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**Facial Attractiveness and Face Perception among Pre- Adolescents
With High-Functioning ASD Comparing to Typically Development**

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Abstract

Background. Among individuals with typical development the face processing and face perception is a product of a developing process from featural processing in childhood till holistic processing of the face in adulthood. More so, judgement of face attractiveness is also based on holistic processes (Abbas & Duchaine, 2008; Wilson, Pascalis, & Blades, 2006). In contrast, face processing among individuals with high-functioning ASD is performed in an abnormal fashion based on featural processing (Morin et al., 2015; Wilson et al., 2006). One of the explanations for their difficulty in this field is the fact that they are characterized with Weak Central Coherence (WCC) expressed by difficulty in viewing holistically (“the big picture”) and in processing meaningful and central information (Happé & Frith, 2006). Moreover, there is uncertainty in regard to focal face areas among ASD individuals. On the one hand there is a strong tendency to focus on the area of the mouth, and on the other hand there is a strong tendency to focus on the area of the eyes (Dalton et al., 2005; Klin et al., 2002; Joseph & Tanaka 2003; Rutherford et al., 2007; Wilson et al., 2012; Yi et al., 2014).

The purposes of the research. The main purpose of the research is to examine whether face processing style - holistic vs– featural impacts the rating of attractiveness set by pre-adolescent with high-functioning ASD compared with their parallels with typical development. In addition, this research sheds light of the dispute regarding the focus of individuals with ASD – focus on the mouth region as opposed to focus on the eyes region (Falck-Ytter, Fernell, Gillberg, & Von Hofsten, 2010; Klin, Jones, Schulz, Volkmar, & Cohen, 2002), and following that to add a course to better understanding of this population and the way they view the world.

For that purpose, several pictures of faces of women rated as “average” were chosen and set as base reference pictures. For each base reference picture one feature was replaced at a single time

(eyes, nose or mouth) which varies in its level of attractiveness (very attractive, average and very unattractive). Therefore, for each average face picture other pictures were created with very attractive eyes, very attractive nose or very attractive mouth. In the same way other face features were attached on both average and not attractive on top of the base reference pictures. Thus, four types of pictures were provided: Original average pictures, picture with one “very attractive” face feature, picture with one “average” face feature and picture with one “very unattractive” face feature. These pictures were shown to the participants of the research and they were asked to rate their level of attractiveness.

Hypotheses. Two first research hypotheses stem from the assumption that the two research groups differ by the face processing style they based on – featural processing style which characterizes participants with ASD (e.g., Morin et al., 2015) and holistic processing style which characterizes participants with typical development (e.g., Bank et al., 2015). Hence, it was expected that differences in overall face attractiveness ratings would be found between groups. More specifically, ratings of pre-adolescent with ASD would rate face pictures with one “very attractive” organ higher than the rating of pre-adolescent with typical development. Accordingly, ratings of pre-adolescent with ASD would rate face pictures with one “very unattractive” feature lower than the rating of pre-adolescent with typical development. In addition, based on the dispute between preferred focal areas among individuals on the autistic spectrum (Joseph & Tanka, 2003; Rutherford, Clements, & Sekuler, 2007) and based on the fact that eyes are very significant for measuring attractiveness among individuals with typical development (Saegusa & Watanbe, 2016), it was assumed that among individuals with typical development, replacement of the eyes to very attractive eyes would lead to much higher face attractiveness rates compared to rates of pictures in which very attractive mouth or nose were replaced. And the opposite, replacement of the eyes with very unattractive eyes would lead to face rating lower than those of

pictures in which a very unattractive mouth or nose were replaced. Regarding pre-adolescent with ASD it was assumed that in case they focus on the area of the eyes there would not be any differences between them and participants with typical development. However, if they focus on the area of the mouth differences between the groups would be found.

