Perseverative speech is the inability to adapt topics of conversation along with the social context and continuing with one topic even after it has ceased to be socially appropriate (Sandson & Albert, 1984). Perseverative speech has been studied in a variety of populations (i.e., aphasiacs, traumatic brain disorder, etc) and has been identified as a common problem in individuals with high-functioning autism (HFA; Volkmar et al., 2005). There is evidence to suggest that perseverative speech may have an operant function, therefore being amenable to interventions based on environmental manipulations (Allyon & Michael, 1959). Functional analysis (FA) is a common assessment of operant function and has been used for a variety of problem behaviors (Hanley et al., 2003).

The current study extended the use of FA to identify the following, three aspects of perseverative speech of three, elementary-aged students with HFA: (a) whether there is a social function; (b) whether perseverative speech is a skill acquisition or performance deficit; and (c) whether peer or adult attention has differential effects on perseverative speech. Results indicate these FA procedures were able to identify these aspects of perseverative speech.
USING FUNCTIONAL ANALYSIS AND PRESESSION ATTENTION TO ASSESS
PEER VERSUS ADULT ATTENTION AS A MOTIVATING OPERATION FOR
PERSEVERATIVE SPEECH

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CHAPTER I

INTRODUCTION

Characteristics of High-Functioning Autism

In his observations of children with autism, Leo Kanner wrote “[t]here is from the start an extreme autistic aloneness that whenever possible disregards, ignores, shuts out anything that comes to the child from the outside” (Kanner, 1943/1971). The “aloneness” Kanner describes in his initial observations has become a key component of an autism diagnosis. Autism is a neuropsychiatric disorder of early childhood, defined on the basis of difficulty with communication, social skills, and restricted interests or stereotypic behaviors (American Psychiatric Association, 2000). In 1994, the diagnostic term “infantile autism” was replaced by “autistic disorder” which represented a change of view towards autism as a spectrum disorder (American Psychiatric Association, 1994). An autism spectrum disorder (ASD) is now thought to be a continuum of degrees of impairment which are qualitatively similar to each other and characterized by deficits in three domains: social reciprocity, communication, and intellectual functioning (American Psychiatric Association, 2007). There is large clinical variability within the presentation of symptoms, which includes intensity of core features, adaptive and cognitive levels, and response to therapy (Asperger, 1944; Bailey et al., 1998; Spence, 2001; Silverman et al., 2002). In the absence of biological markers, ASD is diagnosed using behavioral characteristics.

To analyze student characteristics and response to therapy for a more precisely differentiated group of participants on the ASD continuum, this paper will focus on students whose primary impairment is with social interactions. These students have often
been categorized as either students with high-functioning autism (HFA) or students with Asperger’s syndrome; however, because the term “Asperger’s syndrome” is likely to no longer be a specific diagnosis in the American Psychiatric Association's new diagnostic manual, this paper will use the term HFA in lieu of Aspeger’s syndrome (www.dsm5.org). Students with HFA differ from others on the autism spectrum in that they typically have normal cognitive and adaptive development and no history of delay in spoken language (Woodbury, Klin, & Volkmar, 2005). Instead, the main area of impairment is in one or all of the following categories of symptom presentation (Diagnostic and Statistical Manual of Mental Disorders, 2004):

1. The child exhibits a qualitative impairment in social interaction.
2. The child exhibits a qualitative impairment in communication.
3. The child engages in restricted repetitive and stereotyped patterns of behavior, interests and activities.

These categories are broad in order to encompass the variability of behaviors and degrees of severity seen in people with HFA; however researchers have attempted to provide more specific examples of these impairments. For example, Stichter, O’Connor, Herzog, Lierheimer, and McGhee (2011) narrowed the first category of symptom presentation (impaired social interactions) and defined impaired social interactions as a child’s inability to successfully and independently engage with another person, communicate effectively across settings and people, and establish and maintain friendships. In general, students with HFA have been identified as having low-quality social interactions that consist of a lack of awareness of others, little interest in developing friendships, and atypical peer interactions (Gillber & Ehlers, 1998). Sigman et al. (2004) further narrows the definition of impaired social interactions as behavioral deficits that differ strikingly from social and communicative norms. Examples of such
behaviors common in children with HFA are lack of eye contact, turn taking, imitation, and initiation. These behaviors are usually combined and a failure in one behavior can set the occasion for an overall unsuccessful social interaction (Tager-Flusberg et al., 2005).

The second diagnostic category for HFA is impairment in communication. Communication is a process in which meaning is assigned and conveyed to create a shared understanding (Schramm, 1954). Language is the most often used form of communication, although it can also include listening, observing, and gesturing. For participants with HFA, language development often follows an inconsistent trajectory in which initial language acquisition is normal for the first few years, stagnant for a short period, and resumes and continues at a pace with typical peers (Ghaziuddin, Tsai, & Ghaziuddin, 1992). School-aged students with HFA often have high scores on language measures of vocabulary, syntax, and semantics, but have significant impairment with pragmatics, the social use of language (Ghaziuddin et al., 1992). This is corroborated by Asperger’s (1944) initial descriptions in which the participants had large expressive and receptive vocabularies but considerable pragmatic difficulties, such as odd intonation, inappropriate topics, and pronoun reversals. Since Asperger’s descriptions, a variety of pragmatic communication problems have been reported in children with HFA, such as pedantic speech, literal interpretation, long-winded speech, odd tone of voice, inappropriate affect, and difficulty knowing how much or little to say in a conversation (Capps et al., 1998; Lord & Schopler, 1989). In people diagnosed with HFA, pragmatic difficulties overshadow their relative strength in vocabulary and result in an overall impairment in communication (Ghaziuddin, et al., 1992).
The final category of symptom presentation for HFA is the person must engage in restricted repetitive and stereotyped patterns of behavior, interests, and activities. The DSM-IV (2004) delineates these patterns of behavior as occurring in any of the following four categories of repetitive behavior: (a) narrow, circumscribed patterns of interests that are intensely pursued; (b) preoccupation with parts of or nonfunctional objects; (c) motor stereotypy; and (d) insistence on sameness. In a review of the behavioral characteristics of 200 participants diagnosed with HFA, 88% of the participants were identified as engaging in repetitive behaviors or interests (Leekham et al., 2000). These same participants were reported as being engaged in behaviors across the four categories of repetitive behavior, but were most highly represented in categories that had a social aspect. For example, students with HFA were much more likely to engage in ritualistic behaviors involving “social times” than “self-care times” and have restricted interests regarding “subjects” rather than “objects or parts.” This pattern is consistent with a finding by Woobury, Klin, and Volkmar (2005) showing clinicians were more likely to identify the presence of abnormal preoccupations and interests, engage in repetitive conversations, and exhibit narrow, circumscribed interests in students with HFA than another autism diagnosis.

Although the diagnostic criteria for HFA differentiate social impairments, language impairments, and restricted behaviors from one another, there are a number of specific behaviors that fit in some or all of the categories. An example of this is perseverative speech. In general, perseverative speech is the inability to adapt topics of conversation along with the social context and continuing with one topic even after it has ceased to be socially appropriate (Sandson & Albert, 1984). Perseverative speech meets
criteria as being (a) a restricted or repetitive interest, because it is a narrow interest that is intensely pursued; (b) an impairment in communication, because the focus on the speaker’s restricted interest prevents shared understanding between the speaker and the listener; and (c) an impairment in social interaction, because it is a barrier to meaningful interaction between two people. Inclusion in all three diagnostic categories makes perseverative speech an especially interesting behavioral characteristic of HFA. To understand the role of perseverative speech in individuals with HFA, one must understand the lengthy—and often disjointed—history of perseverative speech.

**Perseverative Speech**

**Perseverative Speech in Diverse Populations**

Across literature bases, a verbal perseveration is “the inappropriate repetition of a preceding behavior when a new, adapted response is expected” (Cohen & Dehaene, 1988, p. 1641). A verbal perseveration can include a repeated phoneme, word, syntactic structure, semantic feature, or idea (Stark, 2011). For example, in an early study of perseverative speech, a young man with a traumatic brain injury and persistent anterograde amnesia is described as being able to intelligently speak on a topic if given continuous prompts but that his self-initiated speech fell within only one of nine categories (McMordie, 1976). In this participant’s case, that he could speak intelligently on a variety of topics given prompts made it “expected” that he would be able to spontaneously converse on a variety of topics, despite his inability to do so.

A number of early studies of perseverative speech included those of people with traumatic brain injuries in different parts of the brain (Luria, 1965; Milner, 1971; Wepman, 1972). This link to traumatic brain damage led Sandson and Albert (1984) to
conclude that perseverative speech was not caused by one underlying deficit as was initially proposed by Neisser (1895); rather perseverative speech had a large number of causes and an equally large number of topographies. To organize the way in which perseverative speech was discussed and studied, Sandson and Albert (1984) proposed the prevailing taxonomy of verbal perseverations in which a verbal perseveration can have three forms: recurrent, continuous, and stuck-in-set.

Recurrent perseveration is the inappropriate repetition of already completed responses. A typical example of a recurrent perseveration is the production of the same word in a picture-naming task, although recurrent perseverations can also include any whole word or parts of words. They are influenced by several stimulus factors, including word length, relationship to the target stimulus, stimulus repetition, and presentation rate (Cohen & Dehaene, 1998; Gotts, Rocchetta, & Cipolotti, 2002; Halpern, 1965). Continuous perseveration is the prolongation of a behavior when it is expected to cease. Sandson and Albert (1987) provide examples of this in an individual who continued to draw fingers on the drawing of a hand and in an individual who continued to draw loops on the letter m. Stuck-in-set is when a perseveration within a specific category is carried across stimuli. An example of this is when a person continues to sort cards to an old rule (such as color) when a new rule has been presented or when a person talks about only one topic. Unlike continuous perseveration and recurrent perseveration, stuck-in-set perseveration is less likely to be identified at the word level; instead it is identified during longer discourse that requires changes in content. For example, an individual may only want to discuss a specific topic, such as a television show or a computer game.
Sandson and Albert (1984) mostly researched perseverative speech in people with aphasia; however, their taxonomy was adopted by researchers who focused on different populations, such as people with traumatic brain injury, Alzheimer’s disease, and intellectual disabilities. This taxonomy was not initially adopted by researchers working with people ASDs, because in early studies of this behavior in people with ASD, perseverative speech had a variety of labels, such as “psychotic speech, bizarre speech and delusional speech”, in addition to perseverative speech (Ewing, Magee, & Ellis, 2002). For example, Bartlett, Ora, Brown and Butler (1973) describe using positive reinforcement to reduce the “psychotic speech” of a 12-year-old boy with autism, who was able to converse on a variety of topics, but often kept up “steady of flow of bizarre talk with references to pumps, air conditioners, and his life in another galaxy” (p. 146). Similar to the participant reported by McMordie (1976) when prompted in conversation, the boy was able to engage in appropriate speech on a variety of topics, but self-initiated talk was often confined to a small variety of topics. Using Sandson and Albert’s (1984) taxonomy, this would be an example of a stuck-in-set perseveration.

