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FACIAL EXPRESSIONS RECOGNITION IN PHOTOGRAPHS, DRAWINGS, AND EMOTICONS

Results of previous studies point to the importance of different face parts for certain emotion recognition, and also show that emotions are better recognized in photographs than in caricatures of faces. Therefore, the aim of the study was to examine the accuracy of recognizing facial expression of emotions in relation to the type of emotion and the type of visual presentations. Stimuli contained facial expressions, shown as a photograph, face drawing, or as an emoticon. The task for the participant was to click on the emotion he thought was shown on the stimulus. As factors, the type of displayed emotion varied (happiness, sorrow, surprise, anger, disgust, fear), as well as the type of visual presentation (photo of a human face, a drawing of a human face and an emoticon). As the dependent variable, we used the number of accurately recognized facial expressions in all 18 situations. The results showed that there is an interaction of the type of emotion being evaluated and the type of visual presentation, $F(10; 290) = 10.55$, $p < .01$, $\eta^2 = .27$. The facial expression of fear was most accurately assessed in the drawing of the human face. Emotion of sorrow was most accurately recognized in the assessment of emoticon, and the expression of disgust was recognized worst on the emoticon. Other expressions of emotions were equally well assessed independently of the type of visual presentation. The type of visual presentation has proven to be important for recognizing some emoticons, but not for all of them.

Key words: drawing of a human face, emoticon, emotions, photo of a human face

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Introduction

Dealing with universal facial expression, Ekman (1992) have summarized 6 basic expressions, as follows: fear, anger, sadness, disgust, happiness, and surprise. Each of these emotions has its own characteristic facial expression. Emotion of happiness is recognized by the specific position of lip ends raised at the same level of each side of the face, which are parted into a smile, with wrinkles in the outer parts of eye corners. When we experience a feeling of disgust, our cheeks are pushed up, the nose is wrinkled at its root, eyebrows are lowered, and the lower lip pushes the upper one, while a specific configuration is formed on our chin. Fear is recognized by raised and brought closer eyebrows, open mouth and clenched teeth, stretched upper eyelid that reveals the white of the eye and strained lower eyelid. For the expression of anger, it is characteristic that the eyebrows are lowered and brought closer, lips are tightened or opened, gaze is fixed and firm. When our eyebrows are raised, and eyes and mouth are wide open, then, we mainly express the facial expression of surprise. When we express sadness, eyebrows are in their inner parts raised while lowered in the outer parts, eyebrows and cheeks are also slightly lowered, the lip ends are turned downwards, the lips tremble (Kostić, 2014).

Besides characteristic look of certain facial areas, perception and processing of the facial expressions of emotions, require the analysis of gaze direction as well. According to the shared signal hypothesis, a congruent combination of specific face expression and direction of the gaze increase the possibility to recognize expressed emotions. Hence, there are examples of congruence between face expression and gaze direction, emotions of joy and anger, which facial expressions are mostly combined with a direct gaze, while facial expressions of fear and sadness are mostly combined with an indirect, i.e., averted gaze (Adams & Kleck, 2005).

Besides specific facial expression and gaze direction, the position of presented stimulus, the intensity of emphasized emotion of facial expression, as well as the age of participants, affected the accuracy of emotion recognition. A study evaluated the intensity of exaggerated expression of emotions of fear and anger on the original faces and morphs by using a 5-point Likert scale type in the pilot study (Groh, 2017). Stimuli evaluated as extremely and typically intensive were introduced in the main part of the research. The results indicated that typical and extremely intensive expressions of emotions of anger, and highly intensive expressive emotion of fear, were recognized with an equal accuracy in both elderly and younger participants.

Taking into account results related to a high accuracy of emotion recognition, a question may be posed whether recognition of emotions is automatic. The analysis of the research results with affective priming suggests that the processing of facial expression of emotion is done without attention, and the information is processed unconsciously. A facial expression of emotion of happiness or fear (prime) with exposition of 200 ms and 1000 ms is shown

to the participant by using a special interocular suppression technique. Then the word (target) is presented to the participant, which may have either positive or negative valence (thus being either congruent or incongruent with the facial expressions presented). The task of the participant is to classify the word according to the valence. It is important to note that the face with emotion expression (prime) is actually not recognized during the presentation due to use of the mentioned technique. The results show that the congruent relationship between prime and target causes facilitation of reaction with regard to the incongruent relation, regardless of the length of presentation of prime (Yang & Yeh, 2019).

