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Theory of Mind Understanding and Socioeconomic Status

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Abstract

The participants underwent assessments across all Theory of Mind (ToM) tasks. All individuals were native speakers, comprising 74 from Iran and 66 from Sweden, aged 6-12, and included those with autism spectrum disorder, Down syndrome, and typical development. We conclude that children's behavior serves as a scale for social and thought problem assessments, evaluated based on teachers' and parents' scores. These scales exhibited a robust correlation with ToM results as perceived by teachers but diverged significantly from parents' perspectives. While exploring the relationship between family socioeconomic status and children's ToM understanding, we were unable to establish a clear link in any of our cases. The current findings underscore that the impact of culture is partially evident in the specific tasks developed by children during childhood. However, this cultural influence did not extend to the entire ToM construct. In essence, our results indicate that while the effect of culture is partially confirmed in certain tasks developed by children in their formative years, it is not uniformly present across the entirety of the ToM constructs within these groups.

Keywords: Autism Spectrum Disorder; Down Syndrome; Intelligence Quotient; Theory Of Mind; Socioeconomic Status; ASEBA

Introduction

According to Dunn et al. 1991 [1], the social world plays a mediating role in crucial conceptual advancements evident in social cognition tasks. Individuals with autism spectrum disorder (ASD) often encounter challenges in social communication and interactions [2]. Consequently, children with ASD may find it difficult to express themselves socially and communicate effectively with strangers, thereby affecting their overall social and communication skills. To test their theory, Perner, Frith, & Leslie et al. [3] designed dolls, and the experiment was subsequently replicated by real individuals who enacted scenarios involving these dolls [3].

One interesting observation in cultural studies of the Theory of Mind (ToM) is that a child may outperform peers from different cultural backgrounds in a specific ToM task. A variety of approaches have been used to study the development of Theory of Mind among children with disabilities considering its importance in the development of daily living skills. In fact, researchers have employed diverse methodologies to examine the evolution of Theory of Mind in children with disabilities, recognizing its significance in shaping daily life that documents is mentioned in one study of Peterson, Slaughter et al. [4]

Method

Participants

The initial sample consisted of 155 children: 86 from Iran and 69 from Sweden. After excluding 140 schoolchildren from Tehran and Karaj, Iran, the study focused on 74 children (43 boys and 31 girls), including 24 with autism spectrum disorder (ASD), 24 with Down syndrome (DS), and 26 with typical development (TD). Additionally, 66 children (33 boys and 33 girls) aged 6-12, with similar characteristics were included, comprising 26 with ASD, 18 with DS, and 22 with TD. Sampling was conducted across 23 different locations in Tehran, including clinics, centers, and elementary schools, with and without special needs. In Sweden, children with typical development (TD), Down syndrome (DS), and autism spectrum disorder (ASD) are selected from regular schools in Stockholm and Göteborg. Children with Down syndrome were recruited from Särskolan schools, which were designed for typically developing students.

Procedures

To gather medical, behavioral, and psychological information about the children in our clinical sample, we used a comprehensive approach. Parents were requested to complete a Child Behavior Checklist (CBCL) questionnaire that offered insights into their children's behavior. Simultaneously, the teachers provided corresponding information by filling out the Teacher Report Form (TR-F), detailing the child's behavior in the school environment. As a native speaker of Persian (Farsi), the author administered all tasks to Iranian individuals in a language familiar to them. Swedish children in similar circumstances underwent testing either at their schools or homes facilitated by a native Swedish research assistant. The testing process involved individual sessions, conducted either by the author or in collaboration with a local researcher, in a quiet room within the school or clinic setting.

Tasks and Instruments

Cognitive Measure: Raven's Progressive Matrices (RPMs)

John C. Raven in 2002 [5] developed Raven's Progressive Matrices (RPMs), originally introduced by Raven in 1936 [6]. Coloured Progressive Matrices (CPM) and Standard Progressive Matrices (SPM) were employed for both typical and clinical groups, with SPM specifically used for children typically aged 12 years. Identical versions of Raven's Progressive Matrices were used to establish IQ ranges for both Iranian and Swedish children.

In the absence of a Swedish standardization version, British norms were applied in Sweden [7]. Indeed, it is important to highlight

that the distinct linguistic and cultural contexts between Britain and Sweden could impact the validity and applicability of the assessment. Language variations may introduce biases, affecting how individuals comprehend and respond to the test items. Consequently, caution should be exercised in generalizing findings and interpreting scores. In addition, it is worth noting that the Raven test had been standardized with Iranian individuals in previous studies [8].

Sally and Anne Task; this classic task evaluates an individual's social cognitive ability within the first order of Theory of Mind (ToM) [9].

Smarties Tube Task; this task involves a tube containing smarties instead of a pen. The child demonstrates and reseals the box to reveal its contents [10].