**Perseverative Speech and ASD**

Although there have historically been a variety of terms used to describe verbal perseverations, “perseverative speech” is now the most common term used among autism researchers (Wetherby & Prizant, 2000). It is currently considered one of the hallmark characteristics of people with an ASD and is a behavioral characteristic in the DSM-IV (2004) diagnostic criteria of HFA. Perseverative speech is considered a cognitively higher-order response and falls within one of the four “restricted interest” ASD diagnostic categories (DSM-IV-R, 2004). One reason perseverative speech may be more
common in HFA than other ASDs is that people with HFA have relatively strong language skills and are better able to develop and communicate about more sophisticated interests (Attwood, 2003). For example, while individuals with autism tend to manipulate objects related to their restricted interest, individuals with HFA amass large quantities of information about their restricted topic through reading and questioning (Volkmar & Klin, 2000). Although all students who engage in perseverative speech share an intense persistence on a particular topic, the specific topic varies by individual. For example, Rehfeldt and Chambers (2003) identified the perseverative speech of a man with autism as statements that focused on one of the following topics: (a) Sirens or alarms, (b) the dentist or doctor, or (c) coughing. Roantree and Kennedy (2012) targeted perseverative speech, but the participants in their study were elementary-aged students with AS and their perseverative statements included holidays, video games, and television shows. Winter-Meissers (2007) categorized the restricted interests in 24 students with HFA/AS into general themes that included transportation, music, animals, video games, movies, and art. Although these themes may seem appropriate, the parents of the individuals reported concerns about the intensity of the interest in the restricted topic and lack of interest in other topics.

It is now agreed upon that there are a variety of populations who engage in perseverative speech and the speech includes a number of different topographies that vary by individual. One area that is still largely unknown—and somewhat in dispute—is the underlying cause of perseverative speech.
Theories of the Cause Perseverative Speech

Neurological Perspective

Sandson and Albert’s (1984) prevailing taxonomy is comprised of different behavioral topographies with each of the categories has its own neurological underpinnings. For example, they argue stuck-in-set perseverations are considered to be due to damage in the frontal lobe, continuous perseveration is due to damage in the frontal lobe and basal ganglia, and recurrent perseveration is due to general brain damage. Current theories on perseverative speech have moved away from thinking of this behavior only in terms of brain damage and toward thinking in terms of affected neuronal systems (McDougle et al., 1996). These systems have been studied in animal and human models and have been studied under the broader category of repetitive behaviors and thinking. Lewis and Baumeister (1982) suggest dopamine pathways may be involved in repetitive behavior, because animal studies show increases in repetitive behaviors in the presence of dopamine agonists and dopamine uptake inhibitors. Other research suggests serotonin is involved, because of a number of studies that show decreases in repetitive behaviors when the animal or human is taking selective serotonin reuptake inhibitors (SSRIs; Hugo, 2003).

Sandson and Albert (1984) mention, but ultimately dismiss, another possible reason people engage in perseverative speech that was proposed by Leicester, Sidman, Stoddard, and Mohr (1977), that perseverative speech could be due to reinforcement history and does not always have a co-occurring physiological abnormality. As restricted behaviors, stereotypies, and perseverative speech began to be identified more often in individuals with developmental disabilities and autism, the evidence for a theory of these
behaviors that was not based in neurology began to grow. This is especially true for researchers studying HFA. Although there are some parallels between the type of perseverative speech common in HFA and Sandson and Albert’s (1984) “stuck-in-set” speech, there also important differences. For example, individuals with HFA who engage in perseverative speech will often have one interest to which they consistently return, similar to the “stuck-in-set” speech outlined by Sandson and Albert (1984). One difference is that the speech of individuals with HFA very rarely includes parroting the speech of something else and includes complex, spontaneous, and novel interpretations of the topic (Ghaziuddin & Gerstein, 1996). Further, most of the individuals with HFA who engage in perseverative speech had no known history of damage to the frontal lobe as suggested by Sandson and Albert (1984). These differences led researchers to attempt to identify potential operant properties of perseverative speech as outlined by Leicester et al. (1977).

**Behavioral Perspective**

The theory that perseverative speech could, in some instances, be caused by reinforcement history was developed by researchers studying people with developmental disabilities. This perspective was initially at odds with the neurological theory of perseverative speech. Newsom and Lovaas (1987, p. 259) illustrate this contention by stating in a response to a paper by Lewis, Baumeister, and Mailman (1987), “our major crime, it turns out, was to propose a behavioral theory [about perseverative speech] instead of a neurological one. To that, of course, we plead guilty by reason of sanity, given the shortage of hard neurological facts.” An increasing number of studies linking perseverative speech and operant properties have led many researchers to agree this
theory has merit. A number of early researchers found that rate and occurrence of perseverative speech was sensitive to environmental manipulations. For example, Ayllon and Michael (1959) used a time-out procedure in which they withheld attention to reduce perseverative speech in a participant with schizophrenia and a number of researchers used differential reinforcement procedures to increase appropriate speech and decrease perseverative speech (Bartlett et al., 1971; Butz & Hasazi, 1973; Reichle, Brubaken, & Tetreault, 1977).

The potential operant properties of perseverative speech have been identified in theories of perseverative speech specifically for individuals with HFA. Tatum (2000) suggested the potential operant function of perseverative speech could be positive reinforcement in the form of seeking out pleasure. His example is when a certain stimulus is paired with enjoyment, the individual will continuously and obsessively try to seek out this stimulus. Pyles (2000) suggested an opposite operant function of negative reinforcement, in which, the a novel stimulus may produce fear or anxiety, so the individual attempts to learn about all aspects of the stimulus in order for it to no longer induce fear.

Overall, the literature suggests although some perseverative speech may be the result of specific brain damage, other instances of perseverative speech may be due to learned social contingencies. For people whose perseverative speech is reinforced by social contingencies, behavioral interventions have been found to be successful in decreasing perseverative speech; however, it is unclear which individual characteristics warrant which intervention. Therefore, an important precursor in the development of interventions for perseverative speech is a comprehensive assessment tool.
Assessment of Perseverative Speech

Currently, there are no assessments designed specifically for perseverative speech. Standardized social skills assessments may include one or two questions related to perseverative speech, but do not measure different dimensions of perseverative speech. Instead, perseverative speech is often assessed through interviews or informal questionnaires with parents and/or teachers (Romanczyk, Lockshin, & Matey, 2001). These informal methods have a lack of congruence between the different people who answer the questions and do not typically generate information that is precise enough to identify what skills to teach (Notari & Bricker, 1990). Further, in most cases, questionnaires provide little information on the causes or functions of perseverative speech. Thus, a more precise assessment is needed to identify the environmental causes of perseverative speech.

One type of experimental assessment that has been used for a variety of behaviors exhibited by people with autism is a functional assessment (FA). Early studies using FAs focused on the function of problem behavior; however, there have been numerous replications and variations of FA procedures across settings, behaviors, participants, and/or procedures, which suggests that FA methods are flexible and can identify the function of any behavior under a variety of conditions. This includes an expansion of FA procedures to perseverative speech, which has been shown to be effective in three studies (Frea & Hughes, 1997; Rehfeldt & Chambers, 2000; Roantree & Kennedy, 2012). To understand how FA procedures can be modified for perseverative speech, it is first important to fully discuss the FA.
**Functional Analysis**

FA is based on the behavioral concept that “both adaptive and aberrant behaviors are learned through a history of interactions between the individual and the environment” (Mace, 1994, p. 385). It is an assessment technique in which the focus is to determine the source of reinforcement that maintains social behavior (Horner, 1994). This assessment is accomplished by identifying relevant aspects of the behavior and environment. These include topography, frequency, and duration of the behavior, as well as the corresponding antecedent and consequent events (Gresham, Watson, & Skinner, 2001; English, & Anderson, 2006). The information gathered from an FA helps determine the operant function of behavior, which in turn guides intervention.

In an FA, the researcher is able to isolate and control reinforcement contingencies. To do this, the researcher presents a series of analogue conditions (i.e., approximations of a typical environment rather than the actual environment) and either presents or removes consequences while holding other variables constant (Iwata et al., 1982/1994). The conditions under which this occurs can vary, but must contain an establishing operation, a discriminative stimulus, and a consequence (Hanley et al., 2003). The consistent occurrence or nonoccurrence of the problem behavior under these conditions allows researchers to demonstrate a functional relation between the behavior and certain environmental events (Mace, 1994).

An FA is the preferred assessment technique when creating a function-based assessment, because an FA allows for the identification of the operant function (Iwata et al., 1982/1994). A number of studies since the advent of FA methodology have shown that interventions for problem behavior based upon the operant function have improved
outcomes over interventions based upon other variables, such as participant characteristics or behavior topography (Axelrod, 1987; Mace, Lalli, & Pinter, 1991; Durand & Carr, 1988). The importance of identifying operant functions prior to creating an intervention is highlighted by a recommendation by the National Institutes of Health Consensus Conference (NIH, 1989). This organization recommends interventions for behavioral disorders in students with intellectual and developmental disabilities should be based upon the results of an assessment that identifies the operant function of the behavior.

