

ABSTRACT

Increasing Turn-taking Skill in Children with Autism Spectrum Disorder

Nandar Min, M.A.

Mentor: Tonya N. Davis, Ph.D.

Children with autism spectrum disorder (ASD) may have a deficit in social communication and be less likely to engage in social-based activities (APA, 2015). Turn-taking is a specific social skill and by improving turn-taking skill, children with ASD may increase in social interaction. The current study examines the improvement of object turn-taking skill of children with Autism Spectrum Disorder. Most-to-least physical prompting procedure was utilized to increase the participants' turn-taking skill. Participants were taught how to wait for their turns to play with the object (i.e., trampoline). Therapists recorded the data using frequency count on the participants' independent performance on turn-taking skill. This study applied the multiple baseline design across participants designed to evaluate the functional relationship between the intervention and turn-taking.

Increasing Turn-taking Skill in Children with Autism Spectrum Disorder

by

Nandar Min, B.S.

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Terrill F. Saxon, Ph.D.

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Approved by the Thesis Committee

Tonya N. Davis, Ph.D., Chairperson

Michaela Ritter, Ed.D.

Terrill F. Saxon, Ph.D.

Accepted by the Graduate School

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J. Larry Lyon, Ph.D., Dean

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CHAPTER ONE

Introduction

Autism Spectrum Disorder

In 1910, the Swiss psychiatrist Eugen Bleuler used the Latin word ‘*autismus*’ while he was defining symptoms of schizophrenia (Holaday, 2012). *Autismus* is also derived from the Greek word meaning a person is indifferent from social interaction, a secluded self (Chown, 2012). Autism was first identified by Leo Kanner and Hans Asperger. Leo Kanner was an Austrian psychiatrist and physician who published a book named *Autistic Disturbances of Affective Contact* in 1943 (Verhoeff, 2013). Hans Asperger was a medical doctor and also published a definition of autistic psychopathy in 1944 (Chown, 2012). Even though it was formerly identified as the earliest form of schizophrenic disorder, autism is now considered to be a biologically based pervasive neuro-developmental disorder which affects social interaction and adjustment to the environment (Holaday, 2012).

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) released in 2013 combined Asperger’s Disorder, Autistic Disorder, and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) under the term Autism Spectrum Disorder (ASD) (American Psychiatric Association, 2013). According to American Psychiatric Association (APA), ASD is a neurological developmental disorder characterized by social, communication and behavioral challenges (2013). The characteristics of ASD include difficulties in social communication and social interaction

as well as restricted, repetitive body movements, interests, or activities (APA, 2015). These symptoms are considered to be present at birth and are diagnosed by 18 months of the child's age (Kuban et al., 2009). The symptoms of the disorder are lifelong (Matson, Mayville, Lott, Bielecki, & Logan, 2003). It is difficult for many children with ASD to live their lives independently (Matson, Dempsey, & Fodstad, 2009). The Center for Disease Control and Prevention (CDC; 2014) reports that the number of children diagnosed with ASD has increased and, currently, one out of 86 children are diagnosed with ASD. Boys are diagnosed with ASD four times more frequently than girls (Rivet & Matson, 2011). The male-female ratio raises to about 10:1 in the absence of intellectual impairment, which means that clinically identified girls with ASD are more likely to present with intellectual impairment (Fombonne 2009; Rivet & Matson, 2011).

Social Skills Deficit

Social skills deficits are a defining characteristic of ASD. Notari, Baumgartner, and Herzog (2014) define social skills as the behaviors that assist with accomplishing a person's goals and behaviors that support in forming and preserving good relationships with others. Gillis and Butler (2007) define social skills as "behaviors each person learns to facilitate awareness of his or her social environment and social contingencies, to be able to solve social problems (i.e., demonstrate social competence), and other behaviors that are developmentally appropriate" (p. 532).

Social skills deficits are of concern because of the relationship between social skills and other life outcomes, including community involvement, psychological well-being, academic achievement, and problem behavior. Social skills may play a major role in maintaining a sense of well-being. Segring and Taylor (2007) found positive

relationships between social skills and six indicators of psychological well-being: life satisfaction, environmental mastery, self-efficacy, hope, happiness, and quality of life. Similarly, Riggio, Throckmorton, and DePaola (1990) identified a positive relationship between social skills and self-esteem and a negative relationship between social anxiety and loneliness. Not only may social skills positively correlate with psychological well-being, but social skills deficits have also been associated with social anxiety and phobia (Wenzel, Graff-Dolezal, Macho, & Bredle, 2005), depression (Segrin, 2000), and loneliness (DiTommaso, Brannen-McNulty, Ross, & Buurgess, 2003).

In addition to psychological outcomes, social skills are also essential for academic outcomes. Malecki and Elliott (2002) identified a positive relationship between social skills and academic achievement among elementary children with ASD. Notari and colleagues (2014) further identify the importance of social skills in the development of collaborative learning such as decision-making, maintaining relationships, problem-solving, and group leadership skills.

Similarly, lack of social awareness may limit interaction with peers and, the natural learning associated with it. The effects of social skills deficits extend beyond psychological and academic well-being, also affecting the problem behavior. Children with better social skills acquire better adaptive skills such as controlling anger and following teachers' instructions (Gresham, Dolstra, Lambro, McGlaughlin, & Lane, 2000).

With the identified concerns associated with social skills deficits, it is not surprising that the improvement of social skills is a frequent treatment goal among children with ASD. The National Research Council's Guidelines for Educating Children

with Autism (2001) points out that appropriate educational objectives for children with autistic spectrum disorders should “include the development of: (a) social skills to enhance participation in family, school, and community activities (e.g., imitation, social initiations and response to adults and peers, parallel and interactive play with peers and siblings)” (p 218). Moreover, Volkmar, Cook, Pomeroy, Realmuto, and Tanguay (1999) stated that monitoring of several domains of functioning, including social/communicative skills should be included in the treatment plan for individuals with ASD. It is also important to note that social skills deficits do not vanish as children with ASD age; the majority of individuals with ASD will continue to demonstrate social difficulties into adulthood (Seltzer, Shattuck, Abbeduto, & Greenberg, 2004).