On the other hand, results of some studies suggest that emotion recognition is not an automatic process, and that it requires certain cognitive engagement (Mermillod et al., 2009; Todić, 2013). Namely, in the task of visual search in the sets of cartoonized faces, participants should detect whether there is a face within the set which is different from the others. There are evident differences in the participants' achievements, depending on the type of facial expression of emotion (happiness or anger), as well as depending whether the set consists of the same faces (negative sets), or one face differs from the others (positive sets). In negative sets of angry faces, the search lasts longer than it does with the sets consisting of all happy faces. However, in positive sets where the face with an expression of anger is distinctive, it is detected faster than the happy face. Even though the detection of an angry face in the group is faster and more efficient than the detection of a happy face, even with an increasing number of distractors in the set, it cannot be said that the processing of this simplified stimulus is a consequence of pop up effect (Fox et al., 2000). This finding points to the fact that the perception or some of its domains is in a way included into the process of emotion recognition.

With regard to the fact showed by some data that we can differentiate specific facial expressions for each expression of emotion, which characterize them, a question is posed: How many such elements do we really need in order to accurately identify an emotion? The research conducted by Wegrzyn and associates aimed to discover the effect which the information from various face areas had on emotion recognition accuracy (Wegrzyn et al., 2017). Stimuli were covered with white tiles, which were uncovered at random every second. The participants` task was to stop further uncovering of the stimulus as soon as they recognized the facial expression on the photo. After the response, stimulus was shown to the evaluator. A number of accurate responses (recognized emotions) was measured, as well as the number of elements revealed up to the moment of the decision.

The results show that areas around the mouth and eyes are most reliable for recognizing an emotion. These data are in accordance with some earlier studies (Adolphs et al., 2005; Lewkowicz & Hansen-Tift, 2012). When evaluating fear and anger, the information we get on the upper parts of the face is more useful (eyes, eyebrows), while the information from the lower

facial areas around lips is more important for the recognition of the emotion of happiness and disgust. The authors note that during the interpretation of the results, localization of uncovering all the tiles, as well as how many tiles had been uncovered before the participant responded, should be taken into account (Wegrzyn et al., 2017). It is also found that it is difficult to differentiate between emotions of fear and sadness, as well as emotions of fear and surprise, respectively. These findings are also in accordance with some earlier studies (Palermo & Coltheart, 2004; Pochedly et al., 2012). The researchers have observed frequency with regard to the fact that the happiness and surprise are relatively easily recognized as opposed to fear which tends to be recognized poorly (Biehl et al., 1997; Matsumoto et al., 2000; Passarell et al., 2018). According to Matsumoto et al (Matsumoto et al., 2000), disgust is also easily recognized, whilst besides fear, sadness is also poorly recognized, according to his findings.

By using cartoon faces and photographs, researchers have tried to investigate whether reaction time and recognition accuracy of emotions depend on the type of stimuli (a real face in relation to the cartoon face), and valence of emotions (happiness in relation to anger). Data have shown that the reaction time for happy facial expressions is shorter than for angry facial expressions. Also, cartoon faces are processed faster than the real ones in the first phase of processing (recognition of expression). Yet, in later phases of face recognition (detection of sex, age, race, and recognition of expression), the attention is more engaged in processing of real faces. Results lead to the conclusion that there are differences in the way of processing between real faces and cartoon faces (Zhao et al., 2019).

Todić has conducted an experiment (2013) with the aim to find out whether recognition accuracy of different emotions (happiness, sadness, fear, surprise, disgust, and anger) is affected by the type of stimulus (whether the task is to recognize emotion on a human face or on emoticon), and the context in which the stimulus is presented (congruent or incongruent one). Congruent context comprises a certain presentation of facial expression followed by a notion that refers to the emotion presented (if the emotion of happiness is presented in the photograph, happiness is written underneath the photograph). On the other side, incongruent context comprises a presented facial expression with a notion that does not represent the particular emotion (if the emotion of sadness is presented in the photograph, disgust is written underneath the photograph). Results of the research have shown that there is an effect of interaction of the factors examined. The participants have most accurately recognized emotions presented on the real faces in congruent context, than on an emoticon in both contexts, and finally, on real faces in incongruent context.

Taking into account the data which indicate that the recognition of emotion is an automatic process (Yang & Yeh, 2018), that the importance of certain facial areas in recognition of certain emotions is emphasized (Wegrzyn et al., 2017), that recognition of emotions is processed faster on the stimuli such as

cartoon faces with regard to the photograph (Zhao et al., 2019), and research which indicates that some emotions in a incongruent context are better evaluated with emoticon presentation than with the human facial expressions (Todić, 2013), we have been interested whether and to what extent the complexity of stimulus (face) affects emotion recognition, as well as whether such influence is the same for all basic emotions. That is why it would be interesting to vary degree of expression of typical facial areas during expression of 6 basic emotions with the types of visual stimuli (a photograph of a human face, drawing of a human face and an emoticon).

