The Use of Chaining and Visual Prompts to Increase Engagement of a Child with Asperger’s Syndrome
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Abstract

Children with Autism Spectrum Disorder (ASD) and Asperger’s Syndrome (AS) face a number of challenges in the classroom. In particular, children with ASD/AS commonly have difficulty engaging their attention to educators giving requests or demands. The inability to engage one’s attention to a speaker may interfere with the development of both appropriate classroom behaviours and social skills. In a specialized classroom for high functioning children, developing and implementing strategies to increase engagement in children with ASD/AS is essential to ensure that children acquire the academic and interpersonal skills needed to meet the ultimate goal of transitioning to a regular classroom environment. The purpose of this thesis is to examine whether the use of chaining and visual prompts is effective in increasing the engagement of a child with AS. Engagement was measured by both the number of prompts needed to comply with a task when requested and the average length of time needed to comply. Results indicated a 73% decrease in the average length of time to comply and a 50% decrease in the number of prompts per task.
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Chapter I: Introduction

“Engagement has been identified as an essential ingredient in programs for young children with Autism” (Ruble & Robson, 2006). The National Research Council (2001) defines engagement as “sustained attention to an activity or a person” (Ruble & Robson, 2006). It is necessary to be engaged when an individual is speaking in order to clearly understand what the speaker is saying, give verbal responses to questions asked by the speaker, and comply with requests given by the speaker. However, a child with disabilities such as autism or Down’s syndrome may have difficulty engaging, making it difficult at times to give direction and make requests of the child in the classroom (Ruble & Robson, 2006). Engagement is believed to be related to both internal child factors (such as diagnosis or temperament) and environmental factors. Because the child’s environment is thought to play a role in their engagement, there is evidence that instructional strategies within the child’s environment can influence engagement (Ruble & Robson, 2006). This study will examine whether the use of a chain of requests and corresponding visual prompts will improve the engagement of a 10-year-old boy with Asperger Syndrome.
Chapter II: Literature Review

As the number of children diagnosed with Autism Spectrum Disorder (ASD) or Asperger’s Syndrome (AS) increases, the number of children in the public school system needing specialized classroom instruction increases as well (Banda & Kubina, 2006). This is because children diagnosed with ASD/AS display very distinctive behaviours, commonly hindering success in the classroom (Goodman & Williams, 2007). Some of these behaviours include difficulty engaging, transitioning, and processing auditory stimuli.

Engagement

Many children with ASD (Autism Spectrum Disorder) have difficulty initiating attention to classroom activities, maintaining attention once initiated and processing information from the environment around them (Carnahan, Rao, & Bailey, 2009). The broad range of behaviours included in the autism spectrum create less opportunity for students with ASD to learn, as they are often less engaged during instruction (Carnahan, Rao, & Bailey, 2009). This lack of engagement can be seen in the fixation on movement of objects in the classroom, and attending to other forms of visual stimuli, rather than the activity at hand or the person who is speaking or giving a request (Goodman & Williams, 2007). Difficulty engaging in requests or transitions is problematic, as engagement is necessary in maintaining focus on information given in the classroom: “The inability of students with ASD to stay appropriately engaged often interferes with their acquisition of essential social skills and academic behaviours” (Goodman & Williams, 2007, p. 55). Fortunately, there are strategies that, when implemented, may improve engagement in instructional activities for students with ASD (Carnahan, Rao, & Bailey, 2009). Students with Autism Spectrum Disorder (ASD) or AS, “who participate in intensive educational experiences with a focus on engagement, make substantial gains in academic, communication and social domains” (Ruble & Robson, 2006, p. 1464). However, there are significant areas of the literature surrounding engagement that need to be explored further; most importantly, there is a need for a clear, operational definition. Ruble & Robson (2006) indicate that a clear definition of engagement allows for the advancement and further assessment of programs specific to children with ASD. With the present definition of engagement, as well as literature on both engagement and compliance in mind, the definition of engagement for the purpose of this study will be: sustained attention to, and prompt compliance with a demand, instruction, rule, or request given by an instructor.

Existing literature suggests that engagement is a trait or characteristic of a child’s nature (Ruble & Robson, 2006). However, this may not be true, as there has been much evidence on the influence of instructional strategies in educational settings on the engagement of children with ASD. Environmental variables have been shown to have a clear link to children’s engagement: “Examining the construct of engagement as a product of specific environmental influences that interact with internal child factors may provide unique contributions to the literature on specific behaviours and instructional strategies critical for positive outcomes” (Ruble & Robson, 2006, p. 1458). That is, examining engagement as matter of a child’s internal factors in combination with, and
influenced by, their surrounding environments may be more beneficial than examining it merely as an internal characteristic of a child’s nature.

Ruble and Robson (2006) studied the individual and environmental determinants of engagement in those with ASD. They did this by recruiting children with ASD and Down Syndrome (DS) from local schools, and training observers to collect narrative recordings of behaviour in the children’s natural classroom environments. The observers collected data on the children’s diagnosis, age, classroom type, instructional grouping (i.e., large group, small group, independent work) within the classroom, and how compliant the children were when requests were made of them. Indeed, the main finding within their research was that “both internal child factors as well as external environmental factors influenced type of engagement” (Ruble & Robson, 2006, p. 1459). The authors suggested that, based on their findings, engagement is not in fact a trait, but a state construct, able to be influenced by external events within the environment. With this in mind, more research is needed on the ability to positively effect a child’s engagement by manipulating variables in their environment where deficits have been shown.