The Current Study

Research has provided considerable evidence that forms the basis of the current study. Perseverative speech falls within all three of the diagnostic criteria of HFA and is common in these individuals. This behavior can negatively impact the quality of life for individuals with HFA, because it can act as a barrier to social interactions and acceptance. Theories for why perseverative speech occurs range from specific brain trauma, to diffuse neurological systems, to operant functions (Sandson & Albert, 1987; Tatum, 2000). In individuals in whom no known brain trauma has occurred, researchers can identify the operant function of perseverative speech by using an established assessment technique, the FA. The current study attempts to modify FA conditions to identify aspects of perseverative speech that are important to intervention development in three elementary-aged students with HFA. We did so by basing the rationale for the modified procedures on the small literature base of FA and perseverative speech. The following section will include a detailed review of this literature.
CHAPTER II
REVIEW OF THE LITERATURE

An Overview

This review of the literature is focused on three studies that have successfully used FA methodology to assess the operant function of perseverative speech in people with ASD (Frea & Hughes, 1997; Rehfeldt & Chambers, 2003; Roantree & Kennedy, 2012). These studies provided an initial effort to extend the literature of a well-established assessment tool from the problem behavior area to the assessment of perseverative speech. In each case, there were modifications to FA conditions, while maintaining the same, overarching framework. Therefore, it is important to conduct a detailed analysis of the FA conditions and specific procedural variations. This review will discuss the limitations of these three studies and how they can be modified to easily assess other relevant aspects of perseverative speech—whether it is a skill acquisition deficit or a performance deficit and whether there are establishing operations that may affect intervention effectiveness.

Analysis of the Literature of FA and Perseverative Speech

Currently, there are three studies that have used FA procedures to assess the operant function of perseverative speech. Frea and Hughes (1997) conducted an FA on a high-school-aged student with developmental disabilities; Rehfeldt and Chambers (2003) conducted an FA on a 23-year-old man with autism in his sheltered workshop; and Roantree and Kennedy (2012) conducted an FA on three elementary students with HFA/AS.
**Functional Analysis Conditions**

In each of these studies, the basic FA framework initially outlined by Iwata et al. (1982/1994) was employed. Each FA used a multielement design that included more than one social reinforcement contingency condition and one control condition. Further, within each of these contingency conditions, the researcher presented a discriminative stimulus and a contingent consequence upon instances of perseverative speech.

**Control condition.** Iwata et al. (1982/1994) provided an example of a control condition. In their control condition, all elements of the social contingency condition remained constant, except participants were neither provided attention nor given task demands, but were provided continuous access to preferred items or activities. To control for the effects of negative reinforcement, tasks were removed from the condition. To control for the effects of positive reinforcement, no attention was provided.

The control conditions in the group of studies using an FA to assess perseverative speech were similar to the one used by Iwata et al. (1982/1994). The control conditions within this group of studies were similar to one another with the only procedural difference being whether the participant was provided with no attention or noncontingent attention. The control condition in the study by Rehfeldt and Chambers (2003) was the most similar to Iwata et al. (1982/1994), in that, the participant was neither provided attention nor given task demands and had unlimited access to preferred items/activities. This participant was left alone in the experimental room with preferred items while a research assistant recorded instances of perseverative speech from outside the room. Frea and Hughes (1997) and Roantree and Kennedy (2012) also removed task demands and provided access to preferred items/activities; however, non-contingent attention was
provided every minute. This alteration controlled for the possibility of an extinction burst if the preservative speech was maintained by access to attention.

**Positive reinforcement condition.** In the problem behavior literature, common positive-reinforcement conditions include allowing the participant to access either attention or a preferred item or activity contingent upon the occurrence of the target behavior (Hanley et al., 2003). In the three studies using an FA to assess perseverative speech, the authors only assessed the role of attention—and not a preferred item or activity—as a positive reinforcer. Although all the studies assessed attention as a positive reinforcer, the type of person providing attention varied across studies. For example, Rehfeldt and Chambers (2003) used a research assistant to provide attention, Frea and Hughes (1997) used the classroom teacher and Roantree and Kennedy (2012) used both a research assistant and a typically-developing peer. The differences in who provided attention across the studies raise important questions about the best way to design the positive reinforcement condition. For example, Northrup et al. (1995) studied the effect of having either an adult or a peer provide attention and found differential response between peer-attention and adult-attention conditions. This led them to conclude peer and teacher attention may not be functionally equivalent and may function as a unique form of positive reinforcement.

The findings by Northrup et al. (1995) have implications for determining who should provide attention during the social-attention condition. One consideration may be where and with whom the target behavior most likely occurs. Roantree and Kennedy (2012) and Frea and Hughes (2003) both included school-aged participants who had been reported to have social skill deficits at school. Therefore, it was more appropriate to have
a peer or the teacher provide or restrict attention. In some instances, the target behavior may occur more frequently around the participant’s parent or strangers. If this is the case, these should be the people providing attention in the FA condition.

**Negative reinforcement condition.** The negative reinforcement condition tests whether the target behavior is maintained by avoidance or escape. Each study in this group had a negative reinforcement condition, however, the studies differed in the type of activity that was terminated when the target behavior occurred. For example, Rehfeldt and Chambers (2003) assessed negative reinforcement by removing task/instructional demands and Roantree and Kennedy (2012) assessed negative reinforcement by removing access to peer or adult attention. Frea and Hughes (1997) included two negative reinforcement conditions and assessed the effects of both escape from attention and escape from task demands.

**Setting**

Another element of the FA that should be considered by future researchers when conducting an FA is the most appropriate setting. In this group of studies, the setting of the FA conditions ranged from occurring in the participant’s natural environment to separate, contrived settings. Frea and Hughes (1997) used the most natural setting. The participants’ classroom teachers were trained to conduct the sessions in their daily homeroom class. An independent observer trained on the study methods provided feedback to the teacher during the sessions to ensure procedural fidelity. Roantree and Kennedy (2012) used aspects of the natural setting by having a same-aged peer and trained research assistant conduct the sessions during the participants’ lunch hour; however, the sessions took place in a small classroom adjacent to the cafeteria, as
opposed to the cafeteria. Rehfeldt and Chambers (2003) used the most contrived setting with an experimenter conducting the sessions in a separate room with the same materials as those in the participants’ natural environment, but no other features of the natural environment.

Summary of the Existing Studies

To conclude, this group of studies maintained many of the common elements of the typical FA conditions by assessing perseverative speech in a control condition, positive reinforcement condition, and negative reinforcement condition. Further, each study author used these conditions to successfully identify the operant function of perseverative speech. These studies provide procedural examples of how FA can be used to assess perseverative speech, but they are missing two important elements that should be factored into the FA procedures. The first is on identifying whether perseverative speech is a skill or a performance deficit. The second is an assessment on potential motivating operations, specifically the role of peer versus adult attention

Motivating Operations and Perseverative Speech

First, although all three studies assessed attention as a positive reinforcer, the type of person providing attention varied across studies. For example, Rehfeldt and Chambers (2003) used a research assistant to provide attention, Frey and Hughes (1997) used the classroom teacher and Roantree and Kennedy (2012) used both a research assistant and a typically-developing peer. The differences in who provided attention across the studies raise important questions. For example, Northrup et al. (1995) studied the effect of having either an adult or a peer provide attention and found differential response between peer-attention and adult-attention conditions. These authors concluded peer and teacher
attention may not be functionally equivalent and may function as a unique form of positive reinforcement.

As discussed above, perseverative speech is considered a cognitively higher-order behavior and is identified most often in students with HFA. These students are more likely than other students on the autism spectrum to have ongoing interactions with peers, so the potential role of peers in maintaining perseverative speech is an important consideration. Frea and Hughes (2000) and Roantree and Kennedy (2012) noted the importance of peers with this population of students by including peers in their FA conditions; however, they also included adults. Because both the peer and the adult were delivering the same consequence contingent on perseverative speech, it is difficult to assess the specific role the peer or the adult played.

The central function of an FA is to determine the maintaining consequence, but it does not answer the question of why the motivation for the consequence exists (McGill, 1999). To answer why, the researcher must attempt to identify the motivating operation. Motivating operations are environmental events that affect behavior by changing the reinforcing or punishing nature of a stimulus, thereby changing the frequency of the target behavior (Michael, 1982). Motivating operations range from environmental factors, such as delaying a planned activity, to biological events, such as lack of sleep (Horner & Day, 1991). For example, food deprivation could increase the likelihood of the target behavior if food is the identified reinforcer and food satiation could decrease the likelihood of the target behavior.

The three perseverative speech studies discussed above identified attention as the maintaining variable. McGill (1993) suggested that problem behavior maintained by
attention is more likely to occur in environments with low levels of social attention. Taylor and Carr (1992) and Hall and Oliver (1992) reported that problem behavior with the consequence of attention increased when the antecedent to the behavior was no attention. In these cases, deprivation of attention increased the reinforcing value of attention as a consequence and led to more instances of problem behavior.

Alternately, a number of studies have introduced time-based (or noncontingent) attention and found decreases in problem behavior (Fischer, Iwata, & Worsdell, 1997; Berg et al., 2000). This is known in the behavioral literature as an establishing operation (EO). McGill (1999) argues that an assessment of EOs is necessary for intervention planning and can be used to explain variability of a behavior in different situations. For example, if a child is given high levels of attention at school but low levels at home, the child may differentially engage in a behavior at different levels in those settings.

O’Reilly et al. (2006) developed presession conditions in which the child was deprived of attention and found the child engaged in higher levels of problem behavior. McComas, Thompson, and Johnson (2003) used presession conditions to create states of deprivation or satiation and found corresponding changes in the rate of attention-maintained behaviors.

To assess whether there is a distinct difference in adult or peer attention, one could conduct presession attention conditions in which the participant is either deprived of all attention, peer attention, or adult attention. If the rate of perseverative speech changed after any of the presession manipulations, this pattern would suggest one type of attention (adult or peer) is more salient than the other. This procedural expansion would allow analysis of whether occurrences of perseverative speech increase in the presence of
a peer or an adult.

