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Helena Hartmann

Social Interactions in Autism

Cognitive Empathy, Egocentricity
and Social Pain

 Springer

Helena Hartmann
Institut für Psychologische
Grundlagenforschung und
Forschungsmethoden
Universität Wien
Wien, Austria

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For Christoph, Elisabeth and Jens – the
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List of Abbreviations

ACC.....	Anterior cingulate cortex
AI.....	Anterior insula
AQ.....	Autism-Spectrum-Quotient
AQ-K.....	Autism-Spectrum-Quotient (Short form)
ASD.....	Autism-Spectrum-Disorder
BDI-II.....	Beck-Depression-Inventory II
BOLD.....	Blood-oxygen-level-dependent
CN.....	Caudate nucleus
dIPFC.....	Dorsolateral prefrontal cortex
DOa.....	Double Other active condition of Cyberball
DOp.....	Double Other passive condition of Cyberball
DS.....	Double Self condition of Cyberball
DSM.....	Diagnostical and Statistical Manual of Mental Disorders
EEB.....	Emotional Egocentricity Bias
EX.....	Exclusion
fMRI.....	functional Magnetic Resonance Imaging
GLM.....	General linear model
IFG.....	Inferior frontal gyrus
IN.....	Inclusion
IRI.....	Interpersonal-Reactivity-Index
MCC.....	Medial cingulate cortex
MFG.....	Middle frontal gyrus
OFC.....	Orbitofrontal cortex
PC.....	Precuneus
PCC.....	Posterior cingulate cortex
rTMS.....	repetitive Transcranial Magnetic Stimulation
SMG.....	Supramarginal gyrus
SOD.....	Self-other distinction
TAS-20.....	Toronto-Alexithymia-Scale-20
TE.....	Echo time
ToM.....	Theory of Mind
TP.....	Temporal pole
TPJ.....	Temporoparietal junction
TR.....	Repetition time

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Abstract

Empathy, the ability to feel with another person, has already been widely studied in both neurotypical as well as psychiatric populations. In this context, the cognitive ability for Self-Other Distinction (SOD) plays an essential role during social interactions, mainly because it avoids confusion when one is confronted with another's emotional state that is not matching one's own. To be able to feel empathy, one must correctly separate and tag these self- and other-related feelings.

But social cognition skills are not free from error, since humans primarily use their own perceptions in guiding their thoughts about conspecifics. Such a self-projection mechanism can lead to empathic judgements that are egocentrically biased towards one's own perspective – an Emotional Egocentricity Bias (EEB) occurs. Since past research has shown that autistic individuals exhibit problems regarding cognitive empathy and Theory of Mind (ToM), they might also show more difficulties in classifying and distinguishing feelings of themselves and other individuals.

By means of the virtual ball-tossing game Cyberball, which elicits congruent and incongruent feelings of social inclusion/exclusion for the self and another player, we investigated (1) twenty neurotypical male adults and (2) fifteen participants with Asperger syndrome (AS) together with fifteen matched controls on the behavioral as well as neurophysiological level.

The results indicated a significant EEB during actively playing the game in contrast to passive observation, thereby showing that SOD is recruited to overcome egocentricity only when the self is directly involved on an emotional level. Interestingly, autistic individuals judged significantly more egocentric than controls when the degree of Alexithymia (the inability to identify/describe feelings) was kept constant. On a neurophysiological level, controls activated regions associated with affective empathy while observing another person experiencing social exclusion. Participants with AS, on the other hand, recruited areas related to emotion processing and mentalizing/ToM when confronted with incongruent emotional states of the self and the other. We found no enhanced hemodynamic activation in the right supramarginal gyrus, a region previously linked to “overcoming” the EEB, and no group differences. Nevertheless,

the present study adds several valuable insights to the investigation of social cognition in neurotypical as well as autistic individuals.

