Journal of Educational and Developmental Psychology; Vol. 7, No. 2; 2017
ISSN 1927-0526 E-ISSN 1927-0534
Published by Canadian Center of Science and Education

Theory of Mind Training in Children with Autism: Relating the Shared Attention Mechanism to the Theory of Mind Mechanism vs. Understanding Beliefs Training

Lama Bergstrand Othman[1] & Lana Collet-Klingenberg[1]

[1] Special Education, The University of Wisconsin-Whitewater, Whitewater, USA

Correspondence: Lama Bergstrand Othman, Special Education, The University of Wisconsin-Whitewater, 800 W Main Street, Whitewater, WI, 53190, USA. Tel: 1-262-472-3019. E-mail: Bergstrl@uww.edu

Received: July 4, 2017 Accepted: July 20, 2017 Online Published: August 3, 2017

doi:10.5539/jedp.v7n2p75 URL: http://doi.org/10.5539/jedp.v7n2p75

Abstract

The purpose of this training study was to examine two interventions that aim to improve the performance of students with Autism Spectrum Disorder (ASD) on False Belief Tasks (FBT) which examines the ability to recognize others' mental representation of the world. The first intervention involved drawing connections between the Shared Attention Mechanism (SAM) and the Theory of Mind (ToMM) Mechanism. The second intervention taught belief understanding and the fact that a person's beliefs about propositions may be false or true. To that end, we employed ABC and ACB multiple baselines across subject designs with matched controls. To assess generalization of learned skills, parents or teachers were interviewed. Results suggest that both interventions were effective.

Keywords: autism, Autism Spectrum Disorders—ASD, Theory of Mind—TOM, Shared Attention—SAM, intervention, social skills

1. Introduction

Theory of Mind (ToM) is the ability to infer other peoples' knowledge, desires, beliefs, and intentions (Bjorklund, 2005). The presence or absence of ToM can be investigated using False Belief Tasks (FBT) which examine one's ability to infer that someone else possesses a certain level of knowledge that may or may not be correct. First-order FBTs are related to the recognition of a person's knowledge, beliefs, or desires (e.g., one knows that Ali thinks it will rain today). Second-order FBTs are related to knowledge of a person's beliefs about another person's beliefs or mental state. For example, one knows that John believes that Ali thinks it will rain today (Baron-Cohen, 1996). This training study is based on the perspective that diminished competencies of ToM can be explained through a core deficit model; which entails a direct connection between ToM and its precursor skills such as shared attention mechanism-SAM (Fletcher-Watson, McConnell, Manola, & McConachie, 2014).

In a standard FBT, students watch a piece of candy being hidden in a drawer. Person X, who is present while the candy is hidden, leaves the room. While out, the candy is moved from the drawer to a new location. Students are then asked "when person X returns, where will he/she look for the candy?" (Wimmer & Perner, 1983). Most four-year old children successfully infer that person X will look for the candy in the drawer (Wellman et al., 2001). Another type of FBT involves showing students a distinctive box of candies that students are highly familiar with. Students are then asked what they think is in the box. The children say the name of the candy. The interventionist then reveals that there are no candies in the box but colors instead. Students are asked two questions: 1) what they thought was in the box prior to opening it; 2) what another person who didn't see the trick will think is in the box? Most four-year old children answer "candies" to both of these questions (Hogrefe et al., 1986). Regardless of the type of FBT, it has been established that children with autism have diminished competencies of ToM and hence fail FBTs (Bjorklund, 2005; Baron-Cohen, 1996; Perner et al., 1989; Leslie & Frith, 1988). Baron-Cohen (1996) proposed the "Agent-Attitude-Proposition" (for example, "Ali-thinks-it is raining"); In addition to the trueness of the proposition, typically developing children can comprehend that the

agent (in this case, Ali's) belief could be true or false. Most children with autism, on the other hand, comprehend the trueness of the proposition, but struggle with understanding the agent's belief.

ToM may be composed of four modules, each of which can work as an input to the other and can eventually engage ToM (Fletcher-Watson et al., 2014; Baron-Cohen, 1996). The Intentionality Detector (ID), which emerges at 0-9 months in typically developing children, is a simple module that exists in all animals with a nervous system. The ID is simply related to realizing or making inferences about the desire of an object or a living thing based on its movement. The Eye-Direction-Detector (EDD), emerging at 0-9 months in typically developing children, indicates that the child can detect an eye or an eye-like stimulus, recognize what the eye is looking at and based on that, infer that a person can see a certain object. Both the ID and EDD are dyadic representations of people or objects. The Shared Attention Mechanism (SAM), which emerges at 9-18 months in typically developing children, occurs when the child realizes that he/she and another person are looking at the same thing. The Theory of Mind module (ToMM), emerges between 18 and 48 months in normally developing children, and refers to a child's ability to represent other people's states of mind. SAM & ToMM are triadic mental representations. A deficit in shared attention is considered one of the early diagnostic criterion for ASD (DSM5; American Psychiatric Association, 2013). Children with autism are believed to have developed the ID & EDD but struggle with developing the SAM & ToMM (Baron-Cohen, 1996; Baron-Cohen, 1989). The implication of this discrepancy is that children with autism are unable to achieve a triadic type of representation or declarative comprehension (Broekhof et al., 2015; Kristen, 2011); one in which, a child and person X, for example, can attend to the same object/person or can share attention as social partners. Deficient triadic type of representation could explain why children with autism lack pretend and symbolic play, and consequently, they fail to relate to other people's different states of minds. However, this explanation was challenged by findings suggesting that many individuals with Asperger's syndrome succeed in FBTs despite their disengagement in pretend play and their sub-average understanding of others' mental states (Bowler, 1992). In the same vein, typically developing children use empathy and emotional routes to solve FBTs and similar social situations, whereas children with Asperger's syndrome who experience success in FBTs may be using alternative routes. In other words, their high cognitive abilities allow them to use cognitive routes that enable them to pass FBTs, and consequently, it takes them more time to solve FBTs than it takes typically developing children (Hermelin & O'connor, 1985) but they are still able to solve them.