**Skill Acquisition vs. Performance Deficit**

The second important piece of information about perseverative speech that was not assessed in the three studies is whether it is a skill or a performance deficit. In general, the absence of a desired behavior (e.g., appropriate speech on a variety of topics) would indicate one of two things; either the child has not acquired the skill (acquisition deficit) or the child chooses not to engage in the skill (performance deficit). Acquisition deficits occur when a child does not have a specific skill in his/her behavioral repertoire needed to obtain a reinforcer (Gresham & Elliot, 1990). Performance deficits are when the child can perform the specific skill, but does not (Gresham, 1997). Within a behavior analytic framework, a skill acquisition deficit can be viewed as a behavior that is not in the child’s response class and a performance deficit is a behavior in the child’s response class but not followed by adequate reinforcement.

A skill acquisition deficit can be identified because the child may lack the skills to complete the task or be unable to complete the task without considerable assistance. This is especially true for social interactions that require the combination of many skills in order to be successful. For example, a child may have the basic skills to initiate a social interaction, such as the ability to physically approach a peer and say the words “hi, how are you?” This same child may lack the more complex skills required to continue an interaction such as knowing when to pause, ask questions, and change the topic. Being unable to complete the more complex skills to initiate an interaction makes this a skill acquisition deficit. Using the same example, the child would have a performance deficit if he/she had the ability to complete the basic and complex skills required to initiate and...
continue an interaction and was able to do so with automaticity, but would only do so in the presence of reinforcement.

The importance of this dichotomy is that it guides the selection of interventions by allowing researchers to specify whether: (a) The student can perform the skill across multiple settings; (b) the student needs assistance or modifications to perform the skill; or (c) the student needs more reinforcement in order to perform the skill. Interventions that target skill acquisition deficits often incorporate the use of stimulus contiguity, task analyses, behavioral rehearsal, video modeling, prompting strategies, and conversation planning. Interventions that target performance deficits often include priming, pairing the appropriate behavior with a reinforcing consequence and the perseverative speech with a punishing consequence (Gresham, 1981).

An experimental assessment of a skill acquisition or performance deficit can be conducted using the same, basic FA framework by adding a contingency reversal condition in which the function of both inappropriate and appropriate behavior is assessed. For example, Roantree and Kennedy (2012) used the traditional FA conditions to assess the function of a student’s perseverative speech. The results of the FA with a contingency reversal found that three of the participants increased appropriate speech when that behavior accessed reinforcement and one participant did not alter appropriate speech. It was concluded that the three participants who altered levels of appropriate speech to access reinforcement had performance deficits and the one participant who did not had a skill acquisition deficit.

By slightly altering procedures, an FA is an assessment tool that can experimentally yield two important pieces of information about perseverative speech—
motivating operations and type of deficit. Both results are important for guiding the
decision on the type of intervention that will most likely decrease perseverative speech
and increase appropriate speech

Rationale for the Current Study

Research has progressed substantially in understanding the role of perseverative
speech in students with HFA (Lord & Schopler, 1989). Assessments and interventions
specifically for perseverative speech and people with HFA would be advantageous
because of the prevalence of perseverative speech with this population; however, there is
currently little research in this area. The first step in developing this area of research is to
identify assessment tools or methodologies. FA is an established assessment technique
that can be modified to assess the operant function of perseverative speech.

Using the same basic FA framework as that found in the problem behavior
literature, three studies have implemented modified FA conditions to identify the function
of perseverative speech (Roantree & Kennedy, 2012; Frea & Hughes, 1997; Rehfeldt &
Chambers, 2003). Identifying the function is an important characteristic of perseverative
speech, but it is not the only information needed. Two other characteristics of
perseverative speech that can aid in intervention planning are (a) whether the behavior is
a skill acquisition deficit or a performance deficit and (b) whether peer or adult attention
differentially affect perseverative speech. Therefore, the purpose of the current study is
to identify whether procedural variations can be made to the existing FA methodology
that can identify both the type of deficit and the motivating operation of the deficit.
Specifically, this study aims to answer the following, two questions:
1. Can FA identify whether perseverative speech is a skill acquisition deficit or a performance deficit by measuring both perseverative speech and appropriate speech?

2. Can the basic FA framework be used to identify the motivating operations of peer or adult attention by including a presession condition in which there were high levels of one type of attention?

The current study used the same, general FA procedures as those used in prior studies of perseverative speech with two, major procedural variations. The literature regarding understanding of perseverative speech is still in its infancy. The goal of the current study is to assess different dimensions of perseverative speech that have thus far remained unstudied, thereby adding to our understanding of this interesting behavior.
CHAPTER III

METHODOLOGY

Participants

There were six participants in this study—three participants with HFA/AS and three typically-developing peers. The participants were grouped into dyads in which one participant with HFA/AS was paired with a same-aged typically-developing confederate peer. All participants attended a public school in the Metro-Nashville Public School (MNPS) system.

Participant Recruitment

Metro nashville autism team. Metro Nashville Public Schools (MNPS) has a team of professionals who work directly with students with ASD. This team consists of five adults who work with students with ASD within every school in MNPS. The first step of the recruitment process was meeting with the members of this team, because of their knowledge of all the students in the system who have an HFA/AS diagnosis. The inclusion criteria and the general parameters of the study were outlined during a one-on-one meeting. These criteria included students who (1) have a diagnosis of HFA/AS in their IEPs, (2) have social-communication goals written in their IEPs, (3) be aged 7-17; (4) engage in perseverative speech as identified by the teacher, and (5) have no history of aggression. During the one-on-one meeting, the Metro Nashville Autism Team identified 7 potential participants who met the inclusion criteria and their classroom teachers.

Participating teachers. The second step of the recruitment process was to contact the principals and teachers of the 7 potential participants via email. The email
included a brief outline of the parameters of the study and the instructions to respond if they were interested in participating or had further questions. Six of the teachers of the identified participants responded that they were interested in learning more about the study. The study coordinator set up a one-on-one meeting with each of the 6 teachers to discuss inclusion criteria and study procedures. Two of the six teachers reported the potential participant with HFA/AS had a minor history of aggression; therefore, these two students were dropped from consideration. The other four teachers confirmed they had students who met the inclusion criteria and they were interested in participating in the study. The study coordinator then read the consent form to these teachers. Once the teachers signed the consent form, the study coordinator moved to the next step in the participant recruitment process.

**Parent consent of participants with AS/HFA.** The participating teacher sent home a consent letter requesting parental permission to screen the student into the study using teacher interview, direct observation, and record review. The letter made it clear the parents could withdraw their consent at any time if they no longer wanted their child to participate. Three of the four consent letters sent home were returned.

**Participant screening.** The next step of the consent process was to confirm that the potential participants engaged in perseverative speech. The study coordinator first reviewed their IEPS to verify they had goals targeting social skills and no goals targeting aggression. Once this was verified for each potential participant, the study coordinator met with the classroom teacher of each potential participant and asked him/her to describe various aspects of the perseverative speech, including a description of the perseverative topic, how often the behavior occurs, and times and activities in which the
behavior is most likely to occur. The last step of the screening process included 3, 30-min observation periods in which the study coordinator observed the participant and recorded instances of the behavior. Observation of each of the three potential participants, confirmed they engaged in speech on the perseverative topics identified by the teacher.

**Typically-developing participants.** When the participant with HFA/AS was screened into the study, the study coordinator again met with the classroom teacher to identify potential confederate peers who (a) were in the same grade or were one grade above/below the participant, (b) shared the same lunch period as the participant, and (c) had no diagnosed disabilities. In these letters the study procedures were outlined and the parents were assured they could withdraw their student from the study at any time.

For the first potential participant, only one peer consent form was returned; therefore the peer who returned the consent form was chosen to participate in the study. For the second and third potential participants, more than one peer consent form was returned. The study coordinator assigned each potential peer a number and used a random number generator to select the potential peer. After this process, three typically-developing peers were chosen as potential participants.

**Participant assent.** Once dyad pairs of potential participants with AS/HFA and typically-developing peers were identified, the final step was to obtain participant assent. The study coordinator met with each potential participant individually and read the assent script. Assent was defined as signing or initialing the assent document and/or verbally agreeing to the assent document. All of the 6 potential participants gave assent to participate in the study.
Participant Description

**Carl and Tory.** The first dyad included the participant, Carl, and a confederate peer, Tory. Carl was a 5th grade male and his IEP stated he was eligible for special education services under the diagnosis of Asperger’s Syndrome. He was included in full-time regular education classes with accommodations and modifications and was academically achieving at the same pace as his peers in all subjects. The only time Carl spent outside of his regular classroom was when he received speech services twice a week for a half hour. Carl also had the speech therapist work with him in the classroom setting twice a week for 30 min. Carl’s IEP goals that targeted social skills included not interrupting others and engaging in reciprocal conversations. Carl’s perseverative speech was defined as any time he made a discrete comment on a restricted topic not related to a current conversation. Carl’s restricted topics included ninjas and karate fighting and the weapons and “moves” common in each. Carl’s appropriate behavior was defined as any discrete comment relating to the topic of conversation. Tory was the typically-developing peer also in the 5th grade. She was not in the same classroom as Carl, but shared a lunch period.

**Pete and Katy.** The second dyad included the participant, Pete, and the confederate peer, Katy. Pete was a 2nd grade male. His IEP stated that he was eligible for special education services under the diagnosis of HFA. Pete was achieving at the same level as his peers in academic subjects but had accommodations and modifications written into his IEP to help with organization and time management. He had goals written into his IEP to target social skills, which included decreasing his voice volume, making eye contact with peers, asking personal questions of peers, and initiating play
with peers. Pete was pulled out of his regular classroom daily for a half hour of speech therapy. Pete’s perseverative speech was defined as any time he made a discrete comment on restricted topics not related to the conversation. Pete’s restricted topics included holidays (Halloween, his birthday, and Thanksgiving) and “other worlds” (i.e. worlds he made up in which inanimate objects came to life). Appropriate behavior was defined as any discrete comment relating to the topic of conversation and not a comment related to his restricted topic. Katy was a typically-developing peer in the same class as Pete.

**Bryan and Freddy.** The third dyad was the participant with AS, Bryan, and his confederate peer, Freddy. Bryan was a 5th grade male and was receiving special education services under the diagnosis of Asperger’s Syndrome. He was academically achieving at the same pace as his peers. He was included in all academic subjects, but was pulled out 30 min a day for speech therapy. Bryan’s IEP goals relating to social skills included asking peers personal questions and making eye contact during conversation. Bryan’s restricted topic included discrete, unrelated animal facts. Bryan’s appropriate behavior was when he would engage in a conversation without including an animal fact. Freddy was the typically-developing peer in Bryan’s class.