Turn-taking

Turn-taking is a specific social skill that is critical for appropriate social interactions. However, children with ASD often do not develop turn-taking (DiLavore, Lord, & Rutter, 1995) and related skills, including the initiation of joint attention (Stone, Ousley, Yoder, Hogan, & Hepburn, 1997), and requesting (Sigman & Ruskin, 1999). Turn-taking is defined as a social exchange within a play activity (Yoder & Stone, 2006). Examples of turn-taking include tossing an item, such as a ball, back and forth or taking turns playing cards. These skills play important roles in the development of children with ASD. During these activities such as social routine, imitative routine, and object turn-taking routine, children with ASD may engage less active turn-taking (DiLavore, et. al., 1995).

Turn-taking can be separated in two ways: initiating and relinquishing a turn (Daubert, Hornstein, & Tincani, 2015). Although children with ASD may have problem

in initiating a turn to play with their preferred objects or games, they may have a more difficulty relinquishing their favorite objects or activities. By increasing the relinquishment behavior, children with ASD may enjoy more in interaction with others.

Social Turn-taking

Social plays involve at least two partners, turn-alternation, and a repetition of performances by each other (Ross & Kay, 1980). During the play, partners perform many types of actions such as imitative (i.e., partners performing the same behavior), complementary (i.e., each partner completes a cycle by engaging in an action), or reciprocal (i.e., partners change roles within a cycle) (Eckerman & Didow, 1989; Ross & Kay, 1980; Ross & Lollis, 1987). Children with ASD are impaired in their ability to exchange objects with others (DiLavore et al., 1995). They also perform poorly on the activities compared to other children with developmental disabilities.

In fact, some researchers even argue that the severity of ASD may be decreased by increasing turn-taking and initiating joint attention (Aldred, Green, & Adams, 2004; Mundy & Crowson, 1997). Yoder and Stone (2006) believe that if children with ASD can improve their turn-taking skill, their generalization to initiating joint attention may be improved. Many studies have done research on increasing conversational turn-taking skill. However, little research has been conducted to increase object turn-taking skill in order to promote social skills of children with ASD. Object turn-taking skill can be applied not only to verbal, but also to non-verbal children with ASD. This current research aims to increase object turn-taking skill for children with ASD.

CHAPTER TWO

Literature Review

The purpose of this review was to summarize current research that targeted the improvement of turn-taking skill among children with ASD. The results of the studies were categorized by the followings: (a) participant and setting characteristics, (b) dependent variables, (c) interventions, and (d) outcomes.

Methods

An electronic database search was systematically administered utilizing the following databases: Academic Search Complete, Educational Resources Information Clearinghouse (ERIC), Education Research Complete, PsycINFO, and PsycArticles. On all databases, the terms *sharing*, *turn-taking*, *object exchange*, *joint attention*, and *reciprocal play*, was inserted into the keyword field. The search was restricted to English language journals. The abstracts of resulting 104 articles were reviewed against inclusion criteria; four met inclusion criteria. Next, an ancestry search of the included articles was carried out, which resulted in a review of an additional 139 articles. No additional articles reviewed met the inclusion criteria. Lastly, the originally included articles, The Psychological Record and the Journal of Applied Behavior Analysis, covering 2013 through 2014 were searched by hand. There were altogether 144 articles from The Psychological Record and 164 articles from the Journal of Applied Behavior Analysis that were reviewed and no articles met the inclusion criteria.

Inclusion and Exclusion Criteria

To be considered in this review, articles had to meet three inclusion criteria. First, the included participants must be diagnosed with ASD. Second, the dependent variables measured included object turn-taking, that is, the participants' abilities to exchange tangible objects with another individual on cue. Only studies in which the authors defined the targeted skill as *turn-taking* or *object exchange* were included. Last, the study must have been published in a peer-reviewed journal.

Data Extraction

Each article was evaluated using the previously mentioned inclusion criteria and the data were summarized across the following categories: (a) participant and setting characteristics, (b) dependent variables, (c) interventions, and (d) outcomes.

Results

Altogether four studies were identified for this review (Ferguson, Gillis, & Sevillever, 2013; Harper, Symon, & Frea, 2008; Schertz, Odom, Baggett, & Sideris, 2013; Yoder & Stone, 2006). Table 2.1 summarizes these studies regarding number of participants, diagnosis, interventions, target behaviors, and results.

Participants and Setting Characteristics

Across the four studies, there were 67 participants with a total of 39 males (58%), five females (7%), and 23 participants in which sex was not reported (34%). Participants' ages ranged from 1.5 to 11 years. All 67 participants were diagnosed with ASD. The studies took place in a variety of settings. Half of the studies (n=2) were conducted in a university clinic (Ferguson et al., 2013; Yoder & Stone, 2006). One study

was conducted in the participants' school (Harper et al., 2008). The remaining study was conducted in the participants' home (Schertz et al., 2013).

Table 2.1 Summary of Literature

Study	N	Disability	Interventions	Target Behavior(s)	Study Outcome
Ferguson et al., (2013)	6	ASD	Behavioral Skills Training	Turn-taking	Positive
Harper et al., (2008)	2	ASD	Pivotal Response Training	Turn-taking	Positive
Schertz et al., (2013)	23	ASD	Joint Attention Mediated Learning	Turn-taking	Positive
Yoder et al., (2006)	36	ASD	Responsive Education and Prelinguistic Milieu Teaching and the Picture Exchange Communication System	Object exchange turn	Positive

Note. ASD = autism spectrum disorder

Dependent Variables

Of the four studies, two implemented a frequency count to measure turn-taking among participants (Harper et al, 2008; Yoder & Stone, 2006). On the other hand, Ferguson and colleagues (2013) measured the occurrence or nonoccurrence of turn-taking per trial while Schertz and colleagues (2013) utilized a partial-interval recording system.

