A New Perspective on Social Communication in Autism: The Double Empathy Problem

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Abstract

Under the guidance of the traditional biomedical model, most accounts attribute the social communication difficulties in autism to deficits within autistic individuals themselves, whereas the double empathy problem is grounded in the bidirectional nature of social communication, positing that the difficulty for autistic individuals to integrate into social environments arises not only from their own inability to understand typically developing individuals, but also from typically developing individuals' difficulty in understanding autism. Due to the mismatch in perception and understanding between both parties and the resulting bidirectional disconnect in information, interaction difficulties emerge for both sides. A series of related studies have confirmed the existence of the double empathy problem; its internal mechanisms include differences in behavioral expression styles and stigmatization phenomena, which can be intervened through shared reading models, peer support, and interpersonal synchrony approaches. Future research needs to focus on social communication among autistic individuals across more age groups, consider the unique empathy expression of autism in research assessments, conduct in-depth investigations into the interaction process between both parties, and encourage the expansion of more effective intervention methods.

Full Text

A New Perspective on Social Communication in Autism: The Double Empathy Problem

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Abstract: Under the guidance of traditional biomedical models, most studies have attributed social communication deficits in autism to individuals' own

shortcomings. However, the "Double Empathy" problem is rooted in the bidirectional nature of social communication. Autistic individuals face difficulties integrating into social environments not only because they themselves struggle to understand neurotypical individuals, but also because neurotypical individuals find it challenging to understand autism. Due to mismatched perception and understanding between both parties, information becomes bidirectionally disconnected, resulting in interaction difficulties. A series of related studies have confirmed the existence of the Double Empathy Problem, with internal mechanisms including differences in behavioral expression patterns and stigmatization. Interventions can be implemented through shared reading models, peer support, and interpersonal synchrony methods. Future research should examine social communication among autistic individuals across different age groups, consider autism's unique empathic expressions in research assessments, conduct in-depth studies of the interaction processes between both parties, and encourage the development of more effective intervention approaches.

Keywords: Double Empathy Problem; Autism; Social Communication

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Autism, or Autism Spectrum Disorder (ASD), is classified as a neurodevelopmental disorder, yet its diagnosis relies on behavioral observation. Two core symptoms exist: social communication deficits and restricted interests with stereotyped or repetitive behaviors. Human social nature determines that individuals cannot completely detach from social environments for learning and living; consequently, researchers have devoted considerable attention to the social communication abilities of individuals with ASD. Since ASD was established as a diagnostic category in the 1940s, the research framework has been dominated by a deficit-based biomedical model [1]. This framework has given rise to numerous theories explaining social communication problems in ASD, such as the broken mirror theory [2], extreme male brain [3], and mindblindness [4], all of which reveal impairments in ASD individuals' ability to understand and share feelings about others' situations—that is, impaired empathy capacity. This manifests as biases in social understanding and lack of appropriate responses to others' emotions, such as difficulties recognizing emotional expressions [5-8], particularly anger, fear, and surprise [9], with tendencies to ignore others' negative states while focusing more on toys [10]. Previous research has emphasized that ASD performs worse than typically developing (TD) individuals on multiple social cognitive indicators, and these social cognitive differences form the basis of interaction difficulties between ASD individuals and others [11]. However, Milton [12] argues that traditional biomedical models overlook the bidirectional nature of social communication. Therefore, responsibility for

social communication deficits should not be placed solely on ASD individuals. Instead, we should examine the double empathy problem between ASD and TD individuals based on the essential nature of social interaction: ASD individuals struggle to integrate into social environments not only because they cannot understand others, but also because TD individuals cannot understand ASD individuals. The mismatch in perception and understanding between both parties leads to bidirectional information disconnection and consequent interaction difficulties [12].

2 Related Research on the Double Empathy Problem

Since Milton proposed the theoretical hypothesis of the double empathy problem [12], researchers have gradually conducted studies on how TD and ASD populations understand each other's social signals and on actual interactions between the two groups, further supporting the double empathy problem perspective. This includes interaction difficulties between ASD and TD individuals and characteristics of their social communication [13].

