

Vulnerable Socially Smart Kid: Theory of Mind and Sensitivity to Teacher Criticism

Jiangyue Li

The Education University of Hong Kong
e-mail: jiangyuebellali@gmail.com

ABSTRACT

Objectives: Previous studies have found that children with advanced social understanding are more sensitive to teachers' criticisms. However, these studies were restricted to Western countries and relied heavily on false belief tasks to represent theory of mind development. This research studied how the development of theory of mind in Chinese children predicted their sensitivity to teachers' criticisms. **Methods:** This study recruited Chinese participants and adopted comprehensive theory of mind measurements to fill research gaps. **Results:** Three major findings shed light on Chinese students' sensitivity to teachers' criticisms. First, when confronted with failure or criticism, Chinese students with a more sophisticated theory of mind experience would be more likely to underestimate their abilities. Second, when criticized, they are more likely to experience more negative emotions than when they fail. Third, the research identified specific relationships between each milestone of the comprehensive theory of mind and sensitivity to criticism.

Keywords: *Theory of mind, Sensitivity to criticism, Comprehensive measurement, Children*

1. INTRODUCTION

Theory of mind has attracted the interest of many researchers owing to its important role in social interaction. It refers to the ability to understand others' mental states [3]. Previous research found that children with better understanding of others' mental states [3][11] might have higher peer acceptance [6], sibling relationship [11], social skills [21], and social competence [1][2]. Despite these benefits, one noticeable cost for children with sophisticated theory of mind may have a great sensitivity to teacher criticism [7]. Sensitivity to criticism has been known as the ability in sensing and valuing others criticism [12]. Extensive research had shown that children who had a higher theory of mind tended to estimate their capability lower and feel more negative to teacher criticism [6][7][11]. However, these studies only rely on the false belief tasks to measure children's theory of mind development. Furthermore, research subjects have been mostly restricted to western countries, and much less is known about Chinese children. In this context, this paper is structured as follows. First, review the background and relevant research on theory of mind and its relationship to sensitivity to criticism. Next, conduct an experiment among Chinese elementary school students to understand

this issue. Finally, conclude the research findings and outline implications for future studies.

2. LITERATURE REVIEW

Previous research suggested a positive correlation between theory of mind and sensitivity to teachers' criticism [6][7][11][12][15]. These studies found that children with more complex theory of mind tended to rate their emotion more negatively and ability lower after being criticized [6][7][11][12][15]. According to Dunn's pioneering research, children who passed the false belief task at 40 months rated their competence lower in their self-report two years later [7]. Similarly, Lecce et al. found that advanced early theory of mind development indicated later sensitivity to criticism [11]. Similarly, Cutting & Dunn found that advanced theory of mind correlated with more sensitivity to teacher's criticism [6]. Despite its potential significance, existing research heavily relied on false belief tasks as a single measure to theory of mind development.

Instead of a single standard test, theory of mind should be a series of social understandings that evolves during development [18][19]. Results showed that 4-year-old children who failed the false belief tasks could demonstrate understanding of others' mental states in other ways [18][19]. Besides, O'Neill's influential

research discussed how about 2 years old children would change their ways of expression according to their parents' knowledge of the situation [16]. The experimenter placed a toy on the shelf in two conditions. One parent group witnessed the toy placement while the other was absent from the scene. When children wanted their parents to get the toy, they were found to be more likely to point the toy to their parents who didn't witness the placement [4][16]. Likewise, indicated that autistic children and typically developing children at age three might both fail the false belief tasks. Nevertheless, it's hard to ignore the fact that their social interactions are vastly different. These phenomena suggested that false belief tasks could not capture all parts of theory of mind development [4].

