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Utilizing Color Preferences in Teaching Materials for an Adolescent with Autism

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Action Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts in
Education

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UTILIZING COLOR PREFERENCES

Utilizing Color Preferences in Teaching Materials for an Adolescent with Autism

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Abstract

Students on the autism spectrum frequently have a more challenging time learning new skills, such as identifying sight words, than their neurotypical peers. This study attempted to utilize color preferences in creating teaching materials with the aim of increasing the acquisition rate of learning sight words with a 15 year old Hispanic male student with a diagnosis of autism and the identified need for an increase in sight word identification. Using an AB method, the use of highlighting the target word with the students' preferred color was evaluated. Due to the specific students' learning profile and challenges, specifically inattention and needing a longer period of time to learn new skills, this intervention did not show an increase in sight word identification. Future studies should utilize intensive 1:1 instruction, individualized motivational systems, and color preference, to attempt to increase acquisition rate when teaching new sight words.

Keywords: autism, sight words, color preference, acquisition rate

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Utilizing Color Preferences in Teaching Materials for an Adolescent with Autism

Literature Review

In the field of special education two topics continue to arise: behavior management and academics (Bowman-Perrott, Burke, de Marin, Zhang, & Davis, 2015; Filter, & Horner, 2009; Freeman, Simonsen, McCoach, Sugai, Lombardi, & Horner, 2016; Reinke, Herman, Petras, & Ialongo, 2008; Ringwalt, Ennet, Vincus, & Simons-Rudolph, 2004; Rosenberg, 1986; Teklu & Kumar, 2013). These two topics are ever present because they comprise the basic tenants of a classroom. Researchers have and continue to examine these constructs in a multitude of settings. This paper will discuss the tenant of academics within a special education setting, specifically for students with autism.

Autism is described by the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition as having five areas of criteria for diagnosis: persistent deficits across various contexts of social communication and interaction; restricted and repetitive patterns of behavior; that the first two symptoms present themselves during early development; symptoms need to cause significant impairment of functioning; the symptoms are not better explained by another diagnosis (The American Psychiatric Association, 2013). Autism is a spectrum disorder, meaning there are varying ranges of ability for each of the aforementioned diagnostic criteria. Academic instruction often begins with specific curriculums that have been designed for the general population. Many of these curriculums are used successfully, but are not a good fit for some learners. Therefore, the classroom teacher or other educational professional must modify curricular materials and instructions for students who struggle. Altering the instruction and modifying the curriculum for those students tends to help them successful and have positive results (Lee, Wehmeyer, Soukup, & Palmer, 2010).

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Common modifications often include presenting information in multiple modalities (e.g., kinesthetic, auditory, visual) to access multiple types of learners (Vondracek, 2009). For example, a teacher may present information verbally as well as write it on the whiteboard. That way, the teacher has reached both students who benefit from auditory processing as well as visual processing. Other modifications include: strategy instruction for academic behaviors (e.g., listening, reading, writing, time on task) and test taking strategies.

The modifications implemented for students with special needs must be a good fit with the student's learning abilities and challenges and these can vary greatly depending on the individual student and his or her diagnosis (e.g., hard of hearing, vision impairment, intellectual disability, physical disabilities, developmental disabilities, and autism spectrum disorder). In order to address student needs with such a wide variety of challenges, a teacher needs to take into account various differences amongst children in order to appropriately teach all students. Perry, Donohue, and Weinstein (2007) found that when teachers made adjustments for student characteristics, such as student interest, participants in their study found an increase in academic skills as well as behavioral gains. When making adjustments for students who are on the autism spectrum in particular, there are many challenges to take into account.

As well as managing different students' varying degrees of sensitivity to external stimuli, educators have to take into consideration different learning profiles. Lai, Lombardo, and Baron-Cohen (2014) stated that language delays amongst individuals diagnosed with autism has substantial inter-individual variability. Additionally, Lai et al. (2014) also stated that more than 70% of those diagnosed with autism have co-occurring conditions, which can be medical, developmental, or psychiatric. Adding yet more variability in the skill sets and learning profiles of individuals with autism, Volkmar and Pauls (2003) found that the loss of skills previously

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acquired was variable, which can have clear limitations in regards to learning advanced skills if basic skills are lost. Lin (2014) found that early learning characteristics- hyperlexia- could be separated in to 5 different subtypes. With so many differences and variables amongst individuals the autism, it is clear that different intervention strategies will have varying degrees of effectiveness. Nation, Clarke, Wright, and Williams (2006) found considerable variability in patterns of reading ability. They found that some children read accurately but had poor comprehension. Participants were also found to have varying degrees of decoding skills.

In order to help students with autism, visual cues are often implemented. Ganz and Flores (2010) investigated the use of visual cues such as cards with pictures and short phrases in the context of play groups. Results indicated an increase in social and communication skills. Additionally, Ganz, Kaylor, Bourgeois, and Hadden (2008) conducted a study using social scripts and visual cues. For all participants, scripted statements increased while perseverative, or inappropriate speech, decreased. For one participant, unscripted language increased, meaning that the participant no longer needed to rely on scripting in order to interact with peers.