Previous research on causes of social interaction difficulties in ASD populations has largely attributed them to deficiencies within ASD itself, suggesting they lack the ability to explain or understand others' mental states. However, as research has deepened, evidence suggests TD individuals may also have insufficient capacity to understand the mental states of those with ASD [14]. For instance, Edey et al. employed a modified animated triangles experimental paradigm [15], recording participants' placement of geometric shapes to convey four types of complex emotions. They found TD participants had difficulty understanding the emotion types conveyed by ASD participants' placements [14]. Brewer et al. used a facial expression recognition paradigm and found TD individuals also had difficulty understanding the facial expressions of those with ASD, pointing to the nonspecific transmission of emotional facial expressions in ASD [16]. Sheppard et al. presented TD participants with natural reactions of different participants (ASD or TD) in four scenarios and found ASD participants' reactions to events differed from TD participants, making it difficult for TD individuals to know what ASD individuals were thinking [17]. TD individuals not only struggled to infer mental states from ASD individuals' external behaviors but also showed biases in role positioning, such as exaggerating the egocentrism of ASD family members [18], overestimating the help they provided to ASD individuals [19], forming prejudices against ASD individuals more quickly [20], and showing low willingness to interact with ASD individuals [20]. These results become obstacles in relationships between ASD and TD individuals, reducing the likelihood of ASD individuals participating in social learning with TD individuals.

On the other hand, related research employing multidimensional methods or emerging experimental paradigms has objectively described or recorded social communication conditions between ASD and TD populations, providing strong evidence for the double empathy problem. Crompton et al. conducted semi-

structured interviews with 12 autistic adults and learned that when interacting with other autistic adults, they experienced comfort and pleasure, gained more understanding, felt reduced pressure to adapt to TD social norms, and found themselves in other autistic individuals [21]. As described in autistic autobiographies: "After feeling like I'd spent my life with aliens, I met someone from the same planet as me" [22]. Dugdale et al. conducted phenomenological analysis [23] (Interpretative Phenomenological Analysis, IPA) of interview records from autistic mothers in special role positions and found that after becoming mothers, autistic individuals showed greater understanding of their autistic children and felt strong connection and intimacy with them [24]. Sasson et al. compared first impressions of TD observers when ASD diagnosis information was hidden, accurately labeled, or mislabeled. Results showed that when ASD individuals' diagnostic information was accurately labeled, TD observers' first impressions were more positive. Greater knowledge about ASD could shift peers' impressions of ASD in a positive direction. This suggests that family members and caregivers who interact with ASD individuals long-term can better understand ASD behaviors and intentions and hold higher evaluations of ASD individuals [25]. Based on these qualitative findings, it appears that previous discoveries of ASD individuals showing 障碍 in understanding others' mental states may apply only to understanding TD mental states [26]. Researchers subsequently tested this hypothesis in quantitative studies. Crompton et al. constructed novel information transmission chains and found that mixed chains (TD-ASD groups) showed weaker information transmission effectiveness and interaction pleasure than same-group chains (ASD-ASD groups or TD-TD groups), with no differences between same-group chains. This indicates that ASD-ASD pairs can achieve the same social information sharing and pleasant experiences as TD-TD pairs [26]. Furthermore, Crompton et al. constructed more natural dyadic cooperation tasks and found that both ASD and TD individuals experienced lower rapport when interacting with people of different neurotypes [13]. Senande et al. observed real unstructured dyadic conversations and found that ASD individuals also expressed preferences for other autistic individuals and disclosed more self-information to them [27]. Heasman et al. recorded interactions among 30 autistic adults in video games, revealing the specificity of same-group interactions in ASD, showing that both parties could understand each other, coordinate mutually, and had the potential to establish rapport [28]. Beyond these brief laboratory measurements, Senande et al. also conducted a five-month observational study of natural peer interactions among autistic and TD adolescents. They found that besides individual preferences for interacting with same neurotypes, this preference might increase over time, and same-group interactions involved more sharing of thoughts and experiences rather than reciprocal behaviors like help-seeking observed in cross-group interactions [29]. In early parenting of autistic toddlers, researchers found that increasing parents' sensitivity to ASD-specific signals and enhancing dyadic synchronous interactions between parents and toddlers facilitated improved communication between both parties, suggesting that when non-ASD individuals interact with ASD individuals using more matched behavioral patterns, the communication

process becomes smoother [30]. Collectively, these findings suggest that what is commonly considered social interaction 障碍 in ASD may be at least partially attributable to neurotype mismatch. ASD social difficulties may be fundamentally relational rather than personal deficits as hypothesized by the biomedical model [31].

