The Effects of the Social-Listener Protocol on the Observing, Helping, and Vocal Behavior of Children with ASD

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ABSTRACT

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Psychologists have long been interested in the study and development of empathy, though there has often been variation in the literature in regards to definition and measurement (Wispé 1986). Nevertheless, researchers in the field do agree that empathy is an essential social skill with evolutionary roots (De Waal, 2008). Yet, findings have shown that this stimulus control does not readily develop for all individuals; one such population is individuals with Autism Spectrum Disorder (ASD). The purpose of this study was to provide a behavioral measurement to determine if children with an educational classification of ASD would demonstrate empathy in an unfair play scenario and, if empathetic behavior is absent, can the Social-Listener Protocol (SLR) intervention result in the emergence of empathy. In Experiment I, the participants were placed in an unfair free play scenario and data were recorded on empathetic behavior. I selected 11 participants, from a mainstream first- and second-grade classroom, and two self-contained classrooms. Three participants from a mainstream second grade classroom were recruited to be actors in the free-play session. In this free play setting the participant was given an item while a peer, functioning as the confederate, was told there that there was not enough for him/her. Data were recorded for the participant's observing and helping behavior. In addition, the participant was asked four empathy questions following the experiment. The results showed that, overall, participants with ASD demonstrated less observing behavior and answered fewer empathy-related questions correctly when compared to their typically developing peers. However, participants

with ASD did not differ from their typically developing peers in regards to empathetic behavior. In Experiment II, I conducted additional free play probes across three activities. These free play settings differed from that of Experiment I as the child with ASD was given a Ziploc bag with multiple items, as opposed to one item. Data were collected on the number of times the participant looked at the peer, the vocal verbal operants emitted, and the number of seconds the participant shared the item. The results overall showed low levels of vocal verbal operants and sharing across participants. A multiple probe design was used to test the effects of the SLR protocol on empathetic behavior. The SLR protocol was composed of four activities that yoked the participant with a peer, against the teacher, to access a reinforcer. The results showed an increase in vocal verbal operants for Participant 3, 4, and 6. In addition, the results demonstrated an increase in sharing for Participants 2, 3, 4, and 6. Interestingly, the results showed an increase in correct responses to empathetic questions for Participants 2, 3, and 4 as well. The results show no significant change for Participants 1, 2, and 5. In Experiment III, I conducted additional phases of the SLR protocol and paired Participants 1, 2, and 5 with the same peer for intervention and probe sessions. In addition, I conducted observational learning probes. The results showed that Participants 1, 3, 4, and 6 had observational learning in their repertoire. Post-intervention results show an increase in vocal verbal operants, sharing behavior, and the induction of observational learning for Participant 2. There was no significant change for Participants 1 and 5.

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DEDICATION

This is always was and will be for the kids. But especially to my boys, my mathematician, golden boy, energizer, and scientist; thanks for inspiring me and for teaching me.

Chapter I

Review of the Literature

The Importance of Empathy

In order to navigate a social world an individual must have the capacity to engage in a number of complex behaviors, one such capability being empathy. Psychologists have defined empathy as, "an emotional response that stems from another's emotional state or condition and that is congruent with the other's emotional state or situation (Eisenberg & Strayer, 1987). This means that one must be able to observe a situation, take the perspective of another individual, and consequently take on the emotions of the individual observed. Psychologists have long been interested in empathy and the roots of this complex capability. However, in recent years, interest in empathy has grown beyond the field of psychology, as it has become a "hot topic" in mainstream culture. The cultural relevance of empathy is demonstrated by the 10 million views of the TED Talk on the topic, given by the famous Brené Brown (The RSA, 2013), to the multiple opinion pieces in the *New York Times* when empathy is typed into the search engine (www.newyorktimes.com), along with the production of dolls, books, puzzles, and even flashcards all designed to enhance this skill (https://www.todaysparent.com).

It is of no surprise that we have been captivated by empathy as our American society is currently wrought with deep societal divisions across politics, race, socioeconomic status, gender, and religion. This cultural climate has caused individuals to seek a solution that would unite us, in spite of our differences, and from this search the significance of empathy has emerged. In recent years, researchers have conducted experiments to demonstrate the relationship between empathy and various positive social outcomes. Findings have shown empathy as a mediating factor for prosocial behavior (Eisenberg, et. Al, 1989), regulation of

aggressive behavior (Feshbach & Feshbach, 1969), and a foundation for care-based morality (Eisenberg, Tracy, & Knafo, 2016).

Defining Empathy

Though there are countless experiments investigating this fascinating phenomenon, researchers have had difficulty agreeing upon a precise definition to encompass empathy. When reviewing the concept in the literature there are over 43 discrete definitions (Cuff, Brown, Taylor, & Howat, 2016). In order to understand the present-day definition we must consider the evolution of this term over time.

The idea of empathy first came from the German term, *Einfühlung*, which Titchener (1909) translated as empathy. This word embodies, "the tendency of the observer to project themselves 'into' that which they observe" (Davis, 2018). This concept of empathy grew out of and was differentiated from the classic term sympathy. Though scientists have long argued that empathy and sympathy are two separate capabilities; researchers in the field have noted that there has often been overlap and confusion between the two terms (Wispé 1986). Recently, scientists have taken extraordinary measures to distinguish one term from the other. Davis (2018) proposed a simplistic way to begin to untangle sympathy from empathy. He argued, "Sympathy, has a largely, though not entirely, *passive* flavor to it. The emphasis is on ways in which an observer came to feel what another felt, or was moved by another's experience. In contrast, empathy suggests a more *active* attempt by one individual to get 'inside' the other, to reach out in some fashion through a deliberate intellectual effort" (Davis, 2018, p. 5). Not only have researchers worked to differentiate empathy from sympathy but they have also sought to create a comprehensive definition of this repertoire. This has proved to be a challenge, as empathy is a multifaceted skill. To account for the complexity of this capability, researchers have fashioned a

definition to outline the component parts of empathy. Presently, there is a general consensus in the research that empathy contains both a cognitive (verbal) and affective (emotional) aspect.

Cognitive Empathy

The first component is defined as cognitive empathy. This term describes when the individual observes and understands the emotions experienced by another individual. Psychologists choose the term cognitive because they believe the mechanism that enables an individual to process such information is cognitively based. Though the origins of empathy were not in cognition, once it became an English term its roots were quickly established in the social cognitive realm (Strayer, 1990). A major proponent of the importance of the cognitive mechanisms in empathy was George H. Mead (1934). According to Mead empathy is, "the capacity to take the role of the other and to adopt alternative perspectives Vis à Vis oneself" (1934, p. 27). In order, then, to study empathy, researchers developed measures in an attempt to identify and capture these cognitive processes. These measures included tests of one's stereotypic knowledge of groups, predicting others' attitudes and opinions, and more specific knowledge such as another person's perspective of an event (Staryer, 1990). Although, these cognitive processes are an essential part of empathy, other scientists in the field argued that empathy is more than these processes alone.

Affective Empathy

To account for the complexity of empathy, researchers have proposed a second component of this repertoire, and termed this portion affective empathy. This encompasses the observation of the emotional state of an individual and the production of an emotional response that is congruent with it (Eisenberg & Miller, 1987). In this, empathy is more than simply taking the perspective of another, as one matches his/her own emotions to another. This concept of

emotional empathy stemmed out of research conducted by Mehrabian and Epstein (1972). In this study, researchers sought to fill present gaps in the literature with a measure of emotional empathy. They measured individuals' emotional responses across two social situations; one involving aggression and the other helping behavior. To measure emotional empathy in each part of the study researchers employed an scored a questionnaire. In the study designed to investigate the relationship between empathy and aggressive behavior researchers compared an empathy score to the level of shock a participant administered to a confederate. The results showed a negative correlation relation between empathy score and the level of shock administered; such that individuals with higher scores of empathy delivered lower levels of shocks. To explore the relationship between helping behavior and empathy researchers contrived a situation in which a confederate actor described how he/she was struggling to pass a class in college to the participant. Researchers took data on whether the participant offered to help the actor study and if he/she offered help how long he/she offered to study with the confederate. The results showed that empathetic scores, as computed by a questionnaire, predicted helping behavior. In each situation, emotional empathy was related to more positive social behaviors.

Evidence for Evolutionary Roots

Through the years, our definition and understanding of empathy has evolved, as researchers have conducted countless studies to investigate this phenomenon. In this pursuit of understanding empathy researchers have proposed theories as to how humans came to acquire this complex capability. Researchers have argued that this skill has evolutionary roots, as it has contributed to the survival of humans and non-humans alike. Tomasello constructed a theory to show how evolution has driven the development of complex human communication (2008). In this theory, he proposed three reasons as to how collaborative interactions are adaptive and as a

result have been selected out by evolution. He claimed that in the context of collaborative activity helping behavior (i) invoked mutual benefit, (ii) invoked reciprocity and indirect reciprocity, and (iii) invoked cultural group selection. He argued that collaborative behavior was initially mutually beneficial for the individual parties involved and such behavior has been demonstrated in humans and non-human primates alike. In a study conducted by Warneken and Tomasello (2006) researchers showed that humans and chimpanzees both demonstrated instrumental helping behavior to achieve a goal. Even though this form of collaborative behavior is the most simplistic, it is essential as it laid the foundation for more complex interactions.

Through time these helping behaviors continued to evolve and became far more robust as they were shaped by direct and indirect reciprocal processes. In this, direct reciprocity is the act of helping those that offer help to you. Though non-human primates demonstrate what appears to be reciprocity these behaviors emitted under direct reciprocal conditions do not account for the vast amount of helping behaviors demonstrated. Shortcomings are seen in the fact that these behaviors tend to be directed only to kin or known individuals, and are almost never present when food is involved (Jensen et al. 2006; Silk et al., 2005). Thus, it is important to consider the impact of indirect reciprocity. This concept describes future implications of helping behavior emitted when there is no immediate benefit to the individual. In light of this, one reason helping behavior may have been promoted is because individuals are more likely to select and associate with those more likely to help. In a study chimpanzee were required to recruit a partner to help solve a problem and the results showed that chimpanzees consistently selected a known helpful partner, as opposed to a dominant partner (Melis, Hare, & Tomasello, 2006). The implication of this then is chimps that emit more helping behavior are to be more desired by members in the group, and thus their survival chances are increased. Both of the

aforementioned evolutionary accounts of helping behavior relate to human and non-human primates, however, the final reason is specific to the social behavior of humans.

The final purpose of these helping behaviors in humans is to invoke cultural group selection. Belonging to a group has been essential to an individual's ability to survive and flourish throughout time. As such, one important function of human behavior is to demonstrate group affiliation. For example, a regional accent associates an individual with a certain group of people from a particular region. But, Tomasello (2008) claimed that humans seek not only to be like others but also to be liked by others. One way humans achieve this is through sharing emotions and attitudes with others. Examples of this are seen when individuals gossip, align with communities based on affinities, or respond with "likes" to information posted on social media networks. In each of these circumstances, the individual attempts to solidify his/her identity within a group as he/she demonstrates similar emotions or attitudes experienced by those within the group. A mechanism that may enable individuals to engage in such behavior is empathy.

Empathy-Altruism Theory

In line with this framework psychologists have constructed the Empathy-Altruism Theory. Altruism is defined as, "behavior that promotes the welfare of others without conscious regard for one's own self-interests" (Hoffman, 1978, p. 326). Proponents of this theory argue that evolution has shaped humans to act in unselfish ways in some circumstances; as such acts may later be reciprocated (Trivers, 1971). Hoffman asserted empathy might be the mechanism that enables such behavior as it is reliable and flexible (Hoffman, 1978), and such a mechanism cannot be automatic. Researchers in the field have conducted experiments to test for the relationship between empathy and these altruistic behaviors. Findings have shown a modest

relationship between empathy and altruism (Eisenberg & Miller, 1987; Batson et al. 1989; Batson et al. 1991; Cialdini et al., 1987).

Behavioral Evidence to Support an Evolutionary Account

Observation of behavior. A behavior that has long promoted the survival of species is the observation of behavior emitted by others in one's own species group. As one comes into contact with his/her social environment he/she has the opportunity to learn new behaviors through observation and thus the rate of learning increases exponentially. Observation of behavior has been an important survival tool for humans and non-humans alike. De Waal (2008) proposed that the observation of an emotional response is important for the survival of species. For example, if one bird detects a threat and demonstrates an emotional response of distress, the whole flock will take flight; regardless if the other members observed the threat itself or not. In this, empathetic behaviors communicate important information, necessary for survival, via emotional responses (De Waal, 2008). In order for this robust skill to be acquired an individual must observe their environment, those in it, and the consequences that those individuals come in contact with. An experiment that demonstrated this important capability showed a change in monkeys' responses to snakes following observation (Cook, Mineka, Wolkenstein, & Laitsch, 1985). Initially monkeys were not fearful of snakes, however, after observing other monkeys demonstrate distress in the presence of snakes, the same monkeys that were originally not afraid began to demonstrate distressed responses in the presence of snakes. This phenomenon, produced by observation, is demonstrated in humans as well. When young infants observe the crying of another they often respond by crying as well (Martin & Clark, 1982). This early presence of this emotional matching seems to imply that this skill has served survival purposes.

Observation of consequences. In addition to the observation of behavior, an equally important process is the observation of the consequence (Greer & Singer-Dudek, 2008). The stimulus control for this behavior is the presence of others part of one's group emitting a behavior and receiving a consequence. Observation of a social consequence has resulted in the acquisition of complex social behavior. For example, monkeys who have seen a larger portion of food paired with a shock delivered to a fellow monkey refuse to select the larger portion and instead consistently opt for the smaller portion of food (Masserman, Wechkin & Terris, 1964). The findings of this study demonstrate the power of social observation and reveal the significant impact social context has on the development of behavior.

Differences in Empathy

Though these findings imply empathy has evolutionary roots, the development and acquisition of this skill is not standardized across individuals. One such difference often noted in the literature is gender. A study conducted by Baron-Cohen and Wheelwright (2004) found that women reliably scored higher in an empathy quotient when compared to their male counterparts. These results were replicated in a recent large-scale study (2018), with a sample of over half a million people. Findings confirmed that women scored higher on an empathetic quotient when compared to men and individuals with ASD (Greenberg, Warrier, Allison, & Baron-Cohen, 2018). A second variable researchers have investigated is the relation between empathetic responding and age. Analyses of the these results shows that differences in performance can be observed though the mid-elementary years and then levels off; when children are younger they tend to rely on facial cues and as they age they pay greater attention to visual cues (Lennon & Eisenberg, 1987). An additional variable that seems to impact the development of empathy is the presence of a developmental disability. Specifically, results have consistently shown that

children with a diagnosis of Autism Spectrum Disorder (ASD) perform differently when compared to their typically developing peer counterparts (Baron-Cohen & Wheelwright, 2004; Greenberg, Warrier, Allison, & Baron-Cohen, 2018).

Children with ASD. According to the most recent data collected by the Centers for Disease Control and Prevention (CDC) 1 in 59 children are diagnosed with ASD. Of these children, there are 4 times as many boys as girls (Centers for Disease Control and Prevention, 2014). The DSM-5 diagnostic criteria are composed of deficits in social skills including deficits across social communication, interaction, and functioning (American Psychiatric Association, 2013). Research through the decades has repeatedly highlighted the differences between children diagnosed with ASD when compared to neurotypically developing peers in performance related to empathy and the frequency of prosocial behaviors (Klapwijk et al., 2017; Marton, Wiener, Rogers, Moore, & Tannock, 2009; Rutter, 1978; Sigman, Kasari, Kwon, Yirmiya, 1992).

One of the greatest obstacles for individuals with ASD, as outlined in the DSM 5, is social communication and deficits and this has important educational implications. These deficits have an effect on the student's ability to access educational content and engage in social interactions throughout the school day. As the number of children diagnosed with ASD is on the rise, the number of children served under IDEA continues to increase over the years. According to the National Center for Education Statistics in the 2017-18 academic year the number of children served under IDEA was 7.0 million, making up 14% of the total public-school enrollment (National Center for Education Statistics, 2019). Of this population 95% of the children, ages 6-21 attended a regular school.

With such a large number of children served under this umbrella of education it is of upmost importance to ensure that each individual in this diverse group of learners is given access

to the *least restrictive* and most *appropriate setting*. However, what both of these terms fail to incorporate is observable standardized measures to ensure that learners are being placed in the best setting. Presently placement is determined by Committee of Special Education, that is composed of the parents, teacher, and the district chair. The committee makes the placement decision based on standardized test scores and behavioral concerns. In this, the decision can become subjective as there is not a rigorous checklist to determine placement.

An interesting fact is the significant increase in the percentage of children in a regular school that push into a general education setting, for 80% or more of their day. In 2000 only 40% spent a majority of their day in a mainstream setting and this rose to 67% in 2017. Though the end goal is always least restrictive, placing a child in a setting that does not have the support necessary to facilitate that individual's learning is not the most appropriate setting. It is essential to consider then what prerequisite skills an individual must possess in order to go into a mainstream setting for the majority of their day. Rather than relying on subjective terms such as, "appropriate," or "least-restrictive," to determine placement it would be of great help to have a standardized checklist to guide placements. This would benefit, educators, parents, and students. Ideally, this checklist would include observable behavior, and empathy would be one of the behaviors important to consider.

Perspectives in Psychology

In order to better understand empathy and its development, psychologists in the field have designed studies to investigate and identify differences in empathy and interventions that effect the presence of empathy. Different schools within psychology have proposed various theories to account for these observed differences.

Developmental Psychology

The goal of developmental psychology is to identify changes in human development and construct theories to give an account for observed growth. As such, psychologists in this school have long been interested in the complex skill of empathy. One researcher who added much to the literature is Martin Hoffman. Hoffman defined empathy as, "an affective response appropriate to someone else's situation rather than one's own" (Hoffman, 1990). He proposed that empathy is composed of six components that enable individuals to react affectively to the experiences of another (Hoffman, 1984).

Hoffman's six modes of arousal. The first mode of arousal is termed the *primary circular reaction*. This refers to the seemingly innate response of newborns to cry when they hear the cries of others. The second mode is *mimicry*. Hoffman described this as a two-step process, first the observation of another's emotional state, and second the ability of matching one's behavior to the observed (e.g., facial expression). A separate study conducted by Gladstone and Cooley (1975) investigated the reinforcer for such imitative behaviors. The researchers compared the difference in the imitative behaviors of preschool-aged children when consequated at differential rates with praise or tokens. The results showed the rate the child imitated the experimenter's behavior was not dependent on the consequence, implying that the act of imitating itself was reinforcing. Third, is the *classical conditioning process.* This is the process in which a child has the same experience of another child and as a result of this experience the two respond simultaneously with the same emotion. The emotion, and demonstration of it, becomes paired with the experience and this becomes something the child can reference in similar future scenarios. The fourth process is called *direct association.* Though similar to classical conditioning, it is differentiated because it is a more general application of the concept. In this, the individual observes another experiencing an emotion, and this may remind him/her of

a similar situation from the past that may evoke the same emotion. The fifth mode is *language-mediated association.* This process is identical to the fourth mode, the only difference being that the emotion is triggered by language and not observation. The final mode is *role-taking* and this is considered to be the most complex mode. *Role-taking* requires the individual to actively take the perspective of the other and as a result have a similar emotional response. Aside from mode one, these capabilities develop as the individual grows and interacts with their environment.

Table 1.

Hoffman's six modes of arousal

Mode	**Behavior**
1st Mode: *Primary Circular Reaction*	Demonstrated by infants, to cry when he/she hears the cries of another.
2nd Mode: *Mimicry*	Infants demonstrate the observation of another's emotional state and the ability to match his/her own emotion to that observed.
3rd Mode: *Classical Conditioning Process*	Following a shared experience the individual experiences the same emotional response as his/her peer.
4th Mode: *Direct Association*	Demonstrated as observation of an individual's experience other than one's own and the identification of emotional response of that individual, though it be different from one's own, by relating it to one's own past experiences.
5th Mode: *Language-Mediated Association*	Demonstrated when the individual identifies the emotional response of another individual, though it is different from one's own, through a vocal exchange with the individual.
6th Mode: *Role-taking*	Demonstrated as taking the perspective of another and then experiencing a similar emotional response.

Hoffman's four levels of empathy. Each of Hoffman's four levels is defined by the presence, or absence, of the six modes of empathetic arousal. The first level is *Global Empathy.* In this stage, often during the child's first year of life, there is no differentiation between self and other. As such, Hoffman argued that when the individual responds to the distress of another, the infant is unaware of who is actually experiencing the distress, him/herself or the other. In this, empathetic distress is, "passive, involuntary, and requiring only the lowest level of cognitive processing" (Hoffman, 1984). During this process, the infant initially relies heavily on the *primary circular reaction.* In addition, the infants uses modes of *motor mimicry*, *classical conditioning*, and *direct association* to process empathy. But, towards the end of the first year there is a shift, as the child begins to distinguish him/herself from others. Once the infant has a firm separation of self, generally at one-year of age, they move to the next level, *Egocentric Empathy.* During this stage, the infant has a firm sense of self, but is not able to understand differences in internal states. The child no longer employs the *primary circular reaction;* rather they rely on *motor mimicry, classical conditioning, and direct association.* Typically, this level occurs between ages one to two years old. In this level we first observe helping behavior, however assistance offered is not always appropriate, as the child cannot yet take the perspective of another. The next level of empathy is *Empathy for Another's Feelings.* The beginning of this level occurs between two- to three-years-old and continues through the age of ten years. The development of language during this phase has a significant impact on the child's ability to experience empathy. This enables them to begin to use new modes to experience empathy, including *language-mediated association* and the beginnings of *role-taking.* Through this, helping behavior becomes more appropriate to the situation, as the child begins to understand that the internal state of others can vary from their own. The final level of empathy is *Empathy*

for Another's General Condition. This stage begins in adolescence and continues through adulthood. Though this stage is composed of the same empathetic modes as the prior level, the modes of empathy are experienced in more complex ways. As such, this stage is defined by the individual's understanding of a person's identity. The implications of this stage are that the individual relies more on a person's unique history, as opposed to contextual cues that aren't as meaningful, to understand the experience of the person. Through these processes individuals can now empathize given conceptual situations and abstract categories.

Table 2.

Hoffman's four levels of empathy

Stage	**Typical Age Range**	**Modes of Empathy**
Global Empathy	● 0-1 years-old	● Primary circular reaction ● Motor mimicry ● Classical conditioning ● Direct association
Egocentric Empathy	● 1 – to 2-years-old	● Motor mimicry ● Classical conditioning ● Direct association ●
Empathy for Another's Feelings	● 3- to 10-years-old	● Motor mimicry ● Classical conditioning ● Direct association ● Language-mediated association ● Role-taking (beginning)
Empathy for Another's General Condition	● Adolescence through adulthood	● Motor mimicry ● Classical conditioning ● Direct association ● Language-mediated association ● Role-taking

A Developmental Framework for Empathy in ASD

Not only have researchers in the field outlined the development of empathy, but some have even proposed an account for individuals who do not follow this typical trajectory. Through much research and investigation Simon Baron-Cohen constructed the Empathy-Systemizing (E-S) Theory (Baron-Cohen, 2009). Baron-Cohen argued that a cognitive account for empathy, specifically related to individuals with ASD, is of upmost importance as a cognitive theory allows researchers to consolidate a variety of behavioral features into a few mental processes (Baron-Cohen, 2009). That is to say, rather than focusing on the behavior and the many ways it manifests, researchers should instead put effort into identifying the cognitive mechanisms that produce these behaviors.

Empathizing-Systemizing Theory. This theory was a response to the shortcomings of the Mind-Blindness Theory. The Mind-Blindness theory asserted that children with ASD are delayed in developing Theory of Mind and as a result are left with a degree of "mind-blindness" (Baron-Cohen, 1997). Though this theory accounted for some of the social differences in ASD, it failed to encompass the complexity of both the social strengths and difficulties of individuals with ASD. In the new system, social differences observed in individuals are accounted for by two component skills, the ability to empathize and systematize. In this model, empathy is composed of cognitive (perspective-taking) and affective (emotional matching) empathy. While systematizing is the creation of systems, which are defined as, "anything that follows rules, and when we systemize we are trying to identify the rules that govern the system, in order to predict how that system will behave" (Baron-Cohen, 2009, p. 71). According to this framework, individuals with ASD generally have strong systemizing skills and weaker empathizing skills.

Outcomes for Children with ASD. Specifically, researchers in the field have shown that children with ASD differ in respect to cognitive empathy. A study that compared the cognitive and affective empathetic responding for boys 9- to 16-years-old showed that children with ASD, in respect to affective empathy, performed similarly to the comparison group but differently from peers with conduct disorders and psychopathic tendencies. Though there was no difference in measures related to affective empathy with the comparison group there was a difference in cognitive empathy (Jones, Happé, Gilbert, Burnett, & Viding, 2010). Researchers have shown similar trends for children 6- to 7-years-old with ASD (Deschamps, Been & Matthys, 2014).

Measurement in Developmental Psychology

Though there is a general consensus that children with ASD differ in some aspects of empathy there is not a standardized measure to investigate this phenomenon. Peterson (2014) identified seven common ways scientists investigate empathy. The first way scientists have measured empathy is through direct behavioral observation in structured settings. An example of this is in a study conducted by Charman et al. (1997) that measured infants' response to an experimenter in distress. In this study the experimenter pretended to hit his/her hand with a hammer and expressed pain. Researchers took data on the number of times the infant observed the experimenter's face and hand, the emotion expressed on the child's face, and if the infant continued to play with the toy. In addition, experimenters have designed studies to investigate empathy by measuring physiological reactivity. Sigman, Dissanayake, Corona, and Espinosa, (2003) measured young children's' heart rate when observing videos of infants playing or in distress, during interaction with strangers, and separation from their mothers. Another form of measurement is affect matching to story vignettes. Yirmiya, Sigman, Kasari, and Mundy (1992)

employed the *Feshbach and Powell Audiovisual Test for Empathy* (1982) to measure the child's response to emotions observed in videos. In this, the child observed five videos in which the individual expressed different emotions (happy, anger, pride, sadness, or fear) and then reported his/her own feelings. A fourth form of measurement is identifying unexpressed emotions and views of a real-life conversation partner. Ponnet, Buysse, Roeyers, and De Corte (2005) measured the ability of adults with developmental disabilities to identify the thought or feeling of a conversational partner, along with the content of the thought or feeling. Another common way of measuring empathy is the use of self-reports. Jones, Happé, Gilbert, Burnett, and Viding (2010) gave boys with ASD and psychopathic tendencies the *Emotion Attribution to Self* (Burrett, Bird, Moll, Frith, &Blakemore, 2009) to rate, on a scale of 1-4, how much they would feel an emotion in a hypothetical scenario. Along with self-report researchers often utilize third-party reports. There are many types of third-party reports; one used by Strayer and Roberts (2004) was the *Child Rating Questionnaire* (Buck, 1977; Weir, Stevenson, & Graham, 1980). Researchers had teachers complete this 47-item form to learn more about the aggressive behavior of 5-year-old boys. The seventh form of measurement is similar to third party reports and is the frequency of observed behavior by a third party. In a study Dadds et al. (2008) employed the *Griffith Empathy Measure* (GEM) to measure children's' cognitive and affective empathy. A Likert Scale (1-9) was used to measure parent's reports of their child's empathy.

Table 3.

Seven common ways psychologists investigate empathy

Forms of Measurement
1. Direct Behavioral Observation
2. Physiological Reactivity

3. Affect Matching to Story Vignettes
4. Identifying Unexpressed Emotions (of conversation partners)
5. Self-Reports
6. Third Party Reports
7. Third Party Reports and Frequency Measures

Interventions in Developmental Psychology

In the aforementioned studies the researchers were primarily concerned with identifying differences in the observed empathy of individuals. The findings of these studies showed a difference between the eye gaze of infants with ASD and typically developing infants (Charman et al., 1997), children with ASD demonstrated less empathy and conversational abilities compared to typically developing peers (Yirmiya, Sigman, Kasari, & Mundy, 1992), boys with ASD demonstrated higher levels of empathy when compared to boys with psychopathic tendencies (Jones, Happé, Gilbert, Burnett, & Viding, 2010), and that empathy is negatively related to aggression (Strayer & Roberts, 2004).

Though a majority of research has been to identify differences in the demonstration of empathy between individuals, some researchers have conducted experiments to test the effects of social interventions on empathy. The interventions in this field differ according to the definition of empathy the researchers adhere to. In this, researchers often investigate component skills of empathy. To address this need researchers have utilized technology to teach social skills to children with ASD. One such intervention, *The Transporters,* was developed by Golan et al. (2010). In this study, researchers tested the effects of using animated vehicles to teach young children with ASD emotional recognition. The results showed that following four weeks of the intervention children with ASD performed comparably to their typically developing peers in

their ability to identify emotions. A second virtual reality game to teach emotional recognition is *The Junior Detective Training Program (*Beaumont & Sofronoff, 2008). This intervention was composed of a seven-week computer training program, parent training, and teacher intervention. The results showed that individuals with ASD who completed *The Junior Detective Training Program* were better able to identify emotion-regulating strategies when compared to the control group. Another popular form of intervention in this field are social packages. In a study conducted by Schmidt, Stichter, Lierheimer, McGhee, and O'Connor (2011) researchers investigated the effects of *The Social Competence Intervention-Adolescent* (SCI-A) *program* on the social behavior of six boys, ages 11- 14-years-old, with ASD. The SCI-A program was delivered in the students' classroom across 10 weeks. The program was composed of 20 hours of group intervention, broken down into five units. Each unit contained four, one-hour lessons. The results from teacher reports, regarding executive functioning and social skills, demonstrated improvement in social skills following the intervention. In addition, there was improvement for facial-expression recognition for some participants. A study that investigated empathy specifically was conducted by Koegel, Ashbaugh, Navab, and Koegel (2016). In this experiment researchers employed a multiple baseline design to test the effects of video feedback on the empathetic statements made by adults with ASD. In the intervention participants were given a visual framework that contained three boxes, to prompt empathetic responses. In this, the first box prompted participants to observe times that were appropriate to express empathy (e.g., "I was very sick over the weekend). The second box prompted an empathetic response (e.g. "I'm so sorry to hear you didn't feel well). The third box cued a follow up questions (e.g. "Can I do anything to help?"). Along with the visual framework researchers recorded sessions and provided feedback by reviewing the video with the participant. The results showed that following

the intervention participants increased in the number of empathetic statements and questions emitted.

Gaps in the Literature

Though much research has been conducted in this field, there are still significant gaps in the literature. One area that is lacking is a standardized way of investigating empathy that produces reliable results. For example, children with ASD are often thought to differ greatly from typically developing peers, however, often this difference is expressed only in cognitive capabilities and not affective responding (Hadjikhani, et al., 2014; Jones, Happé, Gilbert, Burnett, & Viding, 2010; Mazza et al. 2014). In addition, results have demonstrated only reliable findings to support this theory for adults, as results for children are not reliable and seem to be impacted by the measurement selected (Eisenberg & Miller, 1987; Underwood and Moore, 1982). Not only have results been inconsistent for young children, other studies have shown that children demonstrate these altruistic behaviors before ages that they typically acquire empathy, as young as 3-years-old (Svetlova, Nichols, & Brownell, 2010). Since these children are able to engage in altruistic behavior, even if empathy is not present, it seems of great importance to consider ways to promote and develop such behavior. In order to do so, as a science, we must agree on definitions for these social behaviors. To add clarity and value, the terms must have significant social implications and include a measurable response. Presently, the definition for empathy does not include social benefits for others. In order to make empathy meaningful it must have social implications. To provide a framework for this definition it is helpful to consider a framework provided through a different school of psychology.

