Unweaving the Complex Relationship between Empathy and Theory of

Mind in Studies Involving Autism Spectrum Disorder: Future Directions

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Abstract: An inherent deficit in empathy is linked to diagnosis of autism spectrum disorder (ASD) but the construct of empathy is often confused with sympathy or largely misunderstood. The objective of this paper is to examine the complex relationship between empathy and theory of mind in the existing body of research in the field of ASD. The confusion between the two ideas, empathy and theory of mind, became increasingly evident as the two words were largely used as synonyms in early research and the trend has continued through time. The result is the development of a theoretical framework within which to explore research in the field of ASD that combines theory of mind, simulation theory, and psychological theories that focus on the motor, cognitive, and emotional components of empathic behaviour. The argument is made that empathy and theory of mind cannot be used interchangeably and the two terms are not mutually exclusive. While the paper confirms that individuals with ASD do not learn empathic behaviours through social interactions and employing theory of mind as typically developing children do, there is evidence that individuals with ASD can learn to demonstrate empathic behaviours in social situations through simulated practice.

Key words: autism spectrum disorder, theory of mind, empathy, simulation theory

1. Introduction

The term ASD refers to a continuum of common communication and social characteristics among individuals with ASD. Where an individual is placed on the spectrum is determined by symptoms, severity, age of onset, functioning level, and level of social interaction difficulties as determined by the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-V). The term ASD usually refers to the three most common spectrum diagnoses: autism, Pervasive Developmental Disorder — Not Otherwise Specified, and Asperger's Disorder (Autism Society Canada, 2013).

Commonly, the triad of social, communication, and thinking impairments are used to classify ASD reflect the pivotal role that empathy plays; the inability to act empathically permeates in all three areas of impairment (Wing, 1993). A survey of seminal and current research paints an increasingly diversified field. The earliest studies of ASD took a demographical and observational approach to explore causes and cures of the complex disorder (Elder,

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Dawson, Toth, Fein, & Munson, 2008; Markram, Rinaldi, & Markram, 2007). As studies that apply such an approach do not translate easily into educational practice they are not extensively explored in this review; this review focuses on the themes that have arisen from a social development framework and brought increased understanding to a disorder that is largely misunderstood (Meyers, Mackintosh, & Goin-Kochel, 2009).

2. Defining the Constructs of Empathy

Despite a seemingly endless pool, Levine (2005) provided one of the most all-encompassing definitions of empathy as an emotional or visceral response to another person's anxious or painful event. The empathy process in its simplest form takes place when a person's emotional response translates into a caring action. Similarly, Hoffman (1982) argued that moral development is the outcome of an active process, involving increased interaction with peers and exposure to levels of moral reasoning higher than one's own. It is these experiences that, in essence, provide the basis for the ability to take the role of others. Hoffman developed this aspect of empathy as a moral affect and explored the natural empathic development. In particular, Hoffman argued that because people can empathize better with someone's emotion if they have experienced the emotion themselves, empathic capability should be fostered by socialization that permits children to experience many emotions rather than protects them from emotional experience. This developmental theory of Hoffman holds that because empathic behaviour is often involuntary, socialization experiences should be created and highlighted that foster empathic development. Thus, developmental theory holds the view that by employing role-taking opportunities, children will increase the chances of paying attention to others and acting empathically.

Studies which distinguished between moral and conventional sense have led to a deeper understanding of empathy among individuals with ASD; having moral sense means being able to distinguish between a moral violation (e.g., pulling hair) and a conventional violent (e.g., chewing gum at school). Interestingly, findings have indicated that children with ASD were not significantly different from controls and were able to distinguish between moral and conventional violations, despite their impairment in theory of mind (De Vignemont & Firth, 2007). This study found that individuals with ASD are able to detect transgressions of rule and detect someone's distress but not necessarily relate the two things to each other. This is easily transferred to empathy among individuals with ASD — they can identify emotions in others and understand why someone would feel a certain way in a certain situation but do not necessarily see the two things together as one emotional response.

3. Social Development of Empathy in Normal and ASD Development

The development of empathy in children is an area that has been largely developed in the field of cognitive psychology. From a cognitivistic viewpoint, empathy is defined as an experience in which people participate in or share the emotional state of somebody else on the basis of the other person's expression and/or their situation (Bischof-Kohler, 1991). Within the discourse of empathy studies, historically two theoretical approaches emerge: cognitive and affective. Cognitive empathy is defined as understanding another person's perspective. In contrast, emotional empathy involves an observer's emotional response to the affective state of others (Baron-Cohen & Wheelwright, 2004). The earliest studies into the development of empathy involved the use of pictures and stories to discuss emotions. Such work discovered that beyond identifying emotion in the picture, cognitive and emotional empathy was not present in young children under the age of five (Bischof-Kohler, 1991).