3 Internal Mechanisms of the Double Empathy Problem

What causes the double empathy problem between these two groups? First, undeniable differences exist between ASD and TD groups, such as different behavioral expression patterns. Research has confirmed that autistic children and TD children convey meaning through different vitality forms. Casartelli et al. filmed video clips of children displaying different vitality forms (e.g., placing objects gently or roughly) and found that while both ASD and TD children could distinguish vitality forms when performing actions, autistic children expressed them through different movement patterns. TD participants showed significantly reduced accuracy when judging vitality forms of autistic children but could correctly judge those of TD children [32]. This may occur because TD participants cannot match the action kinematics of autistic children to their corresponding internal models. Since individual behavioral paradigms are important for both understanding others and being understood by others, and vitality form expression can manifest in every social interaction [33], differences in vitality forms between ASD and TD populations hinder mutual understanding between them. ASD individuals may face multiple dilemmas: initially at a disadvantage in understanding others' mental states, then falling into social communication 障碍 because their own mental states are misunderstood by others [34]. Additionally, Stevanovic et al. found physiological similarity in ASD-ASD and TD-TD dyads; both neurotypes need to dominate social exchanges to experience autonomic nervous system "calm." In cross-neurotype ASD-TD dyads, TD individuals may provide more extensive emotion-related information, causing "socio-emotional overflow" that leads to excessive arousal of emotional empathy in ASD [35]. This supports the theory of cross-neurotype differential socialization [36]. At the brain mechanism level, interbrain neural synchrony between ASD and TD may be key to revealing double empathy, but relevant research remains scarce. Wang et al. investigated interbrain coupling between autistic children and parents during interpersonal coordination tasks and found that compared to solo/non-interactive tasks, coordinated interaction tasks between autistic children and parents promoted neural synchronization in the frontal cortex of autistic children. During cooperative task coordination, more pronounced ASD symptom characteristics were associated with poorer task completion and reduced neural synchrony with parents, indicating that inter-individual neural synchrony is affected by ASD symptoms [37]. These studies suggest that the traditional medical model's view of qualitative differences between ASD and TD has its validity, while similar internal models between ASD and TD facilitate interaction between both parties.

However, from the perspective of individual differences/neurodiversity, differences in behavioral expression may not be specific to the ASD population. Research on interaction processes between ASD and TD has only begun recently, and no studies have yet examined interactions between ASD individuals and those with other neurodevelopmental disorders. Future research could further investigate interactions among other neurodiverse individuals to more deeply reveal potential mechanisms of the double empathy problem.

Second, we must consider interfering effects of other factors, such as stigmatization. Stigmatization refers to the denigration of groups or individuals perceived by the public as outside the "normal" range and undesirable [12], resulting from the combined reflection of prejudice, stereotypes, and discrimination [38]. Due to limited public understanding of this group, they are labeled with negative tags such as "dangerous," "unsociable," or "intellectually disabled," creating obstacles for ASD individuals in education, employment, and transportation [39]. According to social identity perspectives, intergroup behavior is based on perceived group status differences [40]. When TD individuals view ASD as a different group, they may be less motivated to interact positively with ASD individuals and unlikely to form highly-evaluated rapport [13]. Sasson et al. found that TD individuals tend to make rapid unfavorable judgments of ASD individuals—that is, negative first impressions [20]. In studies where TD participants were unaware of ASD diagnoses, they still rated ASD individuals as less attractive and likeable based on photos or videos, showing low willingness to engage in social interaction [20]. During the stigmatization process, individuals' perception of social isolation and alienation may transform into self-stigmatization, producing feelings of shame. To fit in and adapt to normalized social environments, ASD individuals develop camouflaging behaviors. However, this further reinforces negative thoughts that their "true self is not accepted" [41]; camouflaging and masking are often stressful and exhausting, damaging autistic individuals' sense of social belonging and harming their mental health [42, 43]. These unfavorable stigmatizing views and social exclusion further widen the gap between ASD and TD individuals, creating the social interaction difficulties reported in the double empathy problem [44].