Empathy from a Behavior Analytic Approach

Though empathy finds its roots in cognitive psychology there is a way to bring this phenomenon into the behavioral realm. However, in order to do so, one must analyze empathy as a behavior that is under the control of social environmental contingencies. A famous behaviorist who first provided the framework to do so is B.F. Skinner.

Verbal Behavior. In his book *Verbal Behavior* (1957) Skinner presented a functional account of verbal behavior as it relates to individuals. He argued that to give a full account of verbal behavior science must investigate the function of language, which includes both the speaker and the listener. He described this behavior as, "behavior reinforced through the mediation of others" (Skinner, 1957, p. 2). He first asserted that terms must be analyzed as they are observed, which he claimed are chiefly verbal responses. In this, definitions include determiners of the response as opposed to properties of the response. A definition then includes both the specific conditions under which a response is emitted and an explanation for why the condition accounts for the response (Skinner, 1945). In this, he claimed that the function of the verbal behavior is the effect of a speaker on a listener and vice versa. This definition had radical implications for individuals investigating language as, according to Skinner, all verbal behavior is social and all social behavior is verbal.

Behavior Beneath the Skin. Skinner argued that in order to give a full account of verbal behavior one must include not only observable verbal operants but what he termed, "behavior beneath the skin" as well. This behavior encompasses any stimulus that is experienced only by an individual and cannot be directly observed by the verbal community. Examples of this include pain, hunger, illness, etc. Many argue that this behavior is completely "inaccessible" to others, however Skinner offered an alternate view. He outlined four ways, in which private events generate observable responses when he stated,

> "(1) It is not strictly true that stimuli which control the response must be available to the community. (2) A response to a private stimulus is provided by collateral responses to the same stimulus. (3) Some very important responses to private stimuli are descriptive of the speaker's own behavior. (4) The principle of transfer or stimulus induction, as a result of coinciding properties" (Skinner, 1945, p. 273-274).

According to this perspective all behavior comes in contact with environmental contingencies and results in an outward, observable behavior.

Current Perspective on Empathy in Behavior Analysis

In light of these advancements, it is possible to apply a behavior analytic approach to empathy, as it is an important social behavior. However, this has proven to be a challenging feat. Presently, there is not a widely accepted account for the development of empathy within Behaviorism, as empathy has historically been defined by its cognitive and emotional components. This is problematic for those in the behavior analytic field as it is not possible to directly measure the cognitive processes or "emotions" of another (Argott, Townsend, & Poulson, 2017). In order to address this issue, researchers recently have sought to develop a definition that is composed of observable and measurable behavior. In a recent article Argott et al. defined empathy as, "A social skill composed of four component skills: (1) a verbal statement uttered in the correct (2) intonation accompanied by an appropriate (3) facial expression and a (4) gesture corresponding to the affect displayed."

With the production of an operational definition, it has become possible to develop a theoretical framework to give an account for this capability. In the behavioral framework empathy is a product of evolution that has been selected and reinforced by environmental consequences. In this, researchers hypothesize that, "empathy functions to provide conditioned

social reinforcement in the form of non-verbal stimuli (e.g., smiles) or positive verbal interactions and thus functions to facilitate and maintain social interaction" (Argott, Townsend, Poulson, 2017).

Measurement and Interventions in Behavior Analysis

To date, there have been very few experiments conducted in the behavior analytic field on the topic of empathy. When searching *empathy* in the *Journal of Applied Behavior Analysis,* a prominent journal in the field, the search yields only 19 results, and of those only one contains empathy in the title. From these studies we can draw limited conclusions. Often, researchers have investigated component skills of empathy. One such component part of empathy is perspective-taking (LeBlanc, Coates, Daneshvar, Charlop-Christy, Morris, & Lancaster, 2003). To measure perspective taking researchers observed the response of three boys, ages 7 to 13 years, to three false belief tasks. The first task involved puppets, the second was the classic Smarties task, and the third was hide and seek with two experimenters. In the first task, the participant observed a scene with puppets. In this scene the two puppets were present and placed an item under a bowl. Then one puppet left the scene and in the puppet in the scene took the item and hid it under a box. The participant was then asked where the absent puppet would look for the item. In the second task the participant was shown a large box of M&Ms candy. The experimenter asked the participant what he/she thought was inside. After the participant responded the experimenter opened the box to reveal pencils were inside. The experimenter then asked the participant what he/she thought someone else, not present, would think is in the box. The final task involved two experimenters and a puppet. At the start both experimenters were in the room and observed a puppet leave footprints. One experimenter then left the room. The puppet then made footprints to a box labeled 1 but put an item in box 2, without leaving

footprints. The child was asked were the experimenter, not present, would look for the item. The participant was scored as either pass or fail. A second skill investigated by researchers is social perception (Stauch, Plavnick, Sankar, & Gallager, 2018). In this study to teach social perception researchers measured the observation of an affective behavior of others, the discrimination of relevant environmental stimuli, and the differential reinforcement of another person's affective behavior.

Though most researchers have analyzed component skills of empathy there are a few researchers in this field who have attempted to study empathy. Of the studies designed to measure empathy, researchers constructed measures that included observable behavioral measures (Argott et. al, 2017; Sivaraman, 2017). In these studies, the primary focus of the intervention was to teach participants to attend to the relevant environmental events. In a study conducted by Schrandt, Townsend, and Poulson (2009) researchers investigated the effects of a treatment package that included: prompt delays, modeling through scripts, manual prompts, behavioral rehearsals, and reinforcement on teaching empathy skills to four children with ASD in a pretend play setting. The results showed that the participants increased in empathetic behavior demonstrated in a pretend play setting; however, researchers did not test if these skills were generalized to the natural environment. In addition, researchers have investigated the effects of a script-fading procedure on increasing the number of empathetic statements emitted by children with Autism (Argott, Townsend, Sturmey, & Poulson, 2008). The findings of the study showed a significant increase in the scripted response to trained/untrained situations, along with a minimal increase in unscripted responses across settings.

While this provides a basis from which to work, it does not provide a full account for the complexity of empathy. What others have failed to do in the past is identify the stimulus control

for empathy and this has resulted in interventions that fail to teach the function of the behavior (Argott, Townsend, Sturmey, & Poulson, 2008). In order to more fully describe the many dimensions of empathy one must identify the reinforcers that maintain this behavior and the stimulus control that these reinforcers have acquired. To do so, we can apply the framework created in the Verbal Behavior Development Theory.

Verbal Behavior Development Theory

The goal of a behavioral science is to (i) identify the stimulus control for socially significant operants and respondents and (b) determine how the sequence of environmental experiences or induction comes to establish these preverbal and environmental stimulus controls. (Greer, personal communication, December 19, 2018). This theory proposed a developmental sequence to the acquisition of verbal behavior defined as verbal cusps and capabilities. The presence or absence these verbal cusps and capabilities indicate if the child is listener, speaker, listener/speaker, or reader/writer.

Cusps and capabilities. Not only have proponents of this field constructed operational definitions of verbal behavior levels through the identification of verbal cusps but researchers have also conducted experiments to determine protocols to induce these repertoires when they are absent (Greer & Ross, 2008). Rosales-Ruiz and Baer (1996) defined behavioral developmental cusps as, "A change that (1) is often difficult, tedious, subtle, or otherwise problematic to accomplish, yet (2) if not made, means little or no further development is possible in its realm (and perhaps in several realms); but (3) once it is made, a significant set of subsequent developments suddenly becomes easy or otherwise highly probable which (4) brings the developing organism into contact with other cusps crucial to further, more complex, or more refined development on a thereby steadily expanding, steadily more interactive realm" (p. 166).

When these cusps function such that students are able to learn in ways they were unable to learn before the cusp is termed a verbal behavior capability (Greer, 2008).

The Role of Reinforcement in Development

In addition to the identification of verbal cusps and capabilities, recent advancements in the field have shown the significance of the reinforcer. Proponents of this field argue that it is the reinforcer that selects out the behavior, along with its corresponding antecedent and motivating conditions. Greer and Du (2015) synthesize research from the field to propose how individuals come to acquire these complex social behaviors. In this developmental trajectory development begins in utero when as the mother's voice becomes paired with the nourishment provided. Through this pairing the unconditioned reinforcer, food, conditions the mother's voice as a reinforcer. Once the child has developed the necessary capabilities for visually observing their environment the mother's face can then become paired with her voice and through this pairing, observation of faces becomes a conditioned reinforcer. These observing responses are necessary prerequisite skills for the acquisition of the generalized imitation capability. This capability is social in function as an individual imitates an observed response with point-to-point correspondence. These preverbal cusps provide the infrastructure on which verbal behavior is built.

Stimulus Control

Building on these foundational repertoires the child begins to acquire social behavior through contingencies they encounter in their environment. One of the most important behavior repertoires they learn is communicative behavior and language.

Bidirectional Naming. In the verbal development theory the capability that enables a child to learn language incidentally is termed Bidirectional Naming (BiN). This is defined as

"the phenomenon through which students acquire tacts and listener responses without direct instruction" (Greer & Ross, 2008). The Naming capability is first an observing response. It begins when children attend to their environment and as a result acquire a response as a listener. The listener repertoire then joins the speaker response when children can acquire novel tacts through incidental learning. Greer argued that this capability accounts for the rapid expansion of children's vocabulary identified in research (Hart & Risley, 1995; McGuiness, 2004). This accelerated acquisition of vocabulary is not a result of direct instruction, for it is not possible. When a child has the Naming capability he/she is able to acquire language incidentally. For example, if an adult points to an animal in a book and says, "Look it's a cat." The child can later see a cat on the street and say, "Cat." This capability enables an individual to acquire responses as a listener or speaker and emit either the taught, or untaught response.

Observational Learning. Another essential capability for educational and social development is observational learning. Observational learning is defined as the acquisition of new operants through indirect contingencies as a result of observing operant contingences that are in effect for those who are observed (Catania, 2007). Researchers in the verbal developmental field have added to this definition identifying four varying types of observation, distinguishing observation repertoires for (a) emission of previously acquired repertoires, (b) acquisition of new repertoires, (c) acquisition of conditioned reinforcers, and (d) acquisition of observational learning as a new repertoire (Greer, Singer-Dudek, & Gautreaux, 2006). Each type is distinct and important for success in a social environment. Moreover, each is a type of stimulus control that allows one to learn from others.

Observational performance. The first type of observational learning describes observing a response and its consequence, which is in the individual's repertoire, and then

emitting that response under similar environmental conditions. For example, if a student seated on the rug hears the teacher say, “I like how Mary is sitting with her hands folded,” and then folds his/her hands, the student has demonstrated observational performance. The student observed a consequence (vocal praise) and then emitted a behavior in his/her own repertoire (folded hands) in response to the observed consequence.

Observational learning for new operants. This type of observational learning is different from performance, as in this type of learning the individual acquires a novel response through indirect conditions. For instance, if John did not know 2+2=4 and then observed a teacher ask his peer, “What’s 2 + 2?” and the peer responded, “3,” to which the teacher replied, “No, 2+2=4,” and following the observation of this interaction John knew 2+2=4, he would have demonstrated observational learning.

Observational learning of new reinforcers. The third type of OL is the cusp that enables an individual to acquire a novel reinforcer. In an experiment conducted by Greer and Singer-Dudek (2008) researchers showed that plastic discs and pieces of string were conditioned as reinforcers following an observational procedure involving a denial condition for preschool-aged students. In addition, results have shown that the observational procedure was effective in conditioning books (Singer-Dudek, Oblak, & Greer, 2011), and vocal praise as reinforcers (Greer, Singer-Dudek, Longano, & Zrinzo, 2008).

Social-Listener Reinforcement

Each of the aforementioned cusps and capabilities are necessary prerequisites that enable an individual to contact social contingencies. However, in order for an individual to acquire complex social behavior the individuals must have conditioned reinforcement as a listener during social exchanges (Greer & Ross, 2008).

In order to participate in social interactions an individual must function as both a listener and a speaker. This is defined as verbal behavior and consequently as social behavior, as all verbal behavior is social (Greer & Ross, 2008). A measure of this behavior is the conversational unit. This is a unit of direct measurement composed of an interlocking three-term contingency between a listener and a speaker" (Becker, 1989). An example of a conversational unit is a conversation between individuals in which one asks,

"How are you?"

"I'm great! Want to play with me?"

"Sure."

"Okay, you can be the red power ranger."

In this exchange, each individual is reinforced in the role of the "listener" and "speaker." Not only must the individual have both the independent listener and speaker response topographies but also these two independent response forms must join. This enables the individual to engage in social exchanges with others and function as a speaker within their own skin (Lodhi & Greer, 1989; Greer & Ross, 2008). These are the necessary prerequisite cusps that enable a child to engage in more complex levels of verbal behavior.

Social Listener-Reinforcement Protocol. Though social-listener reinforcement is essential for functioning in a social environment it does not naturally emerge for all individuals (Lawson & Walsh, 2007; Baker, 2014). To induce reinforcement for social-listener exchanges scientists developed the Social Listener Reinforcement (SLR) protocol. This SLR protocol is composed of various activities that require the participant to engage in speaker-listener exchanges with a peer. For each of these activities a peer-yoked contingency game board is employed to pair the participants against the teachers. The research has shown a peer-yoked

contingency to be effective for not only inducing observational learning but it too has been identified as an effective tactic for increasing social behavior. The results from dissertations conducted by Davies-Lackey (2005) and Stolfi (2005) tested the effects of a peer yoked contingency game board on the induction of observational learning for preschoolers with a disability. The results showed that using a peer-yoked contingency for learning tasks resulted in the emergence of observational learning. Lawson, Reilly, and Walsh (2007) tested the effects of a peer-yoked contingency on conditioning social listener responses. The results from this study showed that, following the implementation of the peer-yoked contingency game board for four tasks, the number of vocal verbal operants in non-instructional settings increased for two elementary-aged students diagnosed with ASD. As the results show an increase in vocal verbal operants following the intervention, we can interpret these results as effectively conditioning social listener responses as a reinforcer.

In her dissertation Sterkin (2012) extended these findings to preschool-aged children. Results showed that following the SLR protocol participants emitted higher levels of vocal verbal operants and more readily responded as a group. Baker (2014) extended these findings as her results showed the SLR protocol to be more effective for preschool-aged students than video modeling. In her study she matched preschool-aged students based on verbal cusps/capabilities and placed them into one of two conditions, SLR or video-modeling. For each group she recorded data on the number of vocal verbal operants the participant emitted across non-instructional settings (e.g., toy area, snack). The results show that participants emit increased levels of vocal verbal operants following SLR protocol when compared to the video modeling condition.

Reinforcement for Collaboration

Once an individual demonstrates reinforcement for speaker-listener exchanges he/she can come into contact with environmental experiences, stimulus control, that can result in reinforcement for collaboration. In order to function in a social environment one must possess this verbal cusp, as most jobs and industries require collaboration between individuals. In her dissertation Darcy (2017) investigated the effects of reinforcement for collaboration on the rate of students' learning. To measure this, she compared the students' rate of learning across two conditions, and the number of verbal operants emitted. In one condition, the student was yoked with a peer to access reinforcement and in the other condition access to reinforcement was based only on the individual's performance. The findings showed that some students learned faster with the peer-yoked contingency, when compared to the individual contingency, thus implying that the student possessed reinforcement for collaboration. However, not all students demonstrated this, as some had higher rates of learning in the individual setting. In the second experiment, she investigated the effects of peer tutoring on the induction of reinforcement for collaboration. The results showed following the intervention participants showed an increase in learning under the peer-yoked condition, implying that collaboration became a conditioned reinforcer.

Audience Control

Each of these social capabilities enables an individual to access a social environment. Reinforcement for speaker-listener exchanges and collaboration allow the individual's behavior to come under social controls. If an individual seeks to be part of a social environment his/her behavior can be shaped by others in that environment. This ability to adapt one's behavior to a specific context is referred to as audience control. In this, the audience consequates the individual's behavior with either reinforcement or punishment and thus the individual's behavior

becomes shaped according to a particular audience. Han (2014) proposed that the possible prequisite verbal cusps for this skill are conditioned reinforcement by observation, SLR, and conditioned reinforcement for social attention. Each of these social cusps brings the individual's behavior under the unique social contingencies of varying environments. For example, a child with audience control understands that how he/she speaks to friends differs from how he/she would address the teacher. This acquisition of this differentiation is essential for a child to navigate the many social environments they encounter. Studies have shown the presence of audience control to have an effect on the emission of stereotypy (Sterkin, 2012; Han, 2014) and social interactions (Donley, & Greer, 1993).

Empathy as an Extension of Audience Control

According to Skinner, "social behavior arises because one organism is important to another as part of its environment" (Skinner, 1953, p. 298). In this, we can begin to analyze empathy as a behavior that has come under the contingencies of a social environment. To do so, we must consider the individual in the environment as the *social stimulus*. Thus, the behavior observed has important implications for an individual response. These behaviors and appropriate responses are learned through many previous interactions with the environment. For example, the facial expressions we come to learn, as "smiles" are important because we have learned that a "smile" receives a particular social response. Just as our behavior comes under the control of the audience, we can extend this thinking to empathy.

Gaps in VBDT

In the Verbal Behavior Development Theory there is much literature to support the identification and development of verbal cusps and capabilities. Though empathy is an important social skill, to date, there is little identified in the science in regards to effective interventions.

The first study that investigated empathy was conducted by Lawson and Walsh (2007). In this experiment, researchers defined empathy as, "the capability to respond to contingencies in the environment that require an individual to take the perspective of others through directly observing the behavior of others. Students with empathy have the repertoires to accurately tact another's feelings and identify what they can do to help" (Lawson & Walsh, 2007, p. 433). In the final phase of this experiment Lawson and Walsh tested the effects of Multiple Exemplar Instruction (MEI) on the participants' responses to 3 questions: (i) what happened? (ii) How does that person feel? (iii) What could you do to help? Results showed an increase in correct responses following MEI instruction. However, this measure was purely structural and did not include a functional component.

In addition, Baker (2014) replicated this procedure in her social-listener protocol package. During this phase, the participants learned appropriate ways to respond to people experiencing an emotional response. The experimenter presented a picture on the computer and for each scenario asked three questions. The experimenter employed learn units (Albers and Greer, 1991) to teach an appropriate response across five scenarios. Results showed that this direct instruction was effective in teaching the participants empathetic responses across the five scenarios, but these results did not have implications for expression of empathy in situations outside those directly taught.

Similarities Across Perspectives

The lack of complex social repertoires is one of the greatest setbacks for children with ASD. Though the research conducted to identify differences in performance is extensive, the literature related to effective interventions is not as vast (Schrandt, Townsend, & Poulson, 2009). Across fields there appears to be a lack of effective interventions and a comprehensive

definition. Psychologists across fields seem to agree that interaction with the environment significantly impacts empathy. This is evident as each theory describes the way empathy grows and develops and the evidence shows that no one is simply "born" with empathy. If empathy is impacted by experience one can hypothesize that it is possible to induce this skill, by providing an individual with the necessary experiences, if this capability is lacking. Additionally, across each school of psychology, and even society at large, each acknowledges the significance of this skill.

Gaps in the Literature

Though many have investigated empathy there are still gaps in the literature. One of the most prominent gaps is the lack of interventions that result in the demonstration of empathetic behaviors in novel situations. This may be a result of instruction that taught a discrete skill as opposed to teaching the function of empathy. Contrary to the emphasis placed on explicit instruction to teach individuals to observe relevant environmental components by many in the field of behavior analysis, Skinner (1957) argued that verbal behavior ought to be thought of in terms of its consequence. In accordance with Skinner, scientists from the Verbal Behavior Developmental Theory (VBDT) community propose that the consequences select out the behavior and argue that to teach a behavior one must teach the reinforcer (Greer & Du, 2015). Researchers in the field have designed studies to teach the function of a behavior and designed measures to test for the acquisition of social reinforcers. Important social behaviors include the observation of others and helping behaviors. The demonstration of these behaviors imply that the social reinforcers are present in the individual's repertoire. In addition, to teach a new behavior requires an operational definition. As opposed to transforming a term that has much research and sentiment attached, it may be beneficial to investigate specific observable behaviors.

Table 4.

Comparison of a development vs. behavior analytic approach to investigating empathy

	Developmental Psychology	**Behavior Analysis of Development**
Measures	● Response to social stories ● Emotional recognition ● Self- and third-party reports	● Observable measures ● Often specific to study
Interventions	● Media packages ● Multiple components	● Component skills ● Behavioral tactics
Implications	● Mostly differences in empathy (gender, age, ASD, etc.) ● Fewer identification of interventions to teach empathy.	● Results specific to tasks
Gaps	● Definition ● Standard measures ● Interventions to increase empathy	● Definition ● Standard measures ● Number of studies

Table 5.

Measurements of empathy and findings from correlational studies.

Correlations		
Authors	**Measurement**	**Findings**
Charman, T., et. Al (1997)	• Behavior: eye gaze	Infants with ASD observed the experimenter fewer times.
Jones, A. (2005)	• Self-report	Boys with psychopathic tendencies reported less empathy when compared to typically developing peers.
Ponnet, K. et. Al (2005)	• Behavior: observation of video tapes	No difference in the ability to infer a stranger's thoughts when comparing adults with PDD to typically developing adults
Sigman, M. et. Al (2003)	• Behavior: heart rate	Children with ASD performed similar to with developmental delays when watching videos.
Sigman, M. et. Al (1992)	• Behavior: eye gaze	Children with ASD observed negative emotions less when compared to typically developing children and children classified as mentally retarded.
Strayer, J. et. Al (2004)	• Behavior: social interactions in a free play setting	More empathetic children were less angry, physically and verbally aggressive, involved in fewer object struggles, and engaged in more prosocial behaviors

Table 6.

Measurements of empathy and findings from studies with an intervention.

Authors	Interventions	Measurement	Findings
Beaumont, R., et. Al (2008)	Multimedia: *The Junior Detective Training Program.*	• Parent/teacher report • Self-Report • WISC-III • Emotion identification • Social Stories	Following the intervention children with Asperger syndrome were better able to identify regulation strategies for characters in stories and made social gains according to parents/teachers. No difference in emotion recognition.
Golan, O., et. Al (2006)	Multimedia: *Transporters*	• Reading Minds Task • Reading Eye task	Adults with ACS performed better on emotion recognition but results did not generalize.
Koegel,, L. (2016)	Video modeling	• Behavior- number of empathetic statements and questions. • Self-report	Result showed that participants increased the number of statements and questions emitted and that these results maintained. Results from self-reports show an improvement in EQ.
Schmidt, C. et. Al (2011)	School Based Competence Intervention	• Teacher/parent reports • Theory of mind tasks • Emotion recognition • Behavior: vocal behavior	The results showed improvement according to teacher reports. No significant change in emotion recognition. Increase in social behavior at lunch room during intervention
LeBlanc, L. et. Al (2003)	Video modeling	• Behavior – to 3 false belief tasks	Following video modeling the participants increased the number of false belief tasks they passed
Argott, et. Al (2017)	Prompt sequence	• Behavior- eye gaze and empathetic statements	Increased number of empathetic statements.
Lawson, T. et. Al (2007)	SLR	• Behavior- eye gaze and empathetic statements	Increased in the number of empathetic statements

Table 7.

Definitions of empathy and measurement employed in research studies.

Authors	Definition	Measurement
Argott, et. Al (2017)	"Empathy can be defined as a social interaction skill that consists of four components: (1) a statement voiced in the (2) appropriate intonation, accompanied by (3) facial expression and (4) gesture that correspond to the affect of another individual." (p. 107)	• Behavior- eye gaze and empathetic statements
Beaumont, R., et. Al (2008)	"Social competence was operationally defined as engaging in reciprocal positive interactions with others, and responding appropriately to others' behavior." (p. 744)	• Parent/teacher report • Self-Report • WISC-III • Emotion identification • Social Stories •
Charman, T., et. Al (1997)	"Empathetic responses were defined as a measure of affective and attentional response to a display of distress by an adult." (p. 783)	• Behavior: eye gaze, facial expression
Golan, O., et. Al (2006)	"Development of emotional recognition skill continues through childhood and adulthood as part of "theory of mind", or what is also referred to as 'mindreading' or 'empathizing." (p. 591)	• Reading Minds Task • Reading Eye task
Jones, A. (2005)	"The ability to resonate with or recognize others' inner states likely involves a number of potentially separable affective/information processes, and may break down in a number of distinct ways. Important candidate processes include the ability to emotionally 'resonate' with other's feeling while understanding they are distinct from one's own (affective empathy), and the ability to identify what others are thinking of feeling without necessarily 'resonating' with that feeling state cognitive perspective taking) (de Vignemont & Singer, 2006)." (p. 1188).	• Self-report
Koegel,, L. (2016)	"However, the field generally agrees that empathy involves a congruent emotional response to another's emotional state (Hill, 2009). Furthermore, empathy is thought to consist of both a cognitive component (i.e.	• Behavior- number of empathetic

Table 7 continued

Koegel,, L. (2016)	understanding what the other is saying) and an affective component (i.e. recognizing what the other is feeling (Baron-Cohen & Wheelwright, 2004; Hill, 2009). (p. 2)	• statements and questions. • Self-report
Lawson, T. et. Al (2007)	"Therefore, the authors operationally define empathy as the capability to respond to contingencies in the environment that require an individual to take the perspective of others through directly observing the behavior of others." (p. 432)	• Behavior- eye gaze and empathetic statements
LeBlanc, L. et. Al (2003)	"Complex empathetic responses consisted of four components that were required for the response to be considered correct: (1) verbal statements in the (2) appropriate intonation, (3) contextually appropriate facial expressions, and (4) gestures corresponding to the affect displayed." (p. 109)	• Behavior- eye gazes & vocal responses
Ponnet, K. et. Al (2005)	"Empathic accuracy is the degree to which someone is able to accurately infer the specific content of another person's thoughts and feelings and, in addition, is the product of a specific conversation between two or more interacting persons." (p. 585)	• Behavior: observation of video tapes
Sigman, M. et. Al (2003)	No definition was provided for empathy.	• Behavior: heart rate
Sigman, M. et. Al (1992)	No definition was provided for empathy.	• Behavior: eye gaze
Strayer, J. et. Al (2004)	No definition was provided for empathy.	• Behavior: social interactions in a free play setting

The Present Study

Since there are many different definitions and ways to measure empathy this study will focus on observable and direct measures. The purpose of this study is to determine if there is a difference between the observation, vocal, and helping behavior of children with and without an education classification of ASD. The body of research to date has shown differences in empathy for individuals with ASD following social stories evoking empathetic responses (Baron-Cohen & Wheelwright, 2004) and in-vivo situations involving adults (Svetlova, Nichols, & Brownell, 2010). This study is designed to add to the body of literature by investigating the role of observation, vocal, and helping behavior in elementary-aged students with ASD in an in-vivo situation with peers.

Research Questions

1. Is there a difference in the observation of a peer displaying behaviors of sadness between some neurotypically developing children and children with an educational classification of ASD?
2. Is there a difference in the responses to questions related to empathy between some neurotypically developing children and children with an educational classification ASD?
3. Is there a relation between demonstrating perspective taking of another and observation, vocal, and helping behavior?

Chapter II

Experiment I

Method

Participants

There were three participant roles in this study. They were the (i) Child actors, (ii) Typically developing child observers, and (iii) Child observers with an educational classification of Autism. In total, the participants of this study were eight second grade students and three first grade students recruited from a public elementary school. The school was composed of grades pre-kindergarten to second. There were six typically developing children selected to be observers during the 1-min free play session from a 1st and 2nd grade classroom. The typically developing participants were students whose parents signed and gave consent for the current study. In addition, these students performed on or above grade level across academic subjects. Children in this role were those whose teachers described them as having strong self-management skills, comfortable playing with peers, and who followed classroom rules. Participant A was a seven-year-old female in 2nd grade. Participant B was a seven-year-old male in 2nd grade. Participant C was a seven-year-old female in 2nd grade. Participant D was a seven-year-old male in 2nd grade. Participant E was a seven-year-old male in 2nd grade. Participant F was a six-year-old female in 1st grade.

There were three students recruited to be actors for this experiment. These participants were selected from a second-grade general education classroom with the assistance of the principal and classroom teachers. The students recruited for this role were based on recommendations from their classroom teacher and their level of maturity in the classroom. The teacher recommended students that were on or above grade level for academics, demonstrated

social behavior appropriate for his/her age, and who the teacher believed able to act in a free play situation. Additionally, these child actors were friends with the children selected as observers for the study.

There were six participants with Autism recruited to serve as the target participants in this study. These participants were recruited from three K-2 special education classrooms. Participant 1 was recruited from a kindergarten-2nd grade special education classroom, with 12 students, 1 teacher, and 3 teaching assistants. Participant 1 was a seven-year-old male, in the second grade, with an educational classification of ASD. The remaining five participants were enrolled in a class that employed the CABAS® methodology (Comprehensive Application of Behavior Analysis to Schooling) (Greer, Keohane, & Healy, 2002). Participants 2-5 all had an educational classification of ASD and were enrolled in a classroom that was composed of 8 students, 1 teacher, and 3 teaching assistants. Participant 2 was a six-year-old male, in the first grade, who functioned on an emergent reader/writer level of verbal behavior. Participant 3 was a seven-year-old male, in the second grade, who functioned on a reader/writer, emergent self-editor level of verbal behavior. Participant 4 was a six-year-old female, in the first grade, who functioned on an emergent reader/writer level of verbal behavior. Participant 5 was a seven-year-old female, in the second grade, who functioned on an emergent reader/writer, emergent self-editor level of verbal behavior. Participant 6 was from the other classroom in the school that employed the CABAS® methodology. His classroom contained eight students, one teacher, and two teaching assistants. Participant 6 was a six-year-old male, in the first grade, who functioned on an emergent reader/writer level of verbal behavior. He had an educational classification of ASD. Refer to Table 8 for a more detailed description of the participants. The participants for this study were selected because they had the opportunity to mainstream with the first or second graders in some

capacity, whether it was for academics or special activities (e.g. art, gym, music, etc.) and had some rapport with children selected to serve as actors. In addition, the participants had the necessary verbal cusps, as determined by observational learning probes. Prior to the intervention all the participants demonstrated observational learning for performance (OLP) and conditioned reinforcement from observation.

Table 8.

