The key ability from the scope of social cognition, i.e. all cognitive mechanisms of social information processing, is the Theory of Mind (ToM). ToM involves creating cognitive representations of mental states (e.g. beliefs, intentions, emotions) of self (*ToM for Self*) and other people (*ToM for Other*). It enables effective social functioning, as on the basis of mental states' representations we might understand and predict others' behavior. The disfunctions of ToM are regarded as a hallmark feature of Autism Spectrum Disorder (ASD), which is one of the most prevalent neurodevelopmental disorders. Individuals with ASD diagnosis report ToM-related difficulties as the most disturbing in daily life. Research with the use of neuroimaging methods suggests that distortions within dedicated neural ToM network, like decreased activity of the involved structures in response to tasks engaging ToM or lower synchronization of these structures' activity in time at the absence of stimuli (so called resting-state functional connectivity), underlie these difficulties. Moreover, the structures comprising ToM network, preferentially responding to the information concerning self in contrast to the information concerning others in neurotypical subjects, for e.g. ventromedial prefrontal cortex (vmPFC), in ASD are activated with equal strength by the second type of stimuli. It has been observed that the greater the disproportion in the vmPFC's reaction to the information regarding self vs others, the lower the level of social symptoms in subjects with ASD. The results of studies on developmental mechanisms of ToM suggest that the performance in *ToM for Other* depends on the effectiveness of *ToM for Self*. It might be therefore hypothesized that using strategies of explaining others' behavior on the basis of *ToM for Self* as a reference, may be related to better social functioning in ASD.

Despite experiencing similar difficulties in daily functioning, females receive the ASD diagnosis on average later in development, in some cases in adulthood. As a consequence, their access to the dedicated interventions and supporting services is limited. A significant amount of data suggests that there exists so called female autism phenotype. Especially in the part of autism spectrum embracing individuals with high-functioning autism (with at least average IQ, communicative level of language) females demonstrate higher levels of social functioning than males with the same diagnosis, which is expressed, among others, in the domain of non-verbal communication: females are reported to use more vivid gestures or increased pitch range of speech. These sex/gender differences in ASD expression are often explained with superior compensatory abilities of autistic females (i.e. camouflaging). Camouflaging involves masking of undesirable behaviors, imitating typical behaviors during social interactions, but also the strategies of complex social information processing with the use of atypical cognitive mechanisms. Therefore broadening the knowledge on cognitive mechanisms of ToM and their neural correlates, by taking into account sex/gender-related differences, seems crucial. Nevertheless, to date a few studies of neural mechanisms of social information processing in sex/gender balanced samples of participants have been conducted (the estimated proportion of males relative to females is 15:1). Their results suggest that sex/gender is as important factor differentiating neural mechanisms of social cognition in ASD. The nature of these differences, however, remains unknown.

The aim of the project is to fill the gap in knowledge concerning the relationship between behavioral phenotypes of ASD and neural characteristics of this condition and to answer the following questions: Does the use of compensatory strategies of self-referential social cognition underpin the better social functioning of females in ASD, which would be indicated by higher levels of performance in tasks engaging ToM and higher quality of non-verbal communication behaviors? Are the brain mechanisms of this phenomena related to the stronger engagement of vmPFC while taking others' perspective?

120 adults, who will create the two sex/gender balanced groups of 1) individuals with ASD diagnosis and 2) neurotypical subjects, will take part in the study with the use of behavioral and neuroimaging methods. The behavioral part of the study will consist of a) *ToM for Self* and b) *Tom for Other* abilities evaluation. Simultaneously, fine-grained measures of non-verbal communication behaviors (gestures, body position, acoustic patterns of speech) with the use of Kinect v2 motion sensor and linear audio recorder will be collected. Subsequently, 2/3 of the sample (N = 80) will undergo the assessment of activity and functional connectivity within ToM network by the functional magnetic resonance imaging (fMRI).

The project under this proposal will provide broad look at sex/gender differences in neurocognitive mechanisms of ToM in ASD. The results are expected to deepen current understanding of ASD and, in the long term, contribute to increasing the validity of diagnostic procedures and development of effective interventions.