The basic issue of this paper refers to the investigation of the effect of varying the number of evaluation elements and emphasized characteristics (type of visual presentation) and emotion recognition accuracy. Therefore, as opposed to researches where cartoon faces are used as stimulus per se (Zhao et al., 2019), it may be used as stimulus with reduced number of information available for emotion recognition. According to the findings by Todić (2013), further reduction of the number of emphasized characteristics important for emotion recognition can be achieved in emoticons. Accordingly, we are interested whether there are differences in the recognition accuracy of facial expression of emotions in case if they are evaluated by perceiving photographs of a human face (ecologically valid stimulus), drawings of those faces (stimulus with some emphasized parts), or by emoticons (stimulus with less emphasized parts than drawings). With the change of face presentation type, not only that the number of available information decreases, but their mutual interactions change as well. Based on that, the importance of visual complexity of the face stimuli for emotion recognition can be detected. However, complexity does not have to show linear relation to recognition accuracy, since greater number of information might lower the accuracy due to non-congruent interactions of some facial characteristics during certain emotion recognition.

The aim of our research was to examine recognition accuracy of facial expressions of emotions with regard to the type of emotion (happiness, sadness, surprise, anger, disgust, fear) and the type of visual presentations (a photograph of a human face, drawing of a human face, and an emoticon). Another aim was to determine a potential degree of discrimination of the facial expressions in relation to each other, i.e., to determine whether there is some other emotion for each of the emotions, with which the facial expression is replaced mostly, or if it is replaced with all other emotions equally.

Method

Sample

The research was conducted at the Faculty of Philosophy in Kosovska Mitrovica. The sample consisted of the first-year and the second-year students of psychology, 30 of them altogether (both sexes balanced), aged 19 to 25.

Stimuli

Stimuli material consisted of 72 stimuli in total: 24 photos that show emotions on human faces (4 photographs per each of 6 emotions), 24 drawing presentations of emotions on a human face (4 drawings per each of 6 emotions), and 24 emoticons (4 per each emotion). Photographs (Japanese and Caucasian Facial Expressions of Emotion (JACFEE) by Matsumoto & Ekman, 1988) were coded by Ekmann and Friesen (Ekmann & Friesen, 1975) with help of the Facial Action Coding System (FACS) in order to provide validity of expressions, that is, the ability of photographed individuals to express given emotion and provide possibility of comparing emotions intensity. Drawings of human faces were created by converting the photographs into drawings with the help of application "Prisma (effect: curly hair)". Emoticons were taken from the internet applications for communication, and we used only those emoticons in the research that were adequately associated with the emotion they represent in the pilot study (Figure 1).

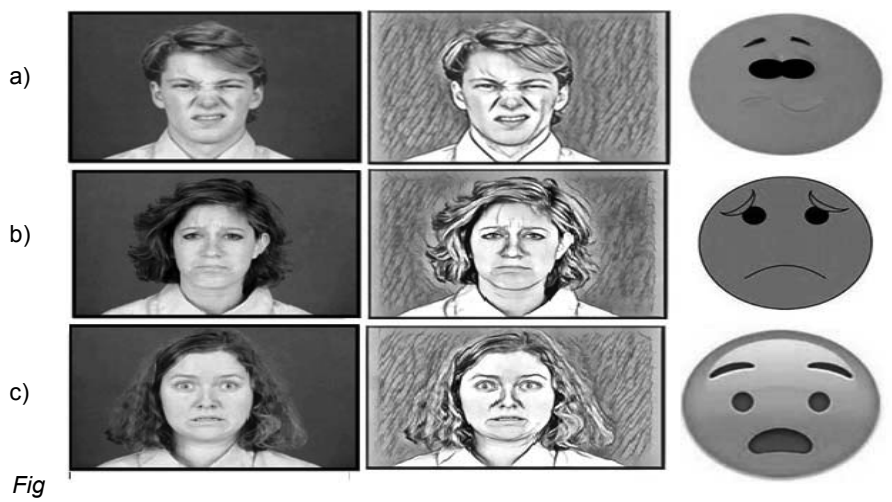

Figure 1. Presentation of different emotional expressions with regard to the type of visual presentation: a) disgust; b) sadness; c) fear

Procedure

To determine the appropriate smiles for each emotion, we conducted a pilot study. We found 10 smiles for each emotion on the Internet, and the task of the respondents was to categorize smiles according to the emotion they represented. For the final research, we singled out 4 smiles (for each individual emotion), which were correctly categorized by the largest percentage of respondents, as representing a given emotion.