Description of participants

Participant	1	2	3	4	5	6
Age	7	6	6	6	7	6
Grade	2nd	1st	1st	1st	2nd	1st
Gender	M	M	M	F	F	M
Educational Classification	ASD	ASD	ASD	ASD	ASD	ASD
Full Scale IQ	126	72	126	95	76	84
Verbal Comprehension	120	77	108	95	76	78
OLP	Yes	Yes	Yes	Yes	Yes	Yes
Conditioned Reinforcement from observation	Yes	Yes	Yes	Yes	Yes	Yes

Setting and Materials

The study was conducted in a CABAS®, Kindergarten-2nd grade, classroom located in a publicly funded elementary school outside a major metropolitan area. The classroom within the school employed the CABAS® model, which is a learner- and data-driven school wide approach to education based on the comprehensive application of the science of behavior analysis (Greer,

1989). In this classroom all instruction was individualized and delivered in a small group (of 3) or 1:1 setting. Instruction was delivered to students through learn units, interlocking three-term contingencies, that are composed of an antecedent, behavior, and consequence (Albers & Greer, 1991). All phases of the study took place inside a classroom or within the office of a classroom within the participants' school. The pre- and post-intervention probes were conducted in the office at a white rectangle table. The participants were seated in chairs at the table across from each other. An iPhone was positioned on a bookcase, hidden within a book, on the side of the room. The materials for pre- and post-intervention probe free play sessions included an iPhone (for video recording purposes), an 11 x 13 in individual dry erase white board, one Expo © dry erase marker, one dry marker eraser, and the four questions printed on individual sheets. See Table 9 for a comprehensive list of materials used in this experiment.

Table 9.

List of materials for Experiment I.

Free Play Sessions
- iPhone - timer - White Board (11x13) - Dry erase marker - Expo eraser - Printed questions

Measurement and Dependent Variable

The dependent variables for the present study were the number of observed empathetic behaviors emitted by student during a 1-min free play session and the number of empathetic responses given immediately following the session. Empathetic behaviors during the free-play sessions were defined as the number of seconds the participant observed the peer or items other

than the free play activity, along with the demonstration of helping behavior (e.g., sharing, asking the adult for more materials, etc.). Empathetic responses to questions were defined as answers that accurately described the perspective of the peer.

Observation. Observation during free-play probe sessions was defined as the number of times the participant looked at the peer (child actor) or the timer. Experimenters recorded the behaviors as they scored videos. One eye gaze of the peer was defined as when the participant looked at the peer and concluded when the participant looked away. The same definition was applied to record data for eye gazes at the timer.

Vocal Verbal Behavior. Data were recorded on the number of vocal verbal operants emitted by the participant during the 1-min play session. To capture social behavior, experimenters recorded data on the number of verbal behaviors emitted as tacts, intraverbals, and conversational units.

Tacts. A tact was defined as "a verbal operant under non-verbal antecedent control such as a physical stimulus, and is reinforced by generalized reinforcers such as praise or attention" (Greer & Ross, 2008, pp. 116). An example of a tact is if a child looked at the peer and said, "I'm going to draw a picture of a heart," or "Look I made a house!" In this experiment researchers recorded data on the number of tacts emitted to recruit peer social attention. This was defined as a vocal verbal operant that was accompanied with or immediately followed by (within 1-sec) body orientation toward the peer, and eye gaze at the peer, with the function of recruiting social attention. For example, when participants looked at the experimenter and said, "I'm going to draw a picture of a horse," as the experimenter exited the room, was not scored as a tact. This was not considered a tact because the participant did not orient her body toward her peer and her eye gaze was at the experimenter, not the peer. Another instance of vocal behavior that was not a

tact was vocal behavior that was self-reinforcing (e.g. looking at the timer and counting down, "3, 2, 1.").

Intraverbals. An intraverbal was defined as an exchange between a speaker and listener involving two individuals. Data were recorded for the number of vocal intraverbals the participant initiated, for example, "Do you like my picture?" and the peer responds, "Yes I do!" Data were recorded for only the number of intraverbals emitted to recruit social attention. Vocal behavior emitted to recruit social attention was defined as behavior that included a wait-time (1-sec) to give the peer an appropriate amount of time to respond. For example, when a participant said, "What number am I going to draw? I know, 10. What's 10 + 9 equal, I know 19!" This was not scored as an intraverbal as the participant quickly emitted the response to his own question and did not leave any wait time, orient his body, or look with his eyes at the peer. These behaviors were considered to then be self-reinforcing and as such were not recorded as social behavior.

Conversational Units. A conversational unit is a unit of direct measurement that is composed of an interlocking three-term contingency between a listener and a speaker (Becker, 1989). An example of a conversational unit is a conversation between individuals in which one says, "Look at this tiger!" (speaker) and another individual responds "That's cool. I saw one at the zoo once." (listener). To which the individual responds, "Wow, when did you go to the zoo?" (speaker) and the peer replies, "Over the break with my mom" (listener). In this example the individual rotated through the role of both speaker and listener. In order to be scored as a conversational unit, each vocal operant had to be relevant/appropriate to the conversation. For example, if the participant said, "Let's play the whiteboard." Then the peer responded, "Cool, what should we draw?" and the participant replied, "I had pizza for lunch." This was not counted

as a conversational unit, even though the participant functioned as the speaker twice, as the response was not related to the peer's response.

Cooperative Play. A final measure recorded during free-play sessions was the presence of cooperative play. This behavior was defined as (i.) observation of the peer (ii.) followed by giving the peer access to the item or including the peer in the play. Total seconds of cooperative play were calculated by identifying the time stamp the participant invited the peer to play until the participant returned to independent play. An example of cooperative play is when the participant offered the whiteboard to the peer. Another instance is when the participant worked with the peer to create a drawing (e.g. "you tell me what to draw.").

Response to Questions. Lastly, at the conclusion of the play session the participant was asked the four questions outlined in Table 10. Questions were scored as correct (1 point) or incorrect (0 points). A higher score implies a greater demonstration of empathy, according to a cognitive definition. A correct response to Question 1 was defined as a response that described a negative emotion (sad, bored, frustrated, angry, etc.). For Question 2, a correct response was considered an answer that included the main idea that it was the result of not having a toy/item (e.g., "Because he didn't have a toy."). Question 3 targeted the affective response of the participant and was scored as correct if the participant's response described any negative dissonance (weird, confused, sad, etc.). The purpose of Question 4 was to assess the participant's perspective taking skills and a correct response was defined as a response that matched the peer's expressed emotion (e.g., sad, bored, upset, etc.).

Table 10.

Questions asked following the 1-min free play

1.	How did he/she feel when I gave you the toy?
2.	Why did he/she feel that way?
3.	How did you feel when you saw him/her?
4.	How would you feel if you were _____ (peer's name)?

Experimental Design and Procedure

The pre-intervention free-play probes were conducted to compare the empathetic responses of children with an educational classification of ASD to typically developing children. In this procedure child actors were first trained and then free-play sessions were conducted. Each phase of this design is described in further detail below.

Child actor training I. All students selected as actors were from a general education 2nd grade classroom based on the recommendation of the teacher and principal. These students performed on grade level across academic subjects and were described by the teacher as students with strong social skills. To begin training, the experimenter first took the student to the office, within the classroom, where pre-intervention probes were conducted. The experimenter described the procedure of the 1-minute free play session and the student's role as the actor during this session. In this explanation the student was told they were being recruited to be an actor during an unfair situation. The student was told that in this session they would be with one peer and that the experimenter would give their peer a toy, and then the experimenter would tell the student that they did not have an item for them. The student was told that they would then have to act sad, as they did not receive a toy. The experimenter explained that during the 1-

minute session the student was not allowed to initiate conversation with their peer or take the toy. The experimenter allowed the student to ask any questions and clarified any part of the procedure the student did not understand. Once the student demonstrated an understanding of the role, by describing the procedure in their own words to the experimenter, the student was asked if they would like to participate as a child actor in the current study. This concluded the first portion of the child actor training.

Child actor training II. If the student agreed to participate as the actor the experimenter brought him/her back to the office the following school day. During this training session, the experimenter had the student practice demonstrating sadness, and complete a practice 1-minute free play session, in which the experimenter pretended to the child who received the toy. The experimenter gave the student feedback following this session (i.e. "That was exactly right." Or " Yes, you did a great job pretending to be sad."). Once the student demonstrated mastery the experimenter asked the student if they would be comfortable doing this procedure with a peer. If the child actor agreed then he/she participated next as the actor in the free play session with a peer.

Free-play session: 1 item. The experimenter first prepared the office by putting the dry erase whiteboard, marker, and eraser, in the office. In addition, the experimenter set up an iPhone to video record the free play session and began the recording prior to getting the students. The iPhone was set up to video record the target participant straight on and captured a side-angle of the child actor. The iPhone was set up on a bookshelf in the office. A hardback book was set standing up, and then the iPhone was situated to rest against the front cover, so that it was propped up. The iPhone was mostly hidden, with only the camera portion exposed. Once the set up was complete, the experimenter went to the participants' classroom and asked the actor and

the participant if they would like to come for a 1-minute free play session. If both students consented, the experimenter walked with the students back to the office in the CABAS® classroom. The experimenter asked the students to sit at a rectangle table in the office. The participant was seated on the far side of the table with the actor directly across from them. The experimenter welcomed them into the office and described the procedure to both students. The experimenter informed the students that they would be given a free 1-min play session and showed the students the whiteboard. The experimenter asked if the children knew what the item was. The children all responded yes, as they have used whiteboards in their classroom for math instruction. The experimenter told the students this play time was not like their classroom. The experimenter informed the students that they can draw or do whatever they like for the white board for 1-min. If questioned, the experimenter responded that it was free-play and so they were able to play however they like (e.g., When the student asked, "What do I do?" the experimenter responded, "It's your choice. You can play however you'd like during this time."). The experimenter gave the participant the whiteboard, dry erase marker, and eraser. Then the experimenter turned toward the actor and said, "I am so sorry _____, I only have one so I don't have enough for you. I'm sorry about that." The experimenter said to both students, "Okay everyone, it's time to play for one-minute," began the timer, and exited the room.

Questions following the free-play session. When the timer beeped, the experimenter returned to the room. The experimenter greeted the students and then let them know there was one more thing to do. The experimenter set the child-actor up outside the office, in the classroom, with an activity (MagnaTiles), and then asked the participant, "Would it be okay if I asked you a few questions about the play session that just happened?" If the participant expressed consent the experimenter sat at the table across from the participant, in the child

actor's place. The experimenter told the child, "These questions will be different from school. You know how normally the teacher tells you if you're right or wrong? Well I'm not going to tell you that. For these questions, there isn't just one right answer. I'm just trying to learn more about what you think." The experimenter then presented the typed question and read each one to the participant (e.g., "How did she feel when I gave you the whiteboard?") The experimenter then gave the participant time to respond. If the participant didn't respond, the experimenter reread the question. If the participant emitted a response that did not address the question (e.g. "How did she feel when I gave you the toy?" response, "She didn't have it.") the experimenter represented the question (e.g., "Yes, but how did she feel?"). Following questions the experimenter did not affirm the participant's answer.

Interobserver Agreement

A second independent observer viewed the videos for the purposes of calculating interobserver agreement (IOA). All of the free-play sessions were video recorded so that IOA could be collected. Data were recorded in a premade Excel spreadsheet for observing behaviors, vocal verbal operants, and responses to questions. In addition, a second independent observer transcribed vocal verbal operants emitted during the 1-min play time. IOA was calculated by dividing the number of point-to-point agreements by the total number of agreements plus disagreements and multiplying by 100 for the participants (Johnston & Pennypacker, 1993). IOA was collected for 50% of the transcripts with 100% agreement. For responses to questions and empathetic responses IOA was collected for 91% of recorded responses with 100% agreement. Lastly, experimenters obtained IOA for 91% of vocal operants emitted during the free play sessions with 100% agreement.

Results

The first research question assessed the behavior of children with and without an educational classification of ASD in response to the presence of a peer demonstrating sadness. Results of the current experiment demonstrated that there was a difference in the observing responses when comparing children with ASD to their typically developing peers. Overall children with ASD engaged in observing behavior less than typically developing children. When comparing the averages, children with ASD observed their peer fewer times than typical developing students. Overall, children without an educational classification observed the child actor as much, if not more than the timer, as shown in Figure 1. Participants A, B, C, D, and F all viewed the child actor more than the he/she gazed at the timer. Participant A viewed the child actor 6 times and the timer only 1 time. Participant B viewed the actor 8 times and the timer 7 timers. Participant C viewed the actor 9 times and the timer just 3 times. Participant D viewed the actor 6 times and the timer 5 times. Participant F viewed the actor 5 times and the timer 1 time. Participant E viewed both the actor and timer 1 time. Figure 2 shows the observing responses of children with an educational classification of ASD. Overall these participants gazed at the timer more than the child actor and emitted lower levels of observation when compared to their typical developing peers. Participant 1 observed the timer 1 time and did not observe the child actor. Participant 2 gazed at the actor and timer 1 time each. Participant 3 gazed at the timer 6 times and the child actor 1 time. Participant 4 gazed at the timer 9 times and the actor 5 times. Participant 5 gazed at the timer and child actor 1 time each. Participant 6 did not gaze at the timer or the child actor.

Though the results show a difference in observation they do not demonstrate a significant difference in the vocal verbal behavior emitted. Across participants with and without an educational diagnosis of ASD there were low levels of vocal verbal operants emitted. Figure 3

shows the vocal verbal operants emitted by children without an educational classification of ASD. The results showed that none of the 6 participants engaged in a conversational unit. Participant A emitted 1 tact and 1 intraverbal. Participant B emitted 5 tacts. Participant C emitted 1 tact and 1 intraverbal. Participants D, E, and F did not emit vocal verbal behavior. Figure 4 displays the vocal verbal operants emitted by participants with an educational classification of ASD. Participants 1, 2, 3, 5, and 6 did not emit any vocal verbal operants. Participant 4 emitted 3 tacts and 1 intraverbal. None of the participants engaged in a conversational unit.

The second research question investigated if there was a difference in the response to questions related to empathy. The results show that there was a difference between responses to questions, with children with ASD performing lower overall compared to typically developing children. Figure 5 displays the number of correct responses to four empathy questions for children without an educational classification of ASD. Participants 1, 2, 3, 4, and 5 emitted all correct responses and Participant 6 responded to three of the four questions correctly. Figure 6 shows the correct responses for children with an educational classification of ASD. Overall, these participants emitted fewer correct responses. Participant 1 emitted 4 correct responses. Participant 2 emitted 2 correct responses. Participant 3 and 4 emitted 1 correct response. Participants 5 and 6 emitted 0 correct responses.

The purpose of the third research question was to determine if there was any difference between cooperative play when comparing children with ASD to typical peers. The results show that there is not a significant difference between the participants and peers. Figure 7 shows the number of seconds children without a classification of ASD engaged in collaborative play. Of the six participants only 2 demonstrated this behavior, Participant A for 36 s and Participant C for 40 s. Participants B, D, E, and F only engaged in individual play. Figure 8 shows the number

of seconds participants with a classification of ASD engaged in individual or collaborative play. The results showed that all 6 participants engaged only in individual play.

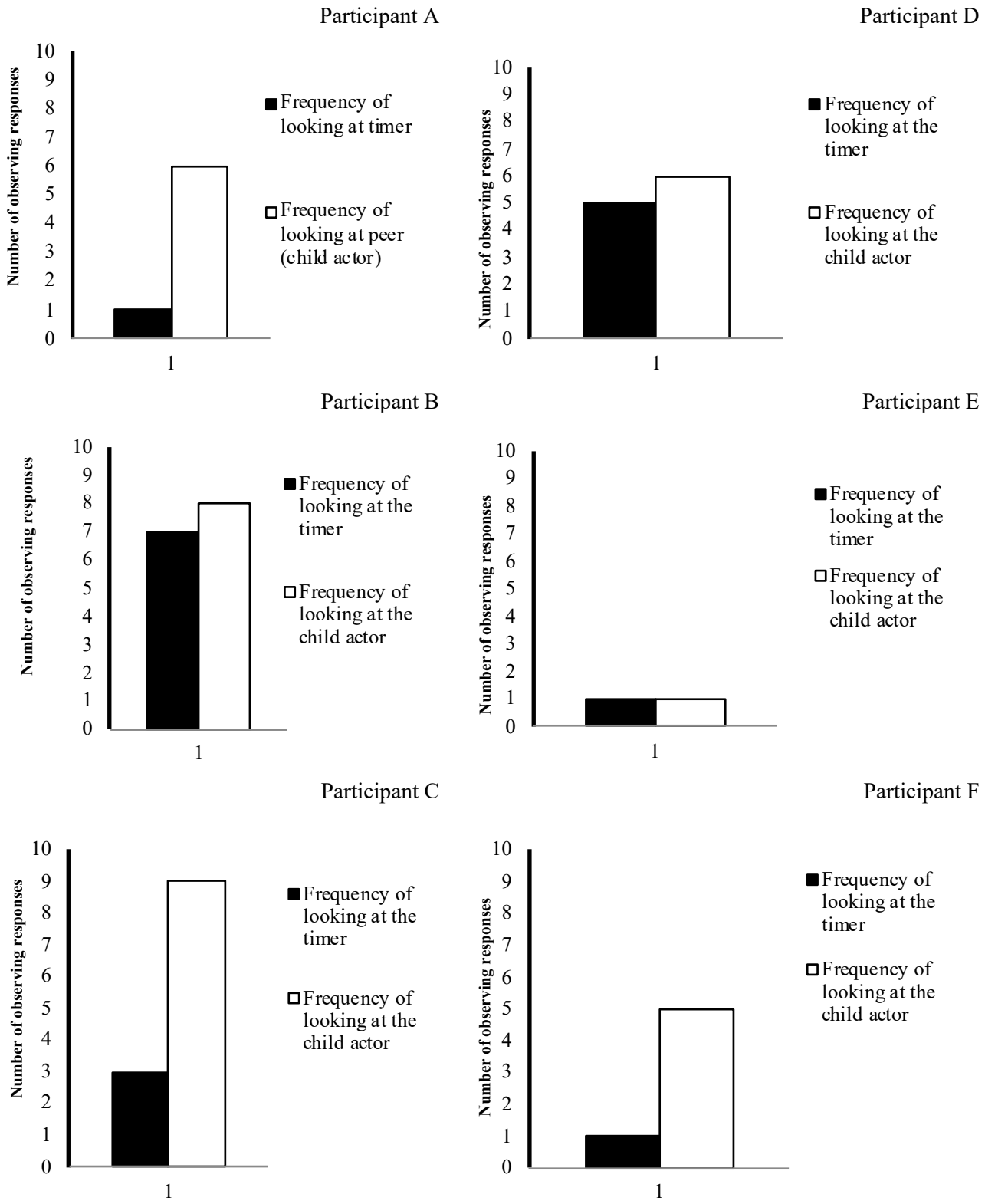

Figure 1. The number of observing responses emitted during pre-intervention 1-min free play probe session for participants in 1st or 2nd grade without an educational classification of ASD.

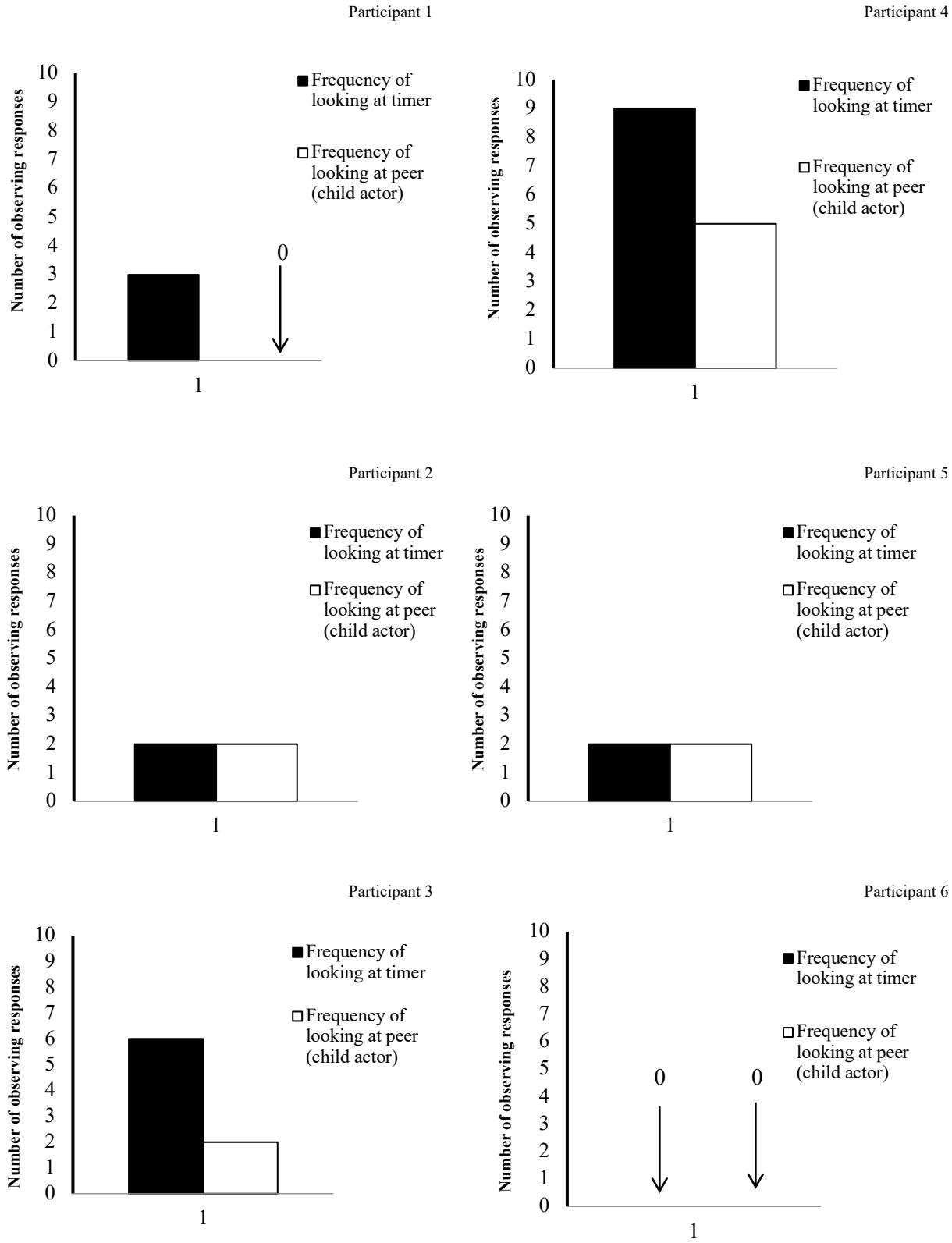

Figure 2. The number of observing responses emitted during pre-intervention 1-min free play probe session for participants with an educational classification of ASD.

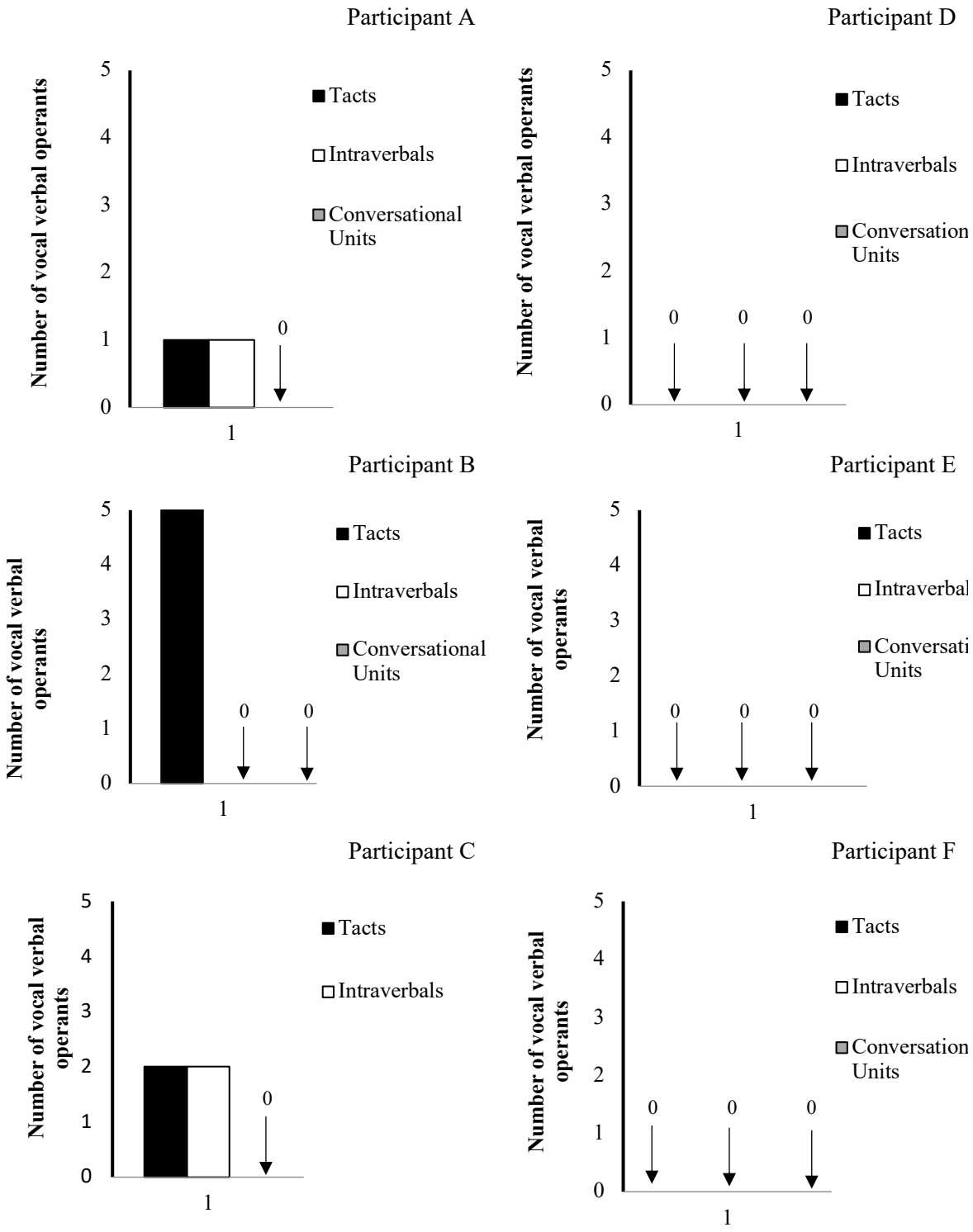

Figure 3. The number of vocal verbal operants emitted during pre-intervention 1-min free play probe session participants in 1st or 2nd grade without an educational classification of ASD.

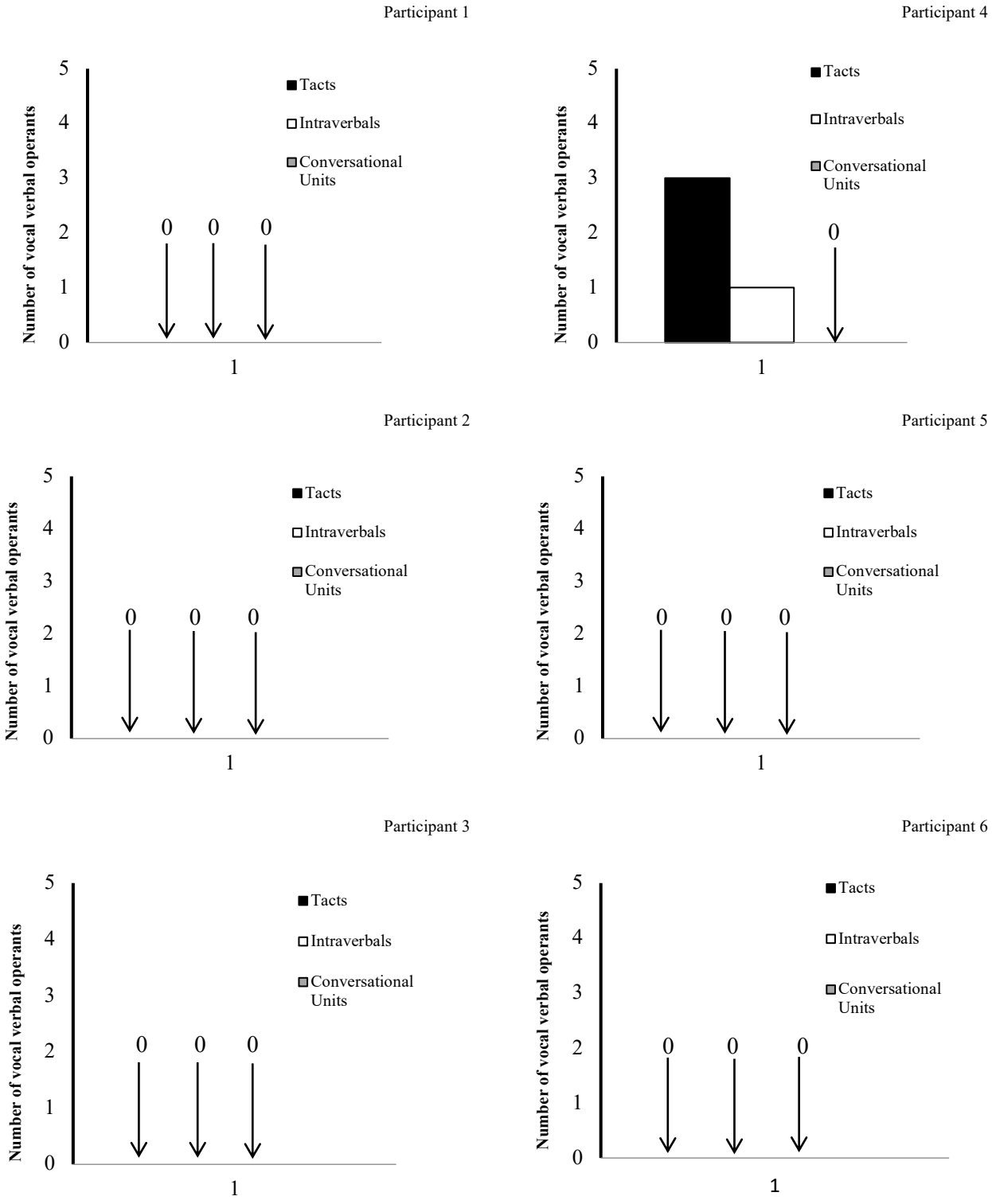

Figure 4. The number of vocal verbal operants emitted during pre-intervention 1-min free play probe session for participants with an educational classification of ASD.