Transitions

Transitioning is known as moving or changing from one position, location, or activity. Transitions occur across individuals and settings, occurring in most every environment. “All individuals, regardless of disability status or age, must move (i.e., transition) between multiple tasks and activities throughout the day” (Turner & Jordan, 2007, p. 681). This is especially true for children. In fact, “researchers have suggested that as much as 25% of preschooler’s and elementary school children’s daily time may be spent in transition activities” (Turner & Jordan, 2007, p. 681). Nevertheless, Dettmer, Simpson, Myles, & Ganz (2000) outline that making transitions between one activity or setting and another may be challenging for students diagnosed with ASD. Turner & Jordan (2007) agree: “In addition to difficulties in social relationships and communication, some individuals with autism may exhibit behavioural difficulties associated with changes in routines, including transition times” (p. 682). Banda and Kubina (2006) also assert that transitioning difficulties are an important and prevalent issue, stating that making a transition from one activity to another is a behaviour that many children with autism find significantly difficult. Because it has been shown that children with ASD commonly have difficulties transitioning, it is imperative that educators be aware that the ability to transition between settings or activities is essentially a skill, and must be learned (Turner & Jordan, 2007).

Transition difficulties in children with ASD can be observed in various forms. “Individuals with autism may resist transitions by exhibiting noncompliance, aggressing toward staff or other students, or engaging in stereotypy and tantrums to avoid changing activities or settings” (Turner & Jordan, 2007, p. 682). This can negatively affect the classroom environment, as “such behaviours may present challenges for the classroom teacher, decrease instructional time, present a danger to the student or others in the educational environment, and ultimately result in placement in a more restrictive educational setting” (Turner & Jordan, 2007, p. 684). With this in mind, the effective and
timely transitioning of students is beneficial for the implementation of successful learning in the classroom, as well as the development of students’ independence. Therefore, there is a need for further literature focused on the transitioning of students in the classroom setting.

Chaining

“The capacity of a child to comply, i.e., to respond promptly and appropriately to a request… stated by another person… is critical to children’s social development, personal adjustment, educational progress, health and safety” (Humm, Blampied & Liberty, 2005, p. 28). Compliance with commands or instructions given by instructors is necessary for effective classroom instruction (Ray, Skinner, & Watson, 1999). However, noncompliance is a common issue in children diagnosed with autism (Ray, Skinner & Watson, 1999). Simple classroom requests that may result in compliance from typically-developed children may result in noncompliance and/or aggression from children with autism. However, compliance with these simple requests is most often a “necessary prerequisite for the occurrence of effective instruction” (Ray, Skinner, & Watson, 1999, p. 1). Although the child participating in the study does eventually comply with requests given to him by classroom instructors, he does not respond promptly and appropriately upon the initial delivery of the request.

Research has shown that providing a series of high probability (high-p) commands prior to the delivery of a low probability (low-p) demand is an effective method of increasing compliance. High probability demands are those which a child has a history of complying with. Low probability demands are those which a child finds difficult. This method of skill acquisition can have various names, such as errorless compliance training, behavioural momentum, and chaining. Some use slight variations on technique. For example, the high-probability requests may simply be random commands (such as “touch your toes!” “now, clap your hands!” “now, put your hand on your head!”) designed to gain the attention of the subject, or the requests may follow a pattern designed to teach a certain skill in order of steps required to complete a task. However, they are extremely similar in that each method uses a series of high-probability requests before the delivery of a low-probability request in order to positively influence behaviour. For the purpose of this study, the use of several high-probability requests before the eventual delivery of a low-probability request will be known as chaining. This is because the requests are not random in nature; they are a chain of steps designed specifically to get the child from one activity to another (i.e., “push in your chair”, “now walk to the carpet”).

Ducharme, Harris, Milligan, and Pontes (2003) studied the effect of errorless compliance training on noncompliance in children with developmental disabilities. This was done by first determining a list of requests, and the likelihood of the participant to comply with each request on a scale of one to four, with one holding the highest likelihood that the participant would comply. In the first phase of the study, compliance with a low-probability request was reinforced without high-probability requests being
given. In the second phase, when the participant was to be given a request that commonly resulted in noncompliance, a series of high-probability requests was given beforehand. The researchers started first with a level 1 request, then a level 2 request, then a level 3 request, followed by a level 4 request, and finally the low-probability request. This sequence was called a graduated request hierarchy. Reinforcement for compliance with requests was given. Ducharme, Harris, Milligan, and Pontes’ (2006) study proved effective, as they state:

Results indicated that use of reinforcement for compliance in isolation was ineffective in bringing about clinically significant improvements in child compliance. The addition of the graduated request hierarchy appeared to be associated with substantial changes in child compliance that maintained in follow-up assessments. (p. 522)

Thus, Ducharme, Harris, Milligan, & Pontes (2006) noted that the delivery of several high-probability requests prior to the delivery of a low-probability request (also known as errorless compliance training, behavioural momentum, and chaining) was an effective strategy to improve the compliance of children with developmental disabilities when given a request.