Another proposed reason for the lack of ToM in people with of autism is a deficit in shared attention and ostensive behavior. That is, most children with autism demonstrate difficulty in imperative comprehension and in their ability to point to something or showing an object to someone (Broekhof et al., 2015; Kristen, 2011). Closely related to joint attention is ostensive communication, in which the child places a stimulus in someone's environment to direct that person's attention (Leslie & Happe', 1989). Students with autism lack social interest, which impedes their ability to develop shared interest (Lind & Bowler, 2009); hence, their inability to develop ToM could be the result of a lack of motivation rather than differences in their ability to represent other people's mental situation. The most popular explanation of the lack of ToM is related to Baron-Cohen's modules, which are ultimately related to a deficit in meta-representational abilities. The fact that the presence and absence of ToM is investigated using FBTs, which are based, for the most part, on language, suggests a connection between conversational skills and perspective taking (Ozonoff & Miller, 1995). Therefore, many training approaches seem to address specific social skills that are directly related to ToM. The results of such studies showed that individuals with autism demonstrated improvements in their overall performance on the FBTs; however, such improvement did not generalize to social skills, as rated by parents and teachers (Begeer et al., 2011; Golan & Baron-Cohen, 2006; Ozonoff & Miller, 1995). Many children use emotional routes to solve problems similar to those presented in FBTs, which suggests that a training approach that teaches emotions and belief understanding in addition to play-related components could be beneficial. However, some of these tasks showed no significant differences after such training (Handwin, Baron-Cohen, Howlin, & Hill, 1997). One prerequisite to understanding false belief is the ability to evaluate one's knowledge or lack of knowledge (Wellman & Liu, 2004; Wimmer & Gschaider, 2000). However, in many aspects of our lives, our knowledge is related to our visual perception or the see-know connection (Wimmer et al., 1988). This suggests that children with autism may have an interrupted perception-knowledge relationship, which is evident in their low performance on standard see-know tasks (Lind & Bowler, 2009; Baron-Cohen & Goodhart, 1993; Leslie & Frith, 1988; Perner et al., 1989).

Most research has used training skills that were not directly related to the hypothesis that SAM is an input of ToMM in the same manner that EDD is an input of SAM. Therefore, an intervention that directly accounts for

this type of relationship is worth investigating and is the purpose of this study. Pre- and post-intervention experimental designs are sound methods for examining the effect of a certain type of training on the ability to successfully complete FBTs. The time interval between the pre- and post-intervention evaluation should be moderately long to allow for sufficient training time but sufficiently short to ensure that the difference in performance is the result of the experimental factors. The purpose of this study is to examine two types of interventional program. One is based on Baron-Cohen's modules, which posit that EDD is an input of SAM-declarative attention. The other intervention program (described below) is training on false or correct beliefs that are based on visual perceptions.

2. Materials and Methods

2.1 Participants and Setting

Twelve students with autism, ages 9-12 years, participated in this study. Six students went through the training program, and the other six served as matched controls. The schools from which the students were selected were affiliated with School District One of the capital city of Amman, Jordan. Selection of the twelve students was based on four criteria: qualified for special education services for autism, verbal and language abilities that are at least at the 60^{th} percentile rank, and academic achievement at the 60^{th} percentile or higher. The fourth criterion was the inability to successfully complete FBTs. To determine whether the students met the criteria, the first author met with their special education teachers and school counselors and obtained parental consent to identify students whose records showed that they were recently given standardized tests of language and verbal abilities, an autism spectrum test, and a test of achievement. Students whose record did not include such standardized documentation or whose test(s) were administered three or more years ago were not considered for this study. Students who met the three testing criteria then took three similar FBTs. Those who failed at all three trials were considered candidates for the study (see Table 1). They were then matched according to age, gender, language and verbal abilities, and academic achievement. The final sample comprised 6 pairs/12 students.

Table 1. Demographics of participants and their matched pairs

	Age	Language and Verbal Abilities %ile	Most Recent Academic Achievement %ile	Eligibility for Autism	Gender
Pair1	9.11-10.2	60-63 %ile	62-65 %ile	√	Male
Pair2	10.6-10.8	79-81 %ile	63-65 %ile	√	Male
Pair3	10.11-11.0	68-69 %ile	67-70 %ile	√	Male
Pair4	11.3-11.7	65-66 %ile	63-67 %ile	√	Male
Pair5	12.4-12.4	64-66 %ile	68-70 %ile	√	Male
Pair6	12.7-12.9	69-70 %ile	73-78 %ile	√	Male

2.2 Procedures and Design

To investigate the presence or absence of ToM, FBTs were used. Each of these tasks could be repeated as many times as needed. The tasks were parallel to second-order FBTs, as described in the literature (Bjorklund, 2005; Baron-Cohen, 1996). Failure on FBTs was the final criterion for inclusion in this study, hence, these tasks were initially used to select participants. Later, the tasks were used in between interventions to investigate any improvement or acquisition of the ToMM. The implementation of each task did not exceed five minutes (see Tables 1).

