

RECOGNITION OF SOCIAL EMOTION FROM EYE REGION OF THE FACE – A PILOT STUDY

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Keywords: social emotion, face recognition, theory of mind

Abstract: For social cognition and interaction, accuracy for recognition of emotion displayed by others is compulsory. Meaning of other people emotion as social interaction requires interpretation of different social cues from face analysis by the visual system. A widely used assessment for social emotion recognition is Reading the Mind in the Eyes Test (RMET) Romanian version. In this test, the subject evaluates a series of 36 pictures of the eye-region of the face and chooses which of four words that are below each picture best fits the feeling expressed. Our study group comprises 20 subjects (mean age =22 years, SD=5.120) who were tested with RMET and we evaluated the responses. Results are consistent with already reported studies on other countries, from psychometric point of view but also indicate some issues at some items. In order to improve the emotion evaluation with RMET, studies on larger samples are required.

INTRODUCTION

For social cognition and interaction, accuracy for recognition of emotion displayed by others is compulsory. Meaning of other people emotion as social interaction requires interpretation of different social cues from face analysis by the visual system.

Through visual system, we get around 80% of the information that our brain analyzes and that is why facial expression of emotion is the strongest and fastest way to communicate social signals. This ability, of putting into the mind of another person is considered to be part of a Theory of Mind (ToM) and is a key feature to predict other’s behaviour adaptation to changing contexts.

From clinical psychopathology point of view, it is mandatory to have sensitive test of social cues dysfunction because there is evidence that misperception of affect is a salient feature in prodromal stages of psychotic and autistic spectrum disorders.

A widely used assessment tool for social emotion recognition is Reading the Mind in the Eyes Test (RMET).(1)

In this test, the subject evaluates a series of 36 pictures of the eye-region of the face (Caucasian faces). After examining the pictures, the subjects are asked to choose which of four words that are in the corners of each picture best fit to the feeling expressed in the picture. We consider that RMET will evaluate whether the subject can put themselves into the mind (mental state) of the person from pictures.

In understanding of emotions from RMET, from the cognitive point of view, subjects must match the eyes expression in each picture to information about eye-region expressions stored in long term memory. This will activate words stored in semantic networks and involves judgements about emotional states that subjects think that will best fit to eyes-region expression in the pictures. This will involve first stages of ToM that are linked to perception but it will not allow inferences about mental states that involve later stages of ToM. Some items related to gaze direction to a specific point could be solved easier and can be passed by subjects

with minor deficits in theory of mind.(2) It is not clear if gender ratio of faces selected for RMET and also the affective lexicon that describes emotional states may bias the subjects’ responses.

PURPOSE

This study evaluates responses to the Reading Mind in the Eyes Test as a measure of social emotion processing ability of adults.

MATERIALS AND METHODS

Participants over 18 years old were recruited, after obtaining the informed consent. Only participants without conditions that can influence the responses accuracy were included in the sample. Our study group comprises 20 subjects with a mean age of 22 years (minimum 19 years, maximum 30 years, SD=5,120).

Subjects were tested with RMET, each picture from the set is surrounded by four mental state terms.

Figure no. 1. An example of an image from RMET test



Participants are instructed to choose only one word that best fits to what the person in the picture is feeling. The subjects must select the best fitted item within 30 seconds for each picture. The instructions are, according to test site “You

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 Article received on 30.09.2015 and accepted for publication on 25.11.2015
 ACTA MEDICA TRANSILVANICA December 2015;20(4):160-162

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are going to see a series of 36 photographs of eyes. Your task is to choose the word, from a choice of 4, that best describes what the person in the picture is thinking or feeling.”(3)

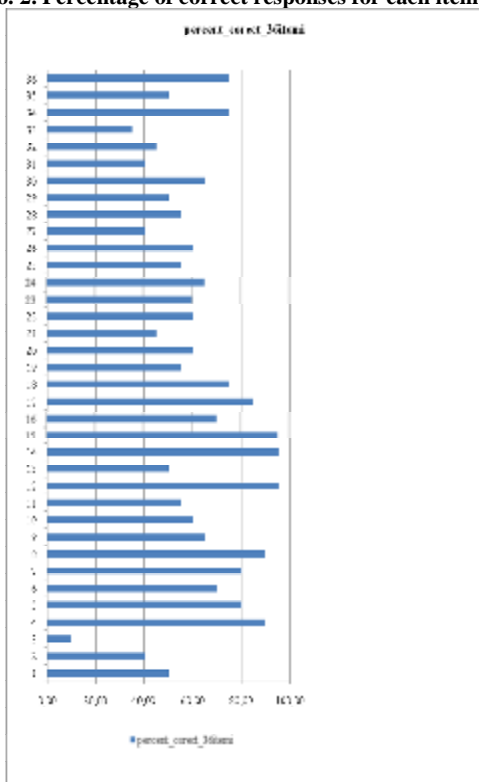
RESULTS AND DISCUSSIONS

The items with low rate of response we identify with the following rule: less than 40% of the subjects select the correct word and more than 25% of the subjects select other word from the response set.(4) Afterwards, we set the conditions for a picture to qualify for further studies we perform analysis picture by picture. Table no. 1 shows the numbers of correct responses for our group of 20 subjects. All of the items in the test have the correct answers on the first place as absolute value and percentage.(5)

Table no. 1. Absolute value of correct responses for each item

Item	Correct no.	Item	Correct no.
1	10	19	11
2	8	20	12
3	2	21	9
4	18	22	12
5	14	23	12
6	16	24	13
7	16	25	11
8	18	26	12
9	13	27	8
10	12	28	11
11	11	29	10
12	19	30	13
13	10	31	8
14	19	32	9
15	19	33	7
16	14	34	15
17	17	35	10
18	15	36	15

Figure no. 2. Percentage of correct responses for each item



The criteria that we set for selecting low responses shows that items 3 and 33 fail to pass the correct word.