Barnett (1987) used Feshbach's (1969) model of empathy which integrates the cognitive and affective

components outlining that an empathic response requires the ability to identify emotional states, take the perspective of another person, and evoke a shared response. Barnett's study was groundbreaking in the attention given to socialization factors that contribute to the development of empathic responses in young children. A recent study by Smith (2006) explored empathy from an evolutionary perspective arguing that empathy is typically developed through socialization. The social development model has been driven by the underlying notion that individuals learn how to apply social behaviour through observation, imitation, and modeling. Recently, researchers have argued that empathy consists of three components: motor, emotional and cognitive empathy. In the most simple terms, emotional empathy is used to reference the experience of emotions that are consistent with the situation and in response to those of peers. Motor empathy, a newer term, refers to "unconsciously mirroring the facial expressions of another" (Bons, Rommelse, Scheepers, & Buitelaar, 2010).

A plethora of studies have found that individuals with ASD appear to lack the social development of empathy. Waterhouse (2000) stated that when a child has difficulties interpreting social cues he or she has little awareness of the social norms that typical children learn through social interactions. Temple Grandin (2006) explained her struggle with ASD as having to explicitly learn empathy because such social skills are not learned naturally. She states that her emotions are simpler than those of most people. I don't know what complex emotion in a human relationship is…complex emotional relationships are beyond my comprehension.

There is no shortage of studies that explore the relationship between empathy and ASD arguing that people with ASD can mentalize the feelings of others but do not socially develop this ability at a young age. Grant, Boucher, Riggs and Grayson (2005) confirmed the findings of Blair's (2005) report that children with ASD could make the "affect-related distinction" between moral rules and social rules but have difficulty applying this knowledge in social situations. Capps, Kasari, Yirmiya, and Sigman (1993) confirmed that children with ASD responded half as often as control groups to emotional situations, but argued that individuals with ASD have more ability to read and express emotion than credited by early research.

4. The Three Theories of Mind: Theory-Theory, Modularity Theory, and Simulation Theory

The exponential growth of theory of mind (ToM) in the last few decades has led many prominent theorists to argue that ToM almost dominates the whole field of cognitive development; publications dealing with [ToM] development now number in the hundreds, and the flow shows no signs of diminishing (Flavell, 1999). Since its conception, ToM has profoundly impacted research in the field of autism spectrum disorders (ASD) by creating a bridge between research and everyday practice. Since primatologists Premack and Woodruff's (1978) early exploration of mental state interpretation in chimpanzees many theories have highlighted the importance of understanding belief, emotion, desire, and intentionality in ToM. In order to explain thought or action it is believed that individuals characterize themselves and others in mental terms. In the popular pursuit of conceptualizing how children come to understand the mental states of themselves and others, a plethora of theories have been proposed. Collectively, ToM researchers have explored children's ability to predict, explain, and manipulate behaviour by employing various versions of Daniel Dennett's original false belief tasks to make inferences about natural behaviour (Dennett, 1978). Such tasks require that children attribute false beliefs to answer questions in order to demonstrate understanding of the mental states of others.

In particular, three approaches have dominated ToM discourse: theory-theory, modularity theory, and

simulation theory (Carruthers & Smith, 1996; Flavell, 1999; Flavell, Green, & Flavell, 2000). Many theorists have argued that each of these theories indeed offers a unique explanation of the development of understanding mental states in the preschool-aged child but do not seek to explain its origin. Despite the common view that all three approaches are in contrast to Piagetian theory, theory-theory has a foundational Piagetian undertone. In contrast, modularity theory and simulation theory apply the specificity hypothesis of cognitive development to different degrees which maintains that development progresses in categorical ways in different learning areas (Gelman & Wellman, 1992).

As a result, many approaches involve an inherent capacity of memorization necessary in ToM tasks and understanding. The connection between the maturation of executive functions that are necessary in the evaluation of mental states and the acquisition of knowledge of the mind seems implicit in each of the three approaches subsequently discussed (Carlson & Moses, 2001). Although this paper presents these approaches holistically, it must be noted that within each there is a range of theories that are beyond the scope of the present discussion. In addition, there can often be tremendous crossover between the approaches and thus, various theoretical frameworks have presented the approaches in different ways. For example, some theorists propose that both modularity and simulation theory are simply more specific versions of theory-theory.