Likewise, Humm, Blampied, & Liberty (2005) studied the effects of high-probability request sequences on compliance by children with developmental disabilities. A fading procedure was also used after adequate intervention time was complete, reducing the number of high-probability requests over time to foster maintenance and generalization. As with the aforementioned study, the Humm, Blampied & Liberty (2005) yielded positive results. In fact, the authors of the study concluded that when dealing with the topic of child compliance, the high-probability request sequence may be an effective alternative to simply manipulating the consequences of complying, as is often done (Humm, Blampied, & Liberty, 2005).

Turner & Jordan (2007) also support the use of request sequences to change negative behaviours, stating that “behavioural momentum has been used successfully to increase compliance among children with autism” (p. 684). They describe the various benefits of implementing this technique, asserting that not only is behavioural momentum a potentially effective strategy, but it is also efficient and easily implemented. Turner & Jordan also suggest that behavioural momentum is specifically effective if implemented in transitions in which students are requested to move from an activity or setting that is more reinforcing, to one that is less reinforcing. They note, however that “a disadvantage noted by many researchers is that a heavy reliance on verbal and auditory cues may result in behaviours that are solely under the stimulus control of the prompt” (Turner & Jordan, 2007, p. 684). More simply put, the desired behaviour occurs solely in the presence of the prompt given. As a result, the student has the potential to become dependent on the prompt, limiting the likelihood of prompt fading and generalization. As Turner & Jordan point out, “some researchers have suggested that visual cues should also be incorporated into interventions to address transition difficulties given the deficits in communication associated with autism” (p. 684).
Visual Supports

“Verbal prompts may be less salient to students with communication deficits” (Turner & Jordan, 2007, p. 684). Case studies and literature on individuals diagnosed with ASD “commonly experience problems in organizing their environments and thoughts and in processing auditory stimuli” (Dettmer et al., 2000, p. 163). There is evidence that individuals with ASD are able to process two-dimensional and three-dimensional visual aids more easily than auditory stimuli. An articulate and well-known individual with autism, Temple Grandin (1995), outlined that those with ASD are visual thinkers and researchers, practitioners, and teachers should avoid relying solely on auditory stimuli for communicating information. Dettmer et al. (2000) agree, stating that a number of individuals diagnosed with ASDs experience issues surrounding the processing and retention of nonvisual stimuli (p. 163). They also point out that students with ASD have demonstrated effective acquisition of various skills when educators included the use of visual cues in classroom instruction.

There are many ways in which visual aids benefit a classroom and those with ASD. Visual supports are praised for both the simplicity with which they can be implemented, and the inexpensive cost to implement them. Visually cued instruction in the classroom is most commonly seen in the form of pictographic symbols, photographs, and written explanation (Dettmer et al., 2000). Visual prompts are used in educational settings to aid children with ASDs to engage and maintain attention, and to understand spoken language. Visual aids used for various purposes allow students to “make sense of their environment, predict scheduled events, comprehend expectations placed on them, and anticipate changes made throughout the day” (Dettmer et al., 2000, p. 163). Children with autism are observed to display a lower frequency of behavioural problems and increase compliance with classroom requests when visual aids are used to communicate teachers’ expectations (Dettmer et al.). Visual aids in the classroom are therefore used as “tools to compensate for difficulties in attention, auditory processing, sequencing, and organization” (Dettmer et al., 2000, p. 164).

Goodman & Williams (2007) are among those researchers who believe that visual aids are effective addition to interventions, stating:

- the use of visual aids has been recommended to elicit a higher level of appropriate social and academic behaviour on a variety of tasks in both experimental and natural learning environments, and they are equally adaptable and effective for use in applied educational settings. (p. 55-56)

Visual prompts have effectively been used in studies on transitioning behaviour. Schmit et al. (2000) conducted a study wherein picture cards were used to prompt transitions for a 6-year-old male with autism. When transitions occurred in the child’s classroom, his teacher presented a photograph of the next activity with a simultaneous verbal cue to transition. Data collected during the study revealed that the procedure was indeed effective in improving transition behaviour, and that the effects of treatment were maintained over time (Schmit et al., 2000). The authors stated that it was important to deliver the verbal and visual cues simultaneously, as “over time, the visual prompt can be
faded and stimulus control can be transferred to the verbal prompt” (Schmit et al., 2000, p. 272).

Presently, in spite of the widespread use of visual aids in educational settings “there is relatively little empirical support for widespread adoption of visual supports” (Dettmer et al., 2000, p. 164). There are currently “only a minimal number of studies on the efficacy of visual strategies with children with autism [that] have been published” (Dettmer et al., 2000, p. 164). There remains much to be explored and learned about the use of visual supports with individuals with ASD (Dettmer et al.).