Representational Change Test (Picture Task); in this task children initially view animal pictures in various colors. Subsequently, the examiner disclosed that the animals were concealed except for one body part. With the exception of the final picture and some false belief questions, these are the same objects that the children encountered earlier [11].

The New Theory of Mind (ToM) Test which introduce by, Muris et al., (1999) [12]. For the current study, we utilized the formatted version by Karen L. Anderson (2013), comprising 20 items for ToM 1 (scored from 0 to 20), 13 items for ToM 2 (scored from 0 to 13), and 5 items for ToM 3 (scored from 0 to 5).

BEHAVIOR: The TRF and CBCL Behavior Scales 6/18 [13]: The Achenbach System of Empirically Based Assessment (ASEBA) employs rating forms to evaluate competencies and problems in an individual's behavior from various sources. Our references were parents or parent surrogates using the Child Behavior Checklist (CBCL 6/18), and teachers or school personnel using the Teacher Report Form (TRF 6/18) [13]. Each item was rated on a three-point Likert scale regarding its applicability to the child: 0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true, or within the past six months for the CBCL and more than two months for the TRF [13]. The questionnaires were completed by parents in both countries in their respective languages, with the Iranian versions documented in earlier studies [15,16], and the Swedish versions [14,17].

MEASURE OF SOCIOECONOMIC STATUS: The Hollingshead four-factor index of socioeconomic status (SES) is a survey designed to assess family socioeconomic status [18]. This measure incorporates social status determined by parents' educational level, profession, and occupational status, which are code-rated on predetermined scales. The education code was scored on a 7-point scale, and the occupational code was scored on a 9-point scale. These codes were then multiplied by specific values (profession and occupation level 5 + education 3 = divided by 2 if there were two parents).

Data Analysis

Statistical analyses were conducted using SPSS version 25 (IBM Corporation, 2013). Descriptive statistics were employed to examine the participants' sociodemographic characteristics and variables. Furthermore, analysis of variance (ANOVA) was utilized to explore group differences in Theory of Mind (ToM) tasks, providing mean and standard deviation values for quantitative variables, and frequency and prevalence for categorical variables. The rates of the measures were evaluated through ANOVA, and post-hoc comparisons were carried out using Bonferroni tests. Additionally, one-way ANOVA was applied to assess the association between variables. The relationship between ASEBA internalization and externalization indicators and socioeconomic status was determined using analysis of variance and correlation coefficients. The significance level was set at .05.

Results

Based on evaluations from both parents and teachers, the Achenbach System of Empirically Based Assessment (ASEBA) was used to assess internalizing and externalizing disorders. Our findings demonstrated a robust correlation between our thought and social

problem scales and Theory of Mind (ToM) scores. Notably, there were significant differences in Teacher Report Form (TRF) scores for social problems, thought problems, internalizing, and externalizing, providing additional support for the majority of the tests. Conversely, there was no significant difference in any variable among individuals who completed the Child Behavior Checklist (CBCL) questionnaire. For more information, see table 1.

Table1: Statistical Analyses of Correct and Incorrect Answers on ToM Tasks in Terms of TRF

	T Score (TS)	Response	X (SD)	T/F	Sig
S_A_R	TS Social Problems	No Answer	65.00 (7.216)	1.818	.071
		Answer	61.24 (10.631)		
	TS Thought Problems	No Answer	65.47 (8.370)	2.651	.010
		Answer	60.30 (12.189)		
S_A_C	TS Social Problems	No Answer	63.71 (11.479)	1.835	.069
		Answer	60.52(8.243)		
	TS Thought Problems	No Answer	62.40 (13.182)	.899	.37
		Answer	60.58 (9.866)		
S_A_M	TS Social Problems	No Answer	65.60(7.577)	2.805	.006
		Answer	60.46(10.675)		
	TS Thought Problems	No Answer	66.10 (10.603)	3.233	.002
		Answer	59.32 (11.481)		
Repr_Q	TS Social Problems	No Answer	64.72(7.854)	2.490	.014
		Answer	60.33(10.589)		
	TS Thought Problems	No Answer	65.68(10.393)	3.652	<.001
		Answer	58.45(11.162)		
Repr_RD	TS Social Problems	No Answer	64.41 (8.021)	1.734	.085
		Answer	61.02 (13.353)		
	TS Thought Problems	No Answer	64.76 (14.468)	2.256	.026
		Answer	59.72 (9.879)		
Repr_FB	TS Social Problems	No Answer	63.43(10.665)	2.616	.010
		Answer	58.72(7.219)		
	TS Thought Problems	No Answer	62.06 (12.252)	1.506	.134
		Answer	58.88 (9.147)		
Smart_N	TS Social Problems	No Answer	65.14 (7.185)	1.514	.133
		Answer	61.57 (10.359)		
	TS Thought Problems	No Answer	65.90 (10.931)	2.035	.044
		Answer	60.42 (11.426)		
Smart_F	TS Social Problems	No Answer	66.16(7.297)	4.511	<.001
		Answer	59.14(10.689)		