The experiment was created in the OpenSesame software. Stimuli presentation to participants was randomized. The exposition of stimulus lasted 1000 ms, after which the participant was presented a set of given answers (a list of terms for each of 6 emotions), and the task of the participant was to press the key of emotion s/he thought was presented on the stimulus. At the end, the number of correct answers for each emotion was calculated on all three types of presentation separately (0 was minimum, 4 was maximum).

The type of emotion presented (six basic emotions: happiness, sadness, surprise, anger, disgust, fear) and the type of visual presentation (a photograph of a human face, drawing of a human face and an emoticon) varied as factors. The number of accurate responses, i.e., the number of accurately recognized facial expressions of the emotions presented was measured as a dependent variable. This measure was determined separately for each of the six emotions and for each way of presenting facial expressions, respectively.

Additionally, we also counted how many times the participants marked a particular emotion instead of another one. For example, how many times they marked the emotion of sadness, surprise, disgust, anger or fear instead of the emotion of happiness. This score was determined separately for each emotion and for each type of visual presentation, respectively.

Results

As the main aim of the research was to examine the accuracy of facial expression recognition with regard to the type of emotion and the complexity of visual presentation, we used the analysis of variance with two repeated factors for data processing. The obtained results showed that there was an interaction between the type of emotion and the type of visual presentation of emotion which were evaluated, $F(10; 290) = 10.55$, $p < .01$, $\eta 2 = .27$. The Sidak post hoc test (Figure 2) showed that the facial expression of fear was the most accurately evaluated on the drawing of a human face, and that evaluation did not differ when evaluating the photograph of a human face and an emoticon. The emotion of sadness was the most accurately evaluated on an emoticon, whilst the evaluation of this emotion did not differ during the evaluation of the photograph of a human face or a drawing either. An expression of disgust was the worst recognized on an emoticon, but it was better recognized when observing

photographs or drawings of a human face. The other expressions of emotions (happiness, anger and surprise) were equally well evaluated regardless of the type of visual presentation.

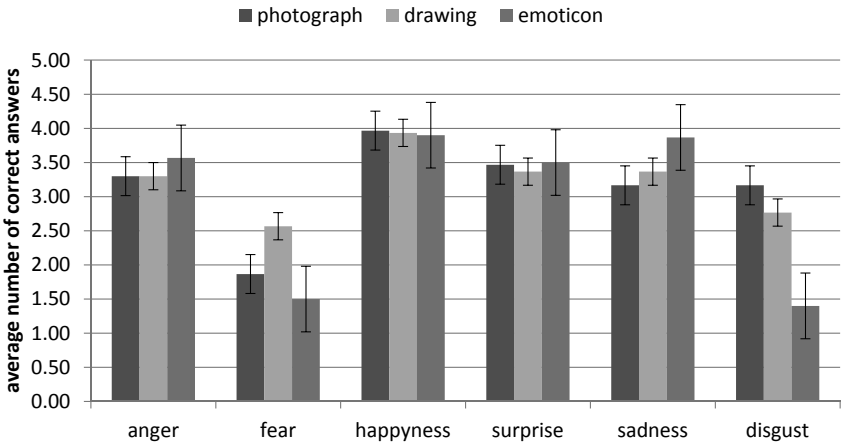

Figure 2. Recognition accuracy of six emotions types on three types of visual presentation

In order to clarify the nature of differences obtained during the evaluation of emotions, we conducted an additional analysis on errors made by the participants, more precisely on so called false alarms (false detection of one emotion on the representation of the other emotion). Namely, we were interested to know what kind of errors participants made, and also whether the participants equally replaced facial expression of certain emotion with any other emotion independently on the stimulation complexity. We conducted two factor analysis of variance with repeated measures with type of emotion as one factor, including 5 levels (all the other emotions apart from the one that was evaluated), and the type of visual presentation with three levels (a photograph of a human face, drawing of a human face, and an emoticon). The range of values on the graphs went from 0 (not even once replaced with that emotion) to 4 (always replaced with this emotion, that is with all 4 stimuli which represent a given emotion, on the given type of visual presentation). The obtained results have been shown for each emotion separately.

Errors Made when Detecting the Emotion of Happiness

The results showed that the emotion of happiness was equally replaced with all the other emotions, $F(4; 116) = 0.46$, $p > .05$, regardless of the type of visual presentation, $F(2; 58) = 0.79$, $p > .05$. Also, an interaction of these factors was not statistically significant, $F(8; 232) = 1.25$, $p > .05$. Number of false alarm

errors, detections of other emotions on the representation of happiness, was very low.

