	16	53.3
	I	14	46.7
Reason for anger 1	C	15	50.0
	I	15	50.0
Reason for anger 2	C	9	30.0
	I	21	70.0
Reason for anger 3	C	11	36.7
	I	19	63.3
Reason for anger 4	C	12	40.0
	I	18	60.0
Reason for surprise 1	C	16	53.3
	I	14	46.7
Reason for surprise 2	C	11	36.7
	I	19	63.3
Reason for surprise 3	C	10	33.3
	I	20	66.7
Reason for surprise 4	C	9	30.0
	I	21	70.0
Reason for fear 1	C	12	40.0
	I	18	60.0
Reason for fear 2	C	16	53.3
	I	14	46.7
Reason for fear 3	C	12	40.0
	I	18	60.0
Reason for fear 4	C	14	46.7
	I	16	53.3

C: Correct; I: Incorrect



Discussion

In this research, we investigated the ability of children with autism to identify the five basic emotions from pictures of facial expression, the facial regions involved in this process of recognition, and their ability to recognize and identify the reasons for emotions in picture stories in children with autism. With regard to emotion recognition from pictures of facial expression, our findings showed that the children with autism could recognize and label all five basic emotions (happy, sad, angry, surprised and scared) in varying degrees of success. They most successfully identified the facial expression of happiness followed by sadness and anger, respectively. Yet, they were less successful in identifying facial expressions of surprise and fear. Ashwin et al. (2006) also showed that while children with autism could recognize all emotions, happiness was the most successfully recognized emotion. Other studies had similar results as well (Ashwin et al. 2006; Pelphrey et al. 2002; Camras and Alison 1985; Herba et al. 2006).

Analysis of the facial regions involved in the process of emotion recognition showed that children with autism recognized expressions of happiness, sadness, surprise and fear from the mouth region. Similarly, previous research on facial emotion recognition showed that children with autism are less attentive to the upper half of the face than the lower part (Klin et al. 2002; Baron-Cohen et al. 1997; Gross 2004; Joseph and Tanaka 2003; Buron et al. 2008). However, while most of the children (60 %) in our study recognized the expression of anger from the region of brow, only a small group of children (26.7 %) recognized it from the region of mouth.

With regard to identifying the emotion in the picture stories, our analysis showed that while the children with autism most successfully identified the emotion of happiness, they also recognized emotions of sadness and anger better than surprise and fear. The lower success in recognizing the surprise and fear in the stories is similar to the findings related to the emotion recognition from pictures. Castelli (2005) also found similar findings on recognition of fear and surprise in children with autism. Emotions of fear and surprise develop relatively later than the other emotions, which might be one of the reasons for children's difficulty recognizing them. The difficulty recognizing others' feelings and thoughts is one of the underlying characteristics of autism. Children with autism might only memorize the feelings, therefore experiencing difficulty understanding the feelings within a context. Sigman et al. (1992), Blijd-Hoogewys (2008) and Sari (2011) demonstrated that the children with autism had difficulty recognizing others' feelings.

With regard to identifying the situations that lead to emotions in the stories, our analysis showed that the most of the children with autism could identify the reasons for the emotion of happiness, but they had difficulty identifying the reasons for sadness, fear, surprise and anger. Baron-Cohen (1991), Hoogewys (2008), and Sari (2011) also found similar findings in children with autism.

Future research may consider evaluating the emotion recognition skills of children with autism using more complex stories and procedures that also incorporate body language and sound.



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