Research in Autism Spectrum Disorders 8 (2014) 851–859

Contents lists available at ScienceDirect

Research in Autism Spectrum Disorders

Journal homepage: http://ees.elsevier.com/RASD/default.asp

Empathic resonance in Asperger syndrome

Florence Hagenmuller [a,b,*], Wulf Rössler [b,d], Amrei Wittwer [b], Helene Haker [b,c]

[a] Department of Psychiatry, Psychotherapy and Psychosomatics, Psychiatric Hospital, University of Zurich, Zurich, Switzerland
[b] Collegium Helveticum, University of Zurich and ETH Zurich, Zurich, Switzerland
[c] Translational Neuromodeling Unit, Institute for Biomedical Engineering, University of Zurich and ETH Zurich, Zurich, Switzerland
[d] Institute of Psychiatry, Laboratory of Neuroscience (LIM-27), University of Sao Paulo, Sao Paulo, Brazil

ARTICLE INFO

Article history:
Received 17 December 2013
Received in revised form 10 April 2014
Accepted 12 April 2014
Available online 6 May 2014

Keywords:
Salivation
Autism spectrum disorder
Perception-action link
Contagion
Coping
Empathy

ABSTRACT

Reports on theory-of-mind deficits have led to the common belief that autism spectrum disorders (ASD) are associated with a lack of empathy. Resonance is a basic empathy-related process, linking two interacting individuals at the physiological level. Findings in ASD have been inconclusive regarding basic empathy. We investigated resonance at the autonomic level – the salivation-inducing effect of watching a person eating a lemon. Salivation-induction was assessed in 29 individuals with ASD and 28 control participants. Cotton rolls placed in the mouth were weighed before and after the video stimulation. Orientation to the stimulus was assessed with eye-tracking, autistic and empathic traits through self-reports. Group comparisons revealed lower salivation-induction in individuals with ASD. Linear regressions revealed different predictors of induction in each group: self-reported empathic fantasizing and age in ASD versus self-reported empathic concern plus orientation to the stimulus' face in the control. In both groups the social component was relevant: in ASD in terms of intellectual involvement with social contents and in controls in terms of the mere presence of a social vis-à-vis. Individuals with ASD may use explicitly acquired intellectual strategies whereas individuals with typical development can rely on intuitive processes for social responsivity.

1. Introduction

Autism spectrum disorders (ASD) are associated with generally reduced social–emotional reciprocity and empathy. However, various definitions of empathy have caused researchers to adopt several methods for assessing this complex process. Within the context of ASD, one of the most popular concepts for study has been that of cognitive empathy, i.e., perspective-taking or Theory of Mind (ToM). Deficits in those processes have been replicated numerous times in individuals with ASD. Nevertheless, criticism has emerged about the explanatory power of ToM because of its lack of specificity to autism and its strong relationship with language abilities (Happé & Frith, 1996; Klin, Jones, Schultz, Volkmar, & Cohen, 2002a; Senju, 2013). For example, compensation strategies by persons with ASD, e.g., heightened verbal skills, can lead to discrepancies between having good results in explicit tasks of social reasoning and dealing with real-life difficulties (Klin, Jones, Schultz, & Volkmar, 2003; Klin et al., 2002a; Senju, 2013).

* Corresponding author at: Department of Psychiatry, Psychotherapy and Psychosomatics, Psychiatric Hospital, University of Zurich, PO Box 1930, 8021 Zurich, Switzerland. Tel.: +41 44 296 73 15.
E-mail address: florence.hagenmuller@dgsp.uzh.ch (F. Hagenmuller).

http://dx.doi.org/10.1016/j.rasd.2014.04.008
1750-9467/

Empathy is influenced by many conscious and unconscious factors that can be difficult to control in an experimental setting. Current means for assessing empathic abilities in ASD may benefit from an approach that examines more basic processes related to empathy within a broader framework of empathy. The perception-action link (Preston & de Waal, 2002) describes empathy-related, automatic processes that occur when two people are interacting. The perception of someone's action automatically stimulates the observer's corresponding representations, so that one involuntarily and directly matches the physiological state of the other person. Unless inhibited, those shared representations then prime or generate an associated action in response that depends upon the level of attention to the stimulus (Preston & de Waal, 2002). This physiological linkage between two individuals, i.e., resonance, is a basic way of being in social contact, and was proposed to be related to empathy (Gonzalez-Liencres, Shamay-Tsoory, & Brüne, 2013; Haker, Schimansky, & Rössler, 2010; Levenson & Ruef, 1992). Common measures of empathic resonance are spontaneous imitation or mimicry of facial expressions (Cacioppo, Petty, Losch, & Kim, 1986), or contagion effects such as in yawning (Norscia & Palagi, 2011; Platek, Critton, Myers, & Gallup, 2003), laughing (Provine, 2005), or itching (Papoiu, Wang, Coghill, Chan, & Yosipovitch, 2011).