4.1 Theory-Theory (TT)

Theory-theory (TT) postulates that individuals employ theoretical concepts in mental state attribution to predict action and thought. In doing so, humans apply what is often referred to as folk-psychology or "commonsense mentalism" (Wellman, 1998) TT posits that one infers the mental states of others through observations of events and behaviour. As a result, a relationship is established between mental concepts and theoretical generalizations through causal inferences (Goldman, 2000). In TT the main question is not "how does the child *engage* in these processes, but how does the child *conceive* of these processes" (Wellman, 1998). The prominent role experience plays in TT development in children is demonstrated through a first-person point of view. This point of view maintains that a child's understanding of others' mental states is contingent on the prior development of a framework for understanding their own mental states.

In keeping with Piaget's model of development where children pass through ordered stages when they reason and think differently, theory theorists have argued that one's knowledge about the mind is comprised of an informal framework theory (Churchland, 1998; Gopnik & Melzoff, 1997). Consequently, TT theorists have emphasized the relationship between desire and belief by developing a series of stages which one moves through (desire psychology, desire-belief psychology and adult belief-desire psychology) with age (Gopnik & Wellman, 1994).

4.2 Modularity Theory (MT)

In contrast, modularity theory (MT) predicates that mentalizing abilities are not developed through experience but are embedded in innate, abstract mental capabilities which humans are born with. Despite the fact that main proponents of MT differ dramatically in their explanations of module functioning, the unifying belief is that ToM is part of an innate mental module that matures through development (Leslie, 1994a). The main assumption of MT is that within these innate human faculties there is a small set of primitive informational relations available early on, among them believe and pretend (Leslie, 1994 b).

Collectively, all MT proposes neurological maturation as the main cause of developing knowledge about the mental states of others. Leslie's (1994a, 1994b) hypothesis that several different modules exist and align

sequentially in children's development of ToM in the first three years of life has played a major role in later research. Subsequently, MT proponents argue that although experience may trigger the operation of these mechanisms, experience does not determine their nature (Flavell, 2000). There are countless MTs proposing different innate and early maturing modular mechanisms, including the area of domain specificity theory, that increasingly use neuroscience technology to explore brain functions (Klin, 2008).

4.3 Simulation Theory (ST)

Simulation theory (ST) is the most recent of the three approaches and, as a result, many argue it has a "long way to go in establishing research authority" (Freeman, 1995). The main principle of ST is that one uses his or her own cognitive resources to attribute mental states. ST ascertains that children develop the ability to compute the mental states of others through role-taking or simulation processes. In particular, a fundamental belief of ST is that the key to understanding mental states lies in the powers of imagination, play, and pretend that children possess (Heal, 1998).

The simulation process occurs by pretending to be in another person's position and generating thoughts or actions attributed to the other through introspection. Harris (1992) provided a series of steps to explain the stages of simulation including echoing, pretending, attributing intention, and imagining. Goldman (2001) highlighted the important role played by echoing and pretending: at the heart of this procedure is that the attributor tries to *reproduce* or *match* what transpires in the target. Like TT, ST assumes that experience plays a formative role because, through practice and social interactions, mentalizing abilities are improved in children (Harris, 1992). There is a shift from questioning if the child develop[s] a theory of the mind [to questioning if the child] develop[s] the ability to imagine what it is like to be in another person's shoes (Davies & Stone, 1995). As a result of the belief that one's ability to imagine and simulate develops, ST holds that a first-person point of view is essential to understanding mental states.

4.4 Theory of Mind and Cognitive, Emotional and Motor Empathy

ToM has been expanding since the late 1970s and has created the scaffolding necessary to build a bridge between research and everyday practice. Baron-Cohen (2006) developed a ground-breaking theory that the categorizing that goes on in the minds of most of us all the time — the automatic connecting of events and people that seem to go together — either doesn't happen or happens in different ways in individuals with [ASD] a condition he fittingly termed as mindblindness. Baron-Cohen compared mindblindness to colour-blindness because people with ASD cannot actually imagine what it is like to think about the mental feelings of others just as people who suffer from blindness cannot imagine seeing the world in colour. As a result, most individuals with ASD are not able to exhibit evidence of cognitive or emotional empathy. Frith (2003) argued that Baron-Cohen's ToM has maintained such a hold in the field of ASD discourse because it provides researchers with the ability to predict relationships between external states of affairs and internal states of mind.