In addition to turn-taking, the following four articles measured additional dependent variables. Schertz and colleagues (2013) measured additional dependent variables including initiating joint attention, responding to joint attention, and focusing

on faces. Yoder and Stone (2006) also measured initiating joint attention and frequency of requesting. Harper and colleagues (2008) calculated the social initiation and gaining attention whereas Ferguson et al., (2013) measured the sportsmanship skills which include giving compliments and negative comments, following rules, and being a good sport.

Interventions

A variety of interventions were utilized across studies. First, Schertz et al. (2013) utilized the Joint Attention Mediated Learning program as an intervention to target joint attention and early communication skills among toddlers with ASD including turn-taking. Parents were provided with the Joint Attention Mediated Learning manual as a guide for interactions with their child. The manual provided suggested activities, as opposed to strict directions to be conducted in the home. Activities targeted three social skills: focusing on faces, turn-taking, and joint attention.

Activities suggested to promote turn taking included imitating child-initiated gestures, responding to the child as if his/her behaviors were intended to be interactions with the parents, embedding parent behavior into the participants' repetitive play, following the child's lead, and playing teasing games. Parents were instructed to engage their child in the suggested activities associated with turn-taking, or the other targeted skills, approximately one hour a day at home. The results were mixed as improvement was variable across participants.

Ferguson et al., (2013) implemented Behavioral Skills Training in which the trainer modeled for participants when to wait for their turn and how to give compliment to each other while playing. The targets of this study were to improve sportsmanship

skills and conversation skills which specifically included giving compliments during the play activity, taking turns, and making a positive comment after the game.

During the Behavioral Skills Training intervention, the trainers modeled the target skills using only Wii Sports™ baseball game, and allowed participant to rehearse the learned skills. Then, the trainers let the participants apply the training with their peers, followed by the feedback and reinforcement in the form of token economy.

Generalization to a new activity, the Wii™ Bowling game, was measured. The mean percentage of the turn-taking increased from 48% of baseline to 74% of the generalization. The results indicated marked improvement among participants' sportsmanship skills including turn-taking. The study concluded that the Behavior Skills Training intervention successfully increased the target behaviors of the participants.

Harper and colleagues (2008) implemented pivotal response training through peer-mediated practice to increase social interaction for two participants with ASD during recess activities. The experimenters trained typically developing peers to implement the strategies of pivotal response training which included (a) gaining attention, (b) changing activities, (c) explaining play, (d) reinforcing attempts, and (e) turn-taking. During the intervention, two trained peers were chosen to play with one target participant with ASD. The peers applied the naturalistic strategies of pivotal response training to begin and maintain play with the target participants. Results indicated turn-taking increased across both participants.

Yoder and Stone (2006) compared the efficacy of Picture Exchange Communication System (PECS) and Responsive Education and Pre-linguistic Milieu Teaching (RPMT) on turn-taking among other social skills. The PECS treatment was

developed by Bondy and Frost (1994) and consisted of six phases. Phase 1 included a participant looking at, reaching for, picking up, and handing the picture or object to a therapist. The other five phases included spontaneously initiating the communicative interaction, spontaneously discriminating the pictures, building sentence structure, responding to the question (i.e., What do you want?) and commenting in response to a question (i.e., What do you see?). Participants' parents were allowed to be involved right after the treatment session. The RPMT treatment was developed to assist intentional communication in young children with developmental delays (Yoder & Warren, 2002). The treatment focused on the pre-linguistic goals such as gaining attention and initiating joint attention. Therapists utilized the turn-taking sequences to motivate the participant at the beginning of the sessions.

A total of 36 participants with ASD were selected and separated into two groups to implement the treatment. The experimenters initiated four pre- and post-treatment assessments including a measure of turn-taking. The turn-taking measure adopted was the turn-taking procedure developed by Ousley (1997). During the measure, the experimenter got the participant's attention on the object, demonstrated how to play with it, and gave the object to the child. The participants were expected to imitate the examiner's performance with the object and give it back to the experimenters. The examiner said, "My turn" or "Your turn" to remind each. However, if the participants had failed to imitate or return the objects, the experimenters utilized the physical, verbal, and gestural prompts to get the desired response. The result indicated RPMT increased turn-taking with objects more than the PECS.

Outcomes

The majority of studies found that the selected intervention had positive outcomes on turn-taking. While the Joint Attention Mediated Learning program implemented by Schertz et al., (2013) had variable results, the other three studies' results indicated positive outcomes on turn taking (Ferguson et al., 2013; Harper et al., 2008; Yoder & Stone, 2006).

Language Assessments and Levels

Some studies reported the standardized assessments and level of the participants' communication abilities. Schertz et al., (2013) utilized the Mullen Scales of Early Learning (MSEL) to assess the participants' cognitive function including receptive and expressive language. According to the result, intervention group scored receptive language ($M = 21.0$, $SD = 2.0$) and the expressive language ($M = 24.6$, $SD = 6.7$) whereas the control group scored receptive language ($M = 25.9$, $SD = 9.1$) and expressive language ($M = 24.8$, $SD = 6.9$). Yoder and Stone (2006) selected the participants who used fewer than ten words or are nonverbal. In order to identify the participants' communication level, they conducted an abridged version of the Early Social, Communication Scales (ESCS) (Mundy, Hogan, & Doehring, 1996). Harper et al., (2008) did not report the utility of language assessment. Instead, they mentioned the two participants' language ability (e.g., one participant was able to use simple sentences whereas the other participant was able to use simple one to four word phrases). Ferguson et al., (2013) also did not report the assessments of the participants' cognitive abilities. However, they selected the participants who demonstrated basic communication skills such as receptive and expressive language abilities.

Social Validity

According to Carr and colleagues, social validity refers to the extent that the effort of the changing behavior influence positively on society (Carr, Austin, Britton, Kellum, & Bailey, 1999). Of four articles, only one article reported the measurement on social validity (Schertz et al., 2013). Schertz and colleagues implemented a Likert scale questionnaire consisting of 18 questions. Results revealed most parents favored the intervention.