Errors Made when Detecting the Emotion of Sadness

The results showed presence of the effect of the type of visual presentation, $F(2; 58) = 5.77$, $p < .01$, $\eta 2 = .17$, and the type of emotions, $F(4; 116) = 3.26$, $p < 0{,}01$, $\eta 2 = .10$, but there was not an interaction of the factors, $F(8; 232) = 1.89$, $p > .05$. Sidak post hoc test showed that there were no differences between individual kinds of emotions, which were opposed to the presence of the main effect, and were probably a consequence of a small effect size. Differences in terms of the type of presentation showed that sadness was more frequently replaced with surprise and disgust on the photographs than on the other two types of presentation. If we combine these findings, we can conclude that the sadness is more frequently replaced with surprise and disgust, but only on the photographs of human faces. Such conclusion still points to the presence of an interaction between the kinds of emotions and the type of presentation, although omnibus test has not reached the level of significance (Figure 3).

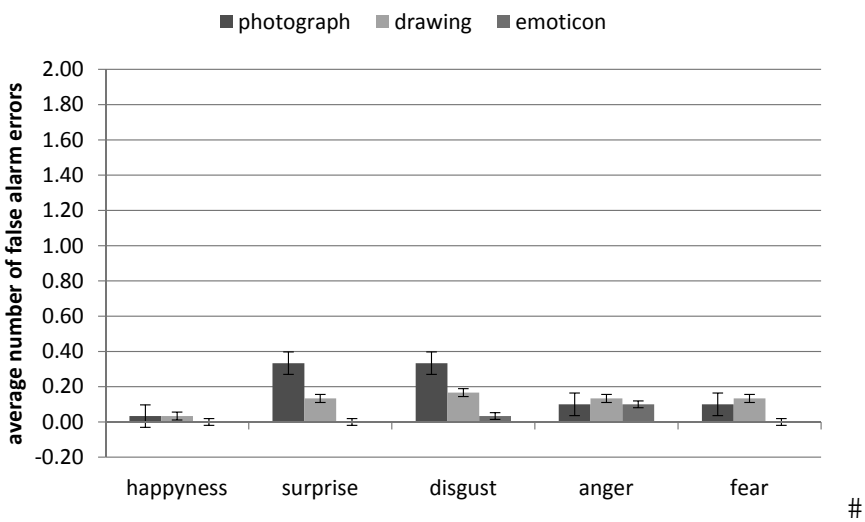

Figure 3. False recognition of other emotions on expression of sadness with regard to the type of visual presentation

Errors Made during Detecting the Emotion of Surprise

The results showed that there was an interaction between the type of visual presentation and the type of emotion, $F(8; 232) = 2.00$, $p < .05$, $\eta 2 = .06$, during evaluation of this emotion. The results of Sidak post hoc tests showed

that on the emoticon, surprise was equally replaced with all the other emotions, while on the drawing and photograph of a human face, it was more frequently replaced with fear than with other emotions.

Errors Made during Detecting the Emotion of Disgust

Results showed that there was an effect of interaction between the type of visual presentation and the type of emotion, $F(8; 232) = 13.39$, $p < .01$, $\eta 2 = .32$. Sidak post hoc tests (Figure 8) showed that during the evaluation of photographs and drawings of a human face, participants most often replaced the emotion of disgust with the emotion of anger, and less rarely with other emotions. As opposed to it, on an emoticon, participants more frequently replaced the emotion of disgust with sadness, surprise and fear, and less with happiness and anger.

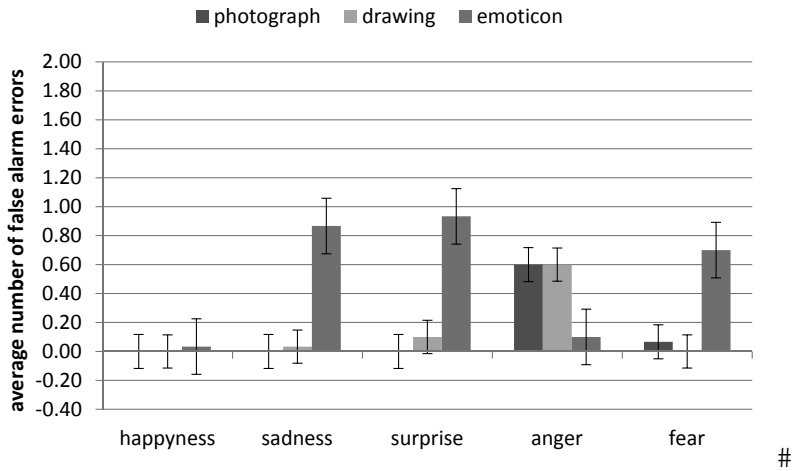

Figure 4. False recognition of other emotions on expression of disgust with regard to the type of visual presentation