Table 2. Example of False Belief Tasks for one session. Possible score 0-3

Session2-FBT1	Session2-FBT2	Session2-FBT3
The participant looks at a box of a popular packed treat (Tofeh). The interventionist opens the box and reveals that there is a pencil inside the box.	The participant checks a box of popular chocolate (Robert's). The interventionist opens then box and reveals that there are erasers instead.	The participant is looks at a kinder egg which is-popular in that area. The interventionist opens the egg and reveals that there is a paper clip instead of a little toy.
FB Question: "What did you think was in the box before opening it?"	FB Question: "What did you think was in the box before opening it?"	FB Question: "What did you think was in the egg before opening it?"

After obtaining permission from the participants' parents, the study was conducted at three schools within an eight-mile radius of one another and continued three-four times a week for six weeks. Graduate students who had a degree in special education and/or worked as special education teachers conducted the intervention program and the FBTs. Other adult volunteers assisted in conducting the study and observing the students' answers for later reliability checks. It is worth mentioning that because of the nature of the experiments, student volunteers who were siblings or friends of the participants were sought to help create the different experimental conditions in the interventions and the FBTs.

The first two FBTs (see Table 2) were only trials to help the participants become acquainted with the elements of the study. The three task implementations that followed were used as baseline data for each of the twelve participants. An ABC multiple baseline across-subjects design with matching controls was employed in this study. The baseline was A; the first training intervention (linking SAM to ToM) was B; and the belief-understanding training was intervention C. Intervention B aimed to teach students that we know what we see. This training is related to Baron-Cohen's concept of EDD and its relatedness to SAM and ToM. It follows the perspective of a core deficit model (Fletcher-Watson et al., 2014). Intervention C, in contrast, was based on training students on the idea that people may have true and false beliefs. Training C included activities aimed at understanding another person's perspectives. Each activity lasted 10 minutes. The training of each of the six students with autism took place in the library or in a room with one interventionist, another adult helper with whom the student was familiar, and a nondisabled sibling or a peer with whom the student with autism was familiar. For three of the students in the experimental group, the routine followed the ABC design for the first 3 weeks: 1) baseline (three sessions total); 2) intervention B was implemented (10 sessions total); 3) FBT was implemented (three tasks per session). For weeks 4-6, the routine was: 1) intervention C was implemented (10 sessions total); 2) FBT was implemented (three tasks per session); For the other three students in the experimental groups the routine followed the ACB design for the first three weeks: 1) baseline (three sessions total); 2) intervention C was implemented (10 sessions total); 3) FBT was implemented (three tasks per session). For weeks 4-6, the routine was: 1) intervention B was implemented (10 sessions total); 2) FBT was implemented (three tasks a session). The reason for using an alternate ABC/ACB design was to make sure that the type of interventions rather than the order of the interventions caused the change in the results.

To further clarify the procedures, the training of one student using the ABC design is described here: During a session of intervention B, an object with which the student was familiar with, a tennis ball, was hidden in a place while the student with autism and his peer/sibling were watching, and the interventionist asked the peer/sibling to leave the classroom. While the peer/sibling was outside the classroom and within sight of the student with autism, the interventionist removed the tennis ball and placed it in a different location, then asked the student with autism "Where do you think your (brother) will look for the ball when he comes back?" The interventionist and the adult helper coded the student's answer as 0 if he referred to the second location and 1 if he referred to the first location. During that period, a video camera recorded the trial; the examiner played the video from the beginning and prompted the student with autism in the following manner: "Did you see me when I changed the location of the ball? How did you see me? Who else saw me? What about your (brother); did he see me? Where was he?" Finally, the routine above was implemented again to understand the effects of the intervention on the student's answer to the FBT question "Where do you think your (brother) will look for the ball when he comes back?" Inter-rater reliability was determined afterwards using a category-to-category comparison. If the student could answer the FBT question 3 consecutive times, he exited the study without having to complete all 6 weeks of sessions.

Students in the ABC design who were unable to provide 3 or more consecutive correct answers on the FBT questions during intervention B were moved to intervention C after session 10, and students in the ACB design who were unable to maintain 3 or more consecutive correct answers to the FBT questions during intervention C were moved to intervention B after session 10. It is worth mentioning that in many research studies the FBTs and intervention close to intervention B of this study were conducted using toy characters and verbal or visual scenarios where students responded to the question by selecting a face or a toy character (Loukusa, Mäkinen, Kuusikko-Gauffin, Ebeling, & Moilanen, 2014; Fisher & Happé, 2005). In this intervention; however, the researchers attempted to create a relatively authentic environment where students with ASD, siblings/peers, and adults were actively involved in the experiment.

The training activities in intervention C were highly structured situations that emphasized the misrepresentations of others' knowledge and were saturated with teasers. One example of such training is as follows: the student with autism and his peer/sibling, together with the interventionist, are cutting papers to paste using a step-by-step visual organizer. The nondisabled peer was previously instructed to try to paste the paper before cutting it, which violated the orders in the visual organizer. After the students pasted the papers onto their cardboard, the interventionist asked the student with autism questions that helped him understand the peer/sibling's misconception of the activity procedures. The prompts were as follows: "Did he cut the papers? What do you think he didn't do right? Shall we go and tell him how it should be done? What shall we tell him? Can you show him the advanced organizer? Let's check and see if he will do it right this time." It is worth mentioning that each training activity in intervention C was selected according to the individual student's interest; hence, avoiding conflicts in desire among participants (Broekhof et al., 2015). For example, if a student liked cutting and pasting, the intervention was tailored around it. A student who liked to count and classify his little cars was given a counting and classifying activity to perform with his nondisabled peer/sibling in the fashion similar to that of the example above.

Engaging in a discussion about the mind, or about the emotional aspects of a story, has significantly helped typically developed students strengthen their concept of ToM (Bianco & Lecce, 2016). In intervention B, students with ASD were involved in a discussion that aimed to find the missing link "your brother didn't see, so he doesn't know". Likewise, in intervention C, students with ASD were involved in a three-way discussion to understand the inaccurate representation of the advanced organizer in the mind of the sibling/peer. Hence, this training study is highly structured around seemingly random conditions that aim to find the missing link between SAM and ToM.