Discussion

This review identified four studies that targeted turn-taking skill among individuals with ASD. Overall, most interventions resulted in increased turn-taking skill among participants.

Several results of this literature synthesis are noteworthy. First, all studies were conducted with children, age 11 years or younger. Second, most studies targeted turn-taking within a larger objective to improve social skills; therefore, various social skills were targeted simultaneously rather than a single focus on turn-taking. Third, only one study measured the social validity of the intervention. Turn-taking is a skill that is required in almost all facets of life, home, academic, vocational, etc. Therefore, it is likely that turn-taking will be addressed by parents, teachers, and other caregivers. While it is important to identify the effectiveness of an intervention, it is equally as important to evaluate the social validity of that treatment, particularly when various stakeholders are likely to implement the selected intervention as opposed to practitioners alone. Social validity plays an important role in the methodology of applied behavior analysis.

Perhaps the most remarkable finding of this systematic literature review is the variation of the interventions implemented across the studies. Each study implemented a unique intervention, providing no replication of any one treatment to improve turn-taking. Horner et al. (2005) stated there were five requirements that must be met before an intervention evaluated with a single-case experimental design is considered evidence-based. Specifically, at least five single-subject peer-reviewed studies with adequate methodological measures and experimental controls must be published before the intervention could be considered evidence-based. Specific and explicit intervention to improve turn-taking are necessary as a resource for practitioners and caregivers wishing to target this as a single skill as opposed to a set of social skills.

Limitations of the Literature Review

This literature review has some limitations. The result of the systematic search identified only four studies which met the inclusion criteria. This may be the result of strict inclusion criteria focused specifically on turn-taking defined as object exchange versus a broader definition of turn-taking. The paucity of research on this topic makes the ability to draw conclusions about best practices to improve turn-taking difficult, if not impossible

Gaps in the Literature

Initially, a large number of studies (551) were examined, but only four of these studies measured object turn-taking skill on children with ASD. However, none of these four studies implemented an intervention solely focused on improving object turn-taking alone. Although packaged interventions that target a variety of social skills are helpful,

they also have limitations. One such limitation is the applicability to children who have deficits in turn-taking, but do not have deficits in the other social skills targeted in the previously-identified literature. Caregivers and practitioners would benefit from the availability specific interventions that focus solely on turn-taking. Moreover, the sheer lack of research on turn-taking indicates a need for more research on this topic. As previously mentioned, in order to meet the widely accepted criteria for evidence based practices (Horner et al., 2005), additional research must be conducted to validate the effectiveness of any turn-taking intervention.

The present study will implement the most-to-least physical prompting procedures to improve the object turn-taking skill for children with ASD. During the most-to-least prompting procedure, the therapists physically guides the participant to perform the whole sequence, and then decrease the amount of physical guidance from trial to trial and session to session (Cooper, Heron, & Heward, 2007; Wolery & Gast, 1984). The study will also include a measure of social validity to further add to the identified gaps in the literature.

CHAPTER THREE

Method

Procedure

Participants

Participants with ASD were recruited from a university-affiliated Applied Behavior Analysis (ABA) clinic that provides ABA assessment and intervention services for children with intellectual and developmental disabilities. Participant inclusion criteria included children that are 11 years or younger, previously diagnosed with an autism spectrum disorder by a qualified practitioner, and who did not independently display turn-taking skill, as confirmed by the participant's ABA therapist. Additionally, participants were selected who are not receiving therapy targeting turn-taking (e.g., speech therapy, ABA targeting turn-taking, etc) during the course of the study. One five year old and two six year old males participated in the study. All three participants are diagnosed with ASD and are able to communicate verbally with others. To protect the participants' confidentiality, pseudonyms were used for all participants.

All participants' skills and barriers were assessed with Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) (Sundberg, 2008). Max is a six-year old male, diagnosed with ASD. Max had completed all the milestones in level 1 and some of the milestones in Level 2 out of all three levels. William is a five-year old male, diagnosed with ASD. William had completed most of the milestones in level 1, some of the milestones in level 2, and a few milestones in level 3. Allen is a six-year old

male, diagnosed with ASD, Attention Deficit Hyperactivity Disorder (ADHD), and speech delay. Allen had completed most of the milestones in level 1, many of the milestones in level 2 and 3. It showed that all three participants were able to respond to the instructions and imitate others. Written consent was obtained from the parents of the participants prior to the start of this study.

Setting and Materials

All sessions were conducted in an individual therapy room at a university-affiliated ABA clinic in private therapy rooms twice a week. All sessions were conducted in the same room for all participants. The therapy room had a table and one child-sized chair in addition to a clock, a white-board, a large closed cabinet, and an empty bookshelf. Participants were not allowed to access the cabinet, shelf, white-board, or clock during all the sessions. The therapy room was quiet and free from distractions. Materials included a trampoline, a timer, and a chair for waiting while taking turns. Papers, pencils, and a timer were provided for data collection.

Measurement

Data collection. Experimenters conducted total five trials per session. One trial involved two activities for a participant: jumping for 30 sec and sitting in a chair for 30 sec. Observational data were collected with paper and pencil by a trained graduate student specializing in ABA. The numbers of independent turns completed were recorded. Turn-taking was defined as the participant relinquishing from the trampoline upon request, then sitting in a chair to wait for their next turn. For example, when asked, the participant got off the trampoline, allowed another person to play with it, and waited

for his or her turn. These data were converted into percentage of turns completed independently. Data are displayed graphically for visual analysis. See Appendix B for a sample data collection sheet.

Inter-observer agreement. Inter-observer agreement (IOA) measures the degree of consistency of observation and compares the independent observations of the same event from two or more observers (Cooper et al., 2007; Kennedy, 2005). Prior to the start of the study, data collectors received training regarding data collection protocol. This training included reviewing the operational definitions and data collection methods. Therapists were handed pamphlets in which the steps of the procedures and list of the materials are included. The experimenter reviewed the operational definition of the target behavior on the pamphlets and demonstrated the procedure to therapists so that they could practice collecting data.