Comparison among results from previous reports about resonance in ASD is challenging due to the high heterogeneity in such spectrum disorders and in the different studied groups. Those differences have been manifested in terms of age, intellectual level, or personality traits such as alexithymia, a sub-clinical, frequently co-occurring phenomenon characterized by difficulties in identifying and describing one's own feelings (Nemiah, 1977). Even though those previous examinations had an advantage because they relied less on verbal skills by the participants than do explicit tasks (e.g., ToM), the results were sometimes inconsistent. For example, during passive viewing, children with ASD did not mimic until instructed to do so, suggesting that spontaneous mimicry is impaired in those disorders (McIntosh, Reichmann-Decker, Winkielman, & Wilbarger, 2006). However, other studies reported intact spontaneous mimicry in ASD (Magnee, de Gelder, van Engeland, & Kemner, 2007; Press, Richardson, & Bird, 2010). Those examples highlight important aspects when applying experimental paradigms in individuals with ASD. Differences in task instructions – maybe even subtle – can lead to contrasting responses by participants. In addition, due to their qualitatively different, e.g., literal, understanding, individuals with ASD may obtain a different meaning for a task instruction than do control participants. This risk increases with the complexity of actions a participant is required to perform. Furthermore, the observed response may cognitively be influenced by the participants themselves, perhaps unintentionally through education or social desirability, or intentionally through manipulation.

In studies of contagious yawning, children with ASD did not yawn when they observed a yawning person in a video, in contrast to typically developing children (Senju et al., 2007). However in a replication study, when the children were instructed to look at the eyes of the stimulus this group difference disappeared (Senju et al., 2009). In accordance with those findings, researchers have suggested that an atypical orientation to the stimulus might be responsible for inconsistent results (Klin, Jones, Schultz, Volkmar, & Cohen, 2002b; Senju, 2013). Several investigations utilizing eye-tracking methodology have shown that visual strategies vary between ASD individuals and persons in the control groups. In contrast to typically developing individuals, children and adults with ASD show preferential attention to inanimate rather than social stimuli (Klin et al., 2002b). They also focus less consistently on core features of the human face, such as the eyes and mouth (Langdell, 1978). However, empathic processes can also be disrupted by cognitive load in non-autistic individuals, indicating that attention impacts empathic processing (Morelli & Lieberman, 2013). Preston and de Waal (2002) have also conceptualized attention as a key component of the perception-action link. Therefore, the impact of atypical attention paid to a stimulus (e.g., in terms of the atypical visual orientation found in ASD) on the empathic response seems obvious.

Here, we assessed basic empathic resonance with the salivation test, a paradigm that minimizes the above-mentioned influences of instruction and participants' cognition (Hagenmuller et al, submitted). This test evaluates the salivation-inducing effect of watching a person eating a lemon. Instruction is minimal, the participants are not required to take a specific action, and the cognitive influence that participants could have on their own salivation rates is comparably low. To understand better the underlying mechanisms, we also assessed spontaneous visual orientation via eye-tracking. Our aim was to investigate a basic empathic process described by the perception-action link in adults with ASD who had no intellectual disability. We predicted that the empathic response would depend upon the degree of visual attention paid to the stimulus as well as personality characteristics.

2. Method

2.1. Participants

Our assessment involved 29 participants with Asperger syndrome (AS group, mean age 35 years, age range 18–59 years, 11 females) plus 28 control participants (control group, CG, mean age 33 years, age range 21–57 years, 11 females) of a similar age and gender distribution. The participants of the CG had no psychiatric history and were free of pharmacological medication. They were part of a larger group of control participants described previously (Hagenmuller et al, submitted). Participants in the AS group had been diagnosed by senior mental-health professionals experienced in those disorders following the criteria of DSM-IV. The standard diagnostic procedure included a minimum of 6 h of exploration (in multiple sessions) with a focus on autistic symptomatology and developmental history, and a collateral history taking. The diagnosis was only given, if a second professional experienced in autism spectrum disorders confirmed the evaluation based on a summary of this information and her presence in one of the exploration sessions. Standardized clinical instruments, such as