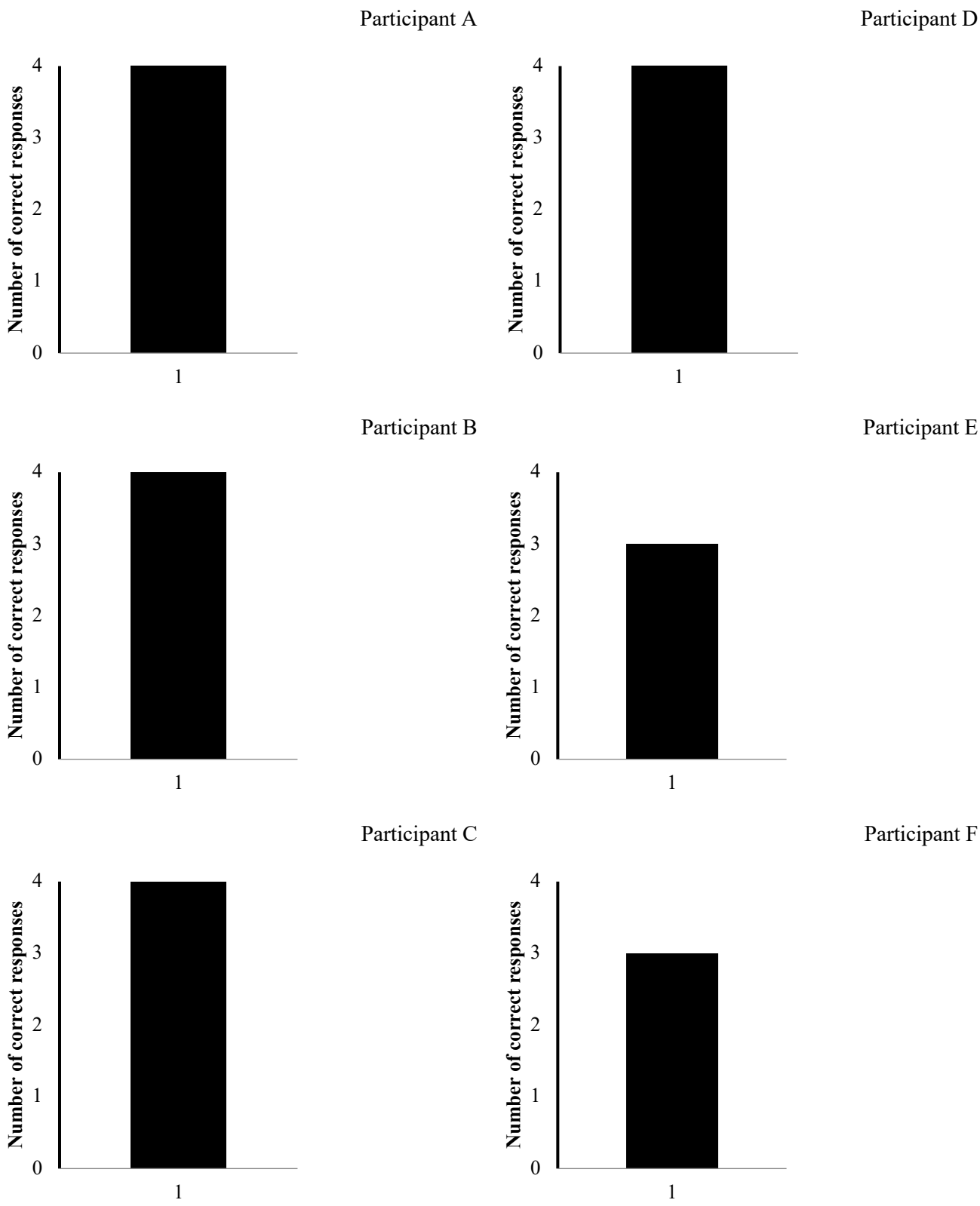

Figure 5. The number of correct responses to 4 questions following pre-intervention 1-min free play probe session for participants in 1st or 2nd grade without an educational classification of ASD.

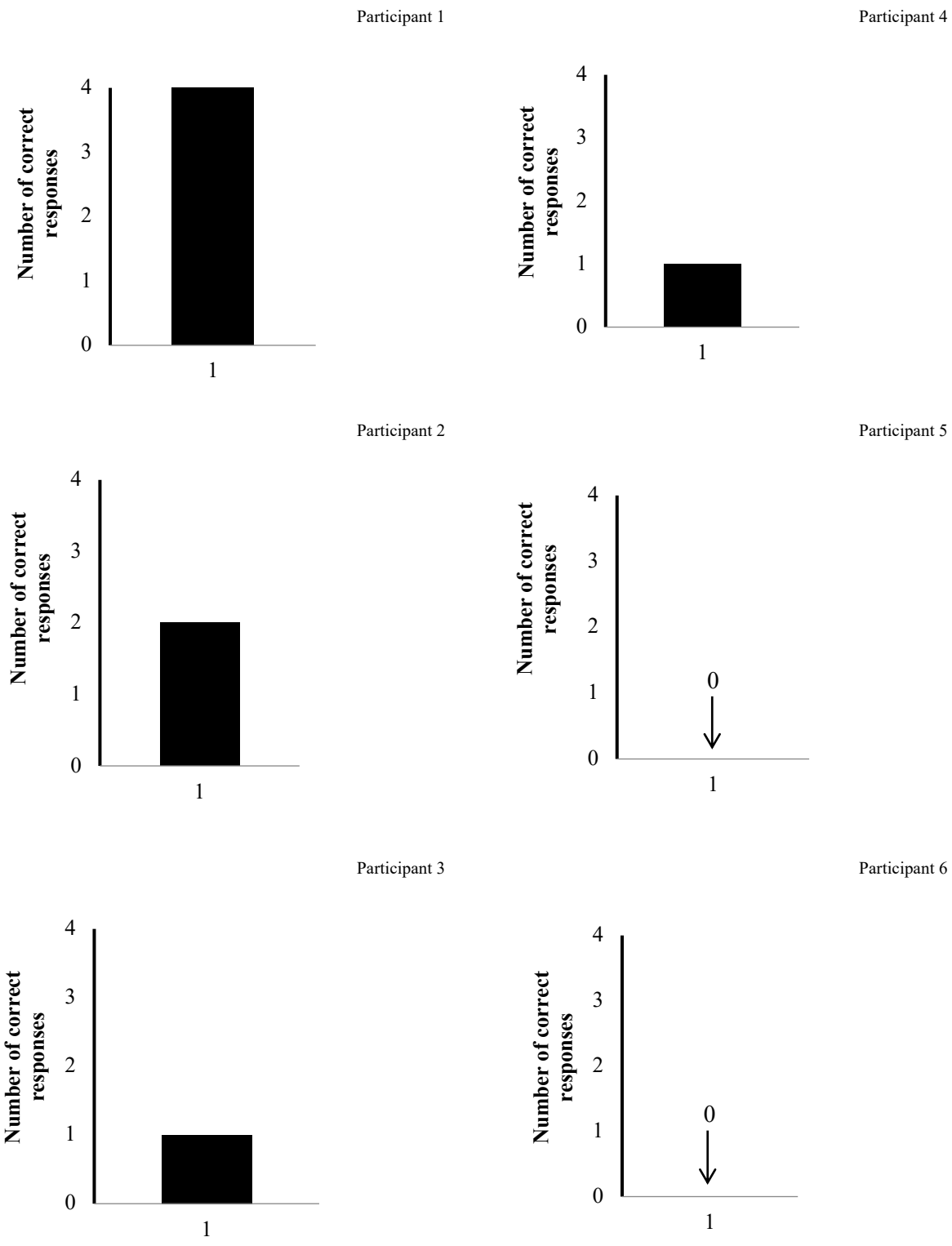

Figure 6. The number of correct responses to 4 questions following pre-intervention 1-min free play probe session for participants with an educational classification of ASD.

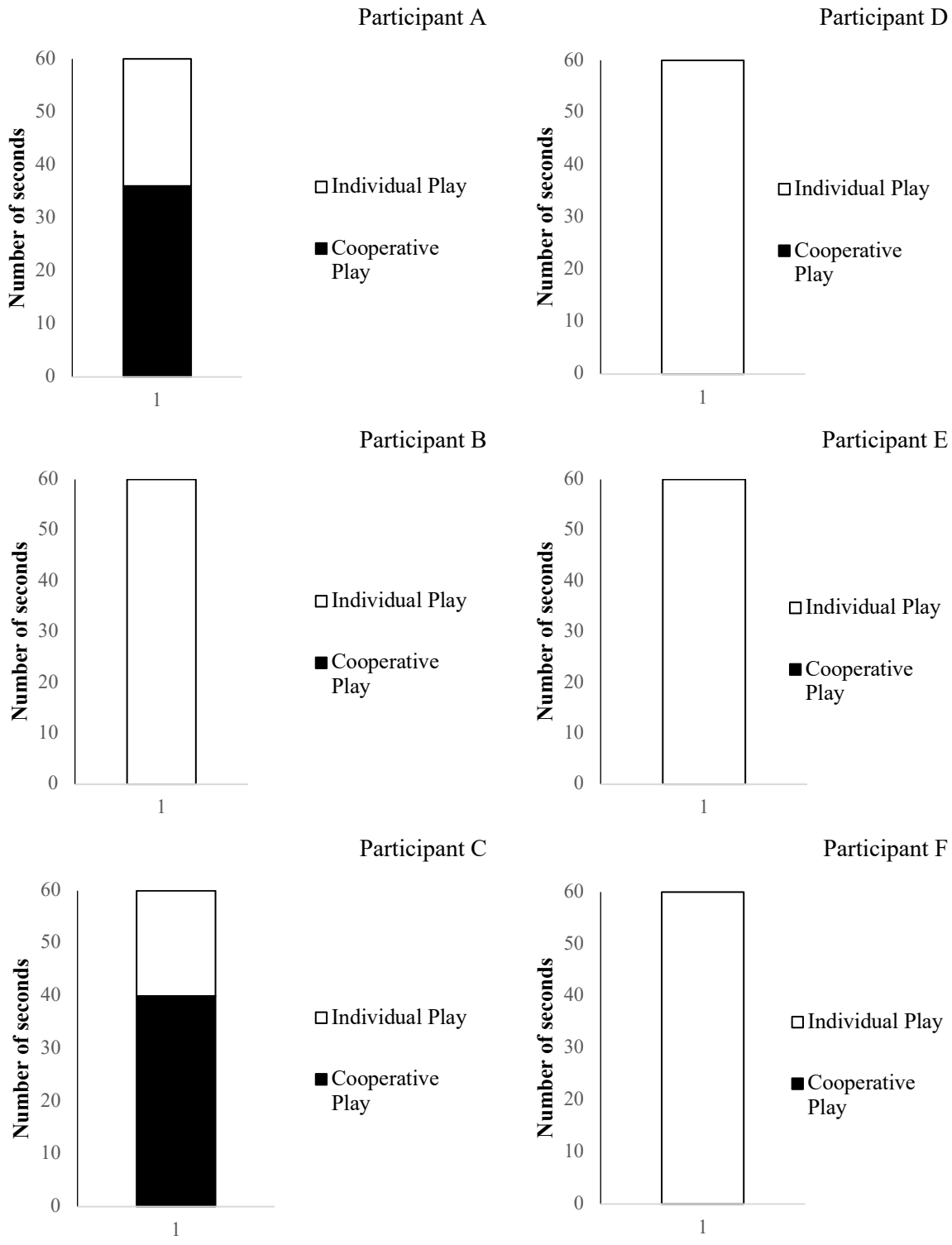

Figure 7. The number of seconds participants in 1st or 2nd grade without an educational classification of ASD engaged in cooperative or individual play during a 1-min free play session.

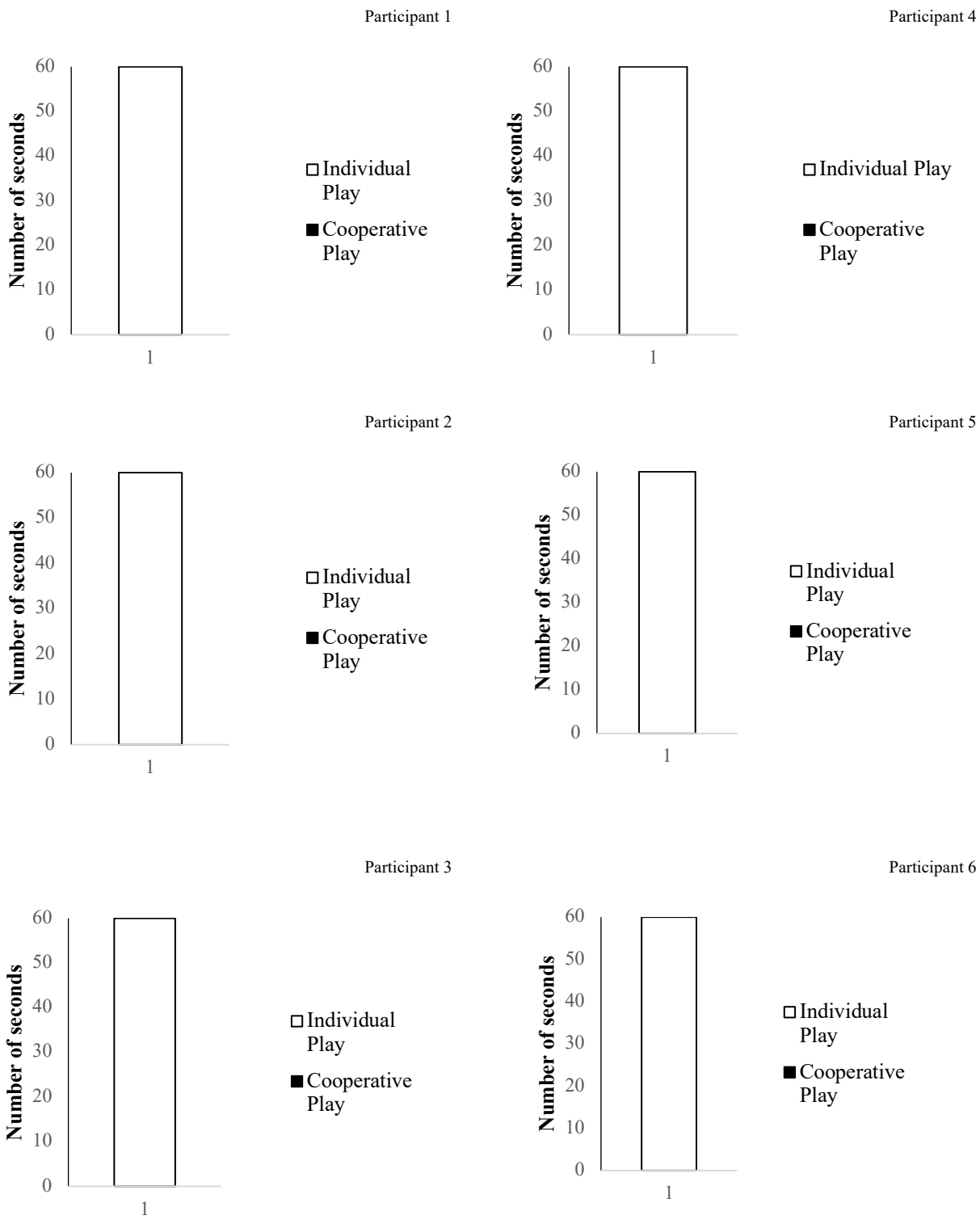

Figure 8. The number of seconds participants with an educational classification of ASD engaged in cooperative or individual play during a 1-min free play session.

Discussion

The results of this experiment showed that children with ASD do respond differently, compared to typically developing children, when observing an unfair situation. Overall, the children with ASD observed the peer fewer times, identified the peer's emotion correctly fewer times, and did not demonstrate empathetic behavior. However, the typically developing students did not reliably demonstrate vocal or helping behavior either. Interestingly, in the small sample set, it was only girls who demonstrated helping behavior, not boys. The sample size is too small to draw any conclusions about these behaviors, but it would be interesting to recruit more participants for a future study. These findings are in line with the literature that demonstrates a relation between gender and empathy (Greenberg, Warrier, Allison, & Baron-Cohen, 2018). Additionally, the findings of this experiment confirm that how children respond to questions may not have an effect on actual behavior.

Experiment II

Due to the difference in observing responses between typically developing children and children with ASD, Experiment II aimed to shift the stimulus control for observing from an activity to the social environment by conditioning the social listener response using a peer-yoked contingency. The data from Experiment I showed that participants with ASD emitted low levels of visual gazes of the child actor, as their attention was often on inanimate objects. In order to engage in higher levels of social behavior individuals must first acquire reinforcement for social interactions. However, since the typically developing children did not reliably share in the free-play sessions the results imply that one item may not have been a valid measure of sharing. As such, probes were adjusted to include more items. Experiment II utilized the Social-Listener

Reinforcement (SLR) Protocol to condition the listener-speaker interactions between the participants with ASD and their peers. In this intervention, the participant is paired with a peer in a yoked contingency against the teacher. The participant must work with the peer to complete a task, beat the teacher, and earn a prize. The activities in the intervention required the participant to function as both a listener and speaker. The goal of SLR is to "yoke" the interaction between the participant and a peer to a known reinforcer (e.g., special activity, free play, etc.) thus increasing the future frequency of speaker-listener exchanges. If reinforcement for social-listener exchanges did emerge following the SLR protocol this would result in the establishment of a new stimulus control, being the presence of a peer. That is to say, the following the acquisition of the reinforcer the individual would observe a peer in his/her environment. If then the participant observed the peer and reinforcement for social-listener exchanges was present, we predict a change in the number of visual gazes and vocal behavior.

Research Questions for Experiment II

1. Will the SLR protocol increase the observation of a peer in a free play setting?
2. Will the SLR protocol have an effect on the sharing behavior of children with an educational classification of ASD?
3. If the speaker-listener exchanges become conditioned reinforcers will this have an effect on the number of correct responses to empathetic questions?

Chapter III

Experiment II

Method

Participants

The participants for this study were the six participants from the self-contained classrooms described in the aforementioned study. Table 8 outlines the relevant characteristics about each participant. For intervention phases peers from the participant's class were selected to serve as the peers. The students all performed on grade level and had the necessary prerequisite reading/listening skills needed for intervention phases. Lastly, the students who served as child-actors were the same from Experiment I.

Setting and Materials

The study was conducted in a CABAS®, Kindergarten-2nd grade, classroom located in a publicly funded elementary school outside a major metropolitan area. All phases of the study took place inside a classroom or within the office of a classroom within the participants' school. The pre- and post-intervention probes were conducted in the office at a brown rectangle table. The participants were seated in chairs at the table across from each other. An iPhone was positioned on a bookcase, hidden within a book, on the side of the room. The materials for pre- and post-intervention probe free play sessions included an iPhone (for video recording purposes), a gallon Ziploc bag, an 11 x 13 in individual dry erase white board, Expo dry erase markers, one dry marker eraser, Alphabots, and toy animal figures. See Table 8 for a comprehensive list of materials used in this experiment. The materials for the SLR protocol were game boards, game pieces, *Match It! Shape Shuffle,* printed instructions for the *Shape Shuffle* and scavenger hunt, an iPhone, a picture on the iPhone of each step to construct the template *Shape Shuffle* and the

location of each hidden clue in the scavenger hunt, 12 piece puzzle, index cards, printed pictures of flags, a PowerPoint with photos of sea creatures, reinforcers, data sheets, and pens.

Table 11.

Description of the materials in Experiment II

Pre- and Post-Intervention Probes			
Free Play Sessions			
- iPhone - timer - White Board (11x13 in) - Dry erase markers - Expo eraser	- Animals - Alpha-Bots - Printed questions - Gallon Ziploc bag		
Social-Listener Reinforcement Protocol			
Phase 1 - Data sheet - Pen - *Match It! Shape Shuffle* - Printed instructions - iPhone - Photo of each step on iPhone - Game board - Reinforcer: iPad, coloring pages, toy area	Phase 2 - Data sheet - Pen - Printed instructions - iPhone - Photo of each step on iPhone - 12 piece puzzle - Game board - Reinforcer: iPad, coloring pages, toy area	Phase 3 - Data sheet - Pen - Student data sheet - 4 x 6 index cards - Colored printed pictures of flags. - Sea creatures PowerPoint - Game board - Reinforcer: iPad, coloring pages, toy area	Phase 4 - Data sheet - Pen - Student data sheet - 4 x 6 index cards - colored printed pictures of flags - Game board - Reinforcer: iPad, coloring pages, toy area

Measurement and Dependent Variable

The dependent variables for the present study were the number of observed empathetic behaviors emitted by students during a 1-min free play session. Empathetic behaviors during the free-play session were defined as the number of times the participant observed the peer and the

duration of seconds the participant engaged in sharing. In addition, experimenters measured the social behavior emitted during the 1-min play session. Each dependent variable is described in greater detail below.

Eye gaze at peer. Data were recorded for the number of times the participant looked at the peer seated next to him/her during the 1-min free-play sessions. To collect data, the experimenter made a tally each time the participant's eyes gazed at the peer. One gaze was defined as the participant's eye gaze on the peer and ended when the participant looked away from the peer.

Vocal Verbal Behavior. Data were recorded on the number of vocal verbal operants emitted by the participant during the 1-min play session. To capture social behavior, experimenters recorded data on the number of verbal operants as tacts, intraverbals, and conversational units. These behaviors were defined and described in Experiment I and were replicated for this experiment.

Table 12.

List of dependent variables in pre- and post-intervention probes

Probe	Dependent Variable
I. Free Play Session: multiple items	1. Visual gaze at peer 2. Tacts 3. Intraverbals 4. Conversational Units 5. Duration of sharing
II. Free Play Session: 1 item	1. Visual gaze at peer 2. Visual gaze at timer 3. Tacts 4. Intraverbals 5. Conversational Units 6. Duration of sharing 7. Correct responses to empathetic questions

Experimental Design and Procedure

A multiple probe design was employed to test the effects of the SLR protocol on the social behavior for six students with an educational classification of ASD. Experimenters first conducted probes for the demonstration of social and empathetic behavior. Following probes, the participant began the SLR protocol. There were three phases to the first part of the SLR intervention. They were a building phase, scavenger hunt, and peer tutoring. Once the participant completed one phase of SLR a 1-min free-play post-intervention probe was conducted. In addition to the three free-play activities, the original free-play probe, from Experiment I, was conducted. Following post-intervention probes a fourth phase of SLR was implemented. Upon completion a final round of post-intervention probes was conducted. Each phase of the experiment is described in greater depth below.

Free play session: 1 item. This probe was a replication of the free play session I in Experiment I. The free play and procedure were replicated after all four phases of SLR were complete.

Free play session: Multiple items. The experimenter first prepared the office by placing the materials in the office. There were three different activities, whiteboard, animal figures, and Alpha-Bots, for three separate 1-min play sessions. The materials were placed in a gallon-sized Ziploc bag. The experimenter placed an excess amount of materials in the bag (e.g. 6 markers, 8 animals, and 6 Alpha-Bots). In addition, the experimenter set up an iPhone to video record the free play session and began the recording prior to getting the students. The 1-min play session

was a replication of the procedure described in Experiment I. The only difference was the addition of items to include Alphabots (AL), animal figures (AN), and the whiteboard (WB).

Social Listener Reinforcement Protocol (SLR)

Training. The first phase of the SLR protocol was the training phase. In this phase the experimenter introduced the participant to the peer-yoked contingency game board (Figure 10). The experimenter explained that the participant and peer would be a team paired against the experimenter. The experimenter showed the students their game piece (the "good" guy, e.g. Anna from Frozen, a favorite NY Ranger hockey player) and the teacher game piece (the "bad" guy: Hans from Frozen, a rival team goalie). The experimenter had the students select an item for the winning team to receive (e.g., extra play time, a sticker, a special snack). The students were shown the top of the game board and told that the first team to get to the top won the prize. The experimenter explained to the students that they must work as a team to move up on the game board. A simple task was selected for the participant and a peer to complete. In this task the students were required to identify an item in a brown paper bag. The experimenter first showed one student the item in the bag. Then, asked the student, who did not view the item, "what's in the bag?" The student was required to ask the peer for the answer and then respond to the experimenter. If the student correctly answered the question the students' piece moved up on the game board. However, if the student emitted an incorrect response, or the student not asked (the one who viewed the bag), answered, the experimenter's piece moved up on the game board. There were 10 spots to reach the top of the game board. The participant began the intervention once he/she made it to the top of the game board.

Figure 9: An example of a game board used during the SLR protocol.

Phase 1. In the first phase of the SLR protocol the participant completed a building activity. The experimenter selected a template from *Match It! Shape Shuffle* and created 12 directions to complete the template. The experimenter typed the instructions on the computer and then printed all the odd directions on one page and all the even directions on a second page (Appendix A). The experimenter took a photo on her iPhone of each step of the process (See Figure 10). The experimenter placed exemplar and non-exemplar shapes in a Ziploc bag. The experimenter brought the directions, template, Ziploc bag, and game board into the office. The participant was seated next to a peer at a rectangular table across from the experimenter. The game board, selected by the participant, was placed on an easel next to the experimenter. The participant and peer identified the game piece for their team (e.g., Tom Brady) and the experimenter selected her game piece (e.g., Peyton Manning). The experimenter asked the

students to identify the item to be awarded to the winning team (e.g., iPad time, toy area time, free draw, etc.). Once the prize was selected the experimenter explained the rules of the activity. The experimenter presented the template and told the students they have to work as a team to complete the template using the shapes in the Ziploc bag. For Participants 1-5, the experimenter explained that the instructions described the steps to complete the template. For Participant 6, the experimenter explained that the students had to match the template to a picture on an iPhone. The experimenter explained that there were a few rules for the game. The first rule for the written direction group was that the student was allowed to read the direction one time only. The experimenter explained that the student was allowed to give the peer feedback (e.g., "Yes right," or "No, the purple one") but could not continue to read the direction word for word. The second rule, for all the participants, was that the student who read the direction, or viewed the picture, was not allowed to touch the shapes. A final rule for Participant 6, referencing the picture, was a 1-minute time constraint placed on the activity. Once the shape/s was/were put in place the experimenter asked the students, "Do you agree?" If the students did not agree the experimenter asked the students to work as a team until they agreed. Once both students vocally stated that they agreed, the experimenter showed the students a picture on an iPhone. If the students' response matched the photo the students moved up one place on the game board. The experimenter delivered vocal praise (e.g. "I love how you worked as a team!") and recorded a plus (+). However, if the students' response did not match the photo, or they did not follow one of the rules, the experimenter moved up one place on the game board. The experimenter explained the reason her game piece advanced (e.g. "Oh, it looks like you didn't follow the directions and it doesn't match the picture. I get to move up." Or "Remember the rule is you are only allowed to read the direction and must keep your hands to yourself. Since you touched the

shape and put it in place that means I get to move up on the game board"). The session was complete when one team reached the top or the template was complete. The directions were designed to allow the students to miss two opportunities and still reach the top. If the template was complete and neither team reached the top the experimenter asked, "Did anyone reach the top?" The students identified that no one did and so the experimenter informed the students that no one earned the special activity. Data were recorded for only the first 10 responses and the number of correct responses was displayed graphically. Criterion for this phase was set at 90% across two templates.

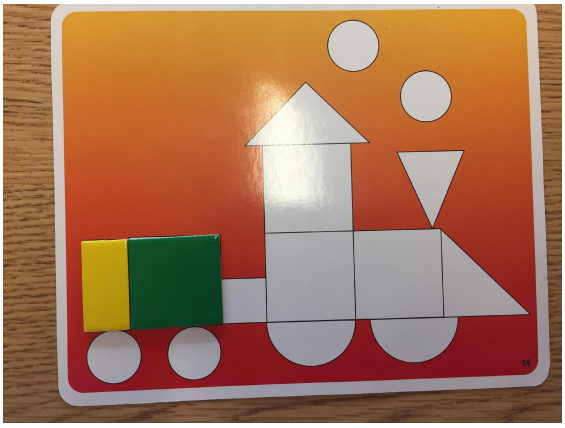

Figure 10: An example of a photo shown to the students during Phase 1 of SLR.

Phase 2. In the second phase of the SLR protocol the participant worked with a peer in a scavenger hunt to find the pieces needed to complete a puzzle. For Participants 1-5 the participant and peer were each given a sheet that contained directions (Appendix B). One student was given the sheet that contained odd numbers; the other was given directions for even numbers. There was a total of 12 directions. The student whose paper contained the direction read the clue aloud (e.g., "The 2nd clue is under the blue circle table."). Once the clue was read the experimenter started a 1-minute timer. The activity was modified for Participant 6, as he was not able to read. Prior to the start of the intervention the experimenter took a picture on an

iPhone to show where each clue was hidden (See Figure 11). The experimenter then showed this picture to the student. The student was then required to vocally describe the location to his peer. Once the student saw the picture the experimenter began a 1-minute timer. Across each condition, the student who listened was required to find the puzzle piece before the timer went off (See Figure 12 for an example of the clue).

Figure 11: An example of a photo shown to the Participant 6 or his peer during Phase 2 of SLR.

Figure 12: An example of a clue hidden in the classroom during Phase 2 of SLR.

The students were told to work as a team to find the clue, however the rule was that only the student who listened to the direction could touch the puzzle piece. If the student found the clue before the timer went off he/she brought the piece back into the office and placed it on the puzzle. If the student placed it in the correct spot the students moved up on the game board. If the student did not find the piece before the timer went off the experimenter provided vocal prompts to model collaboration (e.g., Told the students to ask each other questions, "Where is it?" or "What did you say?" "Can you read the clue again?"). The experimenter provided prompts and redirections but never showed the students where the clue was. Once the students found the clue the experimenter asked if they found it by themselves or required help. The experimenter explained that since they did not beat the timer they were not able to move up on the game board and moved the teacher game piece up. The game concluded when a team reached the top or the puzzle was completed. As in the first phase, if the students made it to the top they were able to gain access to a selected item (e.g., iPad, toy area time, etc.). If neither team made it

to the top then no one accessed the item. Criterion was set at 90% across two puzzles. See Figure 13 for an example of a completed puzzle.

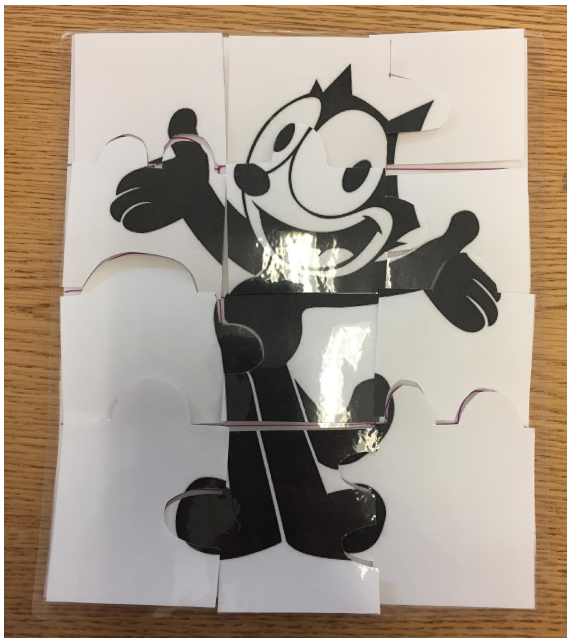

Figure 13: An example of a complete puzzle used during Phase 2 of SLR.

Phase 3. The third phase of SLR was peer tutoring. In this phase Participants 1-5 were trained to teach a peer the names of five novel flags. Participant 6 was not able to read and so he taught a peer the names of sea creatures using a premade PowerPoint presentation. Participants 1-5 were taught to read the name of five countries (Mexico, Spain, Sweden, Brazil, and Australia). Participant 6 was taught to identify five different types of sea creatures (Horseshoe Crab, Narwhal, Flounder, Lion Fish, Walrus). Once the participant mastered reading the name of each country, or labeling the sea creatures, the training tutoring sessions began. Each participant was trained first to deliver learn units (Albers & Greer, 1991) to a teacher.. Participants 1-5 were given a flashcard that contained a printed picture of a flag on one side and on the reverse side was the written name of the country. Participant 6 presented a PowerPoint presentation that contained sea creatures. A complete list of each of the participant's sets is displayed in Table 13.