In general, adolescents with autism require a more intensive system of behavior interventions than that of their neurotypical peers (Baltruschat, et al., 2011). Many general education students are given enough positive reinforcement from naturally occurring contexts such as positive feedback on a paper or by getting to leave class 10 minutes early for a week of arriving to class on time. However, those with autism often need much higher rates of reinforcement, with much more immediacy in order to achieve success. In addition, to the likely need for an increased reinforcement rate, students on the autism spectrum may also benefit from various modifications in order to be successful.

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There are a multitude of academic modifications to consider for adolescents with autism, such as allowing them to turn in assignments past the due date, reading tests to students, providing the student with a smaller amount of homework, or allowing the student to have access to math formulas during test times (Biddulph, Hess, & Humes, 2006). Another system frequently put into place is errorless learning. Errorless learning is designed so that the student is given the correct answer or response immediately after a given question to answer or task to complete, to reduce incorrect responding when learning new skills (Mueller, Palkovic, & Maynard, 2007). Utilizing prompt fading- systematically reducing the amount of prompting a student needs to respond accurately- is another strategy that teachers can employ in order to instruct students (Rivera, Koorland, & Fueyo, 2002). To add yet another factor for all teachers to consider, especially special education teachers, are modifications to attempt to increase the acquisition rate of their students learning. Students with autism often need much more time to learn skills (Biddulph et al., 2006) and it can frequently take weeks or even months for students to learn a new skill. This is true for all academic areas, but reading, particularly decoding skills, can be a particular challenge for many students with autism (Huemer & Mann, 2010).

Many students on the autism spectrum benefit from learning to read in a multitude of ways. Once students are able to identify words, they can then potentially use them to communicate wants and needs, which can help with challenging behaviors that are a result of a lack of communication. For instance, Gerhardt, Weiss and Delmolino (2004) implemented both non-contingent reinforcement as well as functional communication training, which resulted in a dramatic decrease in aggressive behaviors. Additionally, there is the benefit of safety skills, such as being able to identify and appropriately respond to a stop sign.

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Spector (2001) conducted a review of studies to assess various sight words instruction systems with adolescents with autism. Results indicated that instructional strategies that utilized 1:1 instructional systems, direct instruction, discrete trials, stimulus fading, and observational learning were the strongest when considering their methodological rigor. Mule, Volpe, Fefer, Leslie, and Luiselli (2015) compared two additional interventions which focused on flashcard drills. Results of the comparisons showed that there are multiple options to choose from when utilizing educational systems to teach students the valuable skill of reading sight words, all of which were shown to be effective, though some, such as traditional drill and practice, were found to be more effective than others in regards to acquisition rate. Providing the student with preferred items and activities for appropriate responding is an important aspect of combining teaching methods and proactive strategies. In order to select the item or activity that the student is motivated for, a teacher should utilize preference assessments.

According to Cannella-Malone, Sabielny, Jimenez, and Miller (2013), a teacher can use a student's shown preference for identified items to select items and activities for the student that will increase behavior. When selecting stimuli, it would certainly be ideal if the student was inherently drawn to the desired response so that the teacher could then tell the student that they got the correct answer and then utilize appropriate behavioral supports in order to reinforce the response.

Including unfamiliar stimuli when conducting preference assessments can also be effective. Kenzer, Bishop, Wilke, and Tarbox (2013) selected new items for 3 children which were within a similar category to items that the students were familiar with in terms of required responses (physical requirements to engage with the toy), shared a stimuli (perhaps different toys with the same beloved cartoon character), or provided the same sensory stimulation (both the old

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and new toy vibrated). The results indicated that when unfamiliar stimuli are included in preference assessments, the unfamiliar stimuli were selected in a preference assessment as well as in a subsequent reinforcer assessment. By including unfamiliar stimuli in preference assessments, teachers can expand a students' reinforcer repertoire and avoid satiation, which increases motivation for an item. By using preference assessments, the teacher can gain valuable information about what the student is drawn to in order to select teaching materials and reinforcers. Then, when devising and creating teaching materials, students with autism may be able to learn valuable skills more quickly.

With so many different behavioral needs and possible academic adjustments, it can be a daunting task to find the right combination to make the most of instructional time. While there is a wide selection of literature regarding the overarching fields of education and special education, preference assessments and sight words, no literature or research was found on utilizing preference assessments in selecting or creating student materials for sight words instruction. The research thus far is limited to using preference assessments when selecting student reinforcers. There is a clear need for more research on the implications of utilizing preference assessments when working with individuals with autism, and using the results of the preference assessment to drive the selection student reinforcers as well as teaching materials.

Research thus far has focused on preference assessments to identify new items and activities that students are interested in engaging with; however the research has not looked into using preference assessments for color when selecting these new items or activities. The purpose of this study is to utilize color preferences to create teaching materials with the aim of increasing the acquisition rate of sight words.

With so many different behavioral needs and so many different possible academic

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adjustments, it can be quite a formidable task to find the right combination to make the most of instructional time. In order to begin to help with solving this problem, this study will attempt to utilize preference assessments in selecting stimuli to determine if the acquisition rate is affected.