3. Results

To compare the effectiveness of interventions B and C, performance of the three students in the AB design was compared to the performance of the three students in the AC design. Results showed that interventions B and C have similar degree of effectiveness (Figure 1). Regardless of whether they participated in intervention B or intervention C, the students in the intervention groups seem to have outperformed their matched controls (Figure 2). While the students in the experimental group participated in the study activities, the students in the control group went through the daily school routines that were provided by their schools according to each student's academic, behavioral, and emotional needs. This also applied to the students in the experimental group; that is, none of the special education services that they originally received at school were interrupted because of this study. The students in the control group went through the FBTs for the evaluation but did not participate in any of the intervention programs.

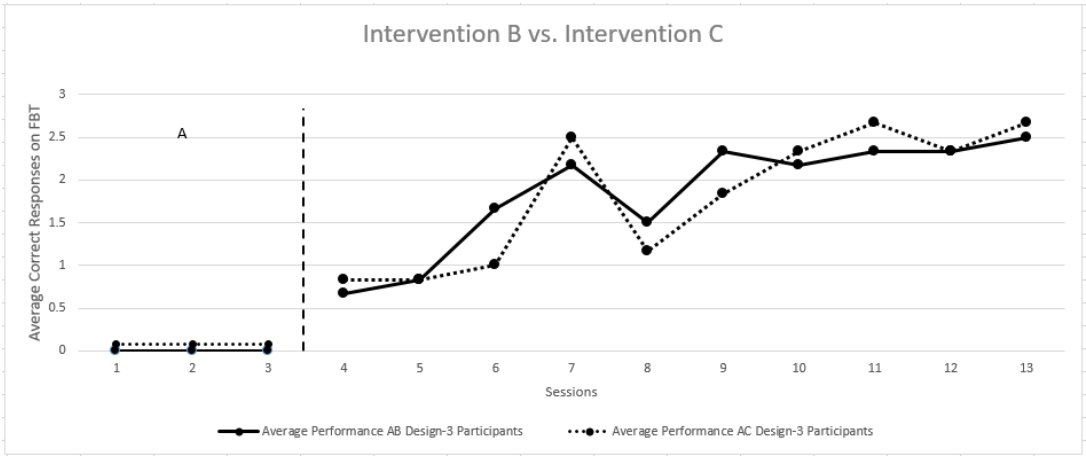

Figure 1. Connecting perceived information with knowledge, intervention (B) vs. belief understanding, intervention (C)

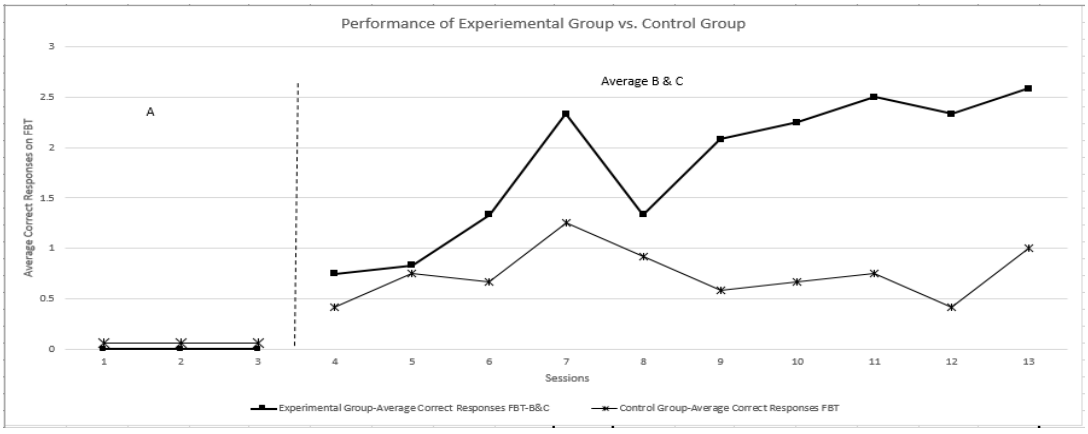

Figure 2. Comparison of performance on FBT between the experimental and control group

The student with autism who was assigned to the ABC design in pair one seemed to have benefited more from intervention C than from intervention B. Additionally, in both interventional programs, this student outperformed his/her control match (Figure 3). The second student in the ABC design seemed to benefit more from intervention B than the first student and exited the program early. Therefore, there was no need to apply intervention C (Figure 4). The third student, on the other hand, seemed to benefit more from intervention C than from intervention B. This student, like the first student, outperformed his/her matched control on both interventions (Figure 5).