**Setting**

All sessions occurred in the students’ school in a 6.5 m by 9 m classroom during the participants’ lunch period. The classroom was familiar to the participants with HFA/AS because it was the room in which they received speech services but was unfamiliar to the typically-developing peers. The students and a research assistant sat at a rectangular table with the research assistant on one side of the table and the two students on the other side of the table. A video camera was placed in the corner of the
room so as to record both the participants and the research assistant throughout the 30 min session.

Initial Training Procedures

Prior to data collection, two, independent observers were trained on both the INTMAN™ (Interval Manager), a computer-assisted data recording system for recording occurrences of perseverative speech, and on hand-made procedural fidelity checklist. Also, the confederate peer was trained on the study procedures of when to provide/restrict attention.

Data collection. Prior to the first observation, the study coordinator and a research assistant became reliable on the data collection system, INTMAN. INTMAN was programmed to divide each session into 10 s intervals and prompt the observer when to record. A partial interval recording system was considered the best method for recording occurrences of perseverative speech because it can capture both the frequency and duration of the behavior. Also, the inclusion of the peer and the choice of conducting the sessions during lunch were intended to create an environment that is more conversational and continuous than discrete. Further, the peers were only instructed to provide or restrict attention and were allowed to interrupt the peer. These variables combined made it difficult to identify discrete statements of perseverative speech, thus making frequency counts and/or durational measures not appropriate. Therefore, partial interval recording was decided to be the most accurate way to collect these data.

The author and research assistant were first trained on using the INTMAN™ system by coding video recordings of a child engaging in perseverative speech. These videos were made for training purposes and a master code file existed in which the exact
intervals of perseverative speech were recorded. The author developed the master code files. This code file was used to check the practice coding sessions of the study coordinator and the research assistant. There were a total of five videos. The master code files for Video 1 and Video 2 were available to the author and the research assistant so they could watch the videos with the code files and discuss any questions about why/when behavior was coded. When both felt comfortable with Video 1 and Video 2, they independently coded Video 3, Video 4, and Video 5. Their data files were checked against the master code file and they were considered reliable when the interobserver agreement (IOA) was 75% or greater on these videos.

Training on FA procedures was conducted using the same five video recordings as those used for coding perseverative speech. There was a master code file of the procedural fidelity for each video that was created by the same senior research member. As before, Video 1 and Video 2 were used just for training and the study coordinator and research assistant had access to the master code file to discuss their scores with one another. The author and research assistant then scored procedural fidelity of Videos 3-5 independently. Researchers were considered reliable when their procedural fidelity was scored with 75% accuracy.

**Confederate peer training.** Prior to the first test session for each dyad, each confederate peer was trained to either provide or restrict attention to the participant contingent upon a prompt by the author. These training sessions were 1:1 with the research assistant and the confederate peer. The training occurred in the same classroom as the test sessions during the confederate peers’ lunch period. The confederate peer was instructed to direct attention to the participant when the research assistant put a hand on
the table in front of the peer and restrict attention when the research assistant removed her hand. The training was 30 min and consisted of direct instruction, modeling, prompting, and guided practice. Freddy and Tory had two initial training sessions and Katy had three. Katy’s extra training session was decided upon by the research assistant and was largely contingent on the fact that Katy was three grade levels younger than Freddy and Tory.

Each confederate peer then practiced providing or restricting attention in informal lunch sessions with the participant and the author. Immediately prior to the start of the session, the author used pre-teaching of the procedures. These sessions were approximately 30 min and occurred in the same classroom as the test sessions. These training sessions were videotaped for later analysis by the study coordinator. The confederate peer was coded to successfully restrict or provide attention if he/she correctly responded to the author’s prompt within 3 s. When the confederate peer was able to successfully restrict/provide attention with 80% accuracy, he/she was considered trained on the procedures. The number of training sessions varied by peer. Katy was trained in 5 sessions, Tory was trained in 3 sessions, and Freddy was trained in 7 sessions.

**Phase 1: Analogue Functional Analysis**

**Research Design**

A mixed multielement, A-B-A design was used for each participant (Kennedy, 2005). In the “A” condition, perseverative speech was reinforced during escape-social, attention-social, and control conditions. In the “B” condition, appropriate social-communicative behaviors (any speech not on the restricted topics) were reinforced during just the attention condition. A multielement design was preferable because it allowed for
a fast-paced assessment of the dependent variable across multiple independent variables (i.e., the social contingency sessions). Due to the quick alteration of independent variables in a multielement design, interaction effects are likely, specifically sequence effects and carryover effects (Hains & Baer, 1992). Sequence effects occur when one condition \( A \) always follows a condition \( B \) which may result in any changes in condition \( B \) to be due to its following \( A \) instead of the actual treatment procedures. To control for the possibility of sequence effects, each condition was randomized so there was no consistent pattern of the social contingency conditions. The second type of interaction effect common in multielement designs is the carryover effect. This effect refers to the interference between social contingency conditions due to the speed at which the conditions are alternated (Hains & Baer, 1992). To control for the carryover effect, 2-min breaks in sessions were programmed into the FA session. A 2-min break between FA conditions was chosen for two reasons. First, there are a number of studies in which a 2-min break was successfully used (Hanley et al., 2003). Second, to ensure the participants did not miss any academic time, the 3 sessions and 2 breaks had to be completed within a 30-min lunch period. These breaks may help control for carryover effects, but does not definitely eliminate them. To be certain carryover effects were not occurring, the study coordinator and two independent observers visually inspected the intervals in which perseverative speech occurred to see if it was consistently occurring at the beginning of a social contingency condition but decreasing quickly as the session concluded. This pattern of responding would indicate that there may be carryover effects. However, responding occurred consistently throughout the session and the senior researcher, the author, and the research assistant agreed it was unlikely that interaction
effects were in place.

The multielement design data was analyzed for response differentiation across social contingency conditions. If response differentiation (i.e., elevated levels of perseverative speech) consistently occurred in one of the social contingency conditions, this information was used to create hypotheses regarding the functions of participants’ perseverative speech.

An A-B-A design was also used to assess the contingency reversal from providing attention consequent on perseverative speech to appropriate speech. Although A-B-A designs are often considered measures of baseline (A) and treatment (B), in this study the A condition was when perseverative speech was reinforced and the B condition was when appropriate speech was reinforced. A difference between the A and B conditions suggested perseverative speech was a performance deficit, whereas no difference suggested perseverative speech was a skill deficit.

**Perseverative Speech Reinforced Conditions (A condition)**

In the escape-social condition, the author asked the participant questions or commented on the existing conversation once every 15 s throughout the 10 min session. Examples of the types of questions or comments made included age-appropriate topics, such as weekend activities, favorite school subjects, hobbies, etc. Every 15 s, the author also signaled to the confederate peer to provide attention by placing her hand on the table in front of the peer (as outlined in the peer training section). If the peer did not immediately provide attention, the author prompted the peer by asking probing questions, such as: “Is that your favorite subject too?; Have you ever done that?; or what do you think of that?” If the participant with AS engaged in perseverative speech, the author
would remove her hand from the table in front of the confederate peer. This action would signal to the peer to remove attention from the participant and engage only with the author. The author and the confederate peer would then address conversation only to each other for 30 s. All attempts by the participant of appropriate speech or perseverative speech were ignored. At the end of the 30-s interval, the author would again address the participant with an age-appropriate topic of conversation not related to his/her restricted interest. If the participant did not engage in perseverative speech, the author, peer and participant continued to interact with one another.

In the **attention-social** condition, the author addressed age-appropriate conversation topics only to the confederate peer throughout the 10-min session. Topics were similar to those in the escape-social condition. If the participant engaged in perseverative speech, the author signaled to the confederate peer to direct the conversation to the participant. If the confederate peer did not respond to the participant within 3 s, the author would ask the peer a probing question about the target student’s restricted interest. The confederate peer and the author then engaged in conversation on the participant’s restricted interest for 30 s. At the end of the 30 s, the author signaled to the peer to remove his/her attention from the participant and reintroduced an age appropriate conversational topic to the peer.

In the **control** condition, both the participant and the confederate peer were instructed to spend 10-min eating lunch without talking. They were allowed to ask the author for help with any lunch items, but the author ignored all other attempts at interaction. If the students tried to interact with each other, the author instructed the participants to be quiet so she could work. In the prior three studies using FA to assess
the function of perseverative speech, two types of control conditions were implemented. The first was to provide the participant with unlimited access to preferred items/activities (Rehfeldt & Chambers, 2003 & Roantree & Kennedy, 2012) and the other was to provide noncontingent attention on a fixed interval schedule (Frea & Hughes, 1997). Both of these methods controlled for the effects of negative reinforcement, by removing social demands from the condition and for the effects of positive reinforcement by either providing no attention or fixed interval attention. The decision to provide no attention in this condition was reached to more closely mirror the natural environment. It was common for students to be told to stop talking and eat their lunch quietly while they were in the actual lunchroom with their peers.

**Appropriate Speech Reinforced Condition (B condition)**

In the Appropriate Speech Reinforced Condition, the same escape-social, attention-social, and control conditions were implemented in the same way as the Perseverative Speech Reinforced Condition. The only difference was that the contingency was reversed so that reinforcement was provided for appropriate speech rather than perseverative speech.

**Interobserver Agreement**

Interobserver agreement (IOA) refers to the extent to which two or more observers agree on the occurrences and nonoccurrences of a behavior (Suen & Ary, 1989). To collect IOA, a second, author independently watched the videotapes of at least 33% of the sessions in Phase 1 of the study to calculate inter-observer agreement (IOA). The number of sessions changed across participant, so the general rule of collecting IOA on 33% of the sessions was used, but the percent for each participant varied. This is
outlined in Table 2. Relatively frequent checks of IOA were conducted to minimize the threat of observer bias or drift.

IOA was calculated interval-by-interval in which an interval was coded as either “agree” or “disagree.” Then, the total occurrence of “agreements” was divided by the total occurrence of “agreements plus disagreements” (i.e., agreements/(agreements + disagreements)) and multiplied by 100. The results for IOA for each code are provided in Table 3. The range of IOA was 76% to 92% and the overall average across all sessions was 86%.