The participants teaching flags were taught to present the picture to the experimenter and ask, "What flag is it?" The experimenter responded and the participant was taught to reinforce correct responses with vocal praise (e.g., "Great!" or "That's right!"). If the experimenter gave an incorrect response the participant was taught to give a correction procedure. In the correction procedure the participant provided the experimenter with the correct name of the country (i.e. the participant held up the card for Spain and the experimenter said "Australia." The participant said, "It's Spain.") and an independent opportunity to respond (i.e. participant "What is it?" teacher "Spain."). The participant was taught to record a plus (+) for correct responses and a minus (-) for incorrect responses on a premade data sheet. The participant completed the training session when he/she delivered five consecutive learn units without errors, across correct and incorrect responses. The procedure was the same for Participant 6 but he used a PowerPoint presentation to show sea creatures. The training for feedback for correct and incorrect responses was the same.

Once the participant was trained the participant began sessions with a peer. The peer tutoring sessions took place in the office within the classroom. In the tutoring sessions the participant was seated across from his/her peer. At the start of the session the experimenter presented the game board and had the students select an activity to work for. The experimenter explained that the students moved up if they worked together and tried their best. In order to work as a team the experimenter explained that the tutor (participant) must accurately teach his/her friend and that the peer (tutee) must try his/her best and listen to the tutor. A correct response was defined as an accurate learn unit. In this the tutor delivered the antecedent (presented the card and vocal, "What flag is it?"), the tutee emitted a response, and the tutor

consequated the response accurately (reinforced correct responses and corrected incorrect responses). Criterion was set at 90% correct responses across two sessions.

Table 13.

The sets used for phase 3, peer tutoring, in SLR.

Participants 1-5	Participant 6
Brazil	Horseshoe Crab
Australia	Narwhal
Sweden	Flounder
Spain	Lion Fish
Mexico	Walrus

Phase 4. The fourth phase of SLR was reciprocal peer tutoring. In this phase, participants were grouped into dyads. In reciprocal peer tutoring sessions the participants alternated with each other as the peer and tutor. The participants were paired as a team against the teacher and competed for a selected prize (e.g., toy area free play, iPad, coloring, etc.). There was a game board with 20 spaces to the top for each team. In this phase of peer tutoring, the experimenter explained that the students moved up only when the tutor presented an accurate learn unit and the tutee emitted the correct response. Since all the participants were trained in learn unit presentation, data were recorded for correct responses to flags presented. If the tutor presented an intact learn unit, as described in Phase 3, and the student emitted the correct response, the students shaded in one spot on the game board, and the experimenter recorded a plus (+). However, if the tutor or tutee emitted an incorrect response the experimenter shaded in a box for the teacher. The experimenter recorded a minus for the tutee if he/she emitted any response other than the correct response. When the tutee emitted an incorrect response, the experimenter reminded the students that it was important to pay attention and learn the names of the flags in

order to move up and win. Criterion was set for tutee responses at 90% across two 10 learn unit sessions. If one individual in the pair met, that participant then became the only tutor until the other participant demonstrated criterion level responding.

Table 14.

List of the sets taught in phase 4 of SLR

Participants	Set 1	Set 2
Participants 1-5	Germany	Chile
	South Africa	Iceland
	China	Japan
	United Kingdom	Italy
	Greece	Canada
Participant 6	Horseshoe Crab	Pufferfish
	Narwhal	Tiger Shark
	Flounder	Mussels
	Lionfish	Shrimp
	Walrus	Angel Fish

Interobserver Agreement

A second independent observer viewed the videos for the purposes of calculating interobserver agreement (IOA). Free-play sessions were video recorded and scored by separate observers. IOA was calculated by dividing the number of point-to-point agreements and disagreements by the total number of agreements plus disagreements and multiplying by 100 for the participants (Johnston & Pennypacker, 1993). IOA was collected for 50% of pre-intervention free-play sessions with 92% agreement (range 80% -100%). Experimenters obtained 38% (28/73) of intervention sessions with 100% agreement.

Results

The first research question was designed to investigate the effects of the SLR protocol on the social behavior of children with ASD in response to an unfair situation. Results of the current experiment demonstrated that there was a difference following the SLR protocol for some participants. These data are displayed in Figure 14, which displays the cumulative data for vocal and non-vocal responses. The results show an increase in vocal verbal operants for Participants 3, 4, and 6. Across pre-intervention probes Participant 3 emitted 0 non-vocal and vocal responses. In post-intervention probes he increased to first 8 and then 5 non-vocal responses. For vocal responses in post-intervention probes he increased to 9 and then 5 responses. Participant 4 emitted 7 non-vocal responses and then decreased to 3 and 2 respectively in post-intervention probes. She emitted 8 vocal responses in pre-intervention probes and increased to 12 and then 11 responses. In pre-intervention probes Participant 6 emitted 5 non-vocal responses and then increased to 9 in his post-intervention probes. Participant 6 emitted 6 vocal responses in pre-intervention probes and increased to 10 and 11 in post-intervention probes. The results show no significant change for Participant 5. In pre-intervention probes she emitted 0 vocal and non-vocal responses. In post-intervention probes she emitted 1 vocal response and 1 non-vocal response. The results show variable responding for Participant 2. In pre-intervention probes he emitted 3 vocal responses and in post-intervention probes he increased to 8 non-vocal responses and 2 vocal responses, and then decreased to 2 non-vocal responses. In pre-intervention probes he emitted 1 vocal response and in the first post-intervention probe he emitted 2 vocal responses, and in the second post-intervention probe he emitted 0 vocal responses. Participant 1's results show variable responding as well. In pre-intervention probes he emitted 0 non-vocal responses and 4 vocal responses. In the first set of post-intervention probes he emitted 5 non-vocal

responses and in the second set he emitted 0 non-vocal responses. For vocal responses he emitted 6 in the first set of post-intervention probes and decreased to 2 in the second round of probes.

In addition, data were recorded and graphed for probes conducted with 1-item in a free play session. The results show a difference following intervention for Participants 3, 4, and 6. In pre-intervention probes Participant 3 gazed at the timer 6 times and the child actor 1 time, while in post-intervention probes he did not gaze at the timer and gazed at the child actor 3 times. Participant 4 gazed at the timer 9 times and the child actor 5 times in pre-intervention probes. In post-intervention probes she did not gaze at the timer and gazed at the child actor 4 times. In pre-intervention probes Participant 6 did not gaze at the timer or child actor and in post-intervention probes he gazed at the timer 1 time and the child actor 5 times. The results show no significant change for Participants 1, 2, and 5. Participant 1 observed the timer 3 times in pre-intervention probes and 1 time in post-intervention probes, he did not observe the child actor in either probe. Participant 2 observed the timer 1 time in pre- and post-intervention probes, there was a slight decrease in the number of eye gazes at the actor from 1 time in pre-intervention probes to 0 times in post-intervention probes. For Participant 5 there was a slight decrease in the number of eye gazes at the timer from 1 time in pre-intervention probes to 0 times in post-intervention probes and she remained constant in the number of eye gazes at the actor with 1 time in pre- and post-intervention probes. The data follow a similar pattern for vocal verbal operants emitted in this setting. Figure 14 displays these data and shows a slight increase in vocal behavior for Participants 3, 4, and 6. Participant 3 did not emit vocal verbal operants in pre-intervention probes and in post-intervention probes emitted 1 conversational unit. In pre-intervention probes Participant 4 emitted 1 tact, 1 intraverbal, and no conversational units. In post-intervention probes she emitted 0 tacts, 1 intraverbal, and 1 conversational unit. Participant 6 did not emit any

vocal verbal operants in pre-intervention probes. In post-intervention probes he emitted 2 tacts, 0 intraverbals, and 1 conversational unit.

The second research question investigated whether there would be a difference in the sharing behavior of students with an educational classification of ASD following the SLR intervention. Results of the current experiment demonstrated that there was a difference following the SLR protocol for some participants. These data are displayed in Figure 15 which displays the cumulative data. The results show an increase in sharing and vocal verbal operants for Participants 2, 3, 4, and 6. The results are for cumulative sharing time in seconds, out of 180 s. In pre-intervention probes Participant 2 shared for 0 s and in post-intervention he shared for 53 s. In pre-intervention probes Participant 3 shared for 0 s and in post-intervention he shared for 114 s. In pre-intervention probes Participant 4 shared for 115 s and in post-intervention he shared for 157 s. In pre-intervention probes Participant 6 shared for 89 s and in post-intervention he shared for 165 s. The results show no effect for Participant 5, as she had 0 s for pre- and post-intervention probes. The results show a decrease for Participant 1 as he shared for 117 s in pre-intervention probes and 9 s in post-intervention probes.

The purpose of the third research question was to determine if there was any difference between responses to empathetic questions following the SLR protocol. The data show an increase in correct responses to questions for Participants 2 (pre-2, post-3), 3 (pre-0, post-4), and 4 (pre-1, post-3). The results showed no change for Participants 1 (pre-4, post-4), Participant 5 (pre-0, post-0), or Participant 6 (pre-0, post-0). The results are displayed in Figure 18.

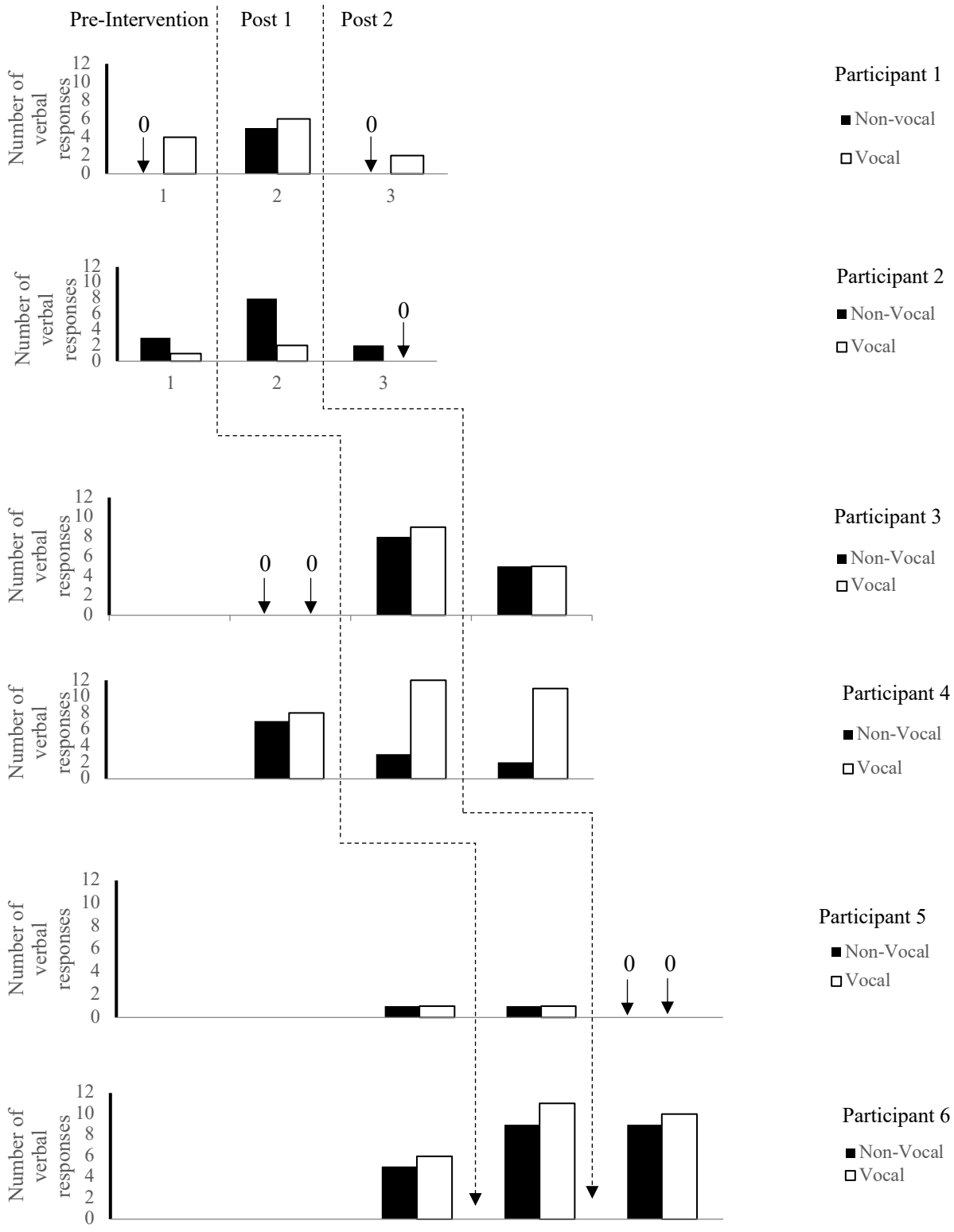

Figure 14. The cumulative number of eye gazes and vocal verbal operants: tacts, intravebrals, and conversational units, emitted across three activities in pre- and post-intervention probes.

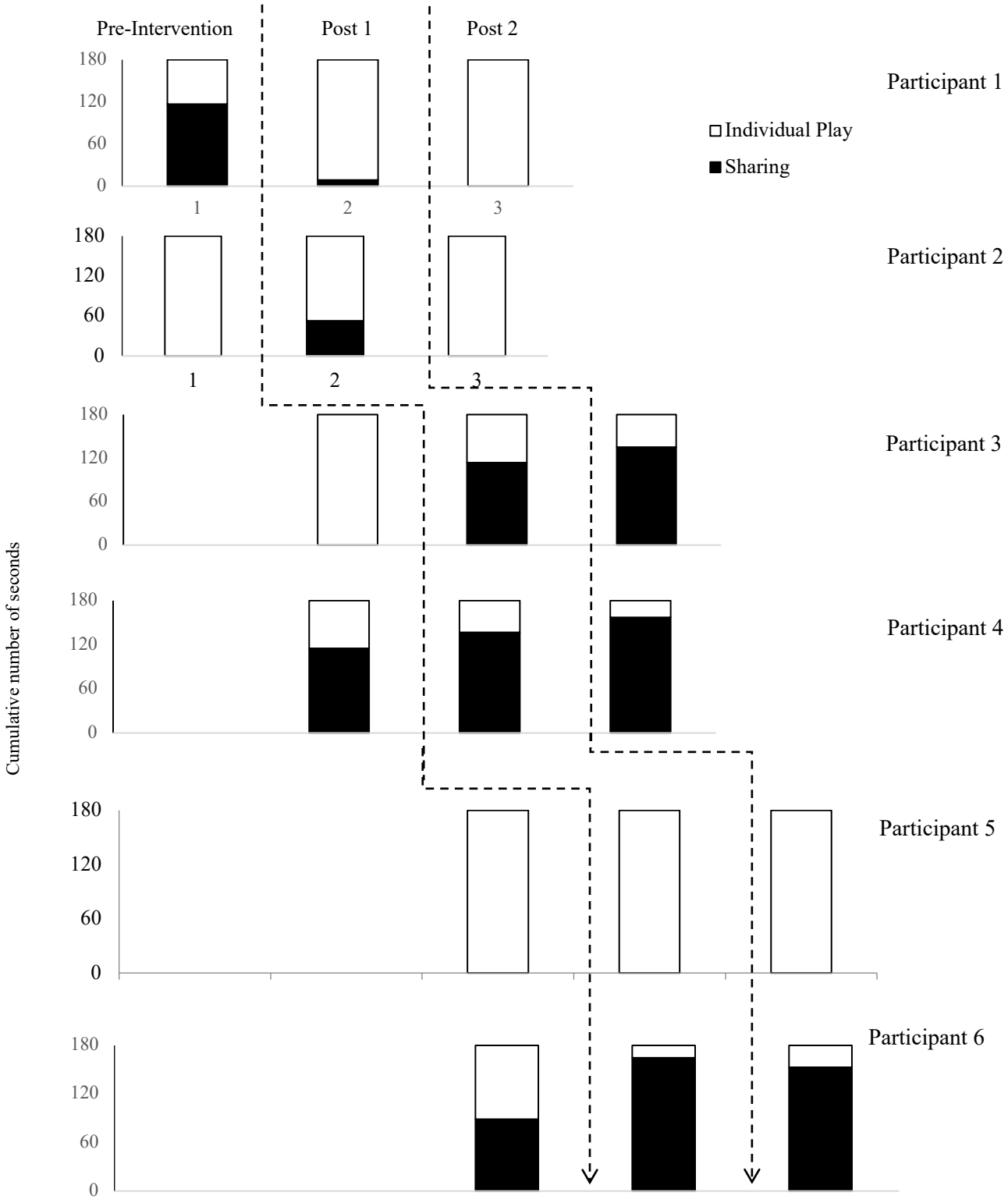

Figure 15. The cumulative number of seconds the participant shared across three activities in pre- and post-intervention probes.

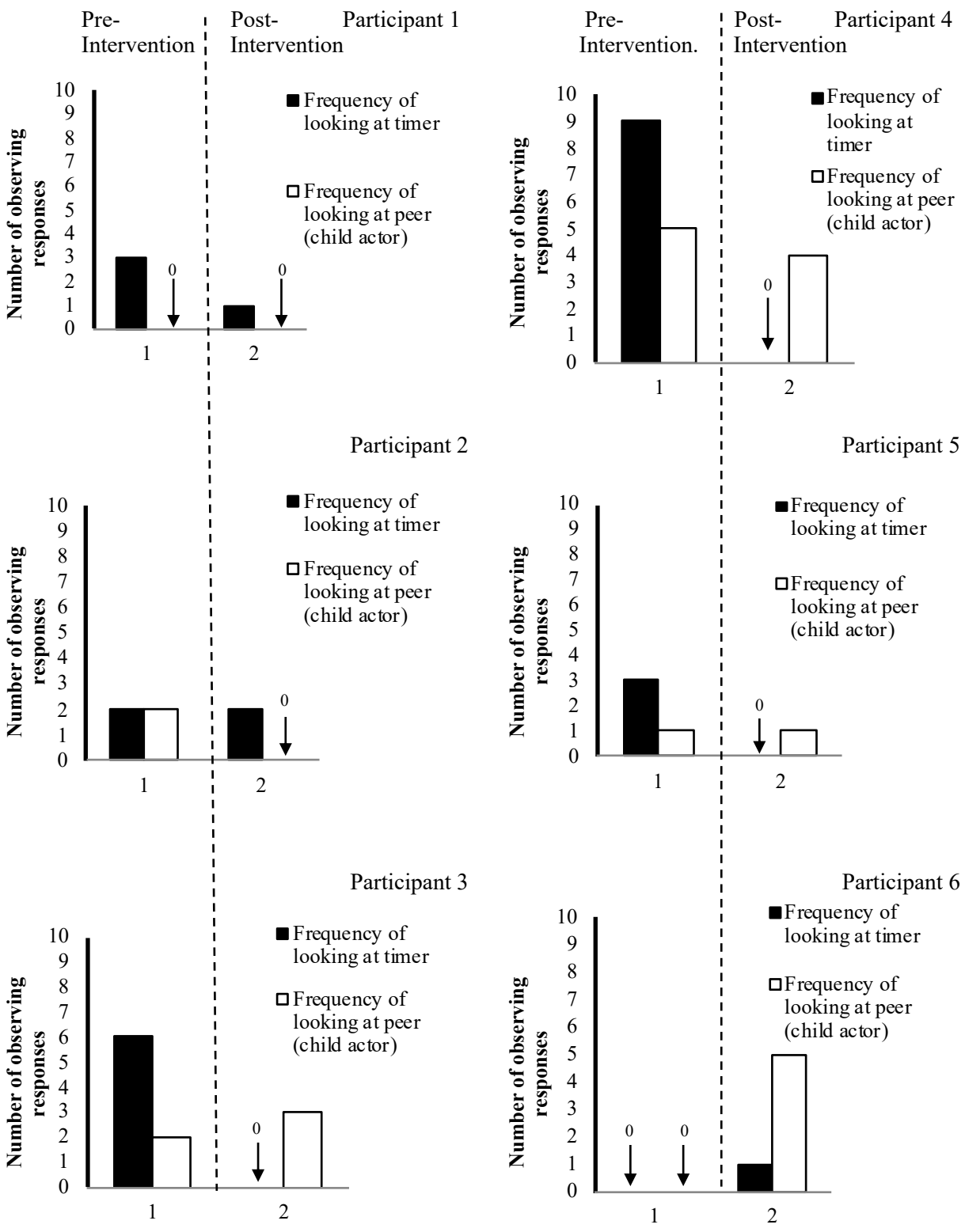

Figure 16. The number of eye gazes of the timer and peer emitted during pre- and post-intervention 1-min free play probe sessions for participants with an educational classification of ASD.

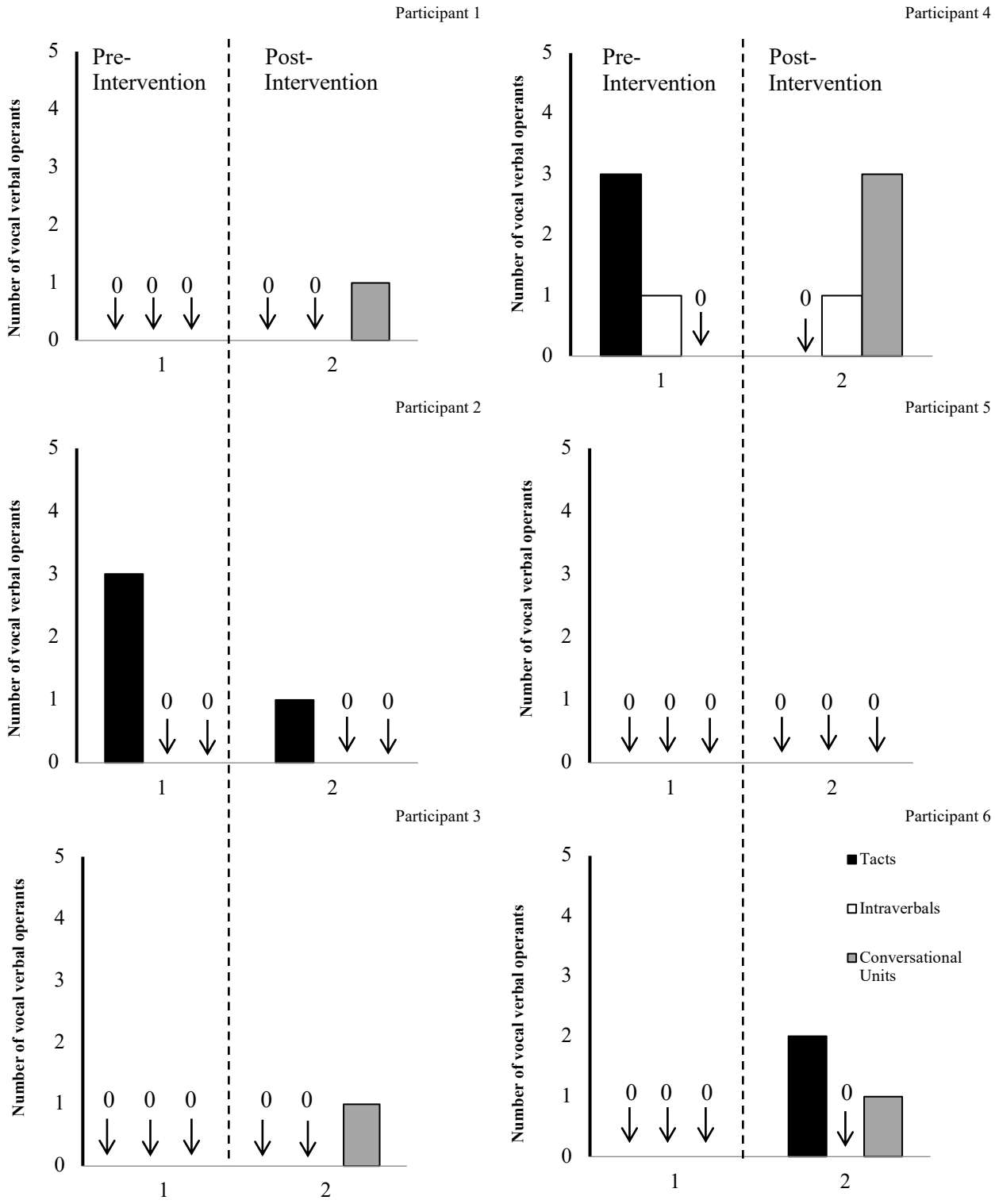

Figure 17. The number of vocal verbal operants emitted during pre- and post-intervention 1-min free play probe sessions for participants with an educational classification of ASD.

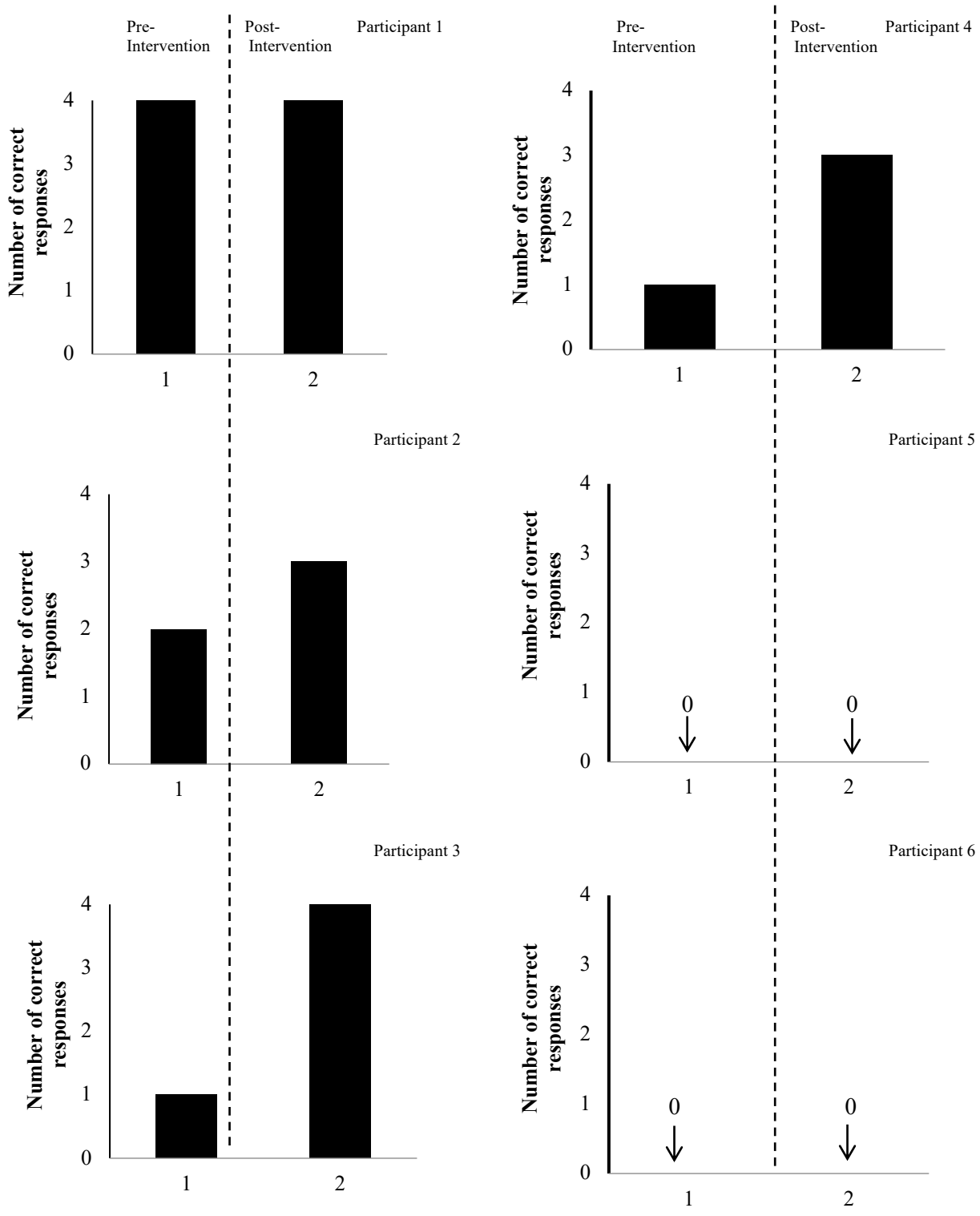

Figure 18. The number of correct responses to 4 questions following pre- and post-intervention 1-min free play probe sessions for participants with an educational classification of ASD.

Discussion

This experiment was designed to investigate the effects of the SLR protocol on the empathetic behavior of children with an educational diagnosis of ASD. The first research question was designed to determine if the SLR protocol would have an impact on peer observation in a free play setting. The results showed that it had an effect for some participants, as there was an increase in verbal behavior for Participants 3, 4, and 6 following the intervention. However, there was no change for Participants 1, 2, and 5 following the intervention.

In prior SLR experiments the intervention had been found to increase vocal verbal behavior only when the participant completed pre- and post-intervention probes with the same individual he/she was yoked with in the intervention (Baker, 2014; Davies-Lackey, 2005; Lawson & Walsh, 2007; Sterkin, 2012; Stolfi, 2005). In line with prior research the reinforcer pulls along the behavior (Greer & Du, 2015) such that the reinforcer, in this case peer attention, establishes a new stimulus control (presence of a peer). The data from this study imply that following the SLR intervention Participants 3, 4, and 6 acquired reinforcement for speaker-listener exchanges. The results demonstrate that the participants acquired the reinforcer, as the behavior was not contingent on an individual, and these participants engaged in social behavior with individuals they did not complete the intervention with. This reinforcer resulted in the establishment of a new stimulus control for the participants. Following the intervention, a peer's presence became the stimulus control for these participants; hence the participants observed when a peer was seated next to them and then engaged in social behavior. Empathy, the same as all other verbal cusps and capabilities, is the product of stimulus control.

The second research question explored the relationship between SLR and sharing behavior of children with an educational classification of ASD. Again, the results from the current study support the theory that the establishment of the reinforcer precedes a change in behavior. Once the participants acquired reinforcement for peer interaction, they demonstrated empathetic behavior by sharing their toys and participants who did not acquire this reinforcer did not emit this behavior, as they were not under the appropriate stimulus control. In line with findings in past research experimenters have often focused on a particular component of social behavior and it has not "generalized" to other settings (Charlop, Loc, & Freeman, 2000; Sarokoff, Taylor & Poulson, 2001) because the intervention failed to establish the proper stimulus control.

The final research question was designed to test if responses to empathetic questions would be affected by acquisition of reinforcement for social-listener exchanges. The data imply that it may have an effect for some children with an educational classification of ASD. Following demonstration of reinforcement for social-listener exchanges Participants 3 and 4 showed an increase in correct responses. However, Participant 6 did not demonstrate this same effect. It may be because Participant 6 did not have the necessary prerequisite skills to demonstrate behavior. There was no significant change for Participants 2 or 5 and Participant 1 already answered all 4 questions correct in pre-intervention probes. Since it is a small sample size and there are various outcomes, we cannot draw conclusions about the relationship between these two variables.