Table no. 2. Item 3 response pattern

Item 3		Frequency	Percent
Valid	funny	1	5,0
	nervous	1	5,0
	desire	2	10,0
	convinced	16	80,0
	Total	20	100,0

The correct response for item 3 is “desire” and it fails to pass the 40% rule.

Table no. 3. Item 33 response pattern

Item 33		Frequency	Percent
Valid	embarrassed	4	20,0
	guilty	3	15,0
	dreamy	6	30,0
	preoccupied	7	35,0
	Total	20	100,0

The correct response for item 33 is “preoccupied” and it fails to pass the 40% rule. Also it has a response (dreamy) that did not pass the 25% rule for other responses.

The percentage rule shows that items 27 and 31 were at the limit.

Table no. 4. Response pattern for item 27

Item 27		Frequency	Percent
Valid	cautious	8	40,0
	arrogant	6	30,0
	reassuring	6	30,0
	Total	20	100,0

The correct response for item 27 is “cautious” and it passed the 40% rule but it did not pass the 25% rule for other responses.

Table no. 5. Response pattern for item 31

Item 31		Frequency	Percent
Valid	ashamed	5	25,0
	confident	8	40,0
	funny	2	10,0
	dejected	5	25,0
	Total	20	100,0

The correct response for item 31 is “confident” and it passed the 40% rule but there are two responses at 25% as the second rule stated.

The value that we obtain for different items shows that further evaluation of the pictures/items that did not have good psychometric properties is necessary or if improvement, based on sample size, will not be obtained we have to replace the items with new ones.

This approach, of setting limit values for each picture/item can be used to elaborate a formal system for information retrieval about affective visual processing.

Results for each item depends on the richness in units of action for each face represented in the photographs and we consider there are differences that could have impact

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on subjects ability to recognize emotion from the eyes region of the face (6).

One issue is that people involved in the developmental stages of the test could express emotional states on their faces inconsistently because there are several ways of displaying a specific mental state on the face.

Another issue is represented by the way we collect responses based on specified alternatives. If subjects with impairment in inferring mental states from faces, even select the correct response from different, specified alternatives, in everyday life situation they might not be able to describe and name the correct response in case when response choices are not available.

The study provides preliminary normative data of the Reading Mind in the Eyes Test in order to identify meaningful differences between subjects in social emotion processing ability.

In the aid of this hypothesis Baron-Cohen (1,2) found that individuals with disorders from psychotic and autistic spectrum (7) were able to recognize only basic emotions (happy, sad, and angry), but had strong difficulties in recognizing complex emotional states (*scheme, admire, interest*).

This shows that in order to recognize complex emotions information from the eyes region of the face is compulsory, even if there are methodological issues with photographs as stimuli without controlling variables such as head position and tilt.

Further researches need to be done in order to evaluate whether or not individuals (normal or impaired) use dynamic instead of static (photographs) information when they are detecting mental states from other's faces.

Limitations of the study are a consequence of the fact that mental state word recognition requires a highly developed mental state lexicon that is related to verbal or performance IQ. In this study we did not measure the IQ or language development in order to perform the analysis that can discriminate between low and highly developed subjects.

CONCLUSIONS

Structure of the mental states that determine behaviour, and also how the emotional states are causally linked with other emotional and other sorts of states.

If we suppose that we have a built-in language of emotions, it must be the case that this language is innate, similar to language of thought as a way of constructing meaning for psychological internal events. Results at RMET test could be proposed as an end phenotypic measure of cognitive processing of emotion.

Results show that we recognize complex emotions with the eyes region of the face as the only cue.

The test could be used to evaluate core social difficulties in individuals with autism due to impaired theory of mind and inability to infer emotional states only from the eye region of the face as other research stated.(2)

This suggests that the eyes region of the face has enough salient features to allow complex emotion recognition. Also the feature of the eyes regions allows the inference of other people's mental states according to theory of mind rules.

Due to gender bias (female>male) in our study and according to advantages in this test for the females we have to replicate this study on a larger, unbiased sample with the items that performs best in this study.

Further studies need to be done regarding emotional lexicon because we found some issues in defining core emotion words. To develop an emotional states dictionary for

Romanian language starting from English language emotional lexicon linked to Reading Mind in the Eyes Test (3) we have to analyze and establish a link between descriptors of emotion in both languages.

We have to ask subjects to write words and sentences related to mental processes and states about emotions or related to expression of affective states. After we get the word list we have to perform a search of various linguistic resources (paper and internet based). After we identify emotional words and synonyms (synsets) will connect to different emotional synsets through semantic relations such as hypernyms for nouns and through hypernyms and troponyms for verbs.

Following these procedures we can define a lexical ontology interpreted as relations between specialised conceptual categories after elimination of semantic inconsistencies. The ontological formalism about emotional states/processes describing words provide natural language support for affective information similarity between above described lexicon.

In order to posit emotional significance differences between words assigned to each photograph from the set of 36, we set the rule that if two words are closer on emotional lexicon, the closer is their meaning.

This approach will cover both lexical and conceptual framework for Romanian language affective lexicon and can provide consistent rules to merge with emotional stimuli linked to eye's region of the face.

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