Keywords: Empathy, Emotional Egocentricity Bias, Self-Other Distinction, Social Pain, Cyberball, Autism-Spectrum-Disorder, Asperger Syndrome

Kurzzusammenfassung

Empathie, die Fähigkeit des Einfühlens in andere Personen, wurde sowohl in neurotypischen als auch psychiatrischen Populationen bereits stark erforscht. In diesem Kontext spielt die kognitive Fähigkeit zur Selbst-Andere Unterscheidung (Self-Other Distinction; SOD) eine essentielle Rolle bei der empathischen Reaktion, weil sie beim Erleben von Gefühlszuständen anderer Personen Verwirrung vermeidet – besonders, wenn die beobachteten Emotionen nicht mit den eigenen, aktuellen Gefühlen zusammenpassen. Um Empathie für jemand anderen zu empfinden, müssen eigene Gefühle und die der anderen Personen richtig getrennt und eingeordnet werden.

Aber die soziale Kognitionsfähigkeit ist nicht ohne Fehler, da Menschen in erster Linie ihre eigene Sichtweise nutzen, um jemand anderen zu verstehen. So ein Fokus auf das Selbst kann daher zu empathischen Einschätzungen führen, die in Richtung der eigenen Perspektive verzerrt sind – ein Emotionaler Egozentrizitäts-Bias (EEB) entsteht. Da vergangene Forschung darauf hinweist, dass autistische Individuen häufig eine Beeinträchtigung der kognitiven Komponente von Empathie bzw. der Theory of Mind (ToM) aufweisen, könnten sie möglicherweise auch verstärkt Schwierigkeiten damit haben, Gefühle von sich und anderen korrekt zu klassifizieren und zu unterscheiden.

Mithilfe des virtuellen Ballspiels Cyberball, dass bei der Person selbst und einem Mitspieler kongruente und inkongruente Gefühle der sozialen Inklusion/Exklusion hervorruft, wurden (1) zwanzig neurotypische männliche Erwachsene sowie (2) fünfzehn Teilnehmer mit Asperger Syndrom (AS) zusammen mit fünfzehn vergleichbaren Kontrollpersonen sowohl auf verhaltensbezogener als auch auf neurophysiologischer Ebene untersucht. Die Ergebnisse wiesen auf einen signifikanten EEB bei aktiver emotionaler Beteiligung der Teilnehmer im Vergleich zu passiver Beobachtung hin, was zeigt, dass SOD als Hilfe zur Überwindung der eigenen Perspektive nur in Situationen gebraucht wird, in denen die eigene Person direkt emotional involviert ist. Interessanterweise bewerteten autistische Teilnehmer signifikant egozentrischer als Kontrollpersonen, wenn das Ausmaß der Alexithymie (die Unfähigkeit, Gefühle zu erkennen/beschreiben) konstant gehalten wurde. Auf neurophysiologischer Ebene zeigten Kontrollpersonen erhöhte Aktivierung in Regionen für affektive Empathie

beim Beobachten des sozialen Ausschlusses einer anderen Person. Teilnehmer/innen mit AS rekrutierten dagegen verstärkt Bereiche für Emotionsverarbeitung und Mentalisieren/ToM, wenn sie mit inkongruenten Gefühlszuständen der eigenen Person und des Mitspielers konfrontiert waren. Es wurde keine erhöhte hämodynamische Aktivität im rechten Supramarginalen Gyrus, eine Region, die in vergangenen Studien mit dem „Überwinden“ des EEB in Verbindung gebracht wurde, und keine signifikanten Gruppenunterschiede gefunden. Gleichwohl trägt die vorliegende Studie wertvolle neue Erkenntnisse zur Erforschung sozialer Kognitionen bei – sowohl im Hinblick auf neurotypische als auch autistische Individuen.

Schlüsselwörter: Empathie, Emotionaler Egozentrizitäts-Bias, Selbst-Andere-Unterscheidung, sozialer Schmerz, Cyberball, Autismus-Spektrum-Störung, Asperger Syndrom