Experiment III

The SLR protocol has been tested and shown to have positive social effects for a variety of students (Baker, 2014; Davies-Lackey, 2005; Lawson & Walsh, 2007; Sterkin, 2012; Stolfi,

2005). The results from these prior studies (Baker, 2014; Davies-Lackey, 2005; Lawson & Walsh, 2007; Sterkin, 2012; Stolfi, 2005) show an increase in the social behavior of the participant following the intervention, thus implying the acquisition of a social reinforcer. The data from Experiment II showed that Participants 1, 2, and 5 did not demonstrate reinforcement for speaker-listener exchanges with a peer. Prior research kept participants paired with the same peer for intervention and probe sessions. This difference in procedure may be the reason the reinforcer was not established for these participants. For Experiment III each participant was paired with one peer for the probe and intervention sessions. The rationale for this was these participants may need more experiences to acquire the reinforcer and in line with the prior research, to be paired with the same peer. In addition, probes to test for the presence of observational learning were conducted to determine whether the presence of this cusp explained the difference in responding following the intervention in Experiment II. These probes were conducted because I hypothesized that the reason SLR had an effect on some participants and not others was because of the presence of OL. In the prior literature the results showed that participants acquired OL following the SLR intervention (Davies-Lackey, 2005, Gold, 2013; Stolfi, 2005). As such, it may be that individuals with OL are able to rotate between peers in the intervention and that participants without OL require direct experiences with one peer.

Research Questions

1. Will using the same peer for the SLR intervention and vocal verbal operant probes have an effect on the social behavior of children with an educational classification of ASD?
2. Will the presence of OL provide a possible explanation for the difference in responding to the SLR intervention seen in Experiment II?

Chapter IV

Experiment III

Method

Participants

The participants for this study were three participants, Participant 1, 2, and 5, from the self-contained classrooms described in the aforementioned study. Table 8 outlines the relevant characteristics about each participant. The participants were selected for this study because results from Experiment II showed no change in vocal verbal operants or sharing behavior. The children who functioned as peers in this study for pre- and post-intervention probes and the SLR intervention were the Participants 3, 4, and 6. In this study, the peer the participant was paired with was held constant across probe and intervention sessions.

Setting and Materials

The setting was the same CABAS® classroom described in Experiment II. The materials for pre- and post-intervention probe free-play sessions were the same items used in Experiment II. The materials for pre- and post-intervention observational learning probes were flags of countries displayed in a PowerPoint presentation. The materials for the SLR protocol were game boards, game pieces, pictures of animals on a 3 x 5 index card, a color printed ocean scene, ocean sea creature stickers, a color printed jungle scene, jungle animal stickers, page protectors, an iPhone, a picture on the iPhone of each step to construct the ocean/jungle scene, a PowerPoint presentation with pictures of people experiencing emotions, data sheets, pencils, and pens. A comprehensive list of materials is displayed in Table 15.

Table 15.

Description of the Materials in Experiment III

Pre- and Post-Intervention Probes		
Free-Play Sessions		Observational Learning Probes
- iPhone - timer - White Board (11x13) - Dry erase markers/eraser	- Animals - Alpha-Bots - Printed questions - Gallon Ziploc bag	- PowerPoint presentation - Flags of countries - data sheet - pen

Social-Listener Reinforcement Protocol – Phase 2		
Phase 1	Phase 2	Phase 3
- Data sheet - Pen - 3x5 index card - Animal pictures - Desktop computer - Game board on computer - Reinforcer: iPad, coloring pages, toy area	- Data sheet - Pen - Ocean scene - Jungle scene - Sea creatures and jungle animal stickers - iPhone - Photo of each step on iPhone - Game board - Reinforcer: iPad, coloring pages, toy area	- Data sheet - Pen - Student data sheet - PowerPoint - Desktop computer - Pictures of people experiencing emotions - Gameboard - Reinforcer: iPad, coloring pages, toy area

Measurement and Dependent Variable

The dependent variables for the present study were the same variables described in Experiment II, with the addition of correct responses to observational learning probes. Definition and measurement for verbal operants can be found in Experiment II. Table 12 displays a list of all dependent variables for Experiment III.

Observational Acquisition of New Operants (OL) Probes. Data were collected for the number of correct responses in observational learning probes. A correct response was defined as

the correct name of the country when presented the flag; all other responses were considered incorrect. Probe sessions were composed of 20 trials. Probe sessions were conducted at a desktop computer in the back of the classroom. The experimenter was seated next to the participant and went through the PowerPoint presentation. Each slide contained the picture of one flag. The presentation was made up of 20 flags. The flags were from five countries with four exemplars each. A list of the flags presented can be found in Table 16. In the probe sessions the experimenter did not consequate the participant's responses. Observational learning was considered in repertoire if the participant emitted 80% correct responses or higher. Data were recorded and are displayed in a bar graph.

Table 16.

Description of OL Stimuli

Participants	Set 1 (Taught)	Set 2 (Probe)	Participants	Set 3 (Probe)
Participants 1-5	Egypt	Denmark	Participants 2 and 5	Finland
	Fiji	Kenya		Jamacia
	India	Poland		Nepal
	Norway	Aruba		Russia
	Peru	Belgium		Chad
	France	Iceland		
Participant 6	Cuba	China		
	Kenya	Japan		
	India	Jordan		
	Turkey	Aruba		

Table 17.

List of Dependent Variables in Pre- and Post-Intervention Probes

Probe		Dependent Variable
I.	Free-Play Session: multiple items	1. Visual gaze at peer 2. Tacts 3. Intraverbals 4. Conversational Units 5. Duration of sharing
II.	Observational Learning	1. Number of correct responses
III.	Free-Play Session: 1 item	1. Visual gaze at peer 2. Visual gaze at timer 3. Tacts 4. Intraverbals 5. Conversational Units 6. Duration of sharing 7. Correct responses to empathetic questions

Experimental Design and Procedure

A multiple probe design was employed to test the effects of the SLR protocol on the social behavior and acquisition of observational learning for three students with an educational classification of ASD. Experimenters first conducted pre-intervention probes for the presence of OL. Results from Experiment II free-play probes were used as baseline measures for vocal verbal operant probes. Following probes, the participant began the second phase of the SLR protocol. There were three phases to this portion of the SLR intervention. The three phases were 20 Questions, scene construction, and identifying emotions/kind behavior. Once the participant completed one phase of SLR one 1-min free-play post-intervention probe was conducted. When the participant completed all three phases of SLR post-intervention probes for three free-play

activities, the original free-play probe from Experiment I, and observational learning probes were conducted. Each phase of the experiment is described in greater depth below.

Free play session: Multiple items. The procedure for these probes was a direct replication of the protocol described in Experiment II. In the pre- and post-intervention probes for Experiment III the participant was paired with the peer that he/she completed the intervention with.

Establishment of Learn Units to Criterion. Prior to the start of OL probes the experimenter first determined the number of learn units each participant required to meet criterion (mastery). Criterion was set at 90% correct responses for one session. To determine learn units to criterion the experimenter taught a novel set of flags to mastery. Before beginning the session the experimenter showed one picture of each flag to the participant, to ensure that he/she did not know the names of the flags. The flags were presented in a PowerPoint presentation at a desktop computer. There were five novel stimuli with four exemplars each, for a total of 20. The participant was seated at a desktop computer in the back of the classroom next to the experimenter. Once the experimenter confirmed the responses were not in the participant's repertoire the session began. The experimenter employed learn units (Albers & Greer, 1991) for all sessions. The experimenter delivered a non-vocal antecedent, the presentation of the flag, and if the participant emitted the correct response the experimenter gave vocal reinforcement (e.g. "Nice work it is Japan!"). If the participant emitted an incorrect response the experimenter delivered the correction. The correction procedure consisted of the correct response (e.g., "Norway") followed by the opportunity for the participant to independently emit the response. Once the participant met criterion the ratio of learn units to criterion was established. The experimenter then selected five novel flags and began observational learning probes.

OL Probes. For observational learning probes the participant was seated next to a peer at a desktop computer in the back of the classroom. To begin the session the experimenter explained to the participant and peer that they would play a game to learn the names of flags. The experimenter told the peer that he/she would go first and the participant second. Then the experimenter presented the flags to the peer using learn units (Albers & Greer, 1991). If the peer emitted the correct name (e.g., "Belgium") the experimenter recorded a plus (+) and delivered vocal reinforcement (e.g. "That's right it is Belgium."). If the peer emitted an incorrect response the experimenter delivered the correction procedure. The participant was given vocal reinforcement for performance behavior (e.g., "I love how you're sitting," or "Good job having a quiet voice."). Once the participant observed the total number of learn units required to meet criterion (40 learn units for Participant 1, 80 learn units for Participant 3 and 5, 100 learn units for Participant 2, 4, and 6) the instructor dismissed the peer and presented the flags to the participant. In this probe the experimenter did not consequate the participant's responses and gave only performance-related feedback ("Nice job look" or "I love how you're working quickly"). The experimenter recorded data on the participants' responses, marking a plus (+) for correct responses and a minus (-) for incorrect responses. Observational learning was considered in the participant's repertoire if the participant emitted 80% correct responses or higher.

Social Listener Reinforcement Protocol (SLR)

Phase 1. In the first phase of the SLR protocol the participants played *20 Questions* with a peer. The participant was seated next to a peer at a desk in the back of the classroom, in front of a desktop computer. The game board was created as a *Word* document so the experimenter could easily move up the student or teacher game piece. The participants all went through SLR in the prior experiment and so each participant understood how the gameboard

worked, even when it was on the computer. Prior to beginning the session the experimenter asked the students to identify the item to be awarded to the winning team (e.g., iPad time, toy area time, free draw, etc.). Once the prize was selected the experimenter explained the rules of the activity. The experimenter explained that the game was going to be *20 Questions*. The experimenter gave each student an index card with an animal printed on it and instructed the student to keep the card hidden from his/her peer. The student looked at the card and the experimenter confirmed that the student knew the name of the animal. The experimenter then stated the purpose of the game was to ask the partner questions to try and guess the animal he/she was given. In order to move up the student was required to ask a good question and the partner was required to respond to the question correctly. A good question was defined as a yes/no question, a question that the student had not previously asked, and one that was unknown in light of prior questions. For example, if the student asked, "Is the animal green?" and the partner responded, "yes," but then asked "Is the animal blue?" this was defined as not a good question because the student should have known the animal was green. In order to prevent repeated questions, the experimenter typed each question into a *Word* document and placed the questions in either the yes or no column (Figure 19). The experimenter pulled the document up for the students to view and reference before asking a question. The students were allowed to work together and provide feedback to their partner in order to formulate a good question. For example, Participant 5 had difficulty asking a yes/no question. She often asked "wh" questions and so her partner would tell her to ask a yes/no question by telling her to start with the phrase, "does it," or "is it." Once the student asked the question the partner responded with yes or no. The experimenter consequated both students based on their responses, delivering vocal praise for a correct response and a correction for incorrect responses. For example, if the student asked a

good question the experimenter said, “That’s a great question,” and if the partner responded correctly the experimenter stated, “Nice job answering your friend’s question correctly.” If the student did not ask a good question the experimenter gave feedback to explain the reason it was not counted as a good question. For instance the experimenter would ask, “Is that a yes/no question?” and would give examples of yes/no questions to the student. Once the question had been asked and answered the experimenter pulled up the gameboard document on the computer and moved up one of the pieces. If the students’ question and answer were correct the experimenter moved up the student game piece, however if either were incorrect the experimenter moved the teacher piece up. There were 20 spaces to the top and the first team to the top won.

Student 1		Student 2	
Yes	No	Yes	No
1. Is the animal green?	1. Does it fly?	1. Does it live on a farm?	

Figure 19. An example of the table used in a *Word* document to record the student’s questions.

Phase 2. In the second phase of the SLR protocol the participant worked with a peer to complete a scene using foam stickers. Prior to the start of this session the experimenter created a scene by placing a page protector on the scene, putting a sticker on the scene, and taking a photo of the scene using an iPhone. The experimenter created a scene using 12 stickers and documented each step on the iPhone. The experimenter used the photo editing feature on the iPhone to place a yellow circle around the sticker to clearly show the current step. Figure 20 shows an example of one of the photos on the iPhone.

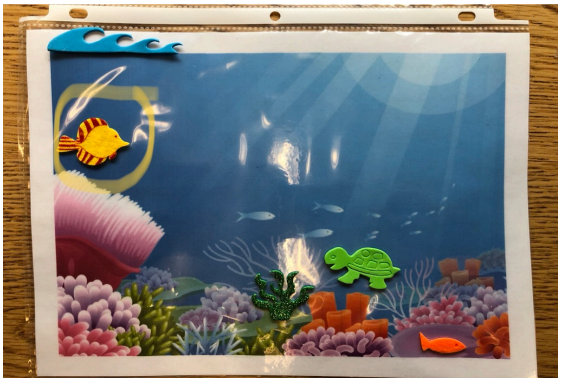

Figure 20. An example of a photo on the iPhone shown to create the ocean scene.

This phase of SLR was conducted in the office within the CABAS® classroom. The students were seated at the rectangle table across from the experimenter. The students were given a printed color scene, either an ocean or jungle, that was placed in a clear page protector sheet. In addition, the experimenter placed stickers on the table between the students and explained the rules of the game. The experimenter told the students that the purpose of this game was to create a scene using the stickers on the table. However, the scene required that the stickers be in a particular place and the students would have to work together to put the sticker in the correct location. The experimenter explained she had a photo of the sticker in the correct location on her iPhone and that she would show one student. That student then had to instruct his/her partner on which sticker to get and the location to place it on the scene. The experimenter explained that the student who viewed the photo on the iPhone was not allowed to touch sticker and if he/she did the teacher piece moved up. However, the student was allowed to point to the location on the scene. The students' piece moved up on the gameboard if the sticker, location, and orientation of the sticker matched the photo on the iPhone. The teacher piece moved up if the sticker, location, or orientation did not match the photo or if the student who viewed the photo on the phone touched the sticker. To begin the session the experimenter showed one student the photo on the iPhone, while keeping the image hidden from the other student. The student who viewed the

iPhone then described which sticker to get to his/her peer (e.g., “Get the sparkly orange fish”). The student was allowed to give his/her peer feedback and correct the peer (e.g., “Not that fish, the big orange sparkly fish.”). The student then told the peer where to place the sticker on the scene (e.g., “Place the fish here above the rock. Put the head here.”). Once the sticker was placed on the scene the experimenter asked the students if they agreed, if both agreed the experimenter showed the students the photo on the iPhone and consequated them based on their response. If the students placed the sticker correctly the experimenter gave vocal praise (e.g., “Nice work it’s a match!”) and the students were allowed to move up their game piece. However, if the students did not place the sticker correctly the experimenter explained why the response was incorrect (e.g., “Oh look this sticker is different,” or “Hmm look at the picture it seems like your sticker is in a different place”) and the experimenter moved up the teacher game piece. There were 10 spots to the top of the gameboard and the first to reach the top won the activity or prize the students selected at the start of the activity. If neither team made it to the top then no one received the reward. Each scene contained 12 steps giving the students the opportunity to make two mistakes and still reach the top. An example of a completed scene is shown in Figure 21. Criterion for this phase of SLR was set at 90% across two scenes.

Figure 21. An example of a completed scene.

Phase 3. The third phase of SLR was empathy training. In this phase peer tutoring was utilized to teach the students empathetic responses. The students had all been trained to deliver learn units (Albers & Greer, 1991) in Experiment II. The experimenter created a PowerPoint presentation that contained pictures of people of all ages experiencing emotions. The emotions expressed by people in the photos were both positive (e.g., happy, excited) and negative (e.g., scared, sad). In addition, the photos included context cues that one could see to infer the reason the person was expressing a particular emotion. Figure 22 displays an example of a person experiencing a negative emotion and Figure 23 shows an example of a person experiencing a positive emotion.

Figure 22. An example of a child experiencing a negative emotion.

Figure 23. An example of a child experiencing a positive emotion.

The peer tutoring sessions took place at a desktop computer within the classroom. In the tutoring sessions the participant was seated next to his/her peer. At the start of the session the experimenter presented the game board and had the students select an activity to work for. The

experimenter gave each student a data sheet that contained numbers on left side and two questions listed next to each number. The questions were, “How does he/she feel? Why?” and “What is one kind thing you could do for him/her?” Next to the questions was a column for the student to record data. The experimenter explained that the students moved up if they worked together and answered the questions correctly. A correct response was defined as an accurate learn unit. In this the tutor delivered the antecedent (asked the questions, “How does he/she feel? Why?”), the tutee emitted a correct response (correctly identified the emotion), and the tutor consequated the response accurately (reinforced correct responses and corrected incorrect responses). A correct response for the first portion, “how does he/she feel and why?” was defined as an accurate label of the emotion expressed and a plausible explanation given the clues in the photo. For example, if the student was shown a photo of a child who was crying with a broken toy in his hand and the student said, “He’s sad because he’s hungry,” this would be considered an incorrect response. This was considered incorrect because though the student labeled the emotion correctly the student failed to use relevant visual cues to explain the emotion. A correct response for the second portion of the question, “what’s one nice thing you could do for him/her?” was defined as a response that included an action that would add to the individual’s experience in a positive way. For instance, if the child in the photo was smiling holding a trophy and the student said, “I could tell her congratulations you did a great job!” this was considered a correct response because the vocal praise benefitted the individual pictured. An example of an incorrect response was, “I could ask her to share the trophy,” as the behavior would benefit the student speaking and not the individual pictured. However, if the tutee emitted an incorrect response the students were able to work together to come up with an accurate answer. In the example mentioned above the tutor could correct the student, “No, sharing is not

helping her but maybe you could say something nice to her like awesome job playing!" and if the tutee changed his/her response to match the correct response the students moved up their game piece. However, if the student emitted an incorrect response, or if the tutor failed to consequate a response (deliver vocal praise for correct responses or the correction for incorrect responses), the teacher piece moved up. The students rotated between the tutor and tutee. In the role of tutor the student asked both sets of questions ("How does he/she feel? Why?" and "What is one nice thing you could do for him/her?"). Criterion was set at 90% correct responses across two sessions and there were 20 spots to reach the top on the game board.

Interobserver Agreement

A second independent observer viewed the videos for the purposes of calculating interobserver agreement (IOA) for free-play sessions. Free-play sessions were video recorded and scored by separate observers. IOA was calculated by dividing the number of point-to-point agreements and disagreements by the total number of agreements plus disagreements and multiplying by 100% for the participants (Johnston & Pennypacker, 1993) IOA was collected for 33% of free-play sessions with 100% agreement. Experimenters obtained 20% of intervention sessions with 100% agreement. For OL probes, IOA was collected for 62% of OL probes with 100% agreement.

Results

The first research question was designed to investigate the effects of the SLR protocol on the social behavior of children with ASD in response to an unfair situation. Results of the current experiment demonstrated that there was a difference following the SLR protocol for one participant. Figure 24 displays the cumulative data. The results show an increase in vocal verbal operants for Participant 2. In the pre-intervention probes he emitted 3 non-vocal responses and 1

vocal response. Then in the final round of post-intervention probes he emitted 11 non-vocal responses and 6 vocal responses. The data show no change for Participants 1 and 5. In pre-intervention probes Participant 1 emitted 0 non-vocal responses and 4 vocal responses. In the final post-intervention probe he emitted 0 non-vocal responses and 5 vocal responses. The results showed no change for Participant 5. In pre-intervention probes she emitted 0 vocal and non-vocal responses. In post-intervention responses she emitted 0 vocal and non-vocal responses.

The second research question investigated if there was a difference in the sharing behavior of students with an educational classification of ASD following the SLR intervention. Results of the current experiment demonstrated that there was a difference following the SLR protocol for some participants. Figure 25 displays the cumulative data. The results show an increase in sharing for Participants 1 and 2. The results are displayed as cumulative sharing time in seconds, out of 180 s. In the pre-intervention probe Participant 2 shared for 0 s, then for 53 s in post-intervention 1, then 0 s in post-intervention 2, and 59 s in post-intervention 3. The results show a slight decrease for Participant 1 as he shared for 117 s in the pre-intervention probe, 9 s in the post-intervention 1, 0 s in post-intervention 2, and 103 s in post-intervention 3. The results so no change for Participant 5 as she did not share in any of the pre- or post-probes.

The second research question was to determine if the SLR protocol had an effect on the induction of learning through observation. The results showed that Participants 1, 3, 4, and 6 already had this capability in repertoire, as each emitted 16 or more correct responses. The results for Participants 2 and 5 show an increase in observational learning following the SLR protocol. In pre-intervention probes Participant 2 emitted 8 correct responses and in post-intervention probes emitted 20 correct responses, demonstrating observational learning.

Participant 5 emitted 4 correct responses in pre-intervention probes and then in post-intervention probes increased to 12 correct responses. These data are displayed in a bar graph in Figure 26.

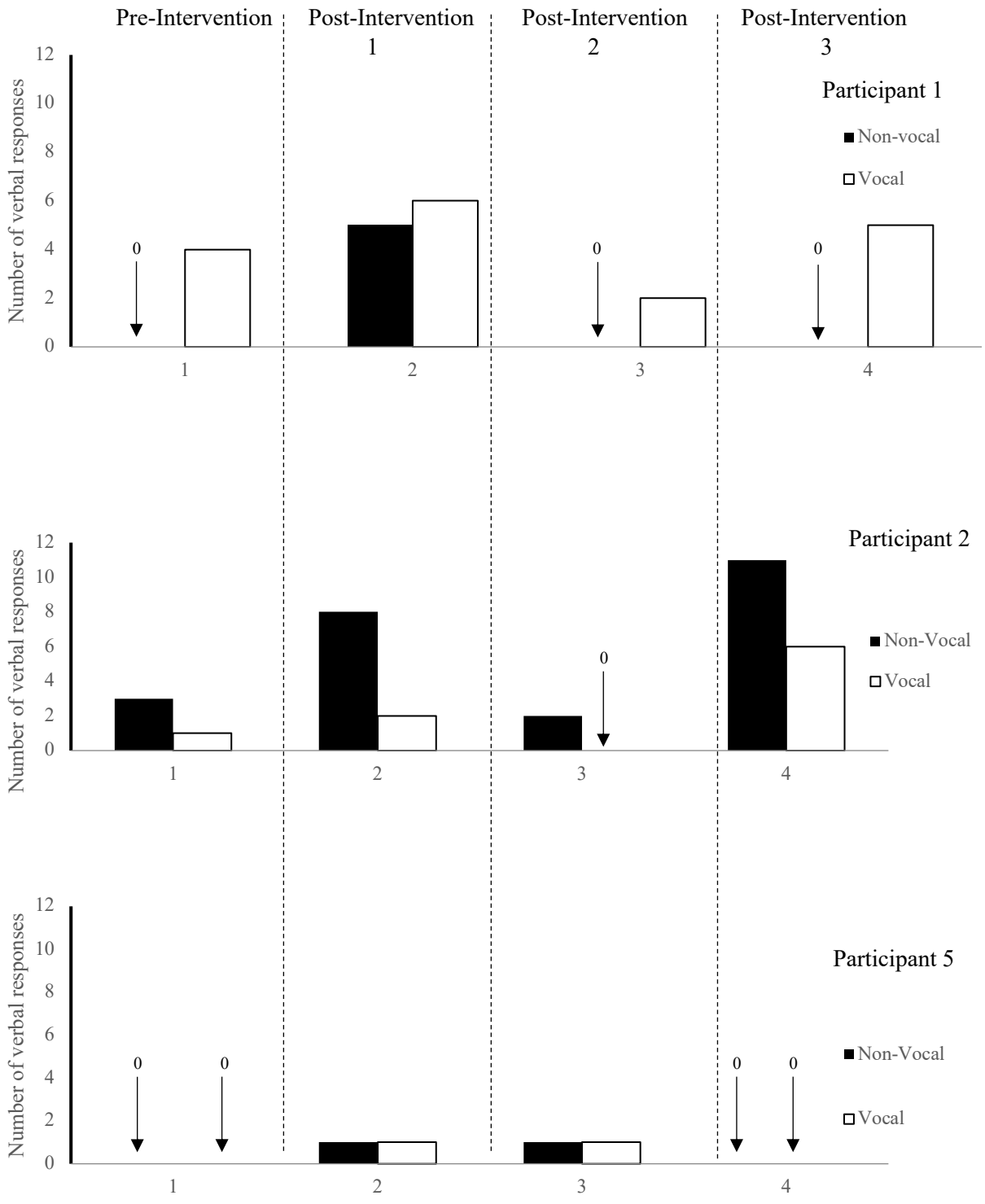

Figure 24. The cumulative number of eye gazes and vocal verbal operants emitted across three activities in pre- and post-intervention probes.

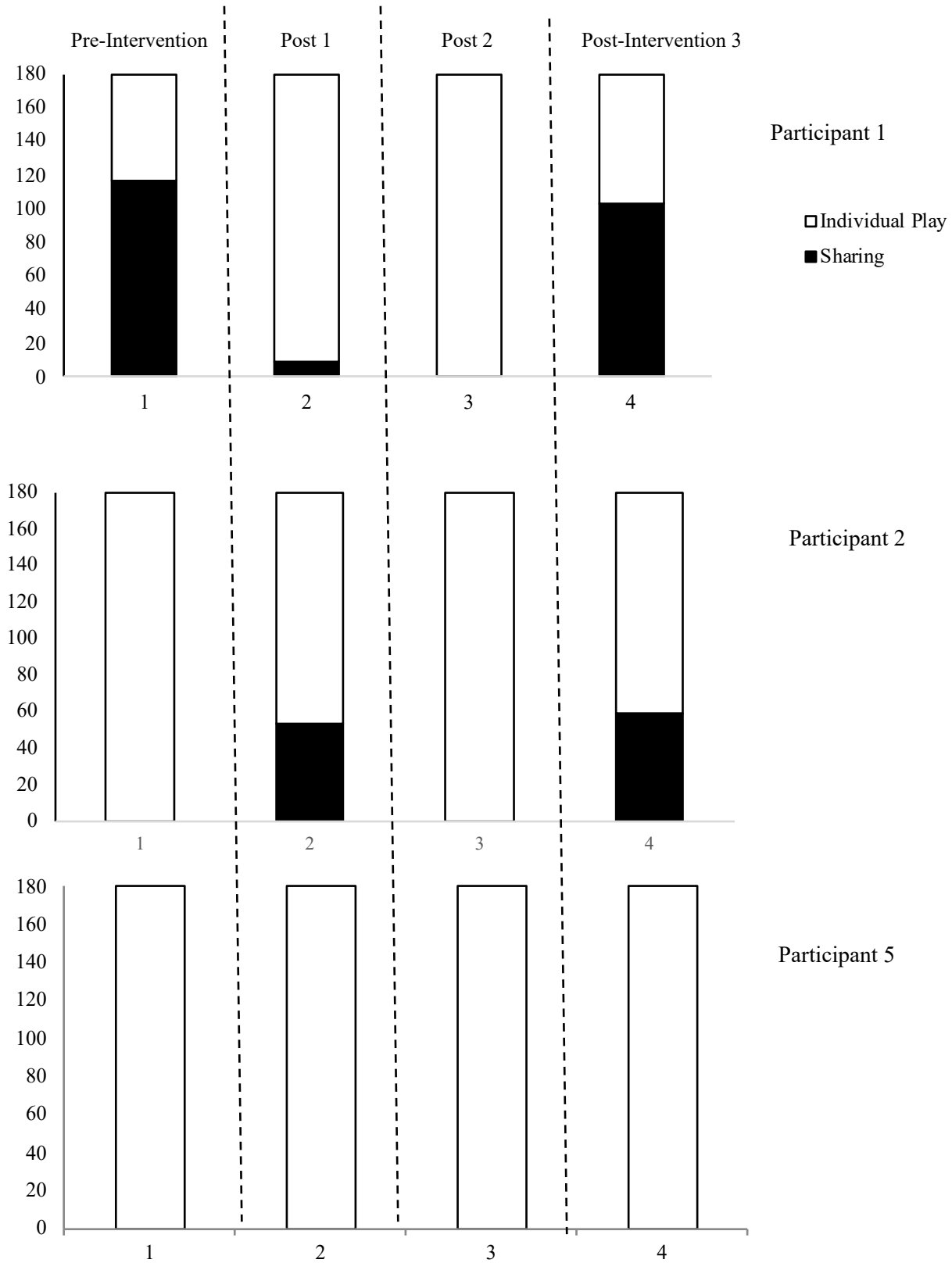

Figure 25. The cumulative number of seconds the participant shared an item out of 180 across three activities in pre- and post-intervention probes.

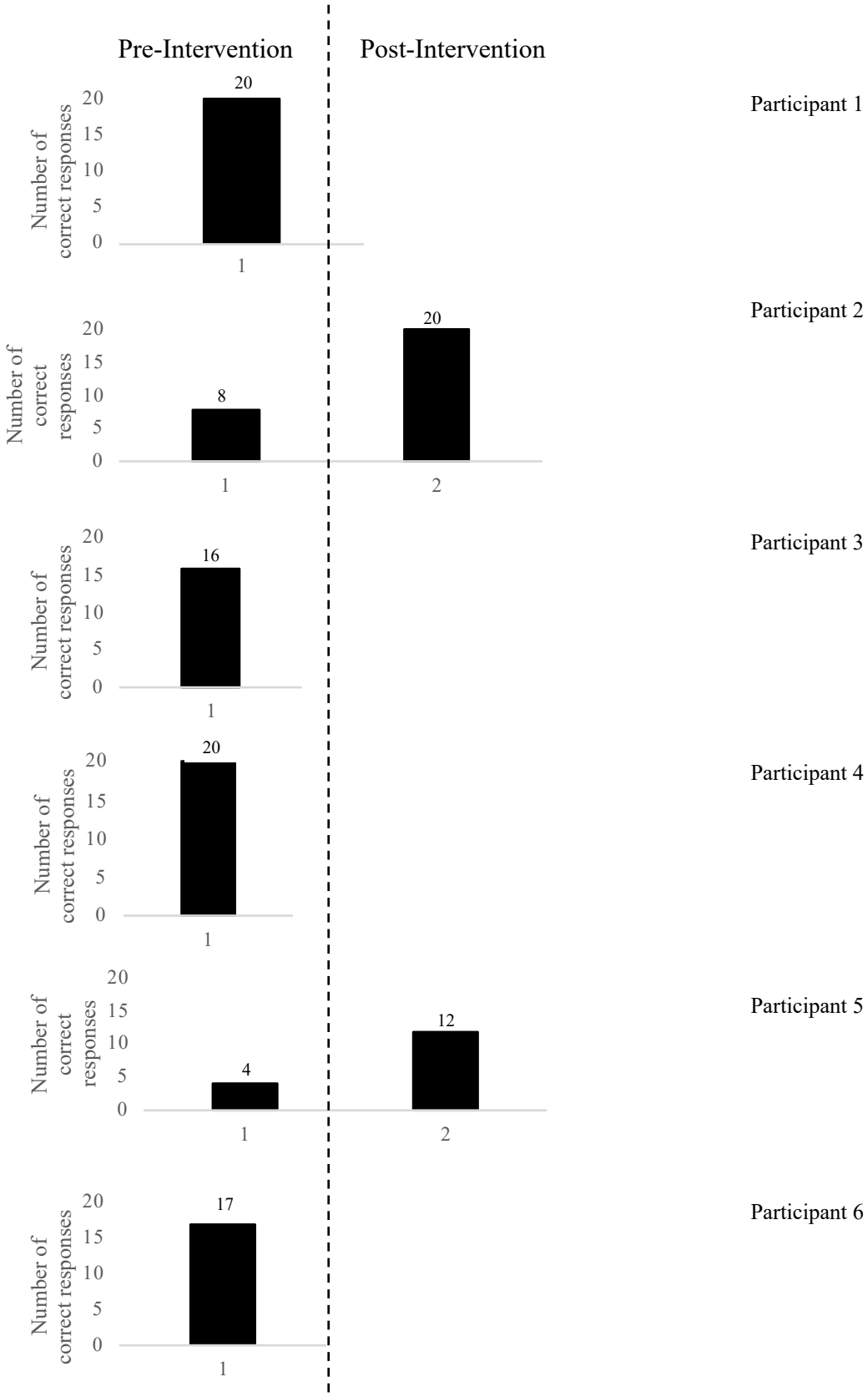

Figure 26. The number of correct responses to observational learning probes.