IOA was measured to determine the consistency of data collected among two independent data collectors. IOA was measured throughout the study by having at least two observers independently collect data for 99% of sessions. IOA was calculated on a point-by-point basis. The number of agreed upon items were divided by the number of total items and multiplied by 100% (Cooper et al., 2007).

Procedures. This study consisted of three phases; (a) baseline, (b) intervention, and (c) generalization probe measures. A total of five trials of a participant's jumping and sitting in the chair were conducted for each session. Specifically, a participant jumped for 30 sec and then sat in a chair for 30 sec for each trial. The session began

when the participant and two experimenters entered a room with a trampoline, child-sized chair, a timer, and no other readily available toys or activities.

Baseline

During baseline, upon entering the room, Experimenter One told the participant, “Jump on the trampoline,” and then guided the child to the trampoline. Every 30 sec Experimenter One told the participant, “It’s my turn” but no other prompts were provided. Noncompliance and problem behavior were ignored. If the participant stopped jumping and got off the trampoline, Experimenter One then jumped on the trampoline for 30 sec. After 30 sec had elapsed, Experimenter One got off from the trampoline and told the participant, “Jump on the trampoline” and guided the participant to the trampoline. No praise or other differential consequences were provided for turn-taking. Baseline procedure was implemented until the data were stable.

Generalization Probes

Generalization across people was measured. Generalization probes were conducted during baseline and after the completion of intervention. Generalization probes followed the same procedures as baseline; however, they were conducted by an experimenter that did not conduct the intervention and was unfamiliar to the participant.

Intervention

Intervention sessions began when the participant and two experimenters entered a room with a trampoline, child-sized chair, a timer and no other readily available toys or activities. Two experimenters utilized the most-to-least prompting technique until the

participant independently performs the target behaviors. A prompt hierarchy including full physical prompts and two levels of partial physical prompts will be implemented.

Full physical prompt. During the initial trials, a full prompt was utilized. Specifically, Experimenter One told the participant, “Jump on the trampoline,” and guided the participant to the trampoline. After 30 sec, Experimenter One told the participant, “It’s my turn.” Then, Experimenter Two assisted the participant to get off the trampoline by gently placing his or her hands on the participant’s shoulders, guided him or her off the trampoline, and assisted the participant to sit in the chair with buttocks in contact with the seat of the chair and both feet to the floor for 30 seconds. Experimenter Two gave compliments to the participant for sitting in the chair (i.e., “Nice sitting in the chair!”). Once the participant was sitting in the chair, Experimenter One jumped on the trampoline for 30 sec. If the participant attempted to leave the chair, Experimenter Two physically guided the participant to sit in the chair until 30 sec has elapsed. At the end of the 30 sec, Experimenter One told the participant, “Jump on the trampoline” and then guided the child to the trampoline. The full physical prompt was provided for at least the initial five trials and continued until the participant completed five successful trials at this prompt level.

Partial physical prompt – step 1. After five successful trials providing a full physical prompt, the prompt level was reduced. A successful trial is one in which the participant completes getting off from the trampoline and sitting in the chair without errors or problem behavior. The prompt level was reduced when the participant showed some improvement such as getting off trampoline by oneself or sitting in the chair for 30

sec. During this phase, Experimenter One started the session by saying, “Jump on the trampoline,” and guided the participant to the trampoline. After 30 sec, Experimenter One said, “It’s my turn.” Immediately, Experimenter Two assisted the participant to get off the trampoline and guided the participant to the chair by gently placing his or her hands on the participant’s shoulders. However, no prompt was provided to sit in the chair. If the participant sat in the chair properly, Experimenter Two praised the participant for sitting properly. Once the participant was sitting in the chair, Experimenter One jumped on the trampoline for 30 sec. If the participant attempted to leave the chair, Experimenter Two physically guided the participant to sit in the chair until 30 sec had elapsed. At the end of the 30 seconds, Experimenter One again told the participant, “Jump on the trampoline” and then guided the child to the trampoline. The partial physical prompt – step 1 was provided for five trials. When participant made any error or displayed problem behavior, the prompt level was increased on subsequent trials. Specifically, when a participant made an error or displayed problem behavior, a full physical prompt was delivered for next five trials. This prompt level continued until the participant demonstrates success across five consecutive trials.

Partial physical prompt – step 2. After five successful trials providing a partial physical prompt – step 1, the prompt level was reduced. A successful trial is one in which the participant completes getting off from trampoline and sitting in the chair without errors or problem behavior. The prompt level was reduced when the participant showed some improvement such as getting off trampoline by oneself or sitting in the chair for 30 sec. During this phase, Experimenter One started the session by saying, “Jump on the trampoline,” and guided the participant to the trampoline. After 30 sec,

Experimenter One said, “It’s my turn.” Immediately, Experimenter Two assisted the participant to get off the trampoline by gently placing his or her hands on the participant’s shoulders, then the Experimenter Two turned the participant to face the direction of the chair; no other prompting was provided. If the participant sat in the chair properly, Experimenter Two praised the participant for sitting properly. Once the participant was sitting in the chair, Experimenter One jumped on the trampoline for 30 seconds. If the participant attempted to leave the chair, Experimenter Two physically guided the participant to sit in the chair until 30 sec has elapsed. At the end of the 30 seconds, Experimenter One told the participant, “Jump on the trampoline” and then guided the child to the trampoline. The partial physical prompt – step 2 was provided for five trials. If during any trial the participant makes an error or displays problem behavior, the prompt level was increased on subsequent trials. Specifically, if a participant made an error or displayed problem behavior, a partial physical prompt – step 1 was delivered for the next five trials. This prompt level was continued until the participant demonstrates success across five consecutive trials.