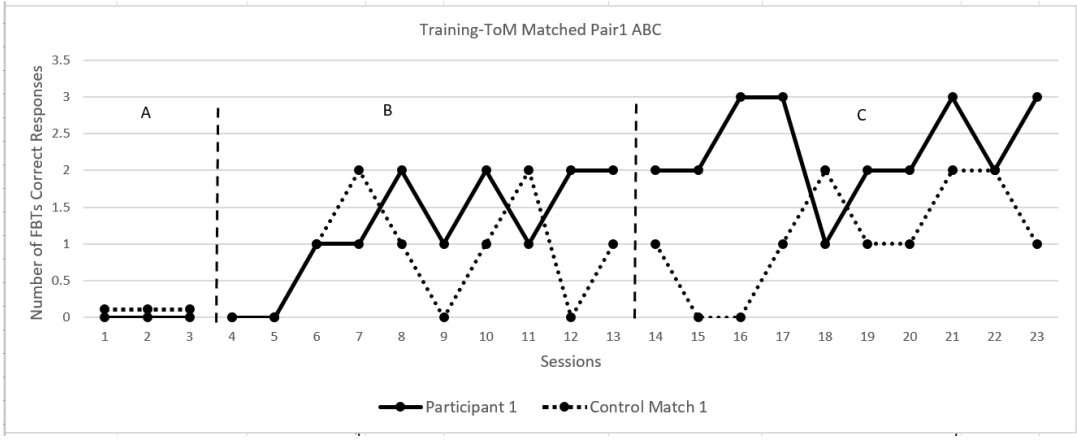

Figure 3. Matched pair one performance on FBT

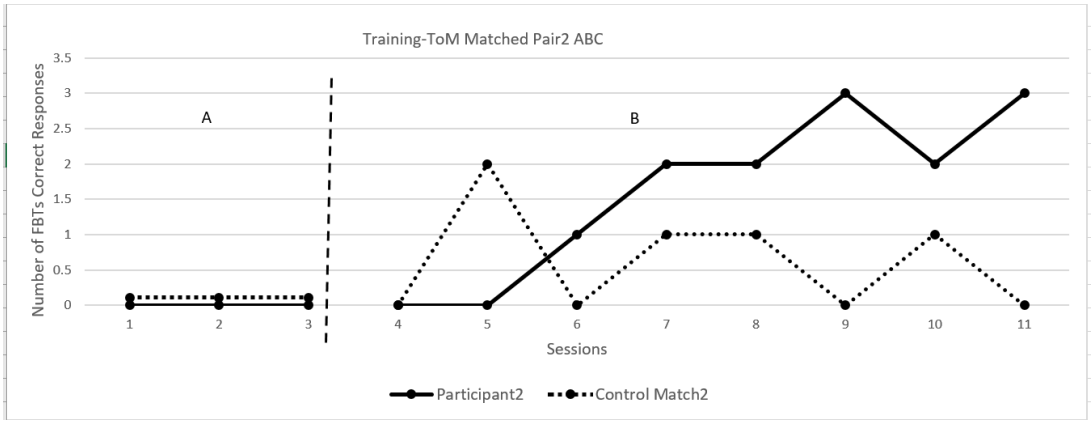

Figure 4. Matched pair two performance on FBT

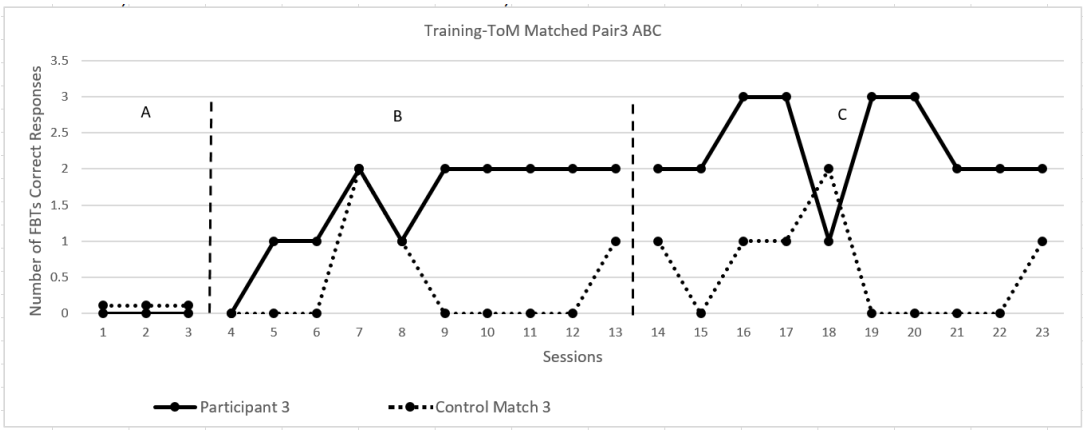

Figure 5. Matched pair three performance on FBT

The fourth student who was assigned to the ACB design (Figure 6) benefited more from intervention B than from intervention C and outperformed his/her control match on both interventional programs. The fifth student seemed to benefit more from intervention B than from intervention C and outperformed the matched control on

both interventional programs (Figure 7). Finally, the sixth student met the exit criteria early during intervention B and thus did not continue through intervention C (Figure 8).