Children can notice that individuals have diverse desires, feelings, knowledge, and intentions, in addition to knowing others' different beliefs (false belief). Wellman and Liu conducted cutting-edge research which carefully mapped out a five-step theory of mind development: Diverse Desire (DD), Diverse Beliefs (DB), Knowledge Access (KA), False Belief (FB) and Hidden Emotion (HE) tasks [22]. Later, Peterson et al. expanded this five-step scale by adding a sophisticated social understanding-Sarcasm (SARC) task [18]. This current six-step scale extended our understanding of theory of mind to other crucial components in children's social understanding development. Concretely, this comprehensive measurement broadened our understanding of belief from false beliefs to diverse beliefs [22]. The first test asked the children to recognize that other people's opinions were different from their own, and the second test asked them to recognize that other people's opinions might be incorrect (false beliefs) [22]. By adding Sarcasm tasks, this scale captured the further theory of mind development in older children who already passed the false belief tasks [18]. It allowed children to perceive others' underlying thoughts, leading to more intricate social interactions [9]. In addition, researchers were able to better comprehend the relationship between theory of mind and other abilities, attributed to the overall implications of this holistic measurement [22]. It's worth nothing that they have yet to discover the association between this comprehensive theory of mind development and sensitivity to criticism. Research in this topic has primarily been limited to western countries, while interest in eastern countries has grown in recent years. Mizokawa delved at this correlation in Japanese students who were given teacher criticism, indicating a positive correlation [15]. Nevertheless, researchers are unclear of this phenomenon with Chinese learners, which urges further research. The cross-cultural differences between western and China might lead to different research findings. Liu et al. found that Knowledge Access development in Chinese children was earlier than Diverse Beliefs [13]. This complete test gave researchers a fuller picture of

children's theory of mind development and its precise relationship to critical sensitivity.

Based on the above, this study aims to use the most recent version of the complete theory of mind measurement, to understand how theory of mind in Chinese children (6-9 years old) predicts their sensitivity to criticism. Drawing upon earlier empirical findings, the author hypothesized that children who performed higher on theory of mind tests would be more sensitive to teacher's criticism. In detail, (1) a higher total theory of mind score predicts a lower emotional rating in the criticism condition; (2) similarly, it also predicts a lower ability rating in the criticism condition.

3. METHODOLOGY

3.1 Participants

This study selected 42 Chinese students from an elementary school in China's Hunan province as participants (24 boys and 18 girls, mean age=88.9 months, range=76-110 months; SD=9.24), who were mainly from the middle and working classes and had no developmental delays. All work conformed to the ethical approval of The Education University of Hong Kong.

3.2 Procedures

Participants were randomly chosen from their classrooms and taken to a quiet testing room inside the school. Role play (e.g., teacher toy, student toy, etc) had been used to facilitate children's familiarity with the task scenario and build rapport [10]. The comprehensive theory of mind and sensitivity to criticism tasks were given to each participant. To balance the test order effect, the two test segments, sensitivity to criticism and seven measures of theory of mind, were tested in random order. Nonetheless, the testing sequence within each segment was predetermined. All materials were translated into Chinese. To maintain students' attention, stickers have been used as incentives.

3.2.1 Sensitivity to Criticism Task

After being brought to the quiet room, children were instructed to select one of the toys to represent themselves, while another toy would play the role of a pretend teacher. When rapport was built, participants were introduced to two scenarios developed by Heyman and Dweck and adapted by [10][15]. In these two parallel stories, the main character (the participant) worked diligently but made a minor mistake while painting a picture (Story A) or writing numbers (Story B). Despite the same theme, these two scenarios end differently to set a prejudgement baseline. Story A ends with no negative input, just pointing out the error (failure condition), while the pretend teacher in story B gives the child criticism after pointing out the error (the criticism condition).

After listening to each story, the child would have to pass a memory control question before giving evaluations in two dimensions: emotion and ability. In the failure condition, participants were asked to describe what occurred in the scenario (they tried hard but made a mistake that was pointed out by the teacher), but in the criticism condition, they were asked to answer the question "what did the teacher say to you". Story would be repeated if the participant failed the memory control question. To measure their sensitivity to criticism, participants were required to report their feelings and rate their perception of their abilities after hearing teacher criticism; assess their mood by selecting one emoji from those that represented joyful, angry, and sad. In addition, think about what happened in the story again and then tell the researcher whether they should get a tick (good) or a cross (bad) for what they did. Later, a debriefing scenario (story C) would be conducted [10][15]. In the debriefing story, the participant was given the opportunity to help another pretended peer solve an issue and was praised by the pretended teacher who had previously criticized them. This story was designed to make every child feel comfortable prior to leaving the testing room [10].

3.2.2 Theory of Mind Tasks

Each participant has completed seven theory of mind assessments to assess their theory of mind development. These series of tasks include diverse desires (DD), diverse beliefs (DB), knowledge access (KA), false beliefs (FB), hidden emotion (HE) [17], and sarcasm (SARC) [18]. Liu et al. found that Chinese children's knowledge access development might be earlier than diverse beliefs when compared to this with western countries [13]. To align this cross-cultural difference, this study implemented the knowledge access task prior to the diverse beliefs task. Moreover, it also adopted the most updated version of the hidden emotion task and its scoring criteria [18]. Previous studies on the comprehensive theory of mind scale used the scoring scale (from 0-7) provided by Peterson et al. [17], however, this study increased the total score to 8 by adding one open ended question on the Hidden Emotion

task as suggested by Peterson et al. [18]. Furthermore, the scores of explicit and content false belief tasks had been combined to represent the False Belief tasks.