Discussion

The results of the present study showed that Participants 1, 3, 4, and 6 all had observational learning in repertoire, while Participants 2 and 5 did not. Following the intervention Participant 2 increased from eight to 20 correct responses, demonstrating the acquisition of observational learning. Participant 5 increased from four to 12 correct responses following the SLR intervention. These data support previous findings that have found SLR to be effective in inducing OL in preschool- and elementary-aged students (Davies-Lackey, 2005; Gold, 2013; Stolfi, 2005).

The results show that Participant 2 increased in verbal operants and sharing behavior following the SLR intervention. These data, then, imply that he acquired reinforcement for speaker-listener exchanges. These data, along with the observational learning probe data, suggest that these reinforcers led to the establishment of a new stimulus control for Participant 2. For both of these verbal development cusps the stimulus control is the presence of a peer. Prior to SLR the presence of a peer did not result in a behavioral change for Participant 2. However, following the intervention Participant 2's responses showed that he observed and then responded to the peers in his environment. These data have important social and educational implications. Now that peer presence has become established as a reinforcer he will have more opportunities to participate in speaker-listener exchanges with peers giving him the opportunity to develop his social repertoires. In addition, observational learning will enable him to acquire objectives without direct instruction, which is essential for academic success in a mainstream setting.

The results for Participants 1 and 5 do not show a significant difference between pre- and post-intervention probes. Though Participant 1 demonstrated observational learning it is hard to determine if the peer functioned as the reinforcer or if the acquisition of a new objective was the

reinforcer. Anecdotally, Participant 1 expressed great interest any time he was given the opportunity to learn something new. For example, when told he was going to be taught flags he readily went to the computer and proceeded to ask many questions about the flags he was shown (e.g., “What country is that? Where is that country? Can I see more?”). In addition, he required hearing the name of the flag only once to acquire the operant. Though Participant 5 showed an increase in correct responses during observational learning probes she did not demonstrate any change in verbal or sharing behavior, thus suggesting that she did not acquire reinforcement for speaker-listener exchanges, even after many phases of SLR. These data imply that there may be some necessary prerequisite skills for this protocol.

The next chapter will discuss potential prerequisite skills, findings as well as limitations, and future research.

Chapter V

General Discussion

In three experiments I compared 1) the difference in empathetic responding between first and second grade children with and without an educational classification of ASD, 2) the difference in verbal operants and sharing behavior following the SLR intervention with a novel peer, and 3) the difference in verbal operants, sharing behavior, and observational learning following the SLR intervention with the same peer. In Experiment I the data showed that typically developing children looked at the child actor more than children with an educational classification of ASD. In addition, typically developing children responded correctly to more empathetic questions than did children with ASD. There was not a significant difference in collaborative play or vocal verbal operants. I hypothesized the lack of observation of the child actor and the incorrect responses to empathetic questions was because the children with ASD lacked reinforcement for speaker-listener exchanges and so presence of a peer did not exert stimulus control for social observation or exchanges.

In Experiment II I sought to determine if the SLR protocol was effective in conditioning speaker-listener interactions for six participants with an educational classification of ASD. The results showed for three participants, Participants 3, 4, and 6, following the SLR protocol the participants increased in the number of verbal operants emitted during 1-min free play sessions and the number of seconds they shared an item with a peer. In addition, there was an increase in the number of correct responses to empathetic questions for Participants 3 and 4. The results from this experiment imply that when these participants acquired the speaker-listener reinforcer that the presence of peers was established as a stimulus control, that preceded social exchanges. The results show no change for Participants 1, 2, and 5 indicating that the participants' behavior

was not under the control of a peer's presence and the participants' interactions with a novel peer did not function as a reinforcer. I hypothesized that these participants needed to complete the SLR intervention with the peer from probe sessions in order to acquire reinforcement for speaker-listener exchanges. In past research the participants had always completed probe and intervention sessions with a specific peer (Davies-Lackey, 2005; Stolfi, 2005, Lawson & Walsh, 2007; Sterkin, 2012; Baker, 2014). Furthermore, I hypothesized that for the SLR intervention to be effective for a novel peer the individual must have the observational learning capability in his/her repertoire.

Experiment III was designed to test the effects of the SLR protocol on the social and sharing behavior of children with ASD when paired with the same peer for intervention and probe sessions. Observational learning probes conducted prior to the start of Experiment III demonstrated that Participants 1, 3, 4, and 6 all had this capability in repertoire. Following the SLR intervention results showed observational learning was induced for Participant 2 and there was an increase in the number of correct responses for Participant 5. In addition, the results showed the acquisition of reinforcement for speaker-listener exchanges for Participant 2 following SLR but no change for Participants 1 and 5.

Major Findings

The major findings of Experiment II and III support the hypothesis that the establishment of the reinforcer leads to a change in behavior. As shown by many researchers in the VBDT community these reinforcers can provide an account for the acquisition of verbal behavior (Greer & Du, 2015). This acquisition of reinforcement leads to a change in behavior without direct instruction and as a result this behavior comes under the control of the environmental conditions. In this, the reinforcer is social attention as demonstrated by engagement in a speaker-listener

exchange with a peer. The social attention, now functioning as a reinforcer, becomes paired with the environmental condition of the presence of a peer, and this reinforcer leads to stimulus control. Both the stimulus control and reinforcer are necessary for complex social behavior.

Verbal Developmental Cusps/Capabilities. These complex social exchanges are the product of the acquisition of verbal cusps and capabilities. These verbal cusps/capabilities enable the individual to learn new things in new ways by coming into contact with environmental contingences they previously did not before. However, in order to develop these cusps/capabilities, or induce them when absent, requires the individual to have certain experiences that result in social attention becoming a reinforcer. In studies that employed a peer-yoked contingency to condition speaker-listener exchanges, results have shown individuals to acquire observational learning (Byers, 2017; Davies-Lackey, 2005; Gold, 2013; Stolfi, 2005), audience control (Sterkin, 2012), and increase the vocal verbal operants emitted in a free-play setting (Baker, 2014; Lawson & Walsh, 2007). At a high level, these social cusps (social-listener reinforcement, audience control) and capability (observational learning) are all a function of social attention as a reinforcer and under the control of the audience. The findings of the present experiments support the hypothesis that the establishment of the reinforcer precedes the behavior. The results from Experiments II and III showed Participants 2, 3, 4, and 6 engaged in more speaker-listener exchanges in post-intervention probes following the SLR intervention. In this, participants never received direct training on behaviors needed to engage in a social conversation but instead were given opportunities to participate in a speaker-listener exchange with a peer to earn access to a reward. Through these experiences the speaker-listener exchange was conditioned as a reinforcer and there was a change in the social behavior demonstrated by the participant.

Empathy. In order to be able to study empathy scientists must come to an agreement on an appropriate definition and valid type of measurement. From the perspective of VBDT, empathy can be defined in terms of its reinforcer and stimulus control. As with other social behaviors the stimulus control is the presence of a peer/s, while the reinforcer for empathy, to some extent, is social attention. Just as there was no formal conversational training this intervention did not specifically teach the participants empathetic responses. Yet, the results of this study show a change in sharing behavior following the SLR intervention for Participants 2, 3, 4, and 6. These results imply that these participants' behavior had come under a new type of stimulus control. In Experiments II and III the stimulus control was the presence of a peer without a toy. These results seem in line with prior findings that showed individuals with ASD seem to perform similarly to their neurotypically counterparts in regards to affective empathy (Deschamps, Been & Matthys, 2014; Jones, Happé, Gilbert, Burnett, & Viding, 2010). However, now that the behavior is defined by the stimulus control and reinforcer it is no longer necessary to break empathy into component parts, as is currently done in the research. This new definition can make the study of empathy more scientific as it can adhere to a specific definition, rather than the 43 discrete definitions employed (Cuff, Brown, Taylor, & Howat, 2016). This definition takes empathy out of its cognitive roots and places it back in an environment where it is observable and measurable.

Limitations

Experiment I

Experiment I is not without limitations. One limitation of the experiment was the number of students recruited to participate in the experiment. For this experiment there were six participants with an educational classification of ASD and six participants without. Since the

number of participants was low conclusions can only be drawn about the performance of the participants in the study. In addition, participants were selected because the parents signed and returned the consent form.

Experiment II

Experiment II is not without limitations. During video recording sessions post-intervention data were lost for Participants 1, 3, and 6 because of technological issues. In addition, this portion of the experiment was disrupted because of holiday breaks, particularly for Participant I who missed two weeks of school during this phase. In addition, one post-intervention probe for Participant 2 had to be redone because the child actor took the toy without the Participant giving it to him. In the next session, he did share the same toy, but it may only have been because the participant took it before.

Experiment III

Experiment III is not without limitations. Observational learning probes were only conducted once, to prevent testing effects, but multiple probes may have yielded different results. In addition, free-play sessions with one item were not conducted for Participant I because the school year ended.

Future Research

In order to be successful in a general education setting children must be able to navigate a social environment. Empathy is one response that enables children to interact appropriately with people in their environment, even individuals who are different from them. As such, it is important to develop interventions that induce this skill when it is lacking.

The findings from these experiments showed that the intervention had different effects for the participants and future research should be conducted to determine necessary prerequisite

skills for this protocol. The results from Experiment III showed that Participants 2 and 5 did not have observational learning in repertoire and this may be a necessary prerequisite capability for individuals completing SLR with different peers in the intervention and probes sessions. In addition, future research should attempt to recruit more typically developing children to establish what is a developmentally appropriate response.

Social and Educational Implications

This new framework to analyze behavior has important social and educational implications. The data from these experiments imply that some children can benefit from experiences that require them to function as a speaker and listener, when working with a peer. As such, teachers can create opportunities in the classroom to afford students the opportunity to engage in these experiences. For example, the teacher could have students work together during reading to support reading comprehension and reinforcer speaker-listener exchanges. In this, one student would read a passage (speaker) and ask his/her peer a question about the passage (listener). Or for a science experiment, the students could rotate between reading the instruction to a peer (speaker) and following the direction (listener). Though most children have such experiences there are others that require additional instruction to establish social-listener exchanges as a reinforcer. If this reinforcer is absent, then these children may not benefit from a mainstream setting.

Though much research has shown the positive outcomes of inclusion (Buysse, Skinner, & Grant, 2001; Chandler, 1998; Hanline & Daley, 2002; Taylor, Peterson, McMurray-Schwarz & Guillou, 2002) there are some studies that indicate the degree to which the child benefits from an inclusive setting depends on the child's cusps and capabilities. For example, in a study conducted by Holahan and Costenbader (2000) results showed that individuals with more cusps

and capabilities benefit more from an inclusive setting when compared to peers with fewer cusps and capabilities. To ensure then that individuals are placed in the most appropriate setting, with necessary supports, the child's educational team can look at more than just test scores and begin to consider the child's level of social functioning. To achieve this it may be beneficial for the committee members of the learner's special education team to adhere to a formal, systematic, quantitative analysis of these behaviors. Testing for the presence of these verbal developmental cusps and capabilities can provide the team with the information needed to determine the child's level of social performance. These measures can ensure each learner is placed in the most appropriate setting and these criteria can help prevent any child from being left behind.

Conclusion

In three experiments I tested 1) the empathetic responding of 1st and 2nd grade children with and without an educational classification of ASD, 2) the effect of the SLR protocol on the social and empathetic behavior of children with ASD, and 3) the effect of the SLR protocol on observational learning, social, and empathetic behavior when intervention and probe sessions are completed with the same peer. The results showed that children with an educational classification of ASD looked at a peer fewer times during a 1-min probe session when compared to their typically developing peers. Following post-intervention probes the results showed an increase in the sharing and verbal behavior emitted during three 1-min free play sessions for Participants 3, 4, and 6. These results imply that the participants acquired reinforcement for speaker-listener exchanges and came under the stimulus control of a peer's presence. However, the results showed no significant change for Participants 1, 2, and 5. In the final experiment pre-intervention probes showed Participants 2 and 5 did not have observational learning in repertoire. In this experiment the participant was paired with the same peer for intervention and probe

sessions. Post-intervention results showed an increase in verbal behavior, sharing behavior, and acquisition of observational learning for Participant 2. There was no significant change for Participants 1 and 5. The results of these experiments seem to support the hypothesis that the reinforcer must come before the behavior, as participants showed a change in social behavior without direct instruction. In addition, the findings of this study demonstrate that the SLR protocol is not effective for all individuals. Social communication is essential for an individual to function in society and this is one of the deficits for children with ASD. It is important that researchers continue to design studies to learn about these complex behaviors and interventions that are effective in developing these behaviors.

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Appendix A

1. Take one yellow rectangle and place it on the back of the train.

3. Take two red circles and place them as the wheels on the back of the train

5. Take a big purple square and place it next to the small green square.

7. Take a purple triangle and put it on top of the big red square.

9. Take a red triangle and put it in the front of the train.

11. Take two small purple circles and place them on the white circles

2. Take one big green square and place it next to the yellow rectangle.

4. Take a small green square and place it next to the big green square.

6. Take a big red square and place it on top of the big purple square.

8. Take a big purple square and place it in front of the big purple square.

10. Take one green triangle and put it on top of the red triangle in front.

12. Take two red semi-circles and place them as wheels in the front of the train.

Displays an example of the instructions, printed on two pages, in Phase 2 given to each student

Appendix B

1. To find your 1st clue go to _____'s cubby.

3. The 3rd clue is under the keyboard at the front computer.

5. The 5th clue is under the pencil sharpener

7. The 7th clue is in _____'s writing journal

9. The 9th clue is behind the computers next to Ms Horton's desk.

11. The 11th clue is in the student desk in the office.

2. The 2nd clue in under Ms Horton's desk.

4. The 4th clue is in the barn in the toy area.

6. The 6th clue is under the rectangle table in the office

8. The 8th clue is clipped to the back of the easel.

10. The 10th clue is in the wooden iPad box.

12. The 12th clue is on the shelf in front of the printer

Displays an example of the instructions, printed on two pages, in Phase 2 given to each student.

Appendix C

1.	
2.	
3.	
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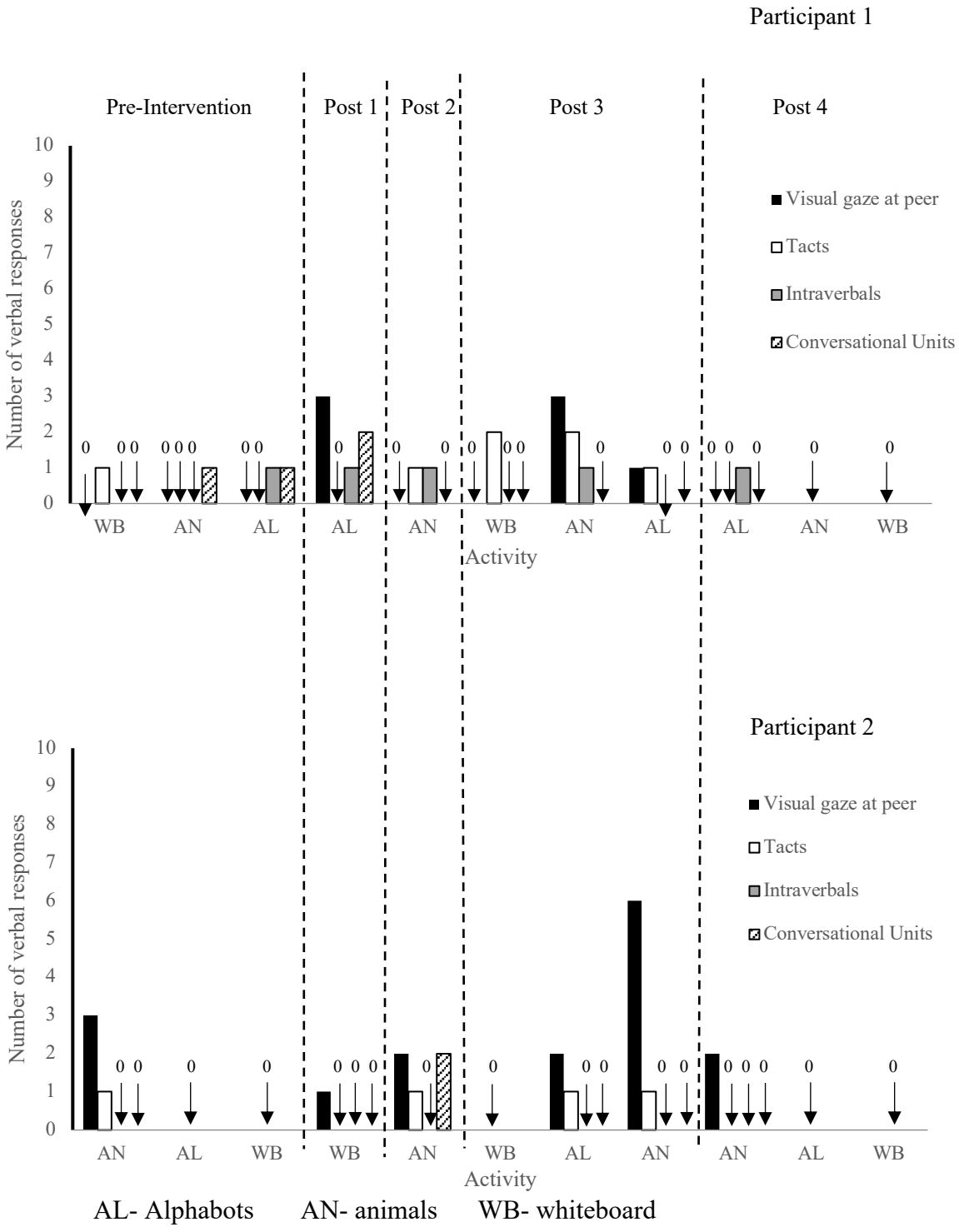
19.	
20.	
Total	

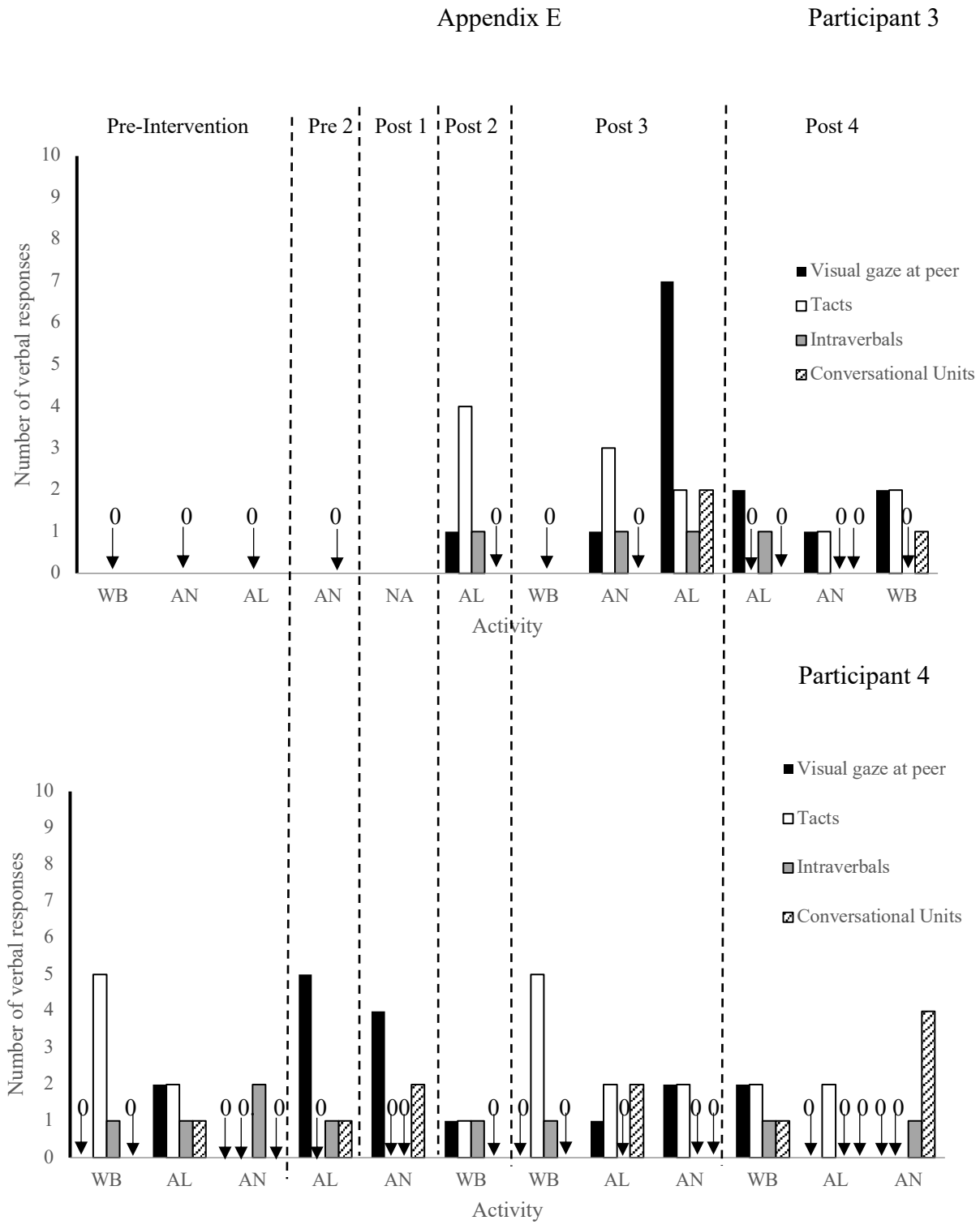
A sample of a student data sheet used in Phase 3 and Phase 4.

Appendix D

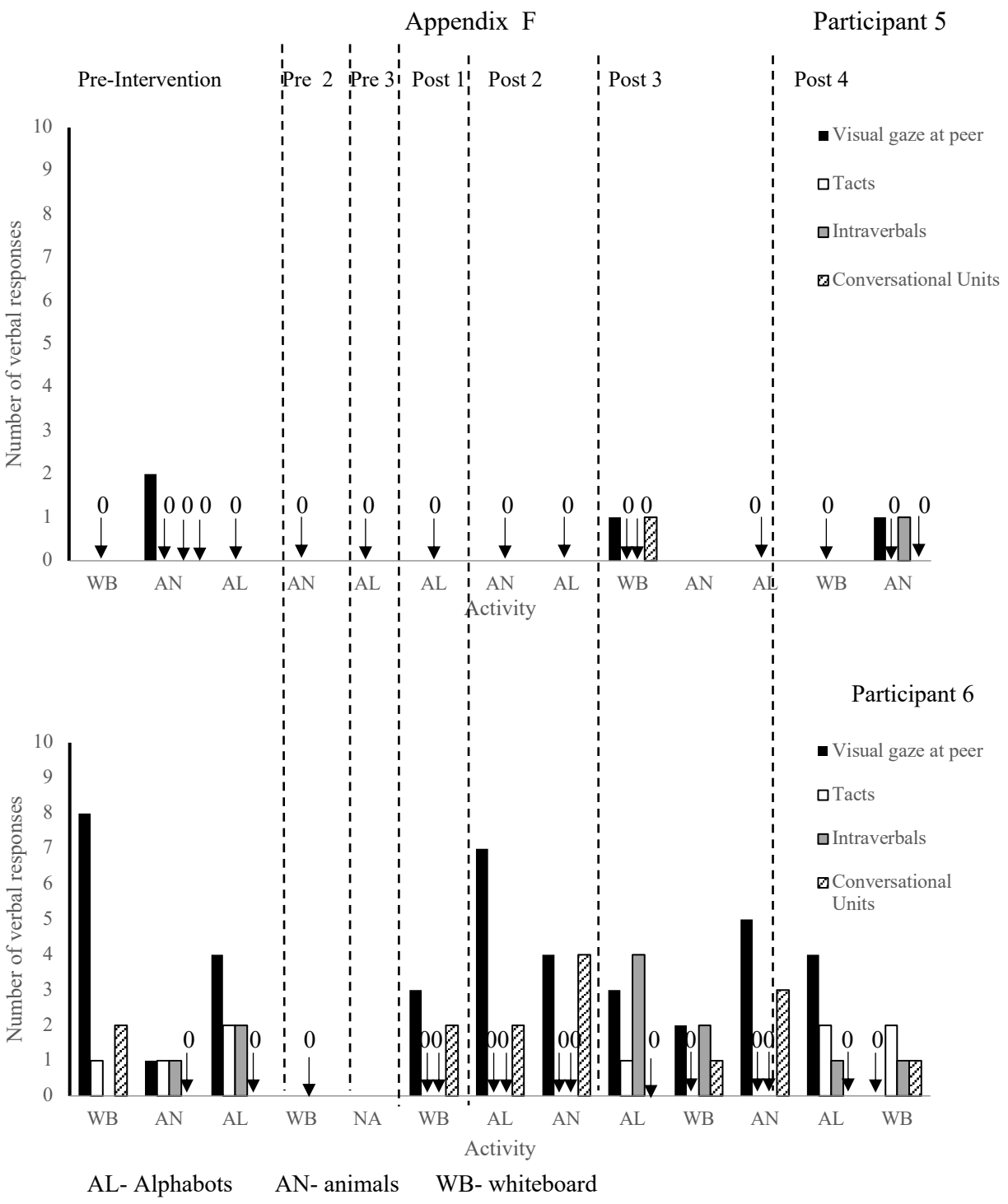


Displays pre- and post-intervention data for the number of eye gazes and vocal verbal operants emitted across all 1-min play sessions for Participant 1 and Participant 2 following Experiment II.

Appendix E

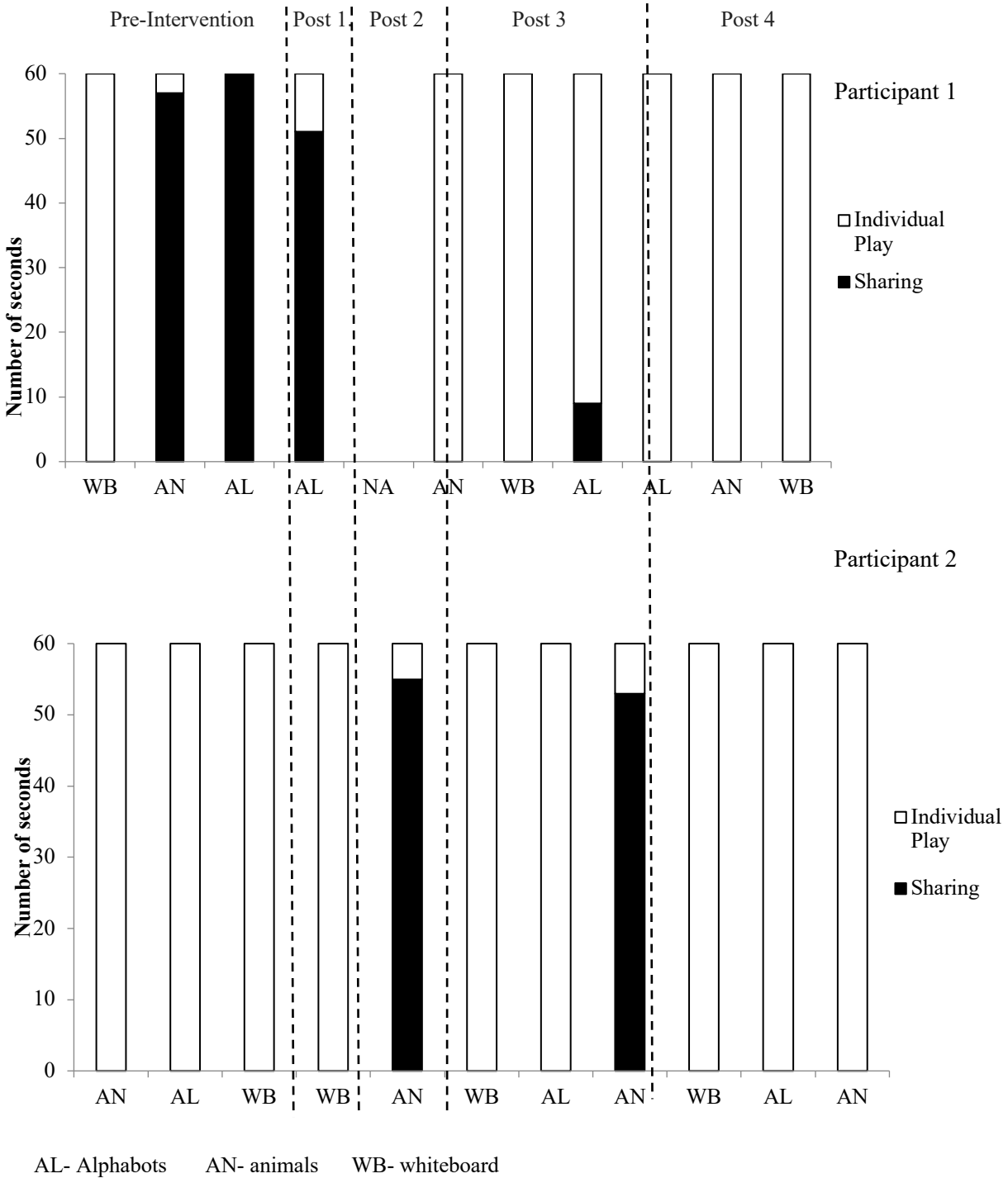


Displays pre- and post-intervention data for the number of eye gazes and vocal verbal operants emitted across all 1-min play sessions for Participant 3 and Participant 4 following Experiment II.