Errors Made during Detecting the Emotion of Anger

The results showed a significant effect of the type of emotion, $F(4; 116) = 7.12$, $p < .01$, $\eta 2 = .20$, which was evaluated. However, it showed neither the type of visual presentation, $F(2; 58) = 1.51$, $p > .05$, nor the interaction between two factors, $F(8; 232) = 0.39$, $p > .05$. Although Sidak`s tests did not detect any significant differences, the main effect showed that some differences probably exist. Thus it could be partly concluded that anger was somewhat more frequently replaced with disgust than with other emotions, in all types of presentations.

Errors Made during Detecting the Emotion of Fear

Results showed that there was an interaction between the type of visual presentation and the type of emotion, $F(8; 232) = 5.20$, $p < .01$, $\eta 2 = .15$. Differences were such that the participants replaced the emotion of fear with happiness and anger more rarely than with other emotions (Figure 9). On a drawing of a human face, participants most frequently replaced the emotion of fear with surprise, and very rarely with happiness and anger. During the evaluation of the photograph, fear was most frequently replaced with the emotion of surprise, and rarely with other emotions.

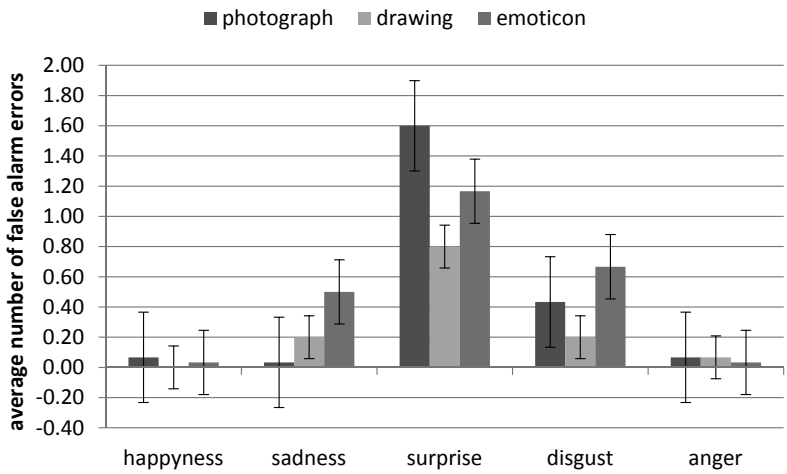

Figure 5. False recognition of other emotions on expression of fear with regard to the type of visual presentation

Discussion

The basic idea of this paper was to examine the recognition accuracy of facial expressions with regard to the type of emotion to be recognized and the type of visual presentation. The specificity of these visual presentations was the quantity of pieces of information offered when identification of primary emotions was in question. Namely, the expression of emotions on the photograph of a human face was a complex presentation as it unified all the characteristics of nonverbal facial expressions of certain emotions. This type of stimulus was important from the ecological point of view as it presented the type of stimulus which the participant was best acquainted with. Drawings presented the version of presentation which had more striking contours of all elements of the face (eyes, mouth, eyebrows, nose and cheeks), but also gaze direction, due to contouring the surround parts of the eyes. We could not say

whether this stimulation was more complex than the photograph or not. The reason for this was due to the fact that contouring of characteristic parts of the face emphasized noticeable parts, which could lead to easier recognition of facial expression. Yet, transformation of the photograph to the drawing level was a sort of simplification, , since one part of information from the photograph was lost (e.g., skin texture, fine lines, micro grimaces). A significant reduction of the number of face elements was presented on emoticons, where presentation of emotions was reduced to only a couple of elements (face contours with a line which marked the mouth, circles for marking the eyes). We were interested to find out whether recognition accuracy of emotions decreased with simplification of the visual presentation of that stimulation, i.e., whether we would better recognize emotions if they were presented to us on the drawings of a human face, somewhat poorer if we observed the photograph, and the poorest if it was presented to us as an emoticon.

Results proved that there was an interaction between the type of emotion and the type of visual presentation. Also, research findings showed that the facial expression of fear was most accurately evaluated on the drawing of a human face, the expression of sadness on the emoticon, and the emotion of disgust on the photograph and drawing of a human face. The other expressions of emotions, such as happiness, anger, and surprise were equally well evaluated regardless of the type of visual presentation.