	TS Thought Problems	No Answer	64.02 (9.191)	2.534	.012
		Answer	59.25(12.601)		
Smart _RQ	TS Social Problems	No Answer	64.95 (12.999)	2.082	.039
		Answer	61.01 (8.337)		
	TS Thought Problems	No Answer	65.05 (14.058)	2.439	.016
		Answer	59.78 (9.988)		

The use of ToM tasks aimed to gauge the impact of a country, revealing a relationship specific to certain tasks rather than ToM as a whole. Specifically, the Sally and Anne tasks, including S_A_R (2 (1) = 1.550; P =.213), S_A_M (2 (1) = 1.512; P =.219), and S_A_C (2 (1) = .125; P =.724), did not exhibit a significant relationship with the country.

Furthermore, significant differences were observed between the Smart_FT and Smart_RQ subscales ((1) = 7.553 and 27.296, respectively). Smart_N scores consistently yielded positive results ((1) = .906; P =.341). Regarding false beliefs and representational change (Repr_FB), no significant relationship with the country was found ((1) = .034; P =.853). However, both the Representational Change-Question (Repr_Q) scores ((1) = 7.038; P =.008) and the Representational Change-Reality (Repr_RD) scores ((1) = 23.993; P < .001) exhibited significant relationships with countries. Several orders of the New Theory of Mind task did not show any significant relationship with the NTT_1 (T = .296; p = .441), NTT_2 (T = .996, p = .743), and NTT_3 subscales (T = 2.325; p = .508). For further details, refer to Table 2.

Table 2: Statistical Analyses of Correct and Incorrect Answers on new ToM task in Terms of First and Second Orders

	Country	X and (SD)	(T)	Sig.
NTT_1	Iran (68)	10.43 (4.198)	-.296	.441
	Sweden (63)	10.65 (4.473)		
NTT_2	Iran (68)	4.24 (2.666)	-.996	.743
	Sweden (63)	4.70 (2.650)		

Note. NTT1-2 (New ToM test _second-third)

Table 3: Frequencies and percentages of Correct and Incorrect Answers on new ToM task in Terms of Tired Order

			Country		Total
			Iran	Sweden	
NTT_3	0	Number	47	36	83
		% NTT_3	56.6%	43.4%	100.0%
		% Country	68.1%	57.1%	62.9%
		% Total	35.6%	27.3%	62.9%
	1	Number	11	16	27
		% NTT_3	40.7%	59.3%	100.0%
		% Country	15.9%	25.4%	20.5%
		% Total	8.3%	12,1%	20.5%
	2	Number	8	7	15
		% NTT_3	53.3%	46.7%	100.0%
		% Country	11.6%	11.1%	11.4%

			6.1%	5.3%	11.4%
	3	Number	3	4	7
		% NTT_3	42.9%	57.1%	100.0%
		% Country	4.3%	6.3%	5.3%
		% Total	2.3%	3.0%	5.3%
Total		Number	69	63	132
		% NTT_3	52.3%	47.7%	100.0%
		% Country	100.0%	100.0%	100.0%
		% Total	52.3%	47,7%	100.0%

Note. NTT_3 (New ToM test- third order).

Despite observing elevated levels of occupation and education within families, our expectations of socioeconomic status (SES) proving indicative of superior performance in Theory of Mind (ToM) tests did not materialize.

Discussion

It has been established that the Child Behavior Checklist (CBCL) and Teacher Report Form (TRF) serve as valuable behavioral measurements for assessing thought and social problems. While significant differences were identified between the subjects, no such distinctions were noted from the parental perspective, where no significant variations were observed. Consequently, children with higher scores demonstrated poorer performance in Theory of Mind (ToM) tasks, indicating a robust correlation between these scales and ToM results. Teachers, in attributing their perceptions, consider daily social situations within the school context, even if these challenges may be less noticeable on a broader scale. The weaker implementation of ToM skills was associated with higher thought and social scores in teacher reports.

Cultural influences were found to affect specific ToM tasks rather than the entire ToM construct. Notably, several tasks exhibited a significant relationship between countries and our predictions, including the Smarties false belief question and representational change/Smarties reality question. Several cross-cultural studies have linked evidence of cognitive precursors and an understanding of false beliefs in the accurate implementation of tasks [19,20,21,22].

Contrary to early studies that utilized socioeconomic status (SES) to assess children's ToM development, our findings suggest that the socioeconomic status of children does not exhibit a significant association with ToM scores [1,23]. Despite previous attempts to establish a link between family SES and ToM development, no clear correlation has emerged [1,23,24].

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