4 Corresponding Intervention Methods

Guided by the traditional deficit-based medical model, corresponding interventions typically attempt to alter the different social cognitive processing patterns between ASD and TD [44] through social skills and social cognition training, thereby making autistic individuals' behavioral patterns more closely approximate TD behavioral norms [45]. However, these interventions have not brought lasting benefits to ASD individuals [46] and may inadvertently encourage autistic individuals to "camouflage" [44], adding pressure to change themselves [45], deepening internalized shame [47], and increasing anxiety levels [48]. Given that previous deficit-based biomedical model interventions have low effectiveness in improving social interaction for ASD and may potentially harm autistic

individuals' mental health, there is an urgent need to consider other effective intervention approaches. Below are two intervention models that researchers have attempted or encouraged in recent years.

4.1 Shared Reading Model

Shared reading of novels, based on the emotional atmosphere created by literary works, can effectively promote joint contemplation of literature among different individuals, facilitate understanding of different thinking patterns, and help explore individual differences [49]. Chapple et al. [50] employed a longitudinal qualitative design to investigate whether shared reading experiences could promote double empathy understanding between autistic and TD adults. The study enrolled four autistic adults and four TD adults (balanced for gender) and selected John Steinbeck's novella *Of Mice and Men* (1937) as the shared reading material. Participants read one chapter alone daily for six days, completing structured questions after each reading. On day seven, they completed three writing tasks. These written records facilitated reflection on the novel. Subsequently, autistic and TD participants were paired for discussions lasting four weeks, one hour per week. Finally, feedback was obtained by combining recordings of paired discussions and post-discussion reflection records. Results showed that participants reported developing new personalized views of each other: TD participants reported increased understanding of autistic individuals' sensitivity, while autistic participants reported overcoming previous concerns about stereotypes held by TD individuals and feeling inclusion and value from TD individuals.

4.2 Peer Support

Previous school-based peer support initiatives have included inviting TD school-age children as role models to increase social communication skills in autistic peers [51]. This approach benefits both autistic children in building relationships with TD children and helps address TD children's insufficient understanding of autistic children [12]. However, the core of peer support should be shared experiences or commonalities. Peer support among autistic individuals can provide autistic students with space for mutual communication without needing to mask their natural behaviors. Being able to display oneself authentically during interactions is what autistic individuals value more [52]; therefore, peer support from fellow autistic individuals is preferable to support from others [53]. Since autistic students may experience marginalization in mainstream schools, and positive interpersonal interactions and accepting social environments are crucial for developing self-understanding [54], school frameworks that facilitate positive interactions between autistic students and other autistic individuals can help cultivate positive self-awareness, increase sense of belonging, and reduce suicide risk [55]. Thus, encouraging mutual support relationships among autistic individuals in schools or communities serves as an effective method for improving mental health, which in turn may enhance interactions with TD individuals

[13].

4.3 Interpersonal Synchrony Intervention

Interpersonal synchrony manifests as individuals spontaneously coordinating their actions with others during social interactions, such as mimicking expressions and postures [56]. Interpersonal synchrony brings both parties closer, enhances intimacy, and increases empathy [57]. Research has found that imitation and synchrony levels are lower in ASD than in TD; for example, autistic children show lower synchrony in rocking chair movements with parents, often displaying spontaneous activity [58]. Therefore, many researchers have applied interpersonal synchrony concepts to social skills interventions for ASD. Koehne et al. conducted a 10-week dance/movement intervention focused on interpersonal movement imitation and synchrony (SI-DMI) with 55 high-functioning autistic adults. Therapists established relationships and enhanced emotional connections through mirroring reactions to the quality of autistic individuals' movements or other forms, resulting in improved empathy capacity in autistic adults [59]. Green et al. used the Paediatric Autism Communication Therapy (PACT), which does not focus on changing atypical behaviors in autistic toddlers but aims to help parents understand the uniqueness of autistic toddlers' communication methods and intentions, increase toddlers' experiences of being understood and responded to, improve interaction synchrony between caregivers and toddlers, and thereby enhance autistic individuals' social communication abilities [30].