Independent performance. After five successful trials providing a partial physical prompt – step 2, prompts was removed. A successful trial is one in which the participant completes getting off from the trampoline and sitting in the chair without errors or problem behavior. The prompt level was reduced when the participant showed some improvement such as getting off trampoline by oneself or sitting in the chair for 30 sec. During this phase, Experimenter One told the participant, “Jump on the trampoline,” and guided the participant to the trampoline. After 30 sec, Experimenter One told the participant only these words, “It’s my turn.” No prompts were provided. When the

participant was sitting in the chair, Experimenter One jumped on the trampoline for 30 seconds. If the participant attempted to leave the chair, Experimenter Two physically guided the participant to sit in the chair until 30 sec has elapsed. At the end of the 30 seconds, Experimenter One told the participant, “Jump on the trampoline” and gave the participant a turn to jump. If during any trial the participant made an error or display problem behavior, the prompt level was increased on subsequent trials. Specifically, if a participant made an error or displayed problem behavior, a partial physical prompt – step 2 was delivered for the next five trials.

Treatment Integrity

In order to assess the fidelity with which the independent variable was implemented throughout the experiment, procedures were carried out to measure treatment integrity. Treatment integrity was measured across sessions using a checklist criterion, which outlined the specific procedures the experimenter would follow during each session. Sessions were video recorded to measure the treatment integrity. The treatment integrity checklist is available in Appendix C. Data for treatment integrity was analyzed for 4% of sessions. According to this treatment integrity measure, the experimenter implemented 92% of steps with integrity.

Experimental Design

A multiple baseline across participants design was implemented to evaluate the functional relationship between the intervention and turn-taking. When data in the baseline were determined to be stable for the first participant, intervention was initiated for that particular participant while other participants remained in baseline probes. The

baseline data for the second participant was continuously collected until the first participant's intervention data showed stable improvement. Intervention was continued until the participants responded at least 80% of independent performances for two consecutive sessions. A successful sessions is one in which the participant independently completes object turn-taking skill with the experimenter for total of five trials.

Social Validity

Social validity measures the appropriateness of the target behaviors, acceptability of the intervention procedures, and important and significant changes in target and other behaviors (Cooper et al., 2007). A subjective evaluation was utilized to gather the perceptions of participants' ABA therapists who were also involved in the study on the turn-taking intervention. This Likert-type scale questionnaire was based on Schertz et al. (2013) and modified the text for the present intervention. It consisted of five questions and was analyzed by summing up each of the selected responses for an overall score. The higher score out of 25 means greater assurance in the social validity of the procedure. The questionnaire is available in Appendix D.

CHAPTER FOUR

Results

Baseline

Baseline sessions continued until a stable trend of responding was established for each participant. Data were depicted using a line graph for visual analysis. During baseline, the mean percentage of trials with independent turn taking was 0 across all participants. Figure 1 in Appendix A illustrates participants' performances during baseline.

Intervention

Most-to-least prompting procedure in which full physical prompt, and two steps of partial physical promptings was implemented for the study. Max's first independent performance of turn-taking skill with trampoline was observed during the second session. Max reached mastery criterion 15 intervention sessions. Max's mean rate of independent performance during intervention sessions was 65% (range: 0 – 100%). William's first independent performance was emitted during the seventh intervention session, at which point his independent performance increased exponentially. William reached mastery criterion within 14 intervention sessions. William's mean rate of independent performance during intervention sessions was 36% (range: 0 – 100%). Allen reached mastery criterion within three intervention sessions. Allen's mean rate of independent performance was 67% (range: 0 – 100%). The intervention was terminated for all participants after observing 100% successful independent performances for two

consecutive sessions, which included total of 10 trials of independent object turn-taking performance with experimenters.

Generalization Probe

All three participants displayed no independent turn-taking during the generalization probes measured during baseline. After completion of intervention sessions, positive outcomes were observed for all three participants on performing the generalization probes. During the post-intervention generalization probe, Max completed 80% of turn-taking trials independently. William independently completed all turn-taking trials 100% during the post-intervention generalization probe. Finally, Allen independently completed 80% of turn-taking trials during post-intervention generalization probes.

Social Validity and Inter-observer Agreement

The experimenters who participated in the study were given the social validity questionnaire. There are five questions in which the score ranges from 1 (strongly disagree) to 5 (strongly agree). The questionnaire includes the effectiveness of the procedure, the delivery of required steps, the level of difficulty, the necessity of the procedure, and the information to put into practice the procedure with clients. Seven out of eight experimenters completed the questionnaire. Overall scores on the social validity survey ranged from 96% to 100% with a mean of 98%.

IOA was measured for 99% of sessions. Overall IOA was 98%. Inter-observer agreement was 100% for sessions conducted with Max, 100% for sessions conducted with Allen, and 95% for sessions conducted with William.

CHAPTER FIVE

Discussion and Conclusions

The present study was conducted to increase object turn-taking skill for children with ASD by utilizing a trampoline. Specifically, participants were expected to relinquish from the trampoline upon request and then sit in a chair to wait for their next turn. All three participants consistently demonstrated poor performance of the target skills during baseline. When intervention was implemented, the participants displayed improved independent performance in jumping, relinquishing trampoline when asked, and waiting appropriately for their next turn. The results of this study demonstrated that implementing most-to-least promptings were effective to teach object turn-taking skill, and increased social skills for these three participants with ASD. All three participants improved their turn-taking skill. The result had indicated a sustainable outcome and the participants maintained their increased levels of turn-taking skill during generalization probes.

This study contributes to the literature in that, as of date, no studies have addressed object turn-taking skill. Moreover, no studies have been published with the use of a trampoline as an object for turn-taking skill. Among four studies identified in the systematic literature review, Schertz et al. (2013) did not specify the objects they used, whereas Ferguson et al. (2013) utilized Wii Sports™ baseball game, Yoder and Stone (2006) and Harper et al. (2008) utilized variety of materials. Although these four studies reported data on object turn-taking skill, turn-taking was addressed as a

component of a larger emphasis on improved social skills. No study targeted and measured only turn-taking skill with object. The present study utilized a trampoline to implement intervention targeting turn-taking skill alone. Trampoline was chosen for the study because it is an appropriate object for participants' age range (i.e., 5-6 years old). Additionally, because of the size of the trampoline, turn-taking behaviors were clear and easy to observe for both the participant and experimenter.

