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Analyzing the connection between various levels of inclusion and the recognition of faces and houses among children with autism, compared to typically developing children

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Abstract

Autism (ASD - Autism Spectrum Disorder) is a pervasive developmental disorder on a broad scale and has a neurobiological basis which appears in early childhood (Lauritsen, 2013). This disorder is characterized by significant deficiencies in social interactions, significant deficiencies in communication, and stereotypical behaviors (APA, 2000).

Face recognition is regarded as one of the most important human skills. Faces are visual stimuli that share a similar structure. They aggregate the same components (eyes, nose, and mouth) in the same basic structure (the location of the nose is under the eyes and above the mouth). Faces are used as the main component in human recognition (Maurer, Le Grand, & Mondloch, 2002). Until adulthood, children with normal development acquire the ability to code and identify a huge number of faces. This ability stems from the structure of the brain and from face recognition mechanisms (Rhodes & Anastasi, 2012).

Face recognition skills are especially important in social processes because it allows for quick recognition and thus also provides for the right social response in social frameworks. It is claimed that children diagnosed with autism, which characterized by severe social deficiencies, would find more difficulty in face recognition than typical children (Dawson, Webb, Wijsman, Schellenberg, Estes & Munson, 2005).

Face recognition among autistic participants has gained a wide range of research in recent decades. Most of the research investigated the face recognition process among children or adults with high functional level of autism (cf. Lahaie, Mottron, Arguin, Berthiaume, Jemel, & Saumier 2006; Joseph & Tanaka, 2003). It is reasonable to assume that among autistic children, the higher their function level, the higher will be

their level of inclusion in typical education frameworks, which means that they will have a higher level of exposure to face stimuli.

The purpose of this research is to analyze for the first time the connection between the face recognition process and the level of inclusion among children with autism in comparison with children of normal development. Moreover, a comparison was conducted between the processes of face recognition and house recognition in order to ascertain whether the dysfunction in recognition is specifically that of face recognition or part of a more general dysfunction of other visual stimuli.

The research hypotheses suggest that because faces are processed in a holistic manner, and thus an inversion of a face would interfere with this process and not with featural processing, therefore among children with typical development the gap between an upright frontal face and an inverted face with a configural change would be greater than the gap with featural change. On the other hand, in house processing using featural processing, there will be no gap between upright houses and inverted houses, either with configural or featural changes.

Moreover, since children with autism find it difficult to process faces in a holistic manner, the higher the level of inclusion of children with autism, the bigger is the gap between the recognition of upright faces and inverted faces with configural changes in comparison to the gap in their featural changes. In contrast to this, there would not be a gap between the recognition of upright houses and the recognition of inverted houses with configural changes and featural changes at all levels of inclusion.

Another hypothesis suggests that since the level of inclusion is expected to be more significant effect on face processing as compared to the level of function, controlling on the variable of the level of function will not change the effect of the level of inclusion on face processing. In addition, we will analyze whether there is any

correlation between the level of function of children diagnosed with autism and their ability to recognize faces and houses.

In order to analyze the hypothesis of the research, a face stimuli test and a non-human stimuli test, i.e. houses, were constructed. The tests were transferred to a sample of 40 children with autism: 15 children studying in special education kindergartens with inclusion (with typical development children) between two to five hours on a weekly basis, 13 children studying in special education kindergartens with inclusion between 10 to 15 hours on a weekly basis (up to the maximum level of inclusion) and 12 children in full one-on-one inclusion within a typical kindergarten. In addition, the sample included a control group of 15 children with typical development. All children in the sample were all of five to seven years of age. Alongside the face recognition tasks, a demographic questionnaire was passed on. Furthermore, in order to rule out autism in the control group, the parents of the children with typical development filled in a Childhood Autism Spectrum Test (CAST). The groups of children diagnosed with autism were given a Raven's progressive matrices test (Raven's Progressive Matrices, 1977) in the same session after the face and house tests were taken. In addition, the kindergarten teachers of these children participated in the Vineland III developmental functional interview (Vineland Adaptive Behavior Scales, Third edition).

From the results of the research it was found that for children with typical development, the gap between the recognition of upright and inverted houses was similar to the configural and featural changes. However, in contradiction to what had been hypothesis, the gap between the recognition of upright faces and the recognition of inverted faces with configural or featural changes was similar to the gap in the recognition of the houses. Moreover, it was found that upright stimuli were not more accurately identified than inverted stimuli, and also that the degree of accuracy in the

recognition of faces was similar to the degree of accuracy in the recognition of houses, but the featural change was more accurately identified than the configural change.

As a general rule, for children diagnosed with autism the degree of accuracy in featural changes was significantly higher than the degree of accuracy in inverted stimuli. In addition, the degree of accuracy in the recognition of houses was clearly higher than the degree of accuracy in the recognition of faces. Nevertheless, in a comparison between the groups at the different levels of inclusion, it was found that among the inclusion groups of two to five weekly hours, and also those of 10-15 weekly hours, the level of accuracy in the recognition of houses was significantly higher than the recognition of faces. By contrast, in the group of full inclusion, faces were identified with a higher degree of accuracy than houses, although not significantly.

In contradiction to what had been hypothesis, no significant difference was found in the degree of accuracy for the recognition of upright, frontal faces as compared with inverted faces, or in configural changes as compared with featural changes in the various inclusion groups. On the other hand, with regard to houses, the hypothesis was validated, and indeed no difference was found between the gap in the recognition of upright and inverted houses in both types of changes (in featural or configural) at the various levels in the inclusion groups.

From the research results it may be assumed that the process of face recognition among children between the ages of five to seven is mainly featural, and that they are at the transitional stage between featural recognition and the ability for a holistic processing of faces, an ability that gradually develops with increasing age. Similarly, among children diagnosed with autism, it was found that they do not use the process of holistic recognition for faces at any level of inclusion, as well as for other objects such as houses. It may be that they are in need of further exposure and experience in order

to develop the same ability for holistic processing as children with typical development. However, it may be that the absence of an inversion effect in the present research among children diagnosed with autism reflects an extensive perceptional defect which is not unique for face recognition. That is to say, people diagnosed with autism tend to process the stimuli in their surroundings in a featural manner at the expense of holistic processing (Happe & Frith, 2006). It also appears that, contrary to the hypothesis, the level of inclusion was found to be less significant in comparison with the level of function of the children. At the same time, it was found that there is a rrelation between these variables, and that the higher the level of function, the higher is the level of inclusion.

So far, no studies have been made to examine the correlation between the different levels of inclusion that represent the degree of motivation and exposure to faces, and the manner in which faces are identified by children with autism as compared with children of typical development. This research opens the way into understanding that the ability for holistic recognition of faces develops gradually with experience and age, and that the level of inclusion and function of children diagnosed with autism are significant factors in the development of this ability. Therefore, it would be meaningful to continue and research this field. Continued examination of this issue will make it possible both to understand the etiology and also to develop a program for treatment and for intervention focused upon difficulties, in order to promote the children and enable them to cope better with the complex social world that surrounds them.