5 Summary and Outlook

In summary, current research trends on social communication problems in ASD are shifting toward new perspectives, moving beyond focusing solely on deficits caused by ASD symptoms themselves and returning to the essence of social interaction to re-evaluate autistic social interaction through the double empathy problem. Multiple studies have confirmed that neurotype matching indeed affects both parties' interaction experiences and willingness to engage, thereby encouraging the adoption of novel intervention models to improve social interaction in ASD.

Several limitations in existing research can inform future directions:

First, conclusions about the existence and impact of the double empathy problem remain uncertain, as current studies on this theory have not included representative samples, mostly focusing solely on adolescents or adults with limited sample sizes. The childhood period, which is crucial for social interaction development, and differences in social interaction between the two groups across developmental stages remain unstudied. Previous research has found that autistic individuals display different developmental trajectories. TD individuals' social communication abilities improve with age from childhood to early adulthood, while autistic individuals show declining abilities with age [60]. On triangle in-

terpretation tasks, autistic children show increasing gaps with TD children over time because TD children's abilities develop faster than those of autistic children [61]. During the unique developmental stage of adolescence, autistic adolescents face more challenges than TD adolescents, experiencing greater marginalization pressure, negative social evaluation, and higher rates of mental health problems such as depression and anxiety [62, 63], disrupting adult development [64]. Compared to TD adults, autistic adults participate less in employment or social activities, gradually becoming disconnected from society [65]. Research has found that autistic individuals' perception of emotional faces becomes more impaired from adolescence to adulthood [66]. Therefore, future research should expand to include more groups across all age ranges, explore similarities and differences between them, and develop trajectories of social interaction development between the two groups. This would help investigate whether the impact of double empathy on ASD development is consistent throughout life or changes with personal maturation, further guiding stage-specific interventions for communication barriers arising from the double empathy problem.

Second, due to blocked bidirectional information flow between different groups, TD individuals may have difficulty understanding autistic expression, leading to underestimation of autistic empathy capacity. Future research must consider autistic individuals' unique empathic expression and response styles—for instance, autistic individuals may express empathy through problem-solving rather than emotional focus [67], or show care and support through quiet companionship and listening [21]. During research, multiple perspectives should be incorporated: interviewing autistic individuals, inviting researchers or family members familiar with autism to understand autistic individuals' true intentions, rather than treating TD behavioral styles as the sole standard. Additionally, regarding TD individuals specifically, current research only focuses on their difficulty understanding social signals conveyed by autistic individuals, using outcome measures such as inability to recognize facial expressions [16] and behavioral patterns [17], while neglecting to explore process characteristics in TD individuals' understanding of signals conveyed by autistic individuals. For example, previous research found that autistic individuals show atypical visual search patterns for TD signals, including eye avoidance [68] and increased focus on mouth information [69]. Do TD individuals show similar atypical visual search patterns when processing signals from autistic individuals? Or do same neurotype individuals show similar or different processing characteristics? Answering these questions would help further reveal internal mechanisms of the double empathy problem. To more objectively assess process characteristics of social signal understanding, future research should construct standardized autistic emotional face images or dynamic emotional video materials, use eye-tracking instruments or functional near-infrared spectroscopy technology to collect objective data on viewing processes, and combine brain imaging hyperscanning technology to simultaneously detect brain activation in two or more members during daily social interactions, thereby analyzing interbrain coupling phenomena—interbrain synchrony (IBS)—to enable more ecologically valid in-

vestigation of social interaction [70].

Third, multiple studies on social interaction experiences between autistic and TD individuals have used interviews and examination of autistic writings—qualitative research conducted in Western cultural contexts. Different cultural backgrounds have different social norms that subtly influence individuals' psychology and behavior. Western cultures emphasize individualism and self-worth, while Eastern cultures advocate collectivism, stressing interdependence between self and surrounding environment and mutual coordination between individuals [71]. Do interaction experiences between different neurotypes vary across cultural backgrounds? Future research must therefore consider potential influences of cultural environmental factors and conduct replication studies in different cultural contexts. Additionally, intervention models advocated under the double empathy problem framework have not yet been empirically studied in China. Regarding shared reading models, selection of book materials and effectiveness across age groups; regarding peer support methods, implementation approaches and evaluation models—all require practical consideration in inclusive education, special education schools, or community environments to provide more evidence-based support and further create better mental health intervention environments for autistic individuals.

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Note: Figure translations are in progress. See original paper for figures.