4. RESULTS

Among 42 participants, there were 41 (98 percent), 39 (93 percent), 36 (86 percent), 26 (62 percent), 18 (48 percent) and 2 (5 percent) students passed the diverse desires, knowledge access, diverse beliefs, false beliefs, hidden emotion, and sarcasm tasks respectively.

A simple linear regression analysis was performed to study the statistical relationship between comprehensive theory of mind and participants' sensitivity to criticism (Table 1). In the criticism condition, theory of mind score explained 12% of the variance ($RR2=.12$, $F(1,40)=5.33$, $p<.05$) and was considered to be a significant predictor of children's emotional rating ($\beta = -.34$, $p<.05$). In ability rating, theory of mind score accounted for 16% of variance ($RR2=.16$, $F(1,40)=7.5$, $p<.01$). The higher the score of theory of mind, the lower the children's evaluation of their own abilities ($\beta\beta= -.40$, $p<.01$). Overall, these results revealed that Chinese children with higher theory of mind scores were predicted to have more negative emotions and lower ability rating after being criticized.

Similar results were observed for children's perception of their ability to failure. The integrated score of theory of mind could be a predictor to children's ability rating in the failure condition ($\beta\beta=-.33$, $p<.05$) and explained 11% of the variance ($RR2=.11$, $F(1,40)=4.77$, $p<.05$). However, children's emotion rating in failure condition was not explained ($RR2=.04$, $F(1,40)=1.68$, $p<.05$) or predicted ($\beta\beta= -.20$, $p<.05$) significantly by theory of mind score. These results provide important insights into Chinese student's sensitivity to teacher's criticism. When encountered failure or criticism, Chinese students with more advanced theory of mind development would likely rate their ability lower. Compared to failure, Chinese students with higher theory of mind score may suffer more negative emotions after hearing the teacher's criticism.

Table 1. Predictors of Sensitivity to Criticism

Variable	Failure Condition		Criticism Condition	
	Emotion Rating	Ability Rating	Emotion Rating	Ability Rating
Theory of Mind Sum Score	B	B	B	B
	-0.20	-0.33*	-0.34*	-0.40**
R^2	.04	.11	.12	.16
F	1.68	4.77*	5.33*	7.5**

Note: * $p<.05$, ** $p<.01$

Pearson r correlations are presented to further reveal how theory of mind development relates to sensitivity to criticism (Table 2). Firstly, diverse beliefs ($rr = -.48, p<.01$) and false beliefs ($rr = -.34, p<.05$) tasks both have significant negative correlation with the ability rating in the criticism condition. As suggested above, previous studies have mainly relied on the false belief task to measure the development of theory of mind. Notably, the diverse beliefs task in this study demonstrates more substantial connections with sensitivity to criticism than false belief tasks. Secondly, when receiving criticism, children who passed diverse desires ($rr = -.35, p<.05$), knowledge access ($rr = -.37, p<.05$) or false beliefs ($rr = -.32, p<.05$) rate their emotions more negatively. Thirdly, diverse beliefs ($rr = -.37, p<.05$) task has a significant negative correlation to emotion rating in the

failure condition, whereas both diverse beliefs ($rr = -.45, p<.01$) and knowledge access ($rr = -.31, p<.05$) tasks have a significant negative correlation to ability rating in the failure condition. These negative correlations indicated positive correlations between sensitivity to criticism and theory of mind.

Generally, the association between diverse belief, diverse desire, knowledge access, false beliefs, ability, and emotion assessment were in the predicted direction. This study did not find a significant correlation of the Hidden Emotion and Sarcasm task, as 52% of participants failed the hidden emotion task and 98% failed the sarcasm. The average age of the participants in the current study was 88.9 months, indicating a flooring effect.