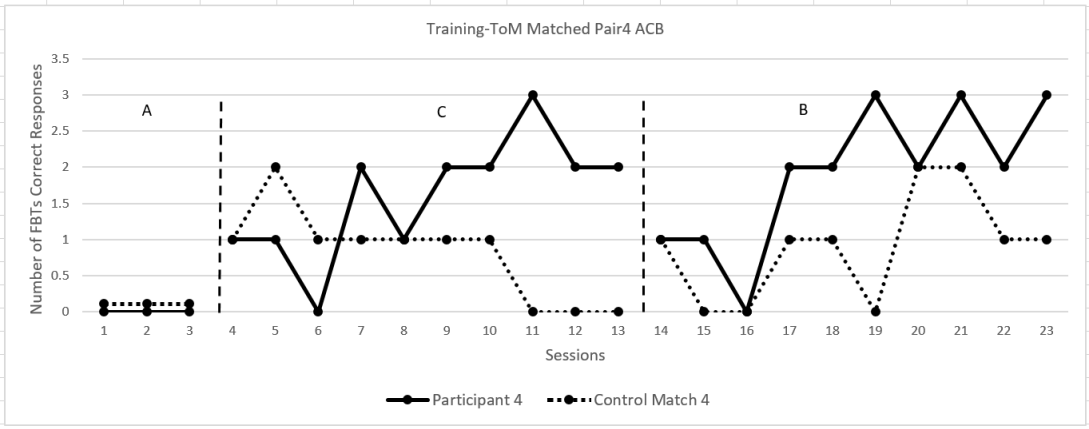

Figure 6. Matched pair four performance on FBT

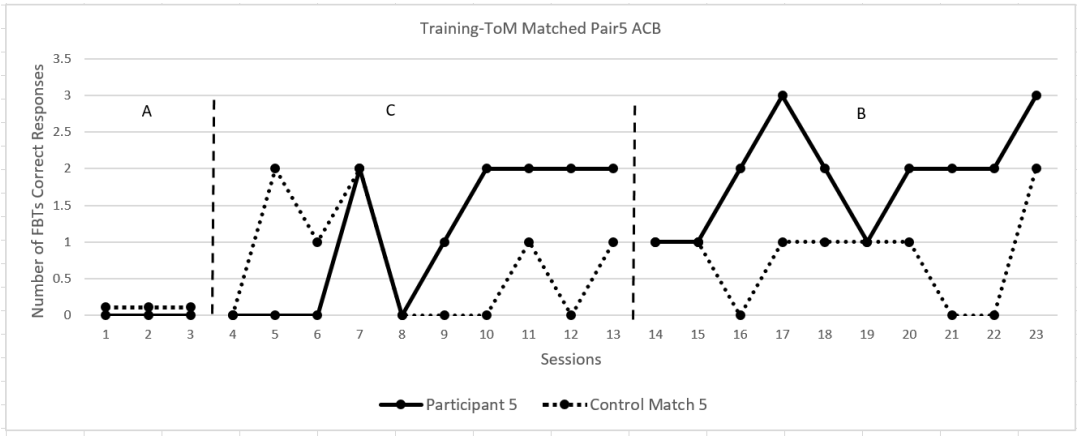

Figure 7. Matched pair five performance on FBT

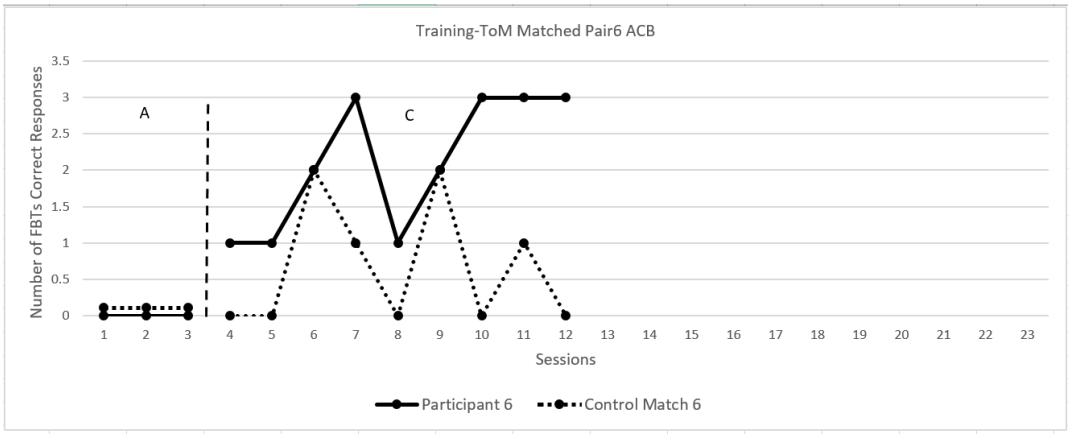

Figure 8. Matched pair six performance on FBT

After the intervention program concluded, in order to solicit any perceived changes in students' social communication, an informal interview was conducted with each student's parent or classroom teacher. The interview questions were based on ADEL Autism Spectrum Disorders Standardized Scale (Mohammad, 2002). For example, parents or teachers were asked if they noticed any differences in the students' ability to 1) pay attention to where someone is gesturing or pointing (imperative comprehension); 2) direct someone's attention to something by pointing or gesturing (declarative comprehension); 3) ask questions about future events; 4) play with others; 5) invite others to play with them; 6) move an object from one location to another in order to enhance its visibility; 7) ask questions such as "do you know?"; 8) rephrase for clarifications when asked; 9) provide justifications for his actions whether voluntarily or when asked; 10) provide justifications for other people's actions whether voluntarily or when asked. Despite the fact that there were differences among students in their level of engagement in one or more of the aforementioned areas, none showed any improvement in the level of engagement as perceived by their parents or teachers.

4. Discussion and Conclusion

Do students with autism fail ToM tasks because of information processing limitations or because of the lack of a genuine conceptual change in their cognitive abilities (Bjorklund, 2005)? In other words, is ToM a general domain competency or specific domain competency? Both perspectives acknowledge the need for a certain competence to develop ToM, but the former emphasizes the masking factors of early competence, whereas the latter acknowledges the presence of an evolutionary conceptual change that allows for the development of ToM. Students with autism lack the SAM and ToM modules, suggesting that the specific competency that allows transitioning from EDD to SAM is interrupted, and consequently, students with autism struggle to produce triadic representations of their social interactions. This single-case design research was an attempt to compensate for this interruption in a direct and systematic way. Moreover, the FBTs were expanded from their classical form by adding components that allowed training in addition to evaluation. For example, the use of video recording facilitated a shared attention simulation in which the interventionist and the student with autism were both viewing the same events in which the student had participated; thus, the events were not novel and were easy for the student with autism to relate to. Moreover, because of the interactive nature and constant reference to the events in the video recording, this intervention is expected to promote students' declarative comprehension or their ability to make a triadic mental representation (Broekhof et al., 2015; Kristen, 2011).