**Conclusion/Rationale**

Students with disorders within the autism spectrum present a number of challenging behaviours in educational settings in response to requests and/or transitions. However, much of a child’s day is spent transitioning from one activity to the next (Turner & Jordan, 2007). It has therefore been suggested that further research on strategies to facilitate effective transitioning behaviour is needed (Turner & Jordan, 2007).

In order to make a request of a child and receive a prompt and appropriate response in return, the child must be engaged in what is being asked. That is, an individual cannot be expected to comply with a request if they have not focused their attention on what is being asked of them. Students with autism commonly have difficulty engaging in an activity or with a speaker, often because their attention is easily swayed or occupied by moving objects in their environment, or other visual stimuli (Ruble & Robson, 2006). It can then be hypothesized that improving a child’s engagement may consequently improve their compliance to requests.

High-probability request sequences, used in errorless compliance, behavioural momentum, and chaining techniques, have been shown to improve a number of behavioural deficits in children with autism, including compliance (Ducharme, Harris, Milligan, & Pontes, 2003) and transition behaviours (Banda & Kubina, 2006). Interventions involving the use of high-probability request sequences followed by the delivery of a low-probability request are not only proven effective, but have advantages such as simplicity of implementation (Turner & Jordan, 2007).

Visual prompts are effective, inexpensive, and easily implemented (Dettmer, Simpson, Myles, & Ganz, 2000). Although visual supports of various kinds are commonly used in educational settings, there remains a need for more research into the effectiveness when used on children with autism.

Upon reviewing the literature on transitions, engagement, chaining and similar techniques, and visual prompts, there are several gaps in the literature. However, all of the previously mentioned areas of research have been proven effective in studies conducted by trained and knowledgeable practitioners. It is thus hypothesized that the use of a chaining sequence with supplemented visual prompts will increase the engagement skills of a 10-year-old boy with Asperger’s Syndrome.
Chapter III: Method

Participants
The intervention involved a single participant. Criteria for selection included both a diagnosis of Asperger’s Syndrome, and a referral from the classroom teacher, Laura Carroll. Laura recommended that Joe Smith be chosen for the intervention. She reported that of all the students in the classroom, Joe’s problem behaviours were least likely to change without a specialized intervention or program. Laura also felt that Joe’s difficulty engaging and transitioning affected the class as a whole, as his noncompliance to classroom requests often resulted in the rest of the class waiting for him to join the group and begin an activity.

After Joe’s referral from Laura, a consent form was sent home to his parents. The form contained general information about the B.A.A. in Behavioural Psychology program, and outlined the baseline and intervention procedures. The form also asked for a signature to confirm that informed consent was given. Assent was obtained from Joe as well. Joe was taken outside the classroom where the procedures were described in the simplest terms possible. He was then asked “Is that okay with you?” to confirm his voluntary participation in the intervention.

Design
The intervention was titled “The Use of Chaining and Visual Prompts to Increase Engagement in a Child with Asperger’s Syndrome”. An AB design was used to increase Joe’s engagement. Engagement was defined as sustained attention to, and prompt compliance with, a demand, instruction, rule, or request given by an instructor. Prompt compliance was defined as complying with a request or demand within 30 seconds of being asked. The participant’s engagement (independent variable) was measured by both the length of time it took the child to comply with a request, and the number of verbal prompts needed for compliance. Latency recording was used to record the length of time to comply with a request in minutes and/or seconds, and tally the number of prompts given. Recording the length of time to comply began at the termination of each request, and ended with Joe’s initiation of the behaviour that was requested. The data collected throughout the study was compared with baseline data collected prior to intervention in order to measure the effectiveness of the intervention.

Setting and Apparatus
The intervention was implemented in the participant’s classroom. Joe currently attends school in a “Junior Autism Program”; a small classroom, located in a regular public school, consisting of eight boys diagnosed with either ASD or AS. An important feature of this setting is that it is a very specialized classroom, specific to the participant’s diagnosis. Many of the students in the classroom have previously either been participants in interventions, or have been exposed to, or worked with, college/university placement students in the classroom. As such, they were less likely to perceive the intervention as abnormal. They were also less likely to question what is happening or why one child is receiving specialized attention, a behaviour that could have caused the participant to feel embarrassed or singled out in front of his peers. Laura also occasionally used Picture Communication Cards (PCS cards) to address problem behaviours in the classroom; for example, using a “don’t interrupt” PCS card when a child spoke out during a group
Because of this, the students were familiar with PCS cards, and again are less likely to perceive them as abnormal.

The materials needed for intervention included PCS cards created using the Boardmaker computer program. The PCS cards served as visual prompts. The materials needed also consisted of data recording sheets, a stopwatch to record time, and the star reward system presently used in the classroom to reinforce students’ appropriate behaviour.