Emotions of happiness, anger, and surprise were accurately recognized regardless of the type of visual presentation that was stimulus complexity. Such finding indicated that these emotions had some specific, clearly noticeable facial expression characteristics, which did not vary much from the presentation type. For example, the expression of happiness contained characteristically bent upward lips, which was strongly noticeable and clear in all the variations of the presented types of stimuli (a photograph of a human face, drawing of a human face and an emoticon). For anger, the reason perhaps laid in the specific position of the eyebrows in anger, they were lowered and brought closer which revealed a characteristic angry look even in the emoticons. In the emotion of surprise there was a characteristic form of lips which were in the form of a letter “o”, which might have been of a help during the evaluation of this emotion on more complex stimuli, as well as on simpler stimuli.

On the other hand, the emotion of sadness was most accurately recognized only on emoticon, although it also contained characteristically lowered lips. The reason for lower accuracy of sadness in the photograph and drawing might be in the fact that this characteristic (lowered lips) interacted with other information. The presence of bent lips on the emoticon with the absence of any other pieces of information, which could affect the decision, gave contribution to the fact that this emotion was the most accurately recognized on this type of stimulus. Error analysis showed that this emotion was mostly replaced with the emotion of surprise and the emotion of disgust, and these errors became more frequent when evaluating photographs of a human face. As for the emo-

tion of disgust, information from the lower parts of the face was more important (Wegrzyn et al., 2017), and the emotion of surprise was well recognized in all variations of visual presentations, perhaps the presence of more pieces of information in the region of lips (wrinkles around lips, nose position, and so on) made recognition of the presented emotion more difficult.

As opposed to the emotion of sadness, the emotion of disgust was better recognized on the photograph and drawing of a human face than on the emoticon. On the photographs and drawings, this emotion was replaced with the emotion of anger, while on the emoticon, this emotion was most frequently replaced with emotions of sadness, surprise, and fear. If we take into account the results which indicated that the lower part of the face was more important for the evaluation of the emotion of disgust (Wegrzyn et al., 2017), as well as that the expression of the emotion of disgust required an engagement of the musculature of cheeks as well (Ekman & Friesen, 1975), then disgust was expectedly better recognized on the photograph and drawing because of the specific position of the muscles, which were not possible to faithfully replicate on the emoticon. The reason why this emotion was replaced with the emotion of anger was perhaps the area of the face based on which participants made their decisions. Namely, the emotion of disgust was characterized by lowered eyes, while for the emotion of anger eyebrows were lowered, hence, this could have led participants to inaccurate evaluation. As far as the errors occurring while evaluating emoticon was concerned, the reason again might be the simplicity of stimulation. For the emotions of sadness, surprise, and fear, the pieces of information on the position of eyebrows, cheeks, and lips were very important, and the simplicity of stimulation of an emoticon probably made bringing an accurate decision more difficult.

Results showed that the facial expression of fear was most accurately evaluated on the drawing of a human face, while its recognition did not differ from the photograph of a human face, and the emoticon during their evaluation. Error analysis showed that the participants more frequently replaced the emotion of fear with the emotion of surprise, especially when presented on a photograph and on a drawing of a human face. On an emoticon, fear was equally replaced with surprise, sadness, and disgust. For the recognition of the emotion of fear, the upper part of the face was characteristic (Wegrzyn et al., 2017), and was more prominent on the drawing than on the photograph (the drawing had sharper lines), while on the emoticon it was presented with a couple of lines which represented slanted eyebrows, eyes were drawn simply, and therefore the recognition was more difficult. On the emoticon, the emotion of fear was mixed with the emotion of sadness (but not on the photograph), and the reason might be in the position of lips which were bent down in both presentations, while emoticon alone did not offer enough specific pieces of information, which would be more relevant for the emotion of fear (forehead lines, tense lips), which made differentiation of these emotions more difficult. Replacement of the emotion of fear with the emotion of disgust on an emoticon

(with regard to the drawing) could be also explained by the simplicity of the stimulation, especially, if taken into account that the participants during evaluation of the emotion of disgust on the emoticon, replaced this emotion with fear. During evaluation of the photograph, the emotion of fear was replaced with the emotion of surprise, which was in accordance with the earlier findings (Palermo & Coltheart, 2004; Pochedly et al., 2012, Wegrzyn et al., 2017). This error was less present when the drawing of a human face was concerned, which might be due to the exaggeration of certain parts of the face important for the recognition of fear in the drawing (sharp features, more visibly drawn forehead lines).