This simulation also allowed for natural reciprocity between the eye directionality detector (EDD; e.g., my brother was not in the classroom and thus did not see where the new location of the ball was), on the one hand, and between he did not see the new location and thus does not know, on the other hand. The types of prompts provided in intervention C also facilitated the student's ability to create a connection between a production of the other (peer/sibling) and how this other's misconception led to erroneous production. The other prompts in intervention C further facilitated the student's attempt to create a new understanding in the minds of the other (peer/siblings) to fix the mistakes that originated from the misunderstanding.

Reichow and Volknar (2010) classified research of evidence based instruction in social skills into three categories: 1) general social abilities (e.g., facial affect and ToM); 2) social interaction abilities (e.g., play skills and proximity); 3) social communication abilities (e.g., verbal social initiation, conversational skills, and shared attention). In order to capture the complexity of any one given social scenario, it was inevitable for the researchers to include different skills from each category of research classified by Reichow and Volknar (2010). While one could argue that it is seldom possible to draw conclusions about an experiment when the experimental factors are not purely isolated, others might argue that the nature of a given authentic social context doesn't naturally include one simple factor in isolation from another. After comparing results of the students in the two designs (ABC and ACB), it is readily apparent that more training leads to better performance on embedded trials. Whether the intervention started with training eye-knowledge relationship (B) and ended with belief training (C) or it started with belief training and ended with eye-knowledge training, the longer it lasted, the better the performance outcomes were. The FBTs are unique in regard to both their novelty and their linguistic and social elements; hence, further investigation into how these individuals were similar to each other and how they were different from the others would be helpful in understanding the effectiveness of the interventions. Upon review of participant demographics (see Table 1) the high performance of both participants two and six can be at least partially explained by their relatively superior language and verbal abilities. Future research should examine differences in language and verbal abilities among students with autism and how these differences may impact the efficacy of training programs such as the one incorporated in this study.

The results showed that compared with the students in the control group, those in the experimental groups improved in their conceptual ToM skills as demonstrated in embedded trials. Similar to Begeer et al. (2011) findings, parent and teacher reports did not support that students' generalized the learned skills outside of the specific intervention, which would suggest improved understanding of social behavioral. It was suggested by researchers that peer mediated intervention is an effective way to promote social behavior (Chan et al., 2009; Bellini, Peters, Benner, & Hopf, 2007). It was further suggested that parents' knowledge of the training program could expand the training condition to include a home setting; hence, increasing the chance of developing and generalizing social skills (Begeer et al., 2011). We recommend that this study be revised to include more effective roles of the peers and the parents of students with ASD. Likewise, it will be important for anyone implementing interventions such as those described here to include instruction in natural settings with structured opportunities to promote the student's ability to understand other people's points of view. Adopting a core deficit model to explain diminished competencies of ToM may require a longitudinal study that will examine ToM as a result of a chain of precursor skills (Fletcher-Watson et al., 2014). Unlike most ToM training programs that last a few weeks to a few months, we suggest a longitudinal training program that would allow for within-subject comparisons while cognitive, language, and social development take their natural course.

In summary, the interventions used in this single-case design research resulted in improved ToM skills related to False Believe Theory. Specifically, regardless of which intervention was implemented first, students in the intervention groups improved their ability to successfully navigate FBT tasks utilizing perspective-taking skills. Students who performed higher also had higher scores in verbal ability. Parent/teacher interviews did not suggest generalization of learned skills to natural settings. We suggest future training programs that include parents/care givers and peers over relatively long periods of time.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington: American Psychiatric Publishing. https://doi.org/10.1176/appi.books.9780890425596

Baron-Cohen, S. (1989). The autistic child's theory of mind: a case of specific developmental delay. *Journal of Child Psychology and Psychiatry*, *30*, 285-297. https://doi.org/10.1111/j.1469-7610.1989.tb00241.x

Baron-Cohen, S. (1996). *Mindblindness: An essay on autism and theory of mind* (3rd ed.). Massachusetts Institute of Technology.

Baron-Cohen, S., & Goodhart, F. (1993). The "seeing leads to knowing" deficit in autism: The Pratt and Bryant probe. *British Journal of Developmental Psychology*, *12*, 397-402. https://doi.org/10.1111/j.2044-835X.1994.tb00642.x

Begeer, S. et al. (2011). Theory of mind training for children with autism: A randomized control trial. *Journal of Autism and Developmental Disorders*, *41*, 997-1006. https://doi.org/10.1007/s10803-010-1121-9

Bellini, S., Peters, J. K., Benner, L., & Hopf, A. (2007). A meta-analysis of school-based social skills interventions for children with autism spectrum disorders. *Remedial and Special Education*, *28*(3), 153-162. https://doi.org/10.1177/07419325070280030401

Bianco, F., & Lecce, S. (2016). Translating child development research into practice: Can teachers foster children's theory of mind in primary school? *British Journal of Educational Psychology*, *86*(4), 592-605. https://doi.org/10.1111/bjep.12125

Bjorklund, D. F. (2005). *Children's thinking: Cognitive development and individual differences* (5th ed.). Belmont, CA: Wadsworth.