Method. In this research 50 pre-adolescent boys participated, 11-12 years old studying in regular schools in Israel (regular classrooms and ASD classrooms). The control group is composed of 25 pre-adolescent boys with typical development and the experimental group is composed of 25 pre-adolescent boys with High-Functional ASD diagnosed by an authorized organization with customary standards of DSM-V (American Psychological Association [APA], 2013). After receiving permission of the parents to allow their children to participate in the research following an explanation about the research, every participant completed several tasks. The time to complete the tasks was between 45 minutes till 1.5 hours based on the needs of every participant. The execution of the tasks was conducted in a fixed order as follows: First, fill up a short questionnaire for background getting to know the participant. Second, execute an intelligence task (Raven et al., 1977) and vocabulary task and the naming ability of Kavé (Kavé, 2005). Finally, a computerized experiment to rate face attractiveness. In parallel, all the parents of the participants filled up a background questionnaire and the parents of the experimental group filled an SCQ questionnaire (Corsello et al., 2007).

Results. The first research hypothesis was confirmed and found that pre-adolescent with high-functioning ASD rated face pictures with “very attractive” feature higher than pre-adolescent with typical development. Hence the dominant processing characteristic for them is the featural process characteristic. Actually, the featural process places in the center the attractive face feature and throws away the attractiveness rating of the overall face. The second research hypothesis was refuted and opposed to what was expected when very unattractive nose and mouth were replaced

and no differences were detected between groups and they rated the attractiveness in similar fashion. Moreover, when the eyes were replaced by very unattractive eyes, the pre-adolescent with ASD rated the faces significantly much higher than pre-adolescent with typical development. One possible explanation is rooted in the fact that individuals with ASD tend to avoid looking directly in the areas of the eyes (Tanaka & Sung, 2013; Wang et al., 2019). Furthermore, as the rate of attractiveness grows, they have higher motivation to look and distinguish the face (Ewing et al., 2013). Hence, most probably when the eyes were changed to very attractive, they had higher motivation to distinguish them, and when the eyes were replaced by very unattractive eyes, they had a much lower motivation to do so. Therefore, they preferred to avoid them and probably focused on the lower part of the face, the area of the mouth and the nose on which they based the attractiveness of the face higher.

In an attempt to better understand the patterns of focus with a face among the research participants while ascertaining the level of attractiveness of the overall face, the third and fourth research hypotheses deal in the significance and importance of the type of face organ and its level of attractiveness. Findings of the research show that pre-adolescent with typical development do not focus on a specific face feature. For them it does not matter what feature was replaced. They rate the overall face based on its level of attractiveness. On the other hand, among participants with ASD it can be seen that the type of feature placed is significant while rating the overall attractiveness of a face. When features were replaced with unattractive features there was a significant tendency to focus on the lower part of the face, and when features were replaced by attractive features, there was significantly less importance to the nose in rating attractiveness, whereas mouth and eyes led to a very high rating in overall face attractiveness.

Conclusions. There is a very high importance to the face attractiveness among pre-adolescents with ASD. Even though there is a variety in the dominance of the face processing characteristics among participants in the research – featural process vs holistic process, this research shows that

for pre-adolescents with ASD, as like pre-adolescents with typical development, there is an ability to judge the overall attractiveness of a face accordingly when only one feature was replaced in the face. Moreover, as we analyze the preferred face focus areas of participants of ASD, it is apparent that attractive face, in which a feature was replaced to a “very attractive” feature, increases their motivation to look at the picture and increases the core areas of focus within the face. Thus, the area is not restricted mainly to the eyes or mainly to the mouth, as described in research literature till now, but both are equally important for rating the attractiveness. Finally, following the current research it can be seen clearly that pre-adolescents with ASD manage to distinguish between attractive faces and unattractive faces. Thus, they set a higher rate for faces with a “very attractive” feature compared to an unattractive face. Following that, it is noticeable that they have the ability to be sensitive to attractiveness or to lack of attractiveness and to identify it. As opposed to previous researches that represent a degrading approach to the abilities of this population and emphasize the variance and the low sensitivity to attractiveness (for example, Roy et al., 2016). The fact that they are sensitive to face attractiveness points to their ability to cope with social stimulations such as face, and this can promote them in understanding the social world around them in a better way. Following this, the knowledge in hand can be used to build involvement programs that take into consideration their high sensitivity to beauty and esthetics of the face. Pictures with attractive characters can be used to learn a specific social subject and in doing so increase the motivation to study it.