**Procedure**

The intervention chosen for this study was based on functional assessment data presented in Appendix A. In completing the Functional Assessment Checklist for Teachers & Staff (FACTS Parts A & B: http://www.specialconnections.ku.edu/~specconn/page/behavior/fba/pdf/facts.pdf), Laura described that Joe’s problem behaviours typically occur in the morning, when he is asked to transition from one activity to another, join the group, or complete academic tasks. Laura outlined that during these times, when a request was given to Joe, he would often continue the activity he was engaged in, re-arrange items on his desk, or read/draw independently, ignoring the request being made, even after being asked several times to comply. Baseline data collection was completed by observing Joe for eight consecutive school days. Observation occurred each morning, from the time Joe arrived in the classroom until the beginning of morning recess (approximately 60 minutes). Data was collected by the counsellor. During this interval, whenever Joe, or his class as a whole, were given a request, the request was recorded on the data collection sheet. Beside this, latency recording was used to record on the data sheet the amount of time it took Joe to comply with the request, and the number of prompts he received for each request. With this information in mind, the current study was formulated to improve Joe’s engagement in the classroom when he is spoken to or given a request. The intervention occurred each morning, from the time Joe arrived in the classroom until the beginning of morning recess (approximately 60 minutes). This is because it was the time of day in which the students endured the most frequent transitions. During this time, when Joe – or the classroom as a whole – was asked to perform a task, that task was broken down into a chain of smaller, higher probability requests (also called high-p requests). For example, if the teacher were to address the class and request “I would like everyone to sit down on the carpet”, the resulting chain of high-p requests might be “look at me”, “now close your book”, and “stand up”, before the eventual delivery of the lower probability (or low-p) request of “go to the carpet”. Throughout both intervention and fading procedures, the “look at me” command was consistently the initial request in each chain, as it increased the probability that eye contact would occur. Eye contact conveys that attention is being given to a speaker, which is an essential part of being engaged.

As the chain of high-p requests was delivered verbally to Joe, a visual prompt in the form of a PCS card – which corresponded with each request – was presented. As Dettmer et al. (2000) outlined, visual prompts can be used effectively in educational settings to aid in engaging and maintaining attention. The use of visual prompts in the chaining sequence gave Joe a cue that could be seen in addition to the verbal request being given.

Compliance with the program was reinforced using the classroom’s existing reward system, which uses the accumulation of 16 stars throughout the day to reinforce
appropriate behaviour. Throughout the school day, students in the classroom can earn or lose stars based on their displaying appropriate or inappropriate behaviours. At the conclusion of each day, students count the number of stars they have earned; if the child received 13-16 stars, they can engage in free play time before they get on the bus to go home; if the child received all of the 16 stars they were able to earn during the day, they are able to choose an item from the classroom’s “treasure box”. If the participant complied with all of the chains presented that morning, he earned a star for his efforts, as well as receiving verbal praise for compliance with each chain such as “great listening skills!” or “you paid close attention to what I asked of you… fantastic job!” If the participant did not comply, he was not given a star for his morning period. The current star reward system was used as a reinforcer because it allows for simpler fading procedures or transference of the intervention procedures after the completion of the study. If the classroom staff wished to continue using the intervention procedures to address Joe’s behaviours, they could do so with ease, as Joe’s reinforcer remains consistent, and the same as that of the rest of the students’, before, during and after intervention. Intervention lasted for 15 consecutive school days. The intervention was terminated after 15 days to allow time for one week of generalization procedures before the counsellor’s departure from the agency.
Chapter IV: Results

During the baseline phase, the mean time needed for Joe to comply with a request given was 82 seconds (SD=37.81). By implementing the chaining and visual prompt program for 15 days, the mean declined to 17 seconds in the intervention phase (SD=13.16). At the conclusion of treatment, the average length of time for Joe to comply had improved by 73%.

Figure 1.1: Average Time to Comply with Requests

As shown in Figure 1.1, the average length of time Joe needed to comply with a classroom request declined during the intervention phase. By observing the graph, it can be seen that some of the average times during baseline and intervention are similar, around the 30-second mark. During baseline, the length of time to comply with a request varied, and as shown in the graph, was unpredictable. When given a request, Joe took anywhere from 30 seconds to 1 minute and 22 seconds. However during the intervention phase, although there were a few days in which Joe’s average time was in the baseline phase range of 30 or more seconds, the data is significantly more stable, implying that Joe not only took less time on average to comply with a request, but that he consistently did so.
As shown in Figure 1.2, the mean number of prompts Joe needed to comply with requests given to him decelerated throughout the intervention phase.

**Figure 1.2: Average Number of Prompts Per Task**

In baseline data collection, Joe needed a mean of 3 prompts in order to comply with each request given to him (SD=.71). After the implementation of the chaining and visual prompt program, however, Joe’s mean number of prompts per task declined to 1.5 (SD=.41). Thus, the intervention resulted in a 50% decline in the average number of prompts Joe needs to comply with a request. There were no instances in which Joe refused to comply with a request after being prompted.

**Chapter V: Discussion**

**Strengths**

**Client.** The visual prompts in the form of PCS cards were an effective means of engaging Joe’s attention towards a speaker or request given. The “Look at me” card in particular was effective in engaging Joe to make eye contact with the speaker. He also seemed to enjoy the variety of colourful characters and pictures depicted on each card, which may have allowed him to easily engage his attention to the requests being asked of
him. During classroom free play periods, he often sorted through the cards, looking at the pictures. One instance was noted in which Joe tapped the shoulder of a busy clinician, and proceeded to use the “Look at me” and “Listen” cards to request the clinician’s attention, an indicator that Joe understood the function of the visual prompts.