**Procedural Fidelity**

Procedural fidelity was measured in each condition of Phase 1 to ensure the study procedures occurred as reported. A second observer (trained on scoring procedural fidelity in FA sessions) scored the study procedures in approximately 33% of the first A condition, 33% of the B condition, and 33% of the second A condition to measure the IOA. Again, because the number of sessions varied by participant, the general rule was to code procedural fidelity for 33% of the sessions. The rubric and the IOA of procedural fidelity for each participant is depicted in Table 4.

Prior to the study, the rule was set that if an independent observer codes treatment integrity below 85% for any of the sessions, the author and peer would be retrained on the study procedures. During the study, procedural fidelity never dropped below 85% across two, consecutive sessions.

**Data Analysis**

The study coordinator used the INTMAN computer-based program to analyze the data each FA session. Data was inputted into an Excel file and graphed daily. The senior
researcher, author, and research assistant used visual discrimination to determine whether there was differentiation in perseverative speech between each of the FA conditions.

When all three members of the research team agreed that data differentiation had occurred, the study coordinator would either move on the Phase 2 of the study with a participant or end the participant’s involvement in the study, delineating the role of peer or adult attention. In order for a participant to move from the A condition to the B condition, response patterns need to indicate higher levels of perseverative speech occur the attention-social condition than the control or escape-social conditions because in order to assess variations in the type of attention, attention must be the maintaining consequence. The participant was deemed not suitable for the B condition in the following circumstances: (a) If there was not data differentiation after 10 data points have been collected; (b) the independent observers did not agree on the function of the behavior after 10 data points have been collected; or (c) if the differentiation occurred such that higher levels of perseverative speech occurred in the escape social or control conditions.

The three independent researchers agreed that all three of the participants engaged in perseverative speech to access peer/adult attention and were continued to Phase 2 of the study.

**Phase 2: Analysis of Presection Attention**

In the second phase of the study, a multielement design was used to assess the effects of no presection attention, presection peer attention, and presection adult attention on each participant’s perseverative speech. Phase 2 began less than a week after Phase 1 concluded. Many aspects of Phase 1 of the study remained constant in Phase 2,
specifically (a) the classroom where the sessions occur; (b) the participants and confederate peers; (c) the person conducting the sessions; and (d) the time of the sessions.

Phase 2 of this study differed from Phase 1 in that it included a 10-min presession condition occurring immediately prior to running the attention-social condition of the FA session. The attention-social condition was the only FA condition run, because Phase 1 had identified that for the three participants, perseverative speech functioned to access attention (see Results section). The attention-social condition mirrored the attention-social condition of Phase 1 of the study. The author addressed age-appropriate conversation topics only to the confederate peer throughout the 10-min session. If the participant engaged in perseverative speech, the author signaled to the confederate peer to direct the conversation to the participant. If the confederate peer did not respond to the participant within 3 s, the author would ask the peer a probing question about the participant’s restricted interest. The confederate peer and the author then engaged in conversation on the participant’s restricted interest for 30 s. At the end of the 30 s, the author signaled to the peer to remove his/her attention from the participant and reintroduced an age-appropriate conversational topic to the peer.

The presession conditions were randomly assigned as either (a) no attention, (b) peer attention, or (c) adult attention, but only one presession condition was conducted in a day. As in Phase 1, each presession condition and each attention-social condition were videotaped for later analysis.

**Presession no-attention condition.** In this condition, the author instructed the dyad to eat lunch quietly at the table. As before, they could ask the author for help with
lunch items, but if either the peer or the participant engaged in other conversation, the author reminded them to eat quietly. Both the peer and author ignored all comments made by the participant on the restricted topic.

**Presession peer attention condition.** In this condition, the author told the dyad that she needed to do some work for the first 10 min of lunch, but they could talk to each other. The peer was instructed to respond to all instances of comments on a restricted topic. If 15 s passed and the participant did not mention the restricted topic, the author would ask the peer a probing question about the restricted topic then go back to work.

**Presession adult attention condition.** In this condition, the author instructed the dyad that today the peer had to quietly eat his/her lunch and could not interact for the first 10 min. The author instructed the peer to ignore all comments made by the author and the participant. The author then interacted only with the participant, by providing attention each time the participant discussed the restricted topic. If the participant did not mention the restricted topic for 15 s, the author reintroduced the topic.

**Interobserver Agreement**

A second research assistant independently watched the videotapes of at least 33% of the sessions of the presession attention conditions and 33% of the attention-social conditions to determine interobserver agreement (IOA). IOA was calculated using the same interval-by-interval system used in Phase 1, in which, the total occurrence of “agreements” was divided by the total occurrence of “agreements plus disagreements” (i.e. agreements/(agreements + disagreements)) and multiplied by 100. The results for IOA for each code are provided in Table 5. The range of IOA was between 79% and 90% and the overall average was 83%.
Procedural Fidelity

Procedural fidelity was measured in both the presession attention conditions and the attention-social conditions ensure that the study procedures occurred as reported. A second observer (trained on scoring procedural fidelity in FA sessions) scored the study procedures in approximately 33% of each condition. The procedural fidelity rubric for the study procedures and IOA for specific steps is depicted in Table 6.

Data Analysis

The study coordinator used the INTMAN computer-based program to analyze the data each day. Data was inputted into an Excel file and graphed daily. The study coordinator and two, independent senior members of the research team with high levels of experience with making data decisions from graphs used visual discrimination to determine whether there was differentiation in perseverative speech between each of the FA conditions. Once all three members of the research team agreed that data differentiation had occurred, the participant was finished with the study.
CHAPTER IV

RESULTS

Results of Phase 1: FA of Perseverative Speech

Dyad 1: Carl and Tory

In Figure 1, results represent percent of the FA session in which Carl engaged in perseverative speech. In Condition A, Carl’s perseverative speech was reinforced. Carl engaged in high levels of perseverative speech in the attention-social condition (M=28%) compared to the control condition (M=1.50%) and the escape-social condition (M=6.25%). In Condition B, the contingency was reversed and Carl’s appropriate behavior was reinforced. Carl engaged in lower levels of perseverative speech in the attention-social condition (M=7.67%), relatively higher levels in the escape-social condition (M=21.67%), and similar levels in the control condition (M=2.67%). When the contingency was reversed back in the second Condition A, the initial pattern of responding re-emerges: attention-social (M=28.33%), escape-social (M=5.33%), and control (M=2.67%).

In Figure 2, results represent the percent of the session in which Carl engaged in appropriate speech. Figures 1 and 2 are reciprocal graphs of the same FA session. Therefore, Condition A represents Carl’s appropriate speech in conditions when perseverative speech was reinforced. Appropriate behaviors occurred at low rates during the control condition (M=2%); and somewhat higher levels during the escape-social condition (M=11.50%) and attention-social (M=10.75%). In Condition B, the contingency was reversed and appropriate behaviors were reinforced. In this condition, levels of appropriate behavior remained stable in the control condition (M=1%).
increased in the attention-social condition ($M=22.67\%$), and decreased in the escape-social condition ($M=9.67\%$). In the second Condition $A$, the contingency was reversed back and perseverative speech was once again reinforced. The pattern of responding was similar as in the first Condition $A$: attention-social ($M=11\%$), control ($M=1\%$), and escape-social ($M=12.33\%$). These data indicate that Carl’s perseverative speech and appropriate speech were maintained by access to attention. Further, because Carl engaged in appropriate social behaviors throughout the AFA sessions, it can be assumed that appropriate social behaviors are in his skill repertoire. This configuration shows that Carl's perseverative speech was due to a performance deficit, as opposed to a skill deficit.

**Dyad 2: Pete and Katy**

Pete’s results are presented in Figures 3 and 4. Figure 3 shows the percent of the session in which Pete engaged in perseverative speech and Figure 4 represents the percent of the session Pete engaged in appropriate speech. In the first $A$ condition of Figure 3, Pete engaged in high levels of perseverative speech in the attention-social condition ($M=43\%$) compared to the control condition ($M=1.67\%$) and the escape-social condition ($M=14.5\%$). In the $B$ condition when appropriate behavior was reinforced, Pete engaged in lower levels of perseverative speech in the attention-social condition ($M=21\%$) and relatively stable levels in the control condition ($M=1.33\%$) and escape-social condition ($M=14\%$). In the second $A$ condition, the initial pattern of behavior reemerged with Pete engaging in the highest levels of perseverative speech in the attention-social condition ($M=31\%$), and lower levels in the escape-social condition ($M=8.67\%$) and the control condition ($M=6.33\%$).

Figure 4 shows the percent of the session in which Pete engaged in appropriate
speech. In the first \( A \) condition of Figure 4, Pete engaged in slightly higher levels of appropriate speech in the attention-social condition \((M=12.25\%)\) compared to the control condition \((M=4.75\%)\) and the escape-social condition \((M=7.50\%)\). In the \( B \) condition when appropriate behavior was reinforced, Pete engaged in higher levels of appropriate speech in the attention-social condition \((M=26.67\%)\) and relatively stable levels in the control condition \((M=3\%)\) and lower levels in the escape-social condition \((M=6.67\%)\). In the second \( A \) condition, the initial pattern of behavior reemerged with Pete engaging in lower levels of perseverative speech in the attention-social condition \((M=17.67\%)\) and higher levels in the escape-social condition \((M=12.33\%)\) and similar levels in the control condition \((M=3\%)\). These data indicate Pete’s perseverative speech and appropriate speech were maintained by access to attention. Further, because Pete engaged in appropriate social behaviors throughout the AFA sessions, it can be assumed that appropriate social behaviors are in his skill repertoire; therefore, Pete’s perseverative speech was due to a performance deficit, as opposed to a skill deficit.