This study not only added to the literature by implementing a specified and targeted intervention for turn-taking with objects, but also by evaluating a turn-taking intervention with early elementary aged children, a population that has yet to be targeted by previous research on this topic. The participants in this study were five to six years old. Previous studies have targeted younger participants. Schertz et al. (2013) studied preschool aged children from two to three years old. Similarly, Yoder and Stone (2006) studied turn-taking behavior with participants aged one to five years old. Harper et al. (2008) included participants that were eight and nine years old and Ferguson et al. (2013) studied participants aged seven to eleven years old.

A great deal of prior research on turn-taking has focused on conversational turn-taking skill to improve overall social skills. However, only four studies had measured the turn-taking ability with object by utilizing various objects along with other goals (Ferguson et al., 2013; Harper et al., 2008; Schertz et al., 2013; Yoder & Stone, 2006). While conversational turn-taking is undoubtedly an important skill to address, it is not an applicable to children with minimal or no verbal skills, which constitutes a large portion of children with autism spectrum disorder (Anderson et al., 2007). In the present study, the intervention did not require the participants to demonstrate speech skills. Therefore,

this intervention procedure may be feasible for not only to verbal children, but also to nonverbal children with ASD. However, all three participants in this study had near age-level communication skills, so future research would need to be conducted to explore feasibility of this approach with children with very limited or no vocal communication skills.

Of four studies which measured the turn-taking skill with object, only two studies mentioned the use of reinforcers during the intervention. Among them, Ferguson et al. (2013) applied the token system and verbal praises as reinforcers, and Harper et al. (2008) conducted peer mediated social reinforcers such as high five and verbal praises. In the present study, only verbal praise from the adult experimenter was applied as reinforcers to all participants. This approach not only reduced distractions, but also mimics a natural setting in which preferred objects may not be available during waiting periods.

A great deal of research have been done to establish the efficacy of most-to-least prompting to teach a variety of skills to children with ASD. Such skills include swimming skills (Yilmaz, Konukman, Birkan, & Yanardag, 2010), leisure skills (Vuran, 2008), and laundry skills (Miller & Test, 1989). The present study extended the literature base supporting the effectiveness of most-to-least prompting by demonstrating its effectiveness to teach turn-taking. Moreover, all four studies identified in the systematic literature review implemented distinctly different interventions: (a) behavioral skill training approach (Ferguson et al., 2013), (b) pivotal response training through peer-mediated practice (Harper et al., 2008), (c) joint attention mediated learning (Schertz et al., 2013), and (d) responsive education and prelinguistic milieu teaching and the picture

exchange communication system (Yoder & Stone, 2006). The present study also added an additional intervention to the literature by utilizing most-to-least intervention to increase turn-taking skill with object.

The present study also contributes more data on the social validity of turn-taking interventions. Of four studies identified in the systematic literature review, only one study measured the social validity of the approach. According to that study, most parents responded “strongly agree”, and favored the intervention (Schertz et al., 2013). The present study also resulted in a favorable outcome on social validity. However, social validity of the present study was measured by the experimenters who were involved in the study and who were specializing in applied behavior analysis.

In conclusion, this study contributed many factors to the literatures regarding social skills. It also presents promising outcomes about the possibilities to increase social circumstances and improve the quality of interactions with others. All three participants with ASD enjoy the benefits of the most-to-least intervention in learning object turn-taking skill. This intervention allows the participants to add a new skill to their social skills.

Limitations

Although this study demonstrated positive outcomes, limitations to this study should be considered when interpreting those outcomes. First, the small sample size of only three participants limits to support the generalization of finding to a large population. Second, lower percentage of the treatment integrity leads to threats to the intervention such as experimenter bias and treatment drift. Third, this study took place in a clinic which may limit to generalize the results to other intervention settings, such as

school, home, or community. Forth, no assessments for participants' language ability was conducted which may limit the effectiveness of the participants' responses to the instructions. Finally, generalization probes were conducted by adults, rather than children. This raises a concern whether or not the participant can apply the learned skill with peers.

Future Research

Future research is needed to replicate and add to the literature of social skills training specifically targeting on turn-taking with an object. The participants included in this analysis were children diagnosed with ASD who were able to communicate vocally. Future research should not only replicate the procedures across participants with other disabilities, but also across other children with ASD with various communication deficits (e.g., nonverbal). Furthermore, future study can add the different prompt levels such as physical, gestural, and verbal in order to add the new findings to the literature. Assessments for participants' language ability or communication scale are recommended for future research. Last but not least, researchers should consider having peers to conduct the generalization probes. Overall, more research need to be done to increase turn-taking skill with object in order to improve social skills for children with ASD.