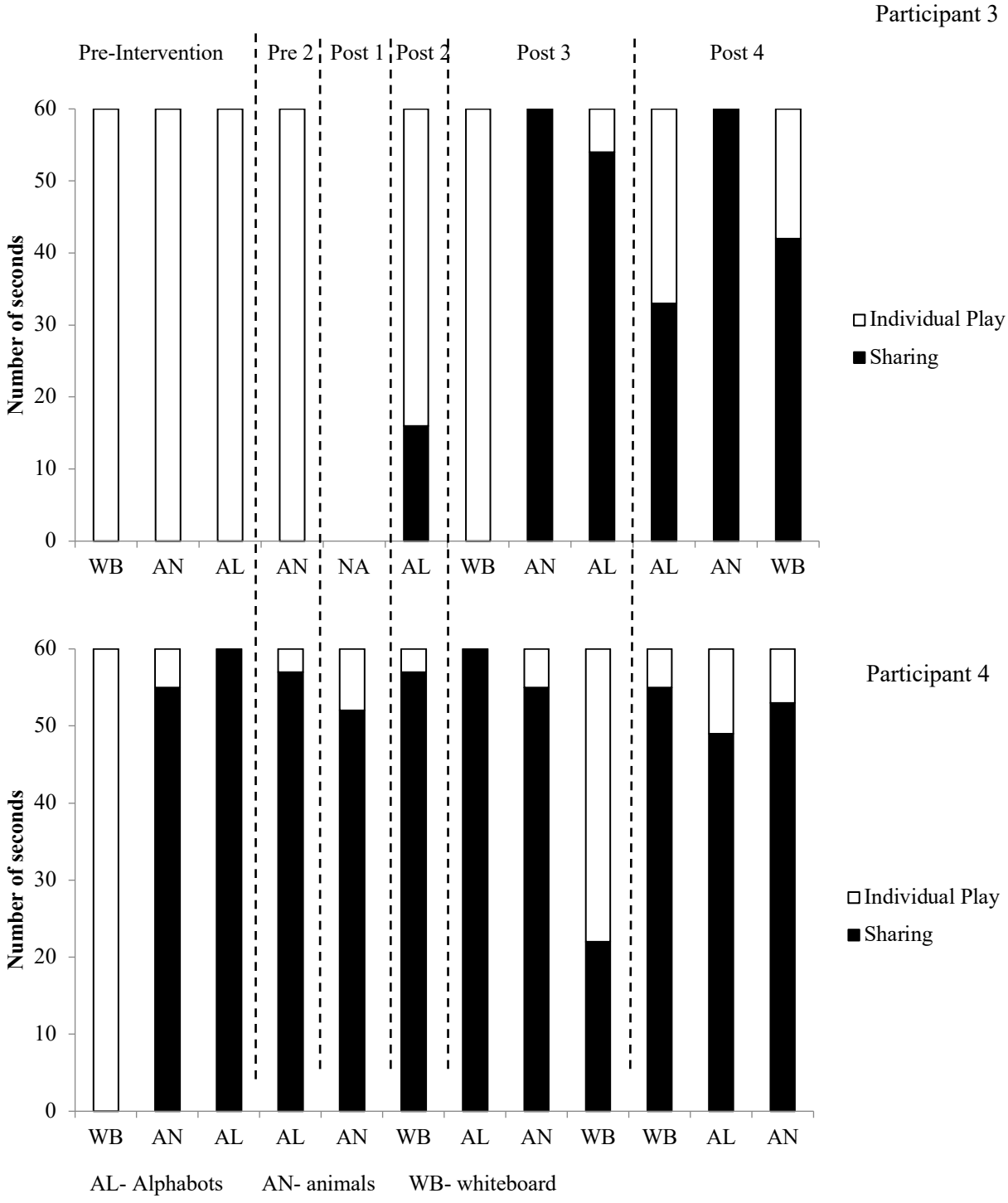
Displays pre- and post-intervention data for the number of eye gazes and vocal verbal operants emitted across all 1-min play sessions for Participant 5 and Participant 6 following Experiment II.

Appendix G



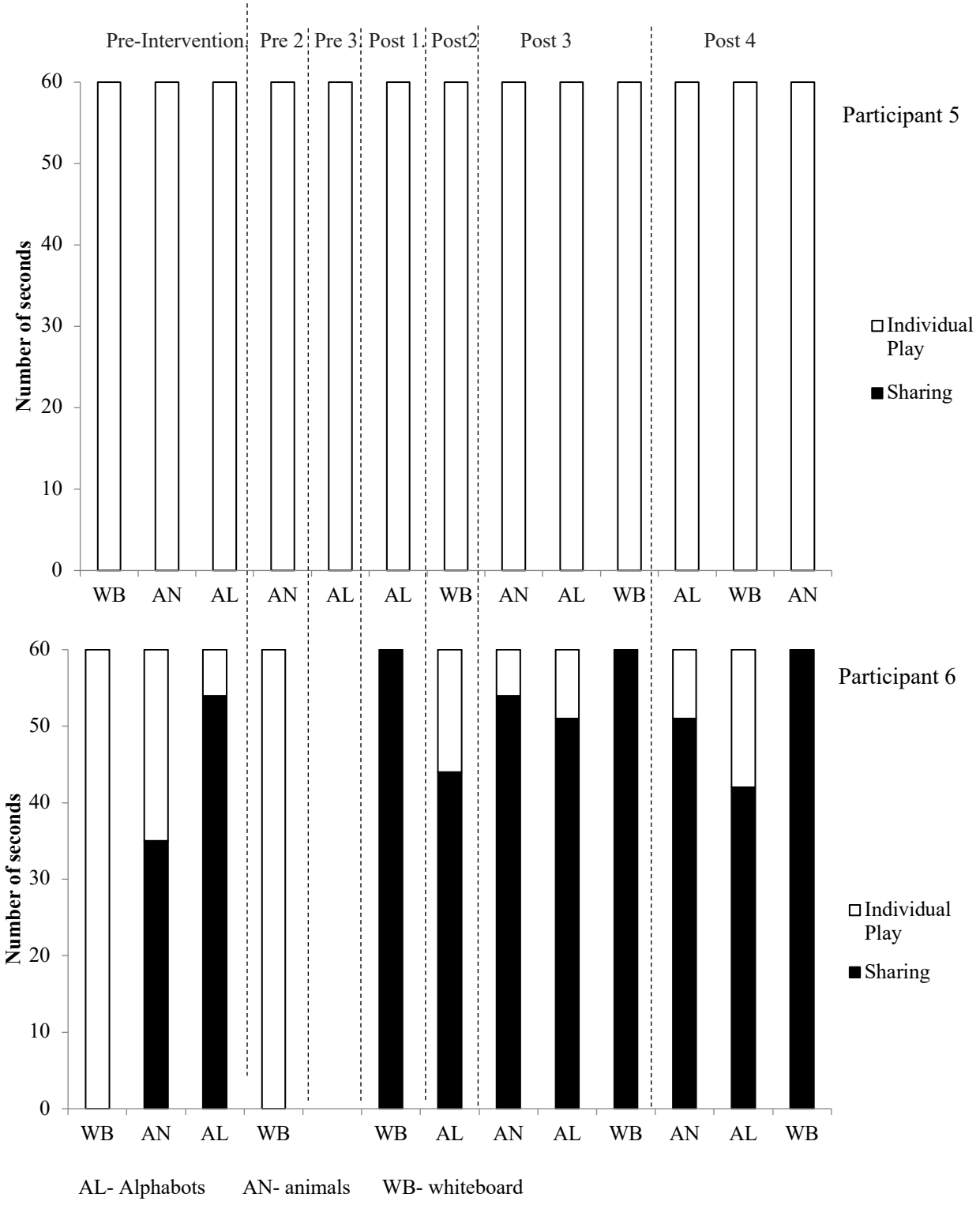
Displays pre- and post-intervention data for the number of seconds Participant 1 and 2 shared an item across all 1-min play sessions following Experiment II.

Appendix H



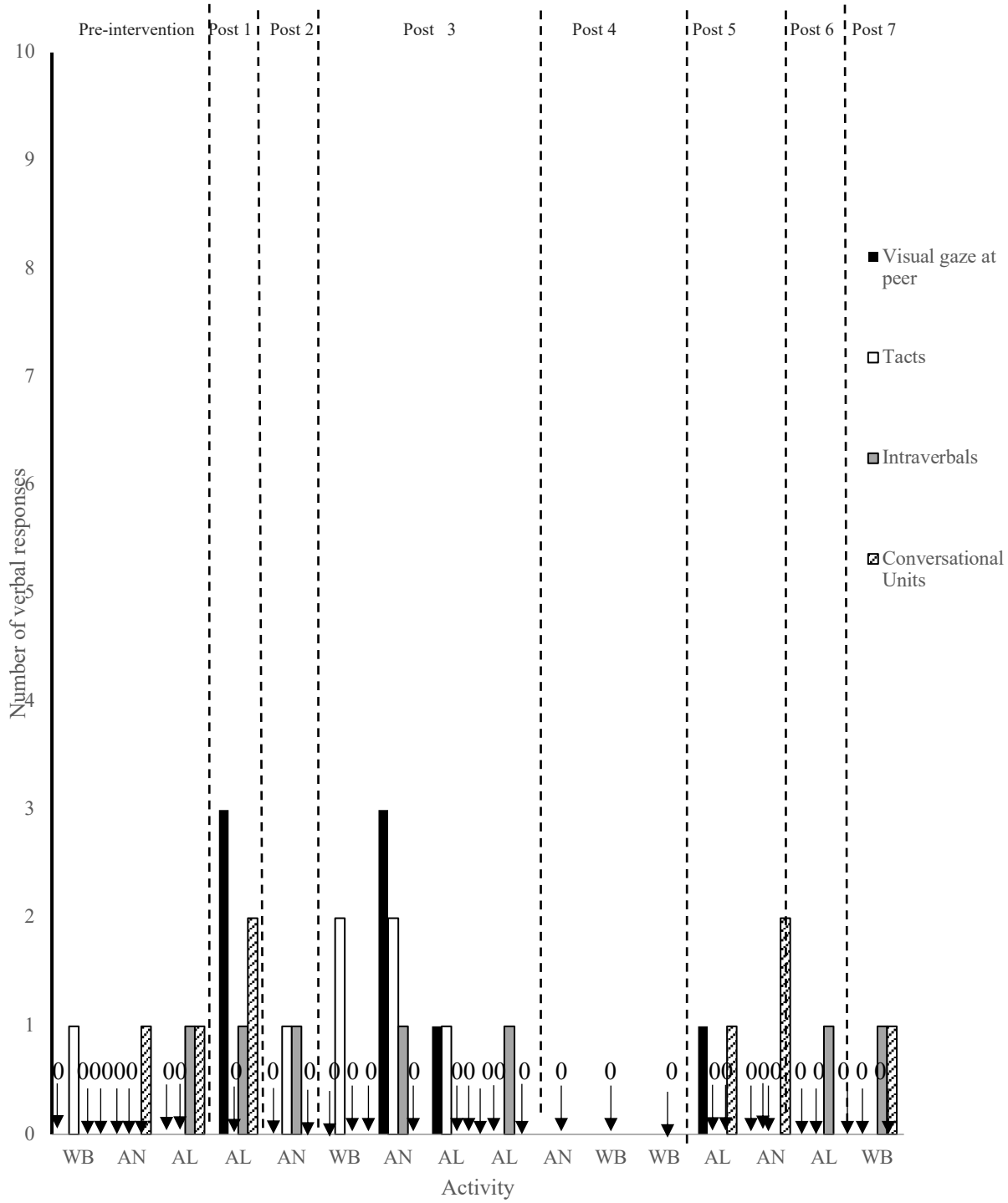
Displays pre- and post-intervention data for the number of seconds Participant 3 and 4 shared an item across all 1-min play sessions.

Appendix I



Displays pre- and post-intervention data for the number of seconds Participant 5 and 6 shared an item across all 1-min play sessions following Experiment II.

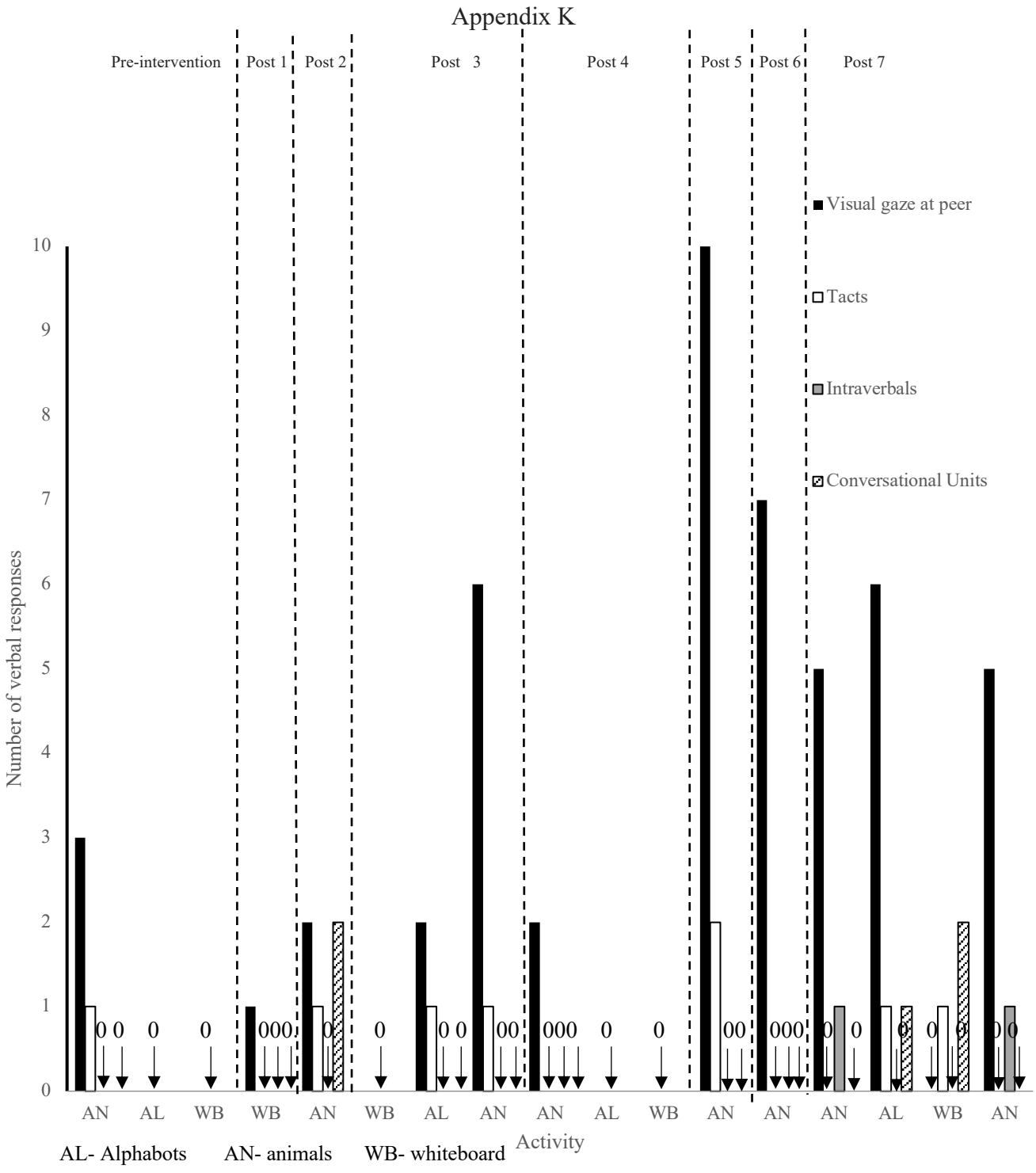
Appendix J



AL- Alphabots AN- animals WB- whiteboard

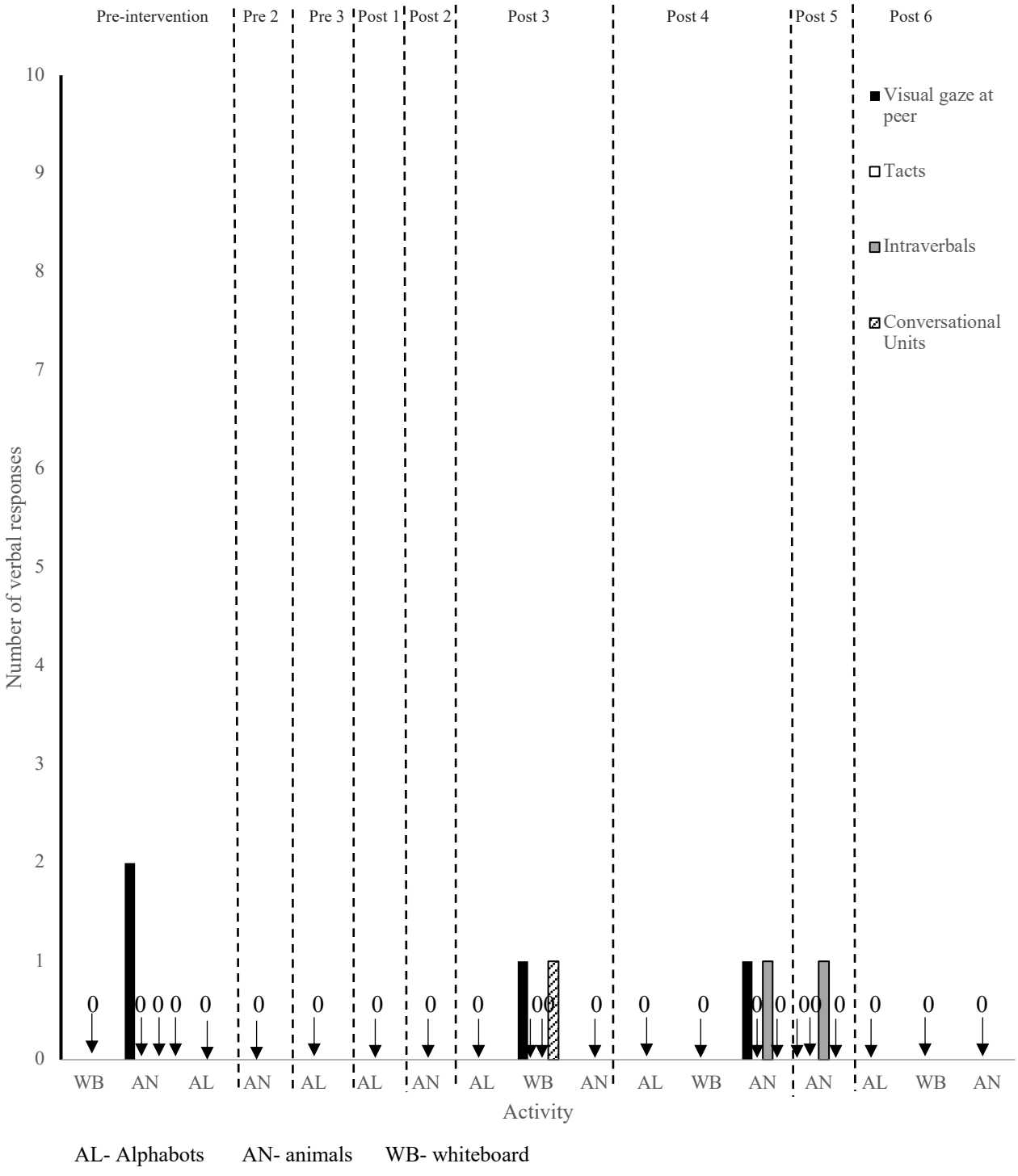
Displays pre- and post-intervention data for the number of eye gazes and vocal verbal operants emitted across all 1-min play sessions for Participant 1 following Experiment III.

Appendix K



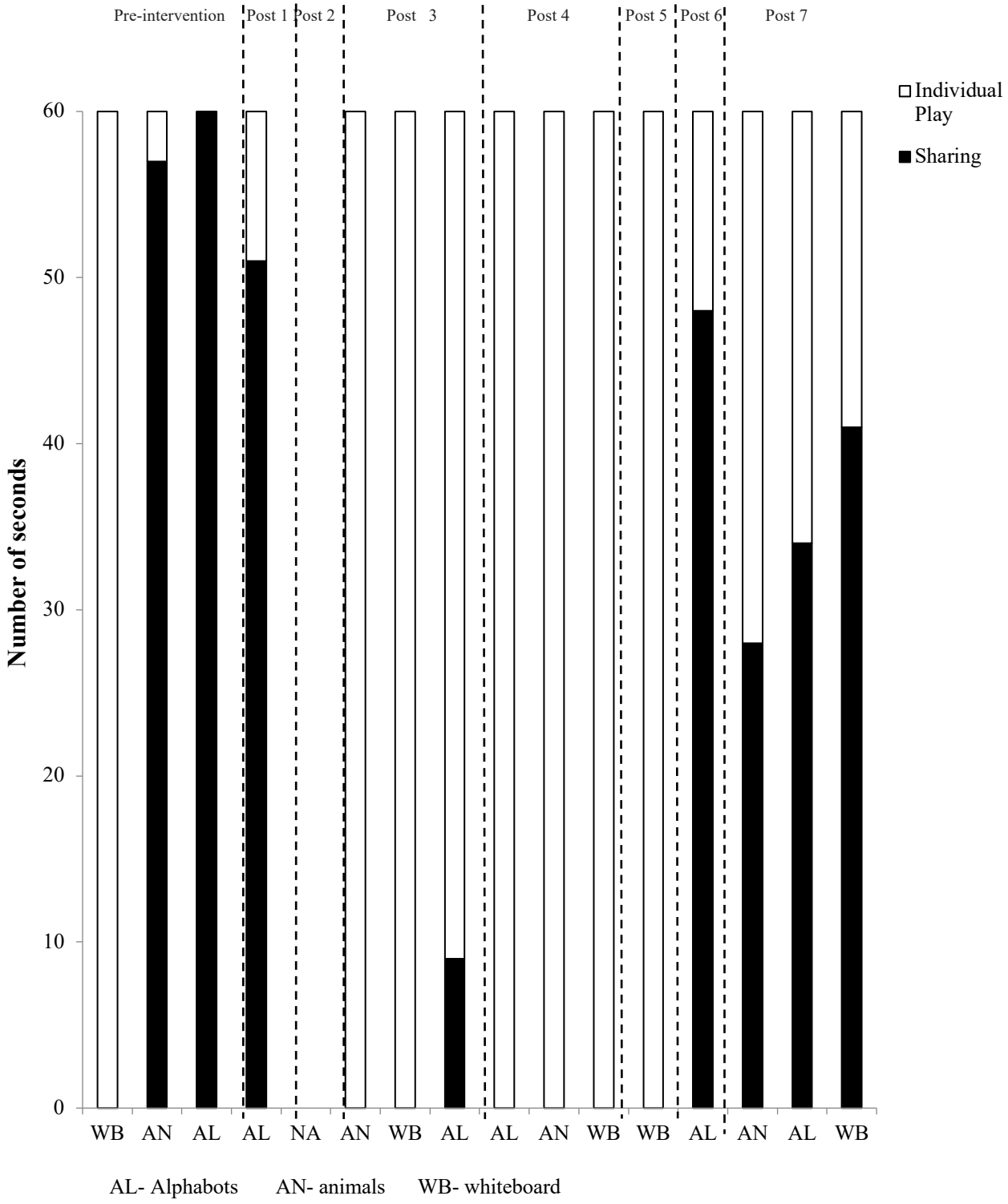
Displays pre- and post-intervention data for the number of eye gazes and vocal verbal operants emitted across all 1-min play sessions for Participant 2 following Experiment III.

Appendix L



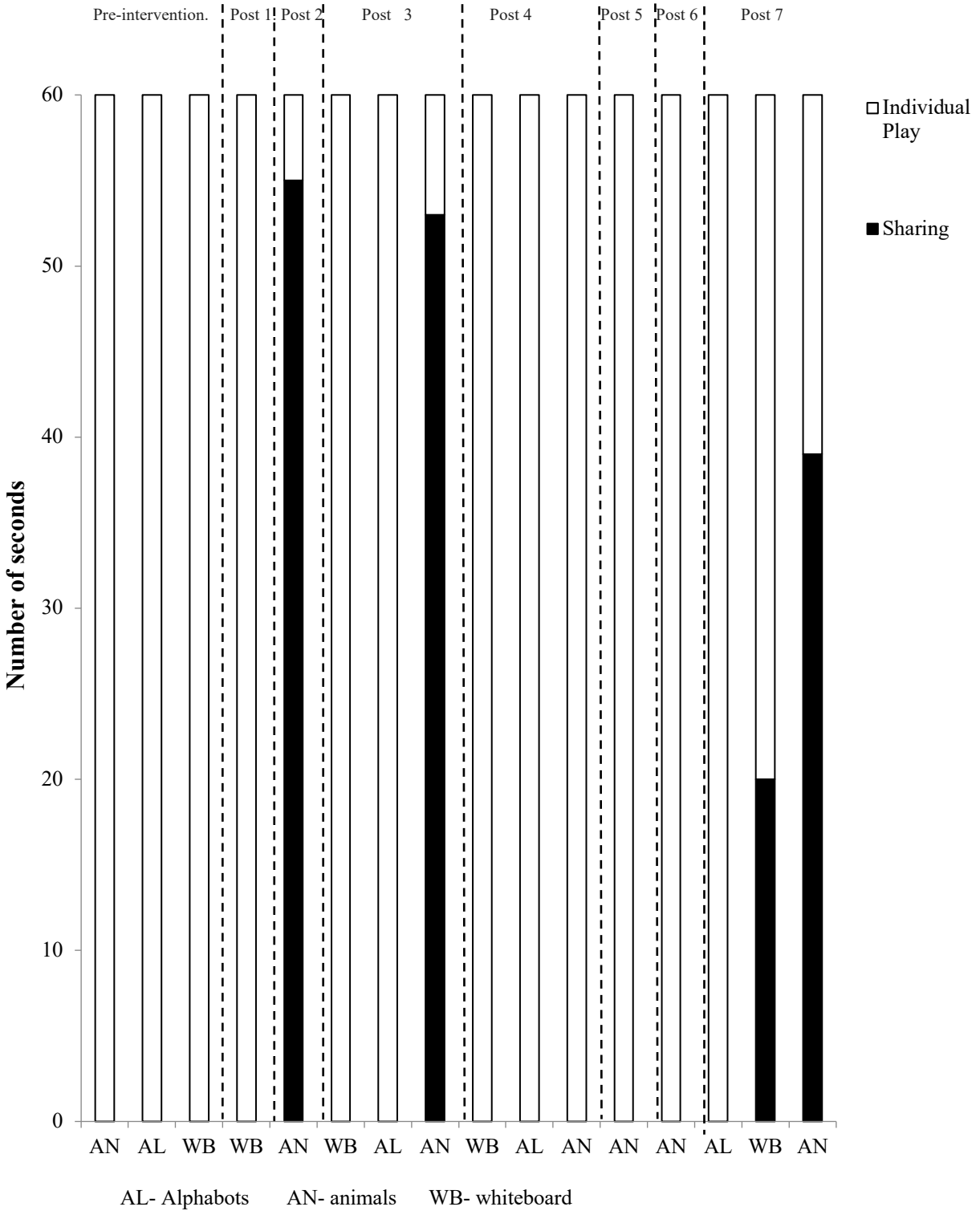
Displays pre- and post-intervention data for the number of eye gazes and vocal verbal operants emitted across all 1-min play sessions for Participant 5 following Experiment III.

Appendix M



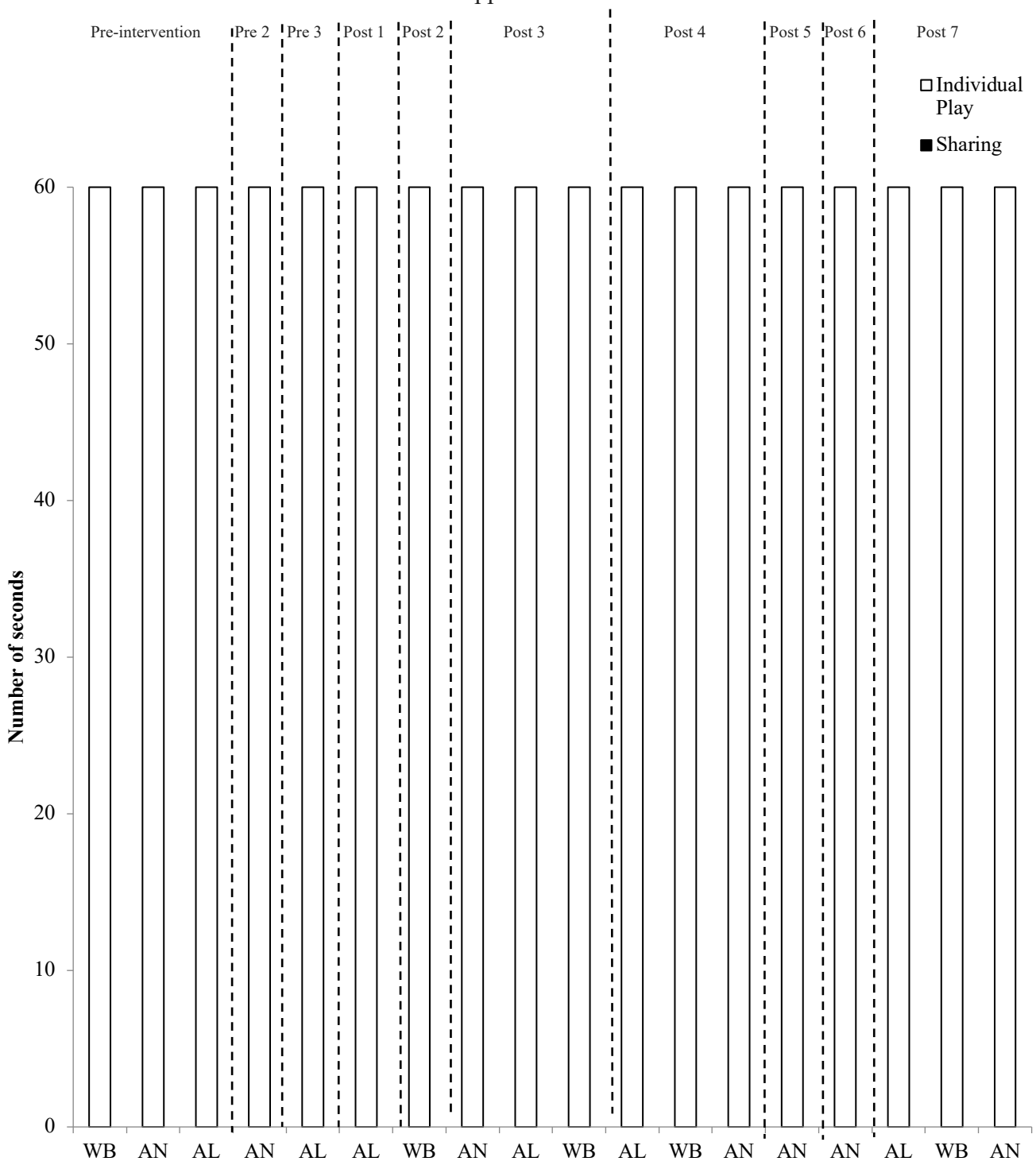
Displays pre- and post-intervention data for the number of seconds Participant 1 shared an item across all 1-min play sessions following Experiment III.

Appendix N



Displays pre- and post-intervention data for the number of seconds Participant 2 shared an item across all 1-min play sessions following Experiment III.

Appendix O



Displays pre- and post-intervention data for the number of seconds Participant 5 shared an item across all 1-min play sessions following Experiment III.