Table 2. Correlation between Theory of Mind and Sensitivity to Criticism

	Correlation Coefficient							
	Age	Gender	Diverse Desires	Diverse Beliefs	Knowledge Access	False Beliefs	Hidden Emotion	Sarcasm
Failure Condition: Emotion Rating	.02	-.08	-.14	-.37*	-.25	-.15	.17	-.01
Failure Condition: Ability Rating	-.17	-.11	-.17	-.45**	-.31*	-.11	-.01	.01
Criticism Condition: Emotion Rating	-.04	-.26	-.35*	-.18	-.37*	-.32*	-.04	.08
Criticism Condition: Ability Rating	-.03	-.17	.06	-.48**	-.18	-.34*	-.20	.19

Note: Correlation coefficients marked were statistically significant (* $p<.05$, ** $p<.01$)

5. DISCUSSION

This study focused on 42 Chinese elementary school children, with the goal of elucidating the link between comprehensive theory of mind and sensitivity to teacher criticism. Previous studies relied on the false belief task to assess theory of mind development and were limited to Western nations, but this study filled in these gaps. Along with that, several significant findings were made.

First, higher theory of mind score predicted lower ability rating and more negativity in emotion rating in the criticism condition, which validated the main hypothesis. In contrast to a vague negative correlation between theory of mind and sensitivity to criticism found in previous studies [6][7][11][12][15], this study further provides a possible predictor of trend based on the entire array of theory of mind array.

Second, the complete measurement not only fills in the gaps left by earlier studies, but it also produces an unexpected result. That is to say, the theory of mind total score did not substantially predict the emotion rating in the failure condition, even though the trend was in the right direction. Using a thorough theory of mind measurement, as Wellman and Liu pointed out, may have an impact on the findings when identifying its relationship with other abilities [22].

These two findings shed light on Chinese students' sensitivity to teacher criticism. When confronted with failure or criticism, Chinese students with more sophisticated theory of mind are more inclined to underestimate their own abilities. Moreover, they would experience more negative emotions because of criticism other than failure.

Third, several significant findings were revealed

when the precise relationship between sensitivity to criticism and individual theory of mind tasks was investigated. Firstly, Chinese children who achieved false beliefs tended to rate their ability lower and emotions more negatively when receiving criticism. This is consistent with former studies in western countries [6][7][11][12]. Secondly, Chinese students who apprehended diverse beliefs rated their ability lower in both criticism and failure condition. They also experienced more negative emotions in the failure conditions. As they understand their teacher might think differently (diverse beliefs), they might have taken their teachers' criticism into account to reassess their abilities. When encountered failure, the outcome indicated that unsuccessful attempts would lead to lower ability rating and more negative feelings. This expanded our understanding of children's diverse beliefs and its relation to sensitivity to criticism. Moreover, Chinese children who passed knowledge access tasks didn't rate their ability lower but rated their emotions more negatively in the criticism condition. A possible explanation for this interesting phenomenon is that Chinese children who understand their teacher are knowledgeable would embrace the limitations in their own abilities but still experience more negativity in their emotions.

This study did not find a significant correlation between hidden emotion, sarcasm, and sensitivity to criticism. This is because most participants failed these two tasks. The mean age of participants in the present study was 88.9 months, suggesting a flooring effect. Banerjee conducted a large sample research on children's comprehension of sarcasm, who found that 7 years old might be aware the sarcasm story was odd and only 25% of 9 years old comprehended sarcasm [5]. Future research may consider recruiting a sample of older children or even adults to study the link between later theory of mind development and its relationship to sensitivity to criticism.

Overall, this present research contributes to the field in several ways. It confirms the results of previous studies and extends this trend by using total theory of mind score as a significant predictor of sensitivity to criticism. In addition, it refines the research measurement by adopting the most recent comprehensive theory of mind measurement. Furthermore, it expands our understanding of Chinese student's detailed theory of mind development and its relationship to criticism. Criticism and failure are common within school settings. This study addresses the importance of providing growth feedback versus criticism [8][14][20]. Finally, it urges school social emotional curriculum to include lessons on coping with criticism. This might provide a buffer between the child with sophisticated theory of mind and the criticism of others. In conclusion, a new approach to investigate the theory of mind development and its relation to other abilities in this study would benefit

future researchers.

6. CONCLUSION

This study investigated sophisticated theory of mind development and its relationship to sensitivity to criticism within 42 primary school Chinese children. It implemented an upgraded version of the theory of mind test, which broadened the scope of theory of mind beyond false beliefs to include desire, knowledge, emotion, and intention. The research findings aligned with previous studies and expanded our understanding. It identified a significant predictor of Chinese children's sensitivity to criticism using a refined research method. This provided insights for teachers, parents, and researchers on how children's social knowledge develops and how to prevent the costs associated with it.

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