Bowler, D. M. (1992). Theory of mind in Asperger's syndrome. *Journal of Child Psychology & Psychiatry & Allied Disciplines*, *33*(5), 877-893. https://doi.org/10.1111/j.1469-7610.1992.tb01962.x

Broekhof, E., Ketelaar, L., Stockman, L., van Zijp, A., Bos, M. G. N., & Rieffe, C. (2015). The understanding of intentions, desires and beliefs in young children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *45*, 2035-2045. https://doi.org/10.1007/s10803-015-2363-3

Chan, J. M., Lang, R., Rispoli, M., O'Reilly, M., Sigafoos, J., & Cole, H. (2009). Use of peer-mediated interventions in the treatment of autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, *3*(4), 876-889. https://doi.org/10.1016/j.rasd.2009.04.003

Fisher, N., & Happé, F. (2005). A training study of theory of mind and executive function in children with autistic spectrum disorders. *Journal of Autism and Developmental Disorders*, *35*(6), 757-771. https://doi.org/10.1007/s10803-005-0022-9

Fletcher-Watson, S., McConnell, F., Manola, E., & McConachie, H. (2014). *Interventions based on the Theory of Mind cognitive model for Autism Spectrum Disorder (ASD)*. The Cochrane Library. https://doi.org/10.1002/14651858.CD008785.pub2

Golan, O., & Baron-Cohen, S. (2006). Systemizing empathy: Teaching adults with Asperger syndrome or high-functioning autism to recognize complex emotions using interactive multimedia. *Development and Psychopathology*, *18*, 591-617. https://doi.org/10.1017/S0954579406060305

Hadwin, J., Baron-Cohen, S., Howlin, P., & Hill, K. (1997). Does teaching theory of mind have an effect on the ability to develop conversation in children with autism? *Journal of Autism & Developmental Disorders*, *27*(5), 519-537. https://doi.org/10.1023/A:1025826009731

Happe', F. (*1995*). The role of age and verbal ability in the theory of mind task performance of subjects with autism. *Child Development*, *66*(3), 843-855. https://doi.org/10.2307/1131954

Hermelin, B., & O'Connor, N. (1985). Logico-affective states and non-verbal language. In E. Schopler, & G. Mesibov (Eds.), *Communication problems in autism*. New York: Plenum Press. https://doi.org/10.1007/978-1-4757-4806-2_15

Hogrefe, G. J., Wimmer, H., & Perner, J. (1986). Ignorance versus false belief: A developmental lag in attribution of epistemic states. *Child Development*, *57*, 567-582. https://doi.org/10.2307/1130337

Kristen, S., Sodian, B., Thoermer, C., & Perst, H. (2011). Infants' joint attention skills predict toddlers' emerging mental state language. *Developmental Psychology*, *47*(5), 1207-1219. https://doi.org/10.1037/a0024808

Leslie, A. M., & Frith, U. (1988). Autistic children's understanding of seeing, knowing and believing. *British Journal of Developmental Psychology*, *6*, 315-324. https://doi.org/10.1111/j.2044-835X.1988.tb01104.x

Leslie, A. M., & Happe', F. (1989). Autism and ostensive communication: The relevance of metarepresentation. *Development & Psychopathology*, *1*(3), 205-212. https://doi.org/10.1017/S0954579400000407

Lind, S. E., & Bowler, D. M. (2009). Recognition memory, self-other source memory, and theory of-mind in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *39*(9), 1231-1239. https://doi.org/10.1007/s10803-009-0735-2

Lind, S. E., & Bowler, D. M. (2010). Impaired performance on see-know tasks amongst children with autism: Evidence of specific difficulties with theory of mind or domain general task factors? *Journal of Autism and Developmental Disorders*, *40*, 479-484. https://doi.org/10.1007/s10803-009-0889-y

Lukusa, S., Mäkinen, L., Kuusikko-Gauffin, S., Ebeling, H., & Moilanen, I. (2014). Theory of mind and emotion recognition skills in children with specific language impairment, autism spectrum disorder and typical development: Group differences and connection to knowledge of grammatical morphology, word-finding abilities and verbal working memory. *International Journal of Language & Communication Disorders*, *49*(4), 498-507. https://doi.org/10.1111/1460-6984.12091

Mohammad, A. (2002). *Adel ASD Standardized Scale*. Cairo: Al-rashad D. T. Press. Retrieved from https://slpemad.com/

Ozonoff, S., & Miller, J. N. (1995). Teaching theory of mind: A new approach to social skills training for individuals with autism. *Journal of Autism and Developmental Disorders*, *25*, 415-433. https://doi.org/10.1007/BF02179376

Perner, J., Frith, U., Leslie, A. M., & Leekam, S. (1989). Exploration of the autistic child's theory of mind: Knowledge, belief, and communication. *Child Development*, *60*, 689-670. https://doi.org/10.2307/1130734

Reichow, B., & Volkmar, F. R. (2010). Social skills interventions for individuals with autism: Evaluation for evidence-based practices within a best evidence synthesis framework. *Journal of Autism and Developmental Disorders*, *40*(2), 149-166. https://doi.org/10.1007/s10803-009-0842-0

Robert, M. J., & Tager-Flusberg, H. (2004). The relationship of theory of mind and executive functions to symptom type and severity in children with autism. *Development and Psychopathology*, *16*, 137-155.

Vicker, B. (2003). Assessment day: Questions about the communication development of your young child with an Autism Spectrum Disorder. *The Reporter*, *8*(2), 18-21.

Wellman, H. M., & Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Development*, *75*(2), 523-541. https://doi.org/10.1111/j.1467-8624.2004.00691.x

Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory of mind development: The truth about false belief. *Child Development*, *72*, 655-684. https://doi.org/10.1111/1467-8624.00304

Wimmer, H., & Gschaider, A. (2000). Children's understanding of belief: Why it is important to understand what happened. In P. Mitchell, & K. J. Riggs (Eds.), *Children's reasoning and the mind* (pp. 253-266). Hove: Psychology Press.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, *13*, 103-128. https://doi.org/10.1016/0010-0277(83)90004-5

Wimmer, H., Hogrefe, G. J., & Perner, J. (1988). Children's understanding of informational access as a source of knowledge. *Child Development*, *59*, 386-396. https://doi.org/10.2307/1130318