To assume that all individuals with ASD cannot be taught to feel or show empathy is not supported by studies that found that individuals with ASD can develop ToM abilities through time; despite an initial struggle to understand the emotions of others, the potential to act empathically may be present. In working with children with ASD, Baron-Cohen (2006) operationalized ToM as a system used to infer a range of mental states from the behaviour of others. Through his work, Baron-Cohen concluded that children with ASD do not understand beliefs at the three to four year old level. Baron-Cohen argued that empirical research proved that children with ASD do not naturally learn empathy through social interactions as a typically developing child. ToM has developed to

postulate that in order to acquire knowledge of the nature of peoples' minds, one must be socially engaged with others (Hobson, 2005). These findings provide further support to the notion that emotional empathy, which requires emotional responses to situations and interactions with peers, is an area that is underdeveloped (but not necessarily impossible) among individuals with ASD. As a result, finding interventions to increase emotional empathy could potentially lead to greater social interactions for individuals on the spectrum.

5. Empirical Studies of ToM with Respect to ASD

Research supporting ToM through empirical findings has commonly used what developmental psychology called the false belief (or Sally-Anne) test to measure a person's social cognitive ability to attribute false beliefs to others (Wimmer & Perner, 1983). Researchers conducting the false belief test show participants (usually children) a simple scene involving two dolls (Sally who has a basket and Anne who has a box). In the skit, Sally puts a marble in her basket and leaves the room. In her absence, Anne takes the marble out of the basket and puts it in her box. When asked where they think Sally will look, they 'pass the test' if they understand that Sally will look in her basket before realizing that her marble is missing. Baron-Cohen employed the test a number of times with the same findings; children under the age of four, along with 85% of older children with ASD, will answer "Anne's box", appearing to not know that Sally is unaware that her marble has been moved. The results indicated that if the child cannot take an alternative perspective he or she will indicate that Sally believes — as he or she does — that the marble has moved. The connection of the findings of the false belief tests among individuals with ASD tie directly to cognitive empathy — the inability to take an alternative perspective is precisely what causes the observable lack of cognitive empathy.

As ToM has developed it has consequently led many researchers to explore the effect of specific treatments on changing the behaviour of individuals with ASD (Bagatell, 2007; Eisenberg, 2006). Researchers continue to state, however, that despite the widespread recognition that socio-emotional relating is impaired in children with ASD, the research evidence for difficulties in empathic responding is not comprehensive (Glossop, 2007). Recent studies have used sophisticated magnetic resonance imaging to investigate the neural mechanisms involved in identifying emotion and reacting in an empathic manner. Greimel et al. (2010) presented emotional faces and participants were asked to infer emotional states and judge their own emotional responses to the pictures. The findings indicated that there is an affected neural process, fusiform gyrus activation, among individuals with ASD. Studies in this area have also cemented a neurological foundation for the lack of empathic response among individuals with ASD but there are few studies examining interventions to increase emotional responses in peer interactions (Wright et al., 2008). Support for the ability to emotionally respond among this group has been proven in studies where the verbal mental age of children in control group and children with ASD were equivalent; no impairment in emotional recognition was observed (Adolphs, Sears, & Piven, 2001). Perhaps, rather than focusing on lack of understanding empathy among individuals with ASD, it is best to look towards ways of regulation emotions and building emotional intelligence.

5.1 The Complex Relationship between Empathy and ToM in the Field of ASD Research

As outlined in the literature review, the basic idea behind ToM is that individuals with ToM are able to understand and predict the actions of others while those who do not have ToM cannot (Doherty, 2009). Many researchers have made the interpersonal process connection between empathy and ToM inextricable and explicit, arguing that understanding your own mind is pivotal to understanding the minds of others (Blair, 2005; Goldman,

1995). Such views have developed into a discourse leaning towards the supposition that putting oneself in someone else's shoes emotionally and cognitively seems to rest on the equivalence between self and other (Meltzoff & Brooks, 2001).