Conclusion

Recognition of facial expressions may depend on the very complexity of the stimulus, that is, on the quantity of information which is at the expense during the evaluation. Researchers often note that happiness and surprise are relatively easily recognized, which is confirmed by our research as well. Differentiation of fear (Biehl et al., 1997; Matsumoto et al., 2000; Passarell et al., 2018), disgust, and sadness, in relation to the other emotions, is shown as somewhat poor, both in our study, and also in some other studies (Mermillod et al., 2009; Wegrzyn et al., 2017).

Based on all presented information, it can be concluded that the type of visual presentation of stimulus may be essential for recognition of some emotions, but not for all of them. The emotion of sadness is more accurately recognized on the basis of a minimum number of information from the face (emoticon), while some other emotions require the integration of more pieces of information (fear, disgust). It is shown that fear is the emotion which is badly recognized on the stimuli which are ecologically valid, i.e., on the photographs of a human face. However, recognition accuracy of fear is the highest on the drawings of human faces. Hence, exaggeration of the contours of all the facial elements gives contribution to the evaluation accuracy. In this way, the number of irrelevant pieces of information on the face is reduced, so that the emotion expression could become noticeable. Also, we can carefully say that drawings, or middle range stimuli by complexity, facilitate recognition of fear.

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PREPOZNAVANJE FACIJALNIH EKSPRESIJA NA FOTOGRAFIJAMA, CRTEŽIMA I EMOTIKONIMA

Istraživanja ukazuju na različitu važnost delova lica u prepoznavanju različitih emocija. Pored toga, pokazano je da se neke emocije bolje prepoznaju na fotografijama nego na karikaturama lica, odnosno da se tačnost prepoznavanja smanjuje sa opadanjem broja dostupnih informacija. Polazeći od toga, postavili smo pitanje da li postoje razlike u tačnosti prepoznavanja facijalnih ekspresija emocija u slučaju da se one procenjuju preko fotografija ljudskog lica (ekološki validan stimulus), crteža tih lica (stimulus sa nekim naglašenim delovima) ili emotikona (podsticaj sa manje naglašenim delovima od crteža). Cilj istraživanja je bio da se ispita tačnost prepoznavanja emocija na licu u odnosu na vrstu emocije i tip vizuelne prezentacije. Uzorak u istraživanju su činili studenti prve i druge godine psihologije na Filozofskom fakultetu u Kosovskoj Mitrovici, ukupno njih 30 (ujednačenih po polu), starosti od 19 do 25 godina. Stimulusni materijal su činili izrazi emocija koji su bili prikazani na fotografijama, crtežima lica i emotikonima. Zadatak ispitanika je bio da osmotre stimulus i pošto se na ekranu pojave ponuđeni odgovori (popis 6 bazičnih emocija) klikom na taster odaberu emociju za koju misle da je prikazana na stimulusu. Kao faktore smo varirali vrstu prikazane emocije (sreća, tuga, iznenađenje, bes, gađenje, strah) i tip vizuelne prezentacije (fotografija ljudskog lica, crtež ljudskog lica i emotikon). Kao zavisnu varijablu koristili smo broj tačno prepoznatih izraza lica u svih 18 situacija. Rezultati su pokazali da postoji interakcija vrste osećanja koja se procenjuje i tipa vizuelne prezentacije, $F(10; 290) = 10{,}55$, $p < .01$, $\eta 2 = .27$. Naknadne analize ukazuju da nema razlika u prepoznavanju emocija sreće, ljutnje i iznenađenja u zavisnosti od složenosti prikaza, dok razlike postoje kod emocija tuge, straha i gađenja. Međutim, razlike nisu uvek u istom smeru, pošto kod tuge složenost prikaza ometa tačnost prepoznavanja i ona se najtačnije prepoznaje na emotikonu. Emocija straha se najtačnije prepoznaje na nešto složenijem prikazu (crtežu lica), a najlošije na ekološki najvalidnijem prikazu (fotografija). Najveća tačnost u prepoznavanju gađenja je na fotografiji lica kao najsloženijem prikazu. Možemo da zaključimo da količina

prikazanih informacija na licu nije bitna za prepoznavanje nekih emocija (sreća, ljutnja i iznenađenje), bilo da se podjednako dobro ili loše prepoznaju na sva tri tipa prezentacije. Kod ostalih bazičnih emocija povećanje količine informacija na licu može da ometa prepoznavanje (tuga), da ga poboljša do nekog nivoa a da ga daljim povećanjem ometa (strah), ili da poboljšava prepoznavanje (gađenje).

Ključne reči: crtež ljudskog lica, emotikon, facijalna ekspresija emocija, fotografija ljudskog lica