**Dyad 3: Bryan and Freddy**

Bryan’s data are represented in Figures 5 and 6. Figure 5 represents the percent of intervals of perseverative speech and Figure 6 the percent of intervals of appropriate behavior. In Condition \( A \) of Figure 5, Bryan's perseverative speech was reinforced. Bryan engaged in high levels of perseverative speech in the attention-social condition \((M=18.2\%)\) compared to the control condition \((M=2.5\%)\) and the escape-social condition \((M=8.4\%)\). In Condition \( B \), the contingency was reversed and Bryan’s appropriate behavior was reinforced. Bryan engaged in lower levels of perseverative speech in the attention-social condition \((M=9\%)\), similar levels in the control condition \((M=1.8\%)\) and
the escape social condition ($M=8.7\%$). When the contingency was reversed in the second Condition $A$, the initial pattern of responding re-emerged: attention-social ($M=20.6\%$), escape-social ($M=3.5\%$), and control ($M=3\%$).

Figure 6 shows the percent of the session in Bryan engaged in appropriate speech. Condition $A$ represents reinforcement of perseverative speech. Appropriate behaviors occurred at low rates during the control conditions ($M=1\%$) and similar levels during the attention-social ($M=7\%$) and the escape social condition ($M=9.4\%$). In Condition $B$, the contingency was reversed and appropriate behaviors were reinforced. In this condition, levels of appropriate behavior remained stable in the control condition ($M=0\%$), and remained somewhat constant in the escape-social condition ($M=10.3\%$) and the attention-social condition ($M=6\%$). In the second Condition $A$, the contingency was reversed again and perseverative speech was once again reinforced. The pattern of responding was similar as in the first Condition $A$: attention-social ($M=10\%$), control ($M=1\%$), and escape-social ($M=13\%$). These data indicate that Bryan’s perseverative and appropriate speech are both reinforced by access to attention. Further, because Bryan engaged in appropriate social behaviors throughout the AFA sessions, it can be assumed that appropriate social behaviors are in his behavioral repertoire. This configuration suggests that Bryan’s perseverative speech was due to a performance deficit as opposed to a skill deficit.

**Results of Phase 2: Analysis of Presession Attention**

**Dyad 1: Carl and Tory**

The results of the presession attention conditions for Carl, shown in Figure 2, represent the occurrence of perseverative speech in the attention social condition.
following each of the three presession conditions: no attention, peer attention, and adult attention. Carl engaged in high levels of perseverative speech when he had no access to presession attention ($M=24\%$) and similar levels when there was peer attention ($M=6\%$) and adult attention ($M=8.4\%$). The clear differentiation between the no attention condition and either of the attention conditions suggests the initial hypothesis that perseverative speech was maintained by attention was accurate. By creating deprivation for perseverative speech in the presession no attention condition, Carl engaged in considerably higher levels of perseverative speech in the following attention social condition. There was little differentiation of occurrences of perseverative speech, however, between the peer attention and adult attention presession conditions. This pattern of responding suggests one type of attention (adult or peer) is not more salient than the other.

**Dyad 2: Pete and Katy**

The results of the presession attention conditions for Pete are represented in Figure 8. Pete engaged in the highest levels of perseverative speech following the no attention presession condition ($M=32.67\%$), lower levels following the adult attention presession conditions ($M=18.45\%$) and the lowest levels following the peer attention presession conditions ($M=13\%$). Pete’s data also corroborates the hypothesis that his perseverative speech was maintained by access to attention, because his highest levels of perseverative speech occurred following no attention presession conditions. Pete had slightly lower levels of perseverative speech following the peer attention presession condition, which suggests peer attention may be more salient than adult attention.

**Dyad 3: Bryan and Freddy**
The results of the presession attention conditions for Bryan are represented in Figure 9. Bryan’s data has clear differentiation with perseverative speech occurring most often after the no attention presession condition ($M=21.8\%$), at lower levels after the teacher attention presession condition ($M=13.8\%$) and the lowest levels after the peer attention presession condition ($M=3.5\%$). This pattern of responding suggests that peer attention is more salient than adult attention for Bryan.

**Discussion**

Overall, this study extends the field’s knowledge of FAs by adapting current FA methodology to identify the type of deficit and potential EOs for perseverative speech. Perseverative speech has been identified as a defining characteristic of people with HFA/AS (Lord & Schopler, 2004). However, there is a lack of evidence-based assessment tools to identify relevant characteristics of this behavior. The current study adds to the small literature base that shows an FA can be used to assess the maintaining function of perseverative speech. In the assessment of function, Carl, Bryan, and Pete’s perseverative speech was maintained by access to attention. This was evidenced by the increased percent of occurrences of intervals of perseverative speech in the attention-social condition and the fewer occurrences of perseverative speech in the escape-social and control conditions when perseverative speech was reinforced. These findings are consistent with past research on using FAs to assess the function of perseverative speech, because in the three previous studies, each participant engaged in perseverative speech to access attention as a positive reinforcer (Frea & Hughes, 1997; Rehfeldt & Chambers, 2003; Roantree & Kennedy, 2012).

The FA conditions were also able to identify whether a behavior was a skill
deficit or a performance deficit based on student responding during the contingency reversal. Carl, Bryan, and Pete's data all indicate a performance deficit because they all altered both the frequency of perseverative speech and the frequency of appropriate speech to correspond with access to attention. This finding is particularly useful because most FA methodologies typically only record the frequency of inappropriate behaviors (Hanley et al., 2003). The addition of recording of frequency of appropriate behaviors allows an intervention to incorporate the operant function of both types of behaviors. In the current study, perseverative speech and appropriate speech are in the same response class of behaviors emitted for access to attention. Knowing this, the program recommendations for the participants did not include a teaching component (as would be necessary for a skill deficit); rather they included matching the rate of reinforcement to the rate of appropriate behavior and withholding reinforcement for perseverative speech.

Finally, the current study incorporated presession attention conditions to identify whether peer or adult attention was more salient for each participant. This is an important addition to the literature base, because it identifies whether peer and teacher attention are functionally equivalent or whether they serve as a unique form of positive reinforcement. The procedural variations in the current study correspond to previous studies on attention as an EO (McComas, Thompson, & Johnson, 2003). The nuanced role of peer or adult attention was determined by assessing whether levels of perseverative speech occurred at differentially different levels following presession conditions of either no attention, peer attention, or adult attention. The data suggest peer attention is more salient for Bryan, but peer and adult attention were equally salient for Pete and Carl. This analysis of the potential EOs of peer or adult attention is an
important part of the assessment process (McGill, 1999). Establishing operations can explain variability in reported levels of perseverative speech. An intervention that is only in place when the participants do not have access to peers will likely not show the same effects as an intervention that is in place when peers are present. Further, an assessment of the EO allows the researcher to identify a more potent reinforcer for appropriate behavior.

Another important aspect of the current study is that it was adapted in such a way that it could be used in a somewhat, natural setting. Most FA studies have been conducted in hospital or inpatient facilities (Hanley et al., 2003). Although this allows for good experimental control, a contrived environment can lack the important discriminative stimuli necessary to occasion the behavior (Lang et al., 2008). In the current study, we attempted to recreate these stimuli by conducting the FA during lunch (a time known for social interactions), with peers the student is likely to see around school and with which the person is likely to interact, without sacrificing the precise manipulation of discriminative stimuli.

**Limitations and Future Directions**

The results from the present study should be considered with the following limitations in mind. First, the choice of the data collection was partial interval to account for the percent of a session during which the participant engaged in perseverative speech; however, partial interval does not allow for an identification of whether the participant made a short, discrete comment in the 10 s interval period or discussed the restricted topic for the entire interval. In prior studies on FA and perseverative speech, each study used a slightly different measurement system. For example, Roantree and Kennedy
(2012) used a partial interval coding system; Rehfeldt and Chambers (2003) used an inter-response time of discrete statements 3 s of the prior statement; and Frea and Hughes (1997) used an inter-response time of 5 s. Although measurement systems are often best decided on an individual basis, future work in this area would benefit from an analysis on the most accurate method of measuring perseverative speech.

A second limitation is how the peer was recruited and chosen for the study. As discussed above, a consent form was sent home to all peers who shared a lunch period with the participant and was in the same grade or one grade above/below the participant. This method did not account for a potential established reinforcement history the participant and the peer may have had with one another. For example, it was noted anecdotally that Bryan and Freddy were described as “friends,” because they had played at one another’s houses and attended each other’s birthday parties. Bryan’s data suggested that peer attention was more salient to Bryan, but it could be that Freddy’s attention would be more salient than another peer and an intervention just targeting peer attention in general would not be as effective as an intervention targeting Freddy’s attention. Alternately, Carl and Tory and Pete and Katy had very little interactions with one another outside of the FA conditions. Carl and Pete both showed no preference in peer or adult attention; however, if the peer had been a preferred peer (as was the case with Bryan and Freddy), their levels of responding after the presession conditions may have been different. It would be interesting for future researchers to identify whether a student responds differently for a preferred peer over a neutral peer and the most effective way to identify this.
A third limitation is with the assessment of skill acquisition versus performance deficit. Because all three participants engaged in appropriate speech in all conditions and increased appropriate speech when appropriate speech was reinforced, it was reasonable to conclude that the participants had the skills necessary to engage in appropriate speech; therefore indicating a performance deficit. However, there remains the option that there are aspects of typical conversational turns (such as attempts to change the subject, diverting attention, facial expressions of exasperation, etc.) that signal to change topics with which the participants were unaware. The nature of perseverative speech complicated this assessment, because there are occasions when conversing about the restricted topic is appropriate and times when it is not. Simply being able to engage in appropriate speech does not show that the participants knew how to read social cues about when the restricted topic is appropriate and when it is not. One way to test whether this is the case is to put in place a function-based intervention that focuses on performance deficits or skill acquisition deficits. The goal of the current study was to take an initial step toward the assessment of different dimensions of perseverative speech, but future research should continue this initial work by pairing it with a function-based intervention.

Summary

Perseverative speech has been identified as a significant source of disruption in the lives of individuals with HFA by impairing typical social relations. The current study sought to modify an existing assessment of operant behavior to assess the function, type of deficit, and establishing operations of perseverative speech of three elementary-aged students. Results suggested all three participants engaged in perseverative speech to
access attention and were performance as opposed to skill acquisition deficits. Further, one participant responded differentially to peer attention than adult attention and two showed no differences. This study successfully modified current assessment techniques to identify aspects of perseverative speech that should be considered when developing an intervention. It represents a step in the young field of perseverative speech and HFA research.
REFERENCES


of clinical diagnoses and those made according to the ICD-10 and DSM-IV.