However, recently, theorists have argued that the accepted inter-changeability of ToM and empathy is problematic, calling for an increased distinction between cognitive empathy and emotional empathy. Cognitive empathy (the ability to take another's perspective) is inherently tied to ToM but emotional empathy (the appropriate response), many argue, is not and future studies in ToM should direct attention solely to affective empathy (Rogers et al., 2007). Similarly, when viewed through a pragmatic lens, the importance of an individual with ASD understanding his/her own mind is called into question. Whether an individual with ASD feels empathy is not the observable behaviour exhibited; further, empathic behaviour can be demonstrated without feeling the same way as the other person. Learning how to act and react in certain situations by understanding the way others feel does not require feeling the same way. In the simplest terms, although individuals with ASD may not demonstrate cognitive empathy they may learn and apply emotional empathy. Studies into facial mimicry and elevated heart rate have led to insight into the ability of individuals with ASD to show emotional empathy. These studies, in a broad sense, argue that an observable motor reaction being present does not necessarily mean that the individual shares the basic emotional experience with others (Bons et al., 2010). Studies in this vein support the argument that motor empathy can be a vehicle for individuals to learn emotional empathy.

This complicated relationship between theory of mind and empathy can be clearly understood through the lens of what Reindal (2008) has deemed as a necessary and sufficient distinction. Basically, a *necessary condition* is defined as a prerequisite: in this case one must have ToM to be able to feel and act empathically. However, ToM is not always a *sufficient condition* because it is possible to have ToM but not act or feel empathic towards others. Thus, having knowledge of the mental states of others does not guarantee one will employ that knowledge in order to act in an empathic manner

5.2 Imitation and Modeling with Individuals with ASD

A study by Cesaroni and Garber (1991) explored ASD through two firsthand accounts (a teenager and a man) who argued it was unfair to say that people with ASD lack empathy and are unable to take others' perspectives. While empathy implies the capacity for participating in another's feelings or ideas, one participant stated that through practice and imitation he was able to project his own feelings to those of others. Such studies draw on a wealth of research supporting simulation theory (ST) which includes echoing, pretending, attributing intention, and imagining (Goldman, 2001).

Practitioners and parents have created many practical resources that attempt to foster prosocial skills among individuals with ASD through modeling. Winner (2008) exemplified this shift toward education-based interventions grounded in ToM; they established curriculum for high functioning individuals with ASD focused on recognizing and developing prosocial skills. Similarly, Gray and White's (2002) landmark resource *My Social Stories Book* of narratives has led to an eruption of simulation-based strategies and digital interventions to target prosocial behaviour in children with ASD.

5.3 Empirical Studies of Simulation Interventions among Individuals with ASD

Methodologically speaking, the effectiveness of simulation among individuals with ASD has been explored substantially through various research designs, leading to a diversified body of literature (Baker, Lang, & O'Reilly, 2009). The measures employed by these empirical studies predominantly include a self or teacher rating of social

behaviour which are analyzed to show change in behaviour. Such intervention research supports the effectiveness of the practice-based implementation of ST in increasing empathic behaviour among individuals with ASD. Collectively, these studies have sparked interest in exploring the various roles that simulation can serve in teaching individuals with ASD to apply social skills in everyday life (Cunningham, 2009). Studies in this vein have largely focussed on mainstream television shows, comics, social stories, and class discussion resources.

More recently, studies exploring the use of virtual environments among individuals with ASD as a means of modeling, imitating, and eventually changing behaviour have created a new research area. The benefits of computer-based tasks for people with ASD have been highlighted in research over the last fifteen years (Moore & Taylor, 2000). Current technology allows visual and auditory input to be controlled allowing for consistency and repetition (Parsons, Mitchell, & Leonard, 2004). With the constant evolution of technology, interactive multimedia computer programs have allowed people with ASD to successfully learn about emotions and social problems (Baron-Cohen, 2010).

Most advantageous is that increasingly sophisticated virtual environments allow users to role-play in environments that are designed to mimic specific social situations [allowing] tasks and skills [to] be practiced in increasingly realistic settings (Parsons, Mitchell, & Leonard, 2004). More recently, Welch et al. (2009) explored the design and development of software to create social interaction modules to target the ability to recognize affect in children with ASD. The virtual environment was explored as a means to present realistic social communication tasks to the children and to monitor their motor empathy responses using various physiological signals (body reactions such as change in temperature, heart-rate or muscle). Although heavily reliant on medical equipment and software development, the study points to a new direction studies are taking. Similarly, Chen, Chiang, Ye and Cheng (2010) employed 3D animated empathic scenarios through a virtual learning environment in an attempt to increase instances of empathy among individuals on the spectrum. Results demonstrated that using a collaborative learning environment that employed such scenarios had "significant and positive effects on participant use of empathy" (Abstract). While findings seek to validate the potential of simulation technology programs they reveal that there is a lack of empirical evidence supporting the effectiveness of such programs. This literature review brought to light the need for further investigation into specific modeling interventions to foster empathy among individuals with ASD.