**Program.** The chaining sequence and visual prompts were effective in reducing both the length of time Joe needed to complete a task, and the number of prompts given. Joe responded well to the visual prompts in particular, engaging his attention to the cartoons depicted on the PCS cards.

**Organization.** On the organizational level, one strength of the intervention was that it was cost-effective and required few materials to implement. The PCS cards were virtually the only material needed for Joe’s classroom teacher and educational assistants to carry out the intervention post-treatment, particularly as all of the PCS cards used in treatment were left in the classroom for their future use. Joe’s teacher approved of the interventions used, and regularly requested specific PCS cards to be made and added to the classroom routine to prompt appropriate classroom behaviours for both Joe and his classmates (i.e., creation of a “Wait your turn” card to be used when one student interrupted another during a lesson). Joe’s lunch recess supervisor also approved of the visual prompts, requesting PCS cards specific to the lunchtime routine for her own use to prompt appropriate recess and lunch-eating behaviours (i.e., “Clean up your lunch!”). Joe’s teacher noted that she will continue to use the PCS cards to prompt appropriate classroom behaviour post-treatment.

**Limitations/Multilevel Challenges**

**Client.** At the client level, one of the limitations of treatment was that Joe was absent 1-2 days per week, due to bus scheduling issues. Joe enrolled in the Junior Autism Program shortly prior to treatment, and as such was attending a new school, with a new bus route, further from his home. During the first months of the school year, Joe experienced some bus scheduling issues with his new bus route and pickup time, and was consequently absent for approximately 10 days during treatment. Time constraints prevented the accommodation of 10 added days of treatment to compensate for these absences. However, it is acknowledged that continuing the intervention phase in the classroom to compensate for absences may have resulted in more stability in the intervention data of both the time Joe took to comply with requests and the number of prompts given to him.

**Program.** Another limitation involves the monitoring of the effectiveness of each PCS card. Although the number of prompts per task was recorded during intervention, a tally was used to record the total number of prompts used in each sequence of requests. However, whether one or more specific PCS cards (e.g., “close the book” or “stand up”) consistently needed prompting, or needed no prompting whatever, remains unknown. In other words, it is indefinite whether a specific card (or cards) was more or less effective in engaging Joe’s attention.
**Organization.** One limitation of the intervention involves generalization to multiple settings. Because the intervention was conducted only in the classroom, it is not known how effective the visual prompts and chaining sequence would be if administered at home, or in other settings within the school, such as the library, gymnasium, or school yard; areas in which Joe spends a portion of each day.

**Society.** On the societal level, the effectiveness of the intervention was, in part, due to the low student to staff ratio of 2:1. This presents one limitation that clinicians might face in future implementations of this intervention. The chaining and visual prompting components of the intervention may have been more effective in a specialized classroom such as Joe’s, where the number of students is limited to fewer than 10, and the teacher receives the support of multiple educational assistants. The curriculum and agenda in many classrooms such as Joe’s are modified; that is, the teachers adjust the daily routine to accommodate both academics and the acquisition and strengthening of skills specific to the classroom’s target population. In Joe’s case, his daily schedule included subjects such as mathematics and reading, and also “social skills” time, in which students work on strengthening skills in areas that children with AS commonly find difficult, such as interpersonal skills. Because Joe’s teacher regularly made room in the student’s school days to essentially work on students’ target behaviours, she was accepting of the implementation of the intervention, and the classroom time required to do so. Implementing the chaining and visual prompt intervention in students with AS who attend regular classrooms, or classrooms with a higher student to teacher ratio, may prove more challenging, as the classroom schedule may not allow the time to implement a treatment with multiple components.

**Recommendations**

In future implementation of the visual prompt and chaining procedure, it is recommended that, if possible, each PCS card be assessed for its effectiveness. This may be done by using a chart or table containing the name of each PCS card, and recording each instance of a card requiring further verbal prompting upon presentation. This may be helpful in determining which PCS cards specifically were essentially effective, or ineffective; the cards that consistently require no additional prompts upon presentation may be considered effective, if Joe complies with the request the first time it is asked of him.

It is also recommended that the intervention be conducted both within the classroom, and in other settings relevant to the child’s life. Using a variety of settings within and around the school (i.e., gymnasium, school yard, bus route, library, or any other general or specialized classrooms within the school that the child may attend part-time), in particular, may be beneficial in assuring the generalization of engagement to multiple situations and environments. This is especially true as environments such as the school yard provide a vast amount of stimuli for the child to attend to, whereas the classroom is a confined, structured environment where stimuli can be controlled.

**Contributions to the Behavioural Psychology Field**
The intervention contributed to the approach that teachers and educational assistants in the Junior Autism Program might use to address similar issues in future students. Although the classroom made use of PCS cards as visual prompts prior to intervention, the addition of a new set of cards addressing various behaviours allows teachers and educational assistants to use the cards to prompt a larger variety of appropriate behaviours.