Table 1.

*Participant Descriptions*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Diagnosis</th>
<th>Typical Peer</th>
<th>Perseverative Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carl</td>
<td>Asperger’s Syndrome</td>
<td>Tory</td>
<td>Ninjas and karate</td>
</tr>
<tr>
<td>Pete</td>
<td>High-functioning Autism</td>
<td>Katy</td>
<td>Holidays and “other worlds”</td>
</tr>
<tr>
<td>Bryan</td>
<td>Asperger’s Syndrome</td>
<td>Freddy</td>
<td>Animal facts</td>
</tr>
</tbody>
</table>
Table 2.

*Interobserver Agreement of Phase 1: FA of Perseverative Speech*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Condition</th>
<th>Agree</th>
<th>Disagree</th>
<th>Occurrence Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bryan</td>
<td>Attention-social</td>
<td>156</td>
<td>24</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>Escape-social</td>
<td>159</td>
<td>21</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>166</td>
<td>14</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>481</td>
<td>59</td>
<td><strong>0.89</strong></td>
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<td>Pete</td>
<td>Attention-social</td>
<td>148</td>
<td>32</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Escape-social</td>
<td>137</td>
<td>43</td>
<td>0.76</td>
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<tr>
<td></td>
<td>Control</td>
<td>165</td>
<td>15</td>
<td>0.92</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td>450</td>
<td>90</td>
<td><strong>0.83</strong></td>
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<tr>
<td>Carl</td>
<td>Attention-social</td>
<td>159</td>
<td>21</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>Escape-social</td>
<td>165</td>
<td>15</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>171</td>
<td>9</td>
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<td><strong>Total</strong></td>
<td>495</td>
<td>45</td>
<td><strong>0.92</strong></td>
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Table 3.

*Interobserver Agreement of Phase 2: Analysis of Presession Attention*

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<th>Participant</th>
<th>Condition</th>
<th>Agree</th>
<th>Disagree</th>
<th>Occurrence Agreement</th>
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<tr>
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<td>No Attention</td>
<td>106</td>
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<td>Peer Presession</td>
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<td>25</td>
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<td><strong>Total</strong></td>
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<td>61</td>
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<tr>
<td>Pete</td>
<td>No Attention</td>
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<td>80</td>
<td>0.83</td>
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<td></td>
<td>Peer Presession</td>
<td>156</td>
<td>84</td>
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<td>Adult Presession</td>
<td>153</td>
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<td><strong>Total</strong></td>
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<td>251</td>
<td><strong>0.80</strong></td>
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<tr>
<td>Carl</td>
<td>No Attention</td>
<td>108</td>
<td>12</td>
<td>0.90</td>
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<td>Peer Presession</td>
<td>104</td>
<td>16</td>
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<td>Adult Presession</td>
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<td><strong>Total</strong></td>
<td>312</td>
<td>48</td>
<td><strong>0.87</strong></td>
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Table 4.

Procedural Fidelity of Perseverative Speech

<table>
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<th>Procedure</th>
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<th>No</th>
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<tr>
<td>Can you see both participants and the research assistant throughout session?</td>
<td>100%</td>
<td>0%</td>
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<tr>
<td>Did the research assistant identify the condition?</td>
<td>100%</td>
<td>0%</td>
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<tr>
<td>Did the research assistant conduct only one FA session a day?</td>
<td>100%</td>
<td>0%</td>
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<tr>
<td>Were the sessions 10 min?</td>
<td>100%</td>
<td>0%</td>
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<tr>
<td>Was there a 2 min break between conditions?</td>
<td>90%</td>
<td>0%</td>
</tr>
<tr>
<td>Did the research assistant ask the participant a question every 15 s?</td>
<td>92%</td>
<td>8%</td>
</tr>
<tr>
<td>Was the question age appropriate?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Did the research assistant signal to the peer to provide attention?</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>Did the peer provide attention within 3 s of the prompt?</td>
<td>85%</td>
<td>15%</td>
</tr>
<tr>
<td>If no, did the research assistant ask the peer a follow-up question?</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>When perseverative speech occurred, did the research assistant remove her hand?</td>
<td>94%</td>
<td>6%</td>
</tr>
<tr>
<td>Did the peer remove attention within 3 s of the prompt?</td>
<td>87%</td>
<td>13%</td>
</tr>
<tr>
<td>If no, did the research assistant ask the peer a follow-up question?</td>
<td>94%</td>
<td>6%</td>
</tr>
</tbody>
</table>

65
<table>
<thead>
<tr>
<th>Attention-social</th>
<th>Did the research assistant begin the session by addressing only the peer in conversation?</th>
<th>100%</th>
<th>0%</th>
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<tbody>
<tr>
<td></td>
<td>Was the conversation age appropriate?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant signal to the peer to restrict attention?</td>
<td>91%</td>
<td>9%</td>
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<tr>
<td></td>
<td>Did the peer provide attention only to the research assistant?</td>
<td>86%</td>
<td>14%</td>
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<td></td>
<td>When the participant engaged in perseverative speech, did the research assistant signal to the peer to provide attention?</td>
<td>92%</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Did the peer provide attention within 3 s of the prompt?</td>
<td>86%</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>If no, did the research assistant ask the peer a follow-up question?</td>
<td>95%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Did the participant, peer and research assistant engage in perseverative speech for 30 s?</td>
<td>98%</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>After 30 s, did the research assistant signal to the peer to remove attention?</td>
<td>94%</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>Did the peer remove attention within 3 s of the prompt?</td>
<td>85%</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>If no, did the research assistant ask the peer a follow-up question?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant and the peer engage in conversation without the participant for 30 s?</td>
<td>94%</td>
<td>6%</td>
</tr>
<tr>
<td>Control</td>
<td>Did the research assistant prompt the participants to eat lunch quietly?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------------</td>
<td>------</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant tell the participants they could ask for help on lunch items</td>
<td>96%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>If the participant or peer spoke, did the research assistant redirect them to eat quietly?</td>
<td>94%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Table 5.

*Procedural Fidelity of Appropriate Speech*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Procedure</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td>Can you see both participants and the research assistant throughout session?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant identify the condition?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant conduct only one FA session a day?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Were the sessions 10 min?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Was there a 2 min break between sessions?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Escape-social</strong></td>
<td>Did the research assistant ask the participant a question every 15 s?</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Was the question age appropriate?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant signal to the peer to provide attention?</td>
<td>96%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>Did the peer provide attention within 3 s of the prompt?</td>
<td>86%</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>If no, did the research assistant ask the peer a follow-up question?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>When appropriate speech occurred, did the research assistant remove her hand?</td>
<td>96%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>Did the peer remove attention within 3 s of the prompt?</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>If no, did the research assistant ask the peer a follow-up question?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant and the peer engage in conversation without the participant for 30 s?</td>
<td>92%</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Attention-social</strong></td>
<td>Question</td>
<td>Yes (%)</td>
<td>No (%)</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Did the research assistant begin the session by addressing only the peer in conversation?</td>
<td>100%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Was the conversation age appropriate?</td>
<td>100%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Did the research assistant signal to the peer to restrict attention?</td>
<td>88%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Did the peer provide attention only to the research assistant?</td>
<td>86%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>When the participant engaged in appropriate speech, did the research assistant signal to the peer to provide attention?</td>
<td>94%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Did the peer provide attention within 3 s of the prompt?</td>
<td>86%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>If no, did the research assistant ask the peer a follow-up question?</td>
<td>94%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Did the participant, peer and research assistant engage in appropriate speech for 30 s?</td>
<td>92%</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>After 30 s, did the research assistant signal to the peer to remove attention?</td>
<td>96%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Did the peer remove attention within 3 s of the prompt?</td>
<td>96%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>If no, did the research assistant ask the peer a follow-up question?</td>
<td>88%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Did the research assistant and the peer engage in conversation without the participant for 30 s?</td>
<td>94%</td>
<td>6%</td>
<td></td>
</tr>
</tbody>
</table>
Table 5. *(Continued)*

<table>
<thead>
<tr>
<th>Control</th>
<th>Did the research assistant prompt the participants to eat lunch quietly?</th>
<th>100%</th>
<th>0%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Did the research assistant tell the participants they could ask for help on lunch items</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>If the participant or peer spoke, did the research assistant redirect them to eat quietly?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Condition</td>
<td>Procedure</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>------</td>
<td>-----</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td>Can you see both participants research assistant throughout session?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant identify the condition?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant conduct only one presession condition session a day?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Was the presession condition 10 min?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the attention social condition follow the presession condition?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Was there a 2-min break between the presession condition and the attention social condition?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Peer Presession Attention</strong></td>
<td>Did the participant and the peer interact throughout the entire 10 min session?</td>
<td>87%</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>Did more than 15 s pass without discussion of the restricted topic?</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant prompt discussion of the restricted topic if more than 15 s passed without discussion of the topic?</td>
<td>94%</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant interact with the peer or participant during times other than prompting discussion of the restricted topic?</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 6. Continued

<table>
<thead>
<tr>
<th>Adult Presession Attention Condition</th>
<th>Did the research assistant interact with the participant throughout the entire 10 min session?</th>
<th>100%</th>
<th>0%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Did the research assistant prompt discussion of the restricted topic if more than 15 s passed without discussion of the topic?</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>Presession No Attention Condition</td>
<td>Did the research assistant prompt the participants to eat lunch quietly?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Did the research assistant tell the participants they could ask for help on lunch items</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>If the participant or peer spoke, did the research assistant redirect them to eat quietly?</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Figure 1. Percent of intervals of appropriate speech for Carl.

Figure 2. Percent of intervals of perseverative speech for Carl.
Figure 3. Percent of intervals of perseverative speech following presession attention conditions
**Figure 4:** Percent of intervals of appropriate speech for Pete.

**Figure 5.** Percent of intervals of perseverative speech for Pete.
Figure 6. Percent of intervals of perseverative speech following presession conditions.
**Figure 7.** Percent of intervals of appropriate speech for Bryan.

**Figure 8.** Percent of intervals of perseverative speech for Bryan.
Figure 9. Percent of intervals of perseverative speech following presession conditions for Bryan.