5.4 Simulation Theory as a Means to Explore Affective Empathy among Individuals with ASD

(ST) postulates that the simulation process of pretending to be in another person's position and generating thoughts or actions attributed to the other through introspection can lead to applying complex social skills in naturally occurring settings. The relationship between motor empathy and ST is that motor empathy, in essence, is the physical response to the emotions of another person (often through mimicry). As discussed above, these responses have been noted among individuals with ASD in many studies. Simulation theory would build on instances of motor empathy through practice and repetition, in an attempt to find methods to increase instances of emotional empathy in social situations.

ST may prove an indispensable tool for developing mentalizing processes including predicting a person's thoughts and actions, making judgements of the thoughts of others, and forming views based on observation of the actions of others. Difficulty arises for individuals with ASD because mental states are not directly observable but are used to predict behaviour about others (Blair, 2005). The facet of transferability of empathic behaviour is

paramount for individuals with ASD because they face immense challenges in comprehending the minds of others. Studies have shown that individuals with ASD are able to respond through motor empathy so the employment of ST framework for drawing attention to the emotions of others may prove a useful tool to increase emotional empathy.

The use of modeling and simulation strategies, through time, may prove effective for increasing understanding of the mental states of others (Klin, 2008). It is precisely in this aspect that ST creates an avenue to facilitate learning how to understand mental states and practice transferring that learning to social situations. Emotional empathy has been shown to motivate people to respond with care which, in turn, improves social behaviours. Through use of simulation theory to build emotional empathy it may lead to individuals who are better equipped to identify and react to the emotional plights of others, thus leading to increased peer acceptance (Hastings, Zahn-Waxler, Robinson, Usher & Bridges, 2000; Izard, Fine, Schultz, Mostow, & Ackerman, 2001).

With the distinction made in the relationship between ToM and empathy, the simulation process can provide the skills individuals with ASD may lack: the ability to master psychological concepts which is based on one's ability to simulate others. Research suggests that there are two kinds of attitudes through which people can see the world: egocentric ("you") and allocentric (he/she/they) and this process involves changing the way one fundamentally views what happens around them. It truly makes a difference which stance one takes; when people adopt an egocentric stance they understand the other person in relation to themselves — "what the other feels, thinks or does is relevant for the self" (De Vignemont & Frith, 2007, p. 279). On the other hand, when one adopts an allocentric stance it is detached from interactions with people. Numerous studies have shown that individuals with ASD display extreme egocentrism, disconnected from allocentrism. Their social world is self-focused. People with ASD do not provide any description of how people do behave, but rather how people *should* behave (De Vignemont & Frith, 2007). Simulation interventions are increasing in ASD educational research because as children become older, prosocial responses become more complex. Individuals with ASD may not learn these behaviours solely through childhood observation and findings are suggesting that practice does, in fact, lead to improvement (Wang & Spillane, 2009).

Temple Grandin reflected that she has a process of using my intellect and logical decision making for every social decision. Emotion doesn't guide my decision; it is pure computing (Grandin, 2006). At a recent talk entitled "Empathizing and Systemizing in Autism Spectrum Conditions", Baron-Cohen presented an approach that supports ST by defining ASD as below average empathy alongside above average systemizing (2010).Systematizing is defined as the drive to analyze and build a system; these common high levels of systematizing among individuals with ASD are the result of good memory and attention to detail but make it impossible to live without concrete rule-based systems. By employing simulation theory of mind as the high levels of systematizing among individuals with ASD can be drawn upon in future studies exploring interventions to foster empathic behaviour.

6. Conclusion

Since a deficit in empathy is not only characteristic among individuals with autism spectrum disorder (ASD) but categorically used in defining ASD, it is of utmost importance to explore educational avenues to build prosocial skills among this group. Although popular cognitive empathy theory in the field of psychology often favours an approach which views empathy as an inherent ability that one develops to be able to put oneself in

someone else's position, this study took a different approach by exploring the complex relationship between empathy and theory of mind. The ability to put yourself in another's position is presented as not necessary in order to demonstrate empathic behaviour in social situations. Individuals with ASD may not learn empathic behaviours solely through observation as typically developing children do, but findings suggest that through video simulation, practice may, in fact, lead to increased empathic behaviour.

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