Autism Spectrum Disorder and Asperger’s Syndrome are fields of growing interest in both research and in the media. Many children in the present public school setting display these disorders. As such, it is important that there is much literature available on ASD and AS for professionals treating this growing population. The current study expands research in the Behavioural Psychology field related to visual prompts and chaining in children with Autism, and their effectiveness on increasing engagement.
References


APPENDIX A: FUNCTIONAL ASSESSMENT CHECKLIST FOR TEACHERS AND STAFF (FACTS)

Functional Assessment Checklist for Teachers and Staff (FACTS-Part A)

Step 1
Student/Grade: Joe Smith - Grade 5  
Date: October  
Interviewer: Nicole Hapnerstall  
Respondent(s): Laura Carroll

Step 2
Student Profile: Please identify at least three strengths or contributions the student brings to school.  
Student is a good reader, brings items to share with classmates, respects others personal space

Step 3
Problem Behavior(s): Identify problem behaviors

- Tardy
- Unresponsive
- Withdrawn
- Fight/physical aggression
- Inappropriate language
- Verbal harassment
- Disruptive
- Insubordination
- Work not done
- Theft
- Vandalism
- Not listed
- Other

Describe problem behavior: Work avoidance

Step 4
Identifying Routines: Where, When and With Whom Problem Behaviors are Most Likely.

<table>
<thead>
<tr>
<th>Schedule (Times)</th>
<th>Activity</th>
<th>Likelihood of Problem Behavior</th>
<th>Specific Problem Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.m.</td>
<td>Joining the group</td>
<td>Low</td>
<td>Goes to bathroom, goes to desk</td>
</tr>
<tr>
<td>a.m.</td>
<td>&quot;Lazy 8:15&quot; transition</td>
<td>1 2 3 4 5 6</td>
<td>Does not want to stop activity &amp; transition</td>
</tr>
<tr>
<td>a.m.</td>
<td>Less preferred activity</td>
<td>1 2 3 4 5 6</td>
<td>Continue preferred activity / ongoing problems</td>
</tr>
<tr>
<td>a.m.</td>
<td>Transition from computer puzzle</td>
<td>1 2 3 4 5 6</td>
<td>ll</td>
</tr>
<tr>
<td>a.m.</td>
<td>Completing writing tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.m.</td>
<td>Change focus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.m.</td>
<td>Math puzzle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.m.</td>
<td>Reading Episodic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.m.</td>
<td>Writing Episodic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p.m.</td>
<td>Writing tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p.m.</td>
<td>Math puzzle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p.m.</td>
<td>Reading Episodic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Step 5
Select 1-3 Routines for further assessment: Select routines based on (a) similarity of activities (conditions) with ratings of 4, 5 or 6 and (b) similarity of problem behavior(s). Complete the FACTS-Part B for each routine identified.

4/24/06
### Functional Assessment Checklist for Teachers & Staff (FACTS-Part B)

**Step 1**
Student/ Grade: Joe Smith - Grade 5  
Date: October
Interviewer: Nicole Hafinshall  
Respondent(s): Laura Carroll

**Step 2**
Routine/Activities/Context: Which routine (only one) from the FACTS-Part A is assessed?

<table>
<thead>
<tr>
<th>Routine/Activities/Context</th>
<th>Problem Behavior(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student receives request to do independent writing activity</td>
<td>Work avoidance, rearranging pencils, reading preferred graphic novel</td>
</tr>
</tbody>
</table>

**Step 3**
Provide more detail about the problem behavior(s):
- **Rearranging items, reading silently**

How often does the problem behavior(s) occur?
Whenever a request is given.

How long does the problem behavior(s) last when it occurs?
Until a preferred activity is delayed until task is completed, given multiple verbal prompts to begin work.

What is the intensity/level of danger of the problem behavior(s)?
No danger, is not disruptive or self-harming.

**Step 4**
What are the events that predict when the problem behavior(s) will occur? (Predictors)

<table>
<thead>
<tr>
<th>Related Issues (setting events)</th>
<th>Environmental Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>illness</em></td>
<td><em>reprimand/correction</em></td>
</tr>
<tr>
<td><em>drug use</em></td>
<td><em>structured activity</em></td>
</tr>
<tr>
<td><em>negative social</em></td>
<td><em>unstructured time</em></td>
</tr>
<tr>
<td><em>conflict at home</em></td>
<td><em>socially isolated</em></td>
</tr>
<tr>
<td><em>academic failure</em></td>
<td><em>with peers</em></td>
</tr>
<tr>
<td><em>Other</em></td>
<td><em>activity too long</em></td>
</tr>
<tr>
<td><em>Other</em></td>
<td><em>tasks too difficult</em></td>
</tr>
</tbody>
</table>

**Step 5**
What consequences appear most likely to maintain the problem behavior(s)?

<table>
<thead>
<tr>
<th>Things that are Obtained</th>
<th>Things Avoided or Escaped From</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>adult attention</em></td>
<td><em>hard tasks</em></td>
</tr>
<tr>
<td><em>peer attention</em></td>
<td><em>Other</em></td>
</tr>
<tr>
<td><em>preferred activity</em></td>
<td><em>reprimands</em></td>
</tr>
<tr>
<td><em>money/thing</em></td>
<td><em>peer negatives</em></td>
</tr>
<tr>
<td><em>Other</em></td>
<td><em>physical effort</em></td>
</tr>
<tr>
<td><em>Other</em></td>
<td><em>adult attention</em></td>
</tr>
</tbody>
</table>