APPENDICES

APPENDIX A

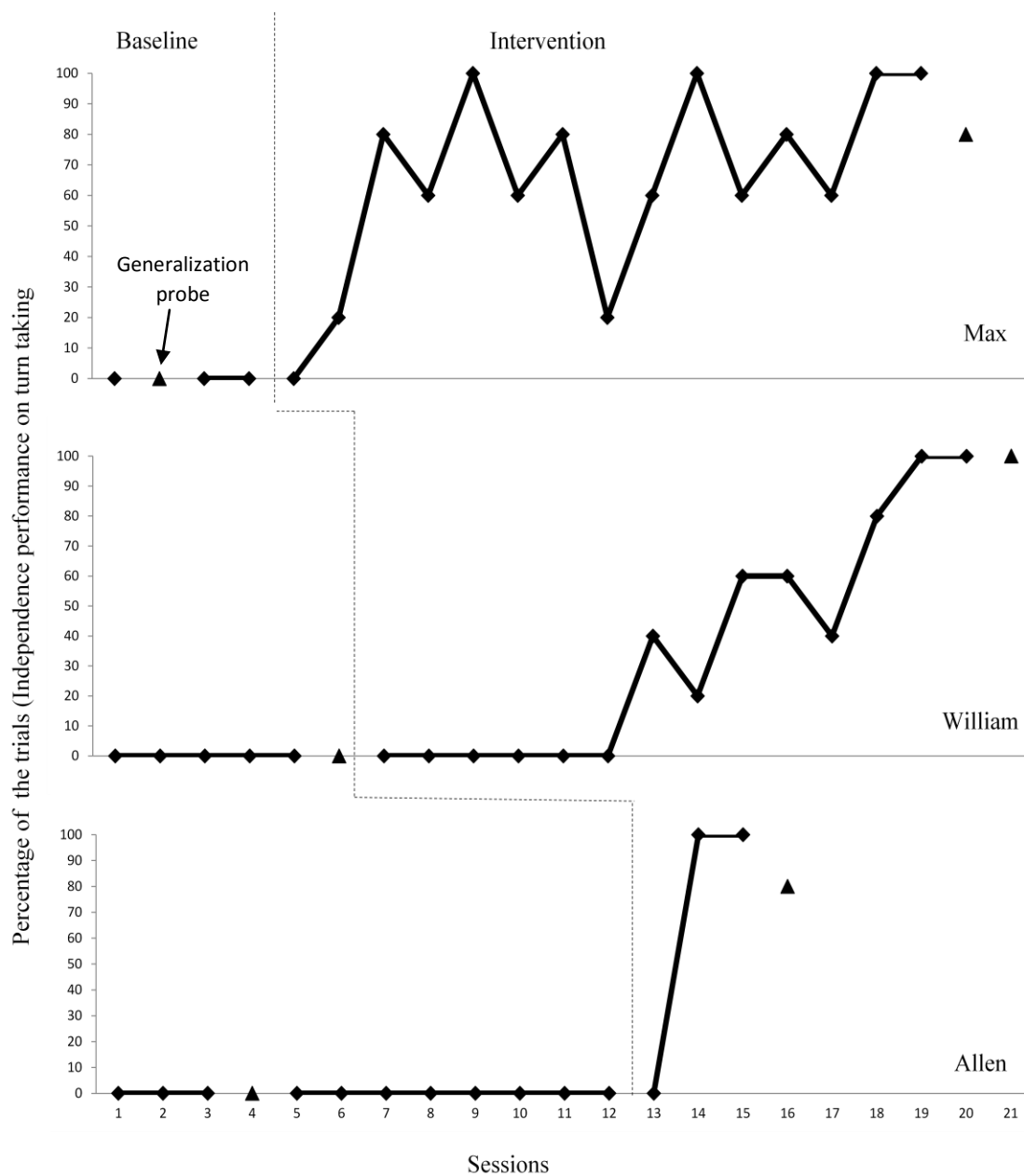


Figure 1. A multiple-baseline-across-individuals design. The generalization probes were marked with closed triangle bullet points.

APPENDIX B

Frequency to Turn-Taking Data Collection Form

Participant : _____ Date : _____
 Primary Coder : _____ Session # : _____
 Secondary Coder : _____ Type of procedure : _____

Direction: Circle the correct data in the box

Trial #	Independent Performance (IP)		Prompting/ Error Correction			Note
1	Y	N	FP	PP1	PP2	
2	Y	N	FP	PP1	PP2	
3	Y	N	FP	PP1	PP2	
4	Y	N	FP	PP1	PP2	
5	Y	N	FP	PP1	PP2	
Total #						
Total %						

FP = Full Physical includes gently placing the hands on the participant's shoulders to stop from jumping and to assist the participant to sit in the chair

PP1 = Partial Physical (Step 1) includes gently placing the hands on the participant's shoulders to stop from jumping and to assist the participant to the chair

PP2 = Partial Physical (Step 2) includes gently placing the hands on the participant's shoulders to stop from jumping

IP =Independent Performance includes a participant gets off the trampoline within three second of a therapist cue (e.g., It's my turn) and sits and waits in the chair without coming back to the trampoline within 30 seconds.

APPENDIX C

Treatment Integrity Checklist: Most to Least Prompting

Participant : _____ Date : _____
Primary Coder : _____ Session : _____
Secondary Coder : _____

Place a check mark next to each item to show the experimenters implemented the procedure.

Baseline procedures for turn-taking behavior

- ___ 1. Experimenter One says, "Jump on the trampoline," and the participant jump on the trampoline for 30 sec.
- ___ 2. After 30 seconds, Experimenter One told the participant, "It's my turn."
- ___ 3. No other prompts were provided.
- 4. Noncompliance and problem behavior were ignored.
- 5. No praise or other differential consequences were provided for turn-taking.
- 6. The Experimenter does not allow the participant to access other materials.

Intervention procedures for turn-taking behavior

- ___ 1. Experimenter One says, "Jump on the trampoline," and the participant jump on the trampoline for 30 sec.
- ___ 2. After 30 seconds, Experimenter One told the participant, "It's my turn."
- ___ 3. Experimenters correctly deliver the prompt levels: Full physical, partial physical step-1, partial physical step-2, and independent performance.
- 4. No other prompts were provided.
- 5. Noncompliance and problem behavior were ignored.
- 6. Verbal praised were provided for sitting in the chair or waiting for the turn.
- 7. The Experimenter does not allow the participant to access other materials.

APPENDIX D

Social Validity Questionnaire

Please indicate the extent to which you agree or disagree with following statement by circling a number that most closely reflects your opinion regarding.

Strongly Disagree	Disagree Somewhat	Neutral	Agree Somewhat	Strongly Agree
1	2	3	4	5

1. I believe the most-to-least procedure was effective in increasing turn-taking skill.

1	2	3	4	5
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2. I believe the components (i.e., full-physical, partial-physical step - 1, partial-physical step – 2, and independent performance) of this intervention were all necessary to its success.

1	2	3	4	5
---	---	---	---	---

3. I believe that these intervention procedures are easy to put into practice.

1	2	3	4	5
---	---	---	---	---

4. I believe most-to-least procedure was necessary, and my client had opportunities to do additional learning.

1	2	3	4	5
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5. I feel I obtained enough information on what was included in the procedure to utilize this effectively in my practice with the client.

1	2	3	4	5
---	---	---	---	---

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