**Step 6**
Identify the summary that will be used to build a plan of behavior support.

<table>
<thead>
<tr>
<th>Setting Events &amp; Predictors</th>
<th>Problem Behavior(s)</th>
<th>Maintaining Consequence(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receives request to transition small or start writing activity</td>
<td>Avoids work, rearranges desk items, reads silently</td>
<td>Avoids school work, effort, uses reprimands to distract himself from task &amp; become victim</td>
</tr>
</tbody>
</table>

**Step 7**
How confident are you that the Summary of Behavior is accurate?

Not very confident 1 2 3 4 5 Very Confident

**Step 8**
What current efforts have been used to control the problem behavior?

**Strategies for preventing problem behavior**
- ✓ schedule change
- ✓ seating change
- ✓ curriculum change

**Strategies for responding to problem behavior**
- ✓ reprimand
- ✓ office referral
- ✓ loss of preferred activity

### Appendix B: Summary of Baseline Data

<table>
<thead>
<tr>
<th>Date</th>
<th>Average Length of Time to Comply with Request</th>
<th>Average Number of Prompts per Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tues. Sept. 21&lt;sup&gt;st&lt;/sup&gt;</td>
<td>54 s.</td>
<td>3</td>
</tr>
<tr>
<td>Wed. Sept. 22&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>25 s.</td>
<td>4</td>
</tr>
<tr>
<td>Thurs. Sept. 23&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>1 m. 22 s.</td>
<td>4</td>
</tr>
<tr>
<td>Fri. Sept. 24&lt;sup&gt;th&lt;/sup&gt; (Student was absent)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mon. Sept. 27&lt;sup&gt;th&lt;/sup&gt;</td>
<td>1 m. 30 s.</td>
<td>4</td>
</tr>
<tr>
<td>Tues. Sept. 28&lt;sup&gt;th&lt;/sup&gt;</td>
<td>47 s.</td>
<td>2</td>
</tr>
<tr>
<td>Wed. Sept. 29&lt;sup&gt;th&lt;/sup&gt;</td>
<td>2 m. 19 s.</td>
<td>3</td>
</tr>
<tr>
<td>Thurs. Sept. 30&lt;sup&gt;th&lt;/sup&gt;</td>
<td>34 s.</td>
<td>3</td>
</tr>
<tr>
<td>Fri. Oct. 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>30 s.</td>
<td>3</td>
</tr>
</tbody>
</table>

Total average length of time to comply with request: 1 m. 22 s.  
Total average prompts per task: 3
## Appendix C: Summary of Intervention Data

<table>
<thead>
<tr>
<th>Date</th>
<th>Average Length of Time to Comply with Request</th>
<th>Average Number of Prompts per Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wed. Oct 27th</td>
<td>16.8 s.</td>
<td>1.6</td>
</tr>
<tr>
<td>Thurs. Oct 28th</td>
<td>15.25 s.</td>
<td>2</td>
</tr>
<tr>
<td>Fri. Oct 29th</td>
<td>17 s.</td>
<td>1.4</td>
</tr>
<tr>
<td>Tues. Nov 2nd</td>
<td>44 s.</td>
<td>2.3</td>
</tr>
<tr>
<td>Fri. Nov 5th</td>
<td>52.4 s.</td>
<td>2</td>
</tr>
<tr>
<td>Tues. Nov 9th</td>
<td>12 s.</td>
<td>1.3</td>
</tr>
<tr>
<td>Wed. Nov 10th</td>
<td>16 s.</td>
<td>1.75</td>
</tr>
<tr>
<td>Thurs. Nov 11th</td>
<td>12.6 s.</td>
<td>1</td>
</tr>
<tr>
<td>Mon. Nov 15th</td>
<td>19 s.</td>
<td>1.5</td>
</tr>
<tr>
<td>Wed. Nov 17th</td>
<td>10 s.</td>
<td>1</td>
</tr>
</tbody>
</table>

(Continued on next page)
<table>
<thead>
<tr>
<th>DATE</th>
<th>AVERAGE LENGTH OF TIME TO COMPLY WITH REQUEST</th>
<th>AVERAGE NUMBER OF PROMPTS PER TASK</th>
</tr>
</thead>
<tbody>
<tr>
<td>MON. NOV. 22ND</td>
<td>6 s.</td>
<td>1</td>
</tr>
<tr>
<td>TUES. NOV. 30TH</td>
<td>13 s.</td>
<td>1.5</td>
</tr>
<tr>
<td>WED. DEC. 2ND</td>
<td>12 s.</td>
<td>1.6</td>
</tr>
<tr>
<td>FRI. DEC. 3RD</td>
<td>11 s.</td>
<td>2</td>
</tr>
<tr>
<td>TUES. DEC. 7TH</td>
<td>5 s.</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Total average length of time to comply with request: 17.12 s.
Total average prompts per task: 1.55
Word Count

Literature Review: 2,966

Overall Thesis: 7,000