Research Question

How does utilizing color preferences in stimuli impact the acquisition rate of sight words among adolescents with autism?

Methods

Importance and Significance

Students with autism more often than not, have a hard time learning new skills. If we can utilize color preference, then they may be able to learn valuable skills more quickly. Increasing the rate of acquisition of new skills for students with special needs can significantly improve their quality of life.

Participant and Setting

Charlie, a male adolescent with autism has been selected. The selected student was included because he has a sight-words goal identified in his Individualized Education Plan (IEP). Charlie is 15, of Hispanic descent and is considered a nonverbal student. He uses assistive technology and modified sign to communicate. When possible he is taught the American Sign Language sign for an item. However, there are motor skill delays so the student is taught an invented sign that can be used for communication purposes. The sign used as well as the item it represents is documented in the student's materials in order to maintain consistency of teaching and communication.

This study took place at a highly specialized school for children ages 5-22 whom have significant developmental disabilities. The school is a non-public, non-private school in the Santa

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Cruz County of California. The school currently serves 48 students and has 5 classroom teachers as well 1:1 ratio of paraprofessionals to students. The student has been assigned a pseudonym and will be kept on an encrypted and password protected laptop.

Dependent Variable

Number of sight words learned. All of the words selected to be taught in the study were meaningful Charlie.

Independent Variable

Charlie's preferred color was used as a background for the corresponding image of target sight-words. The target sight word image was black and white with a background of the preferred color. Images for words that were not being targeted were black and white and had a white background.

Research Design

This study was an AB design. Charlie entered intervention once he had 3 stable data points.

Procedures

In order to determine the color preference for Charlie, he was presented with multiple stimuli (toys, pictures, etc...) over multiple teaching sessions. These stimuli ranged in a variety of colors. Colors used in the preference assessment were the following: red, orange, yellow, green, blue, purple, pink and rainbow. Data was systematically taken in the item selected, and specifically the color of the item Charlie selected. For example, for one of the teaching sessions, the student was given 3 toys that only vary in color. Data was taken on which color of toy the student selected. Once there was pattern of preference (i.e., one color has been selected at least 3 more times than the other colors) that color became the utilized color in teaching sight words.

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After 3 teaching sessions, color preference was reassessed. Charlie's preferred color as reassessment was the same as his initial preferred color.

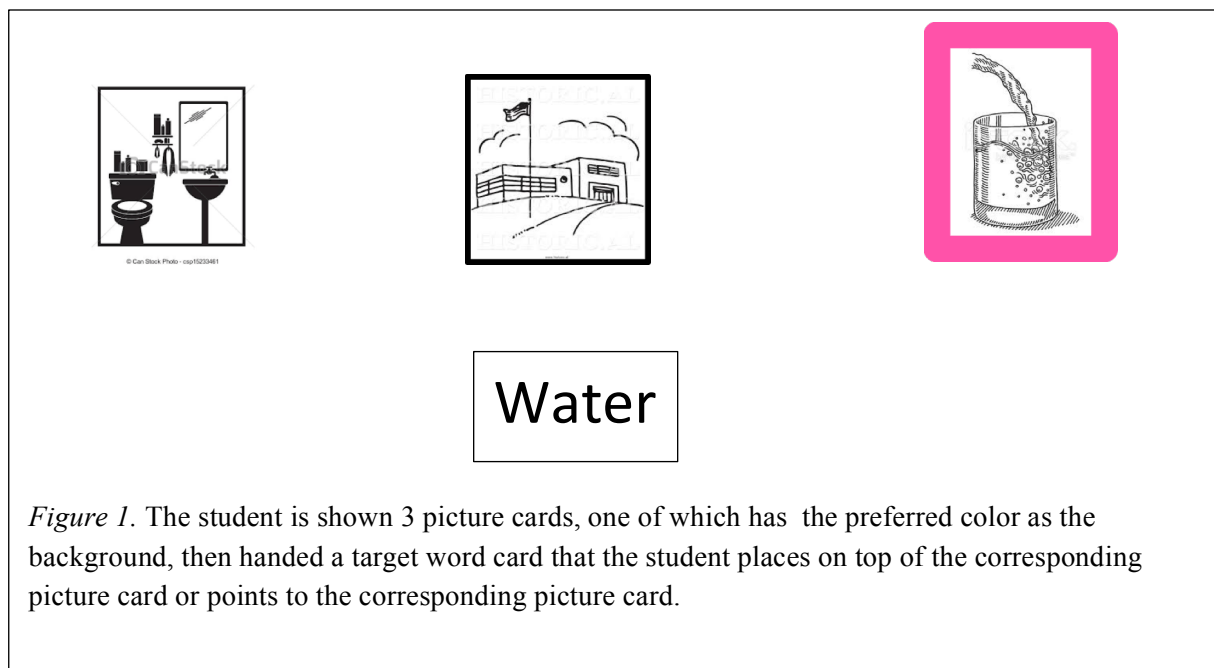
Sight Words

Functional sight words were selected for the current study. 'Water', was selected as the initial word to be taught. Subsequent target words to be taught were 'Bathroom' and 'School.'

Instruction

The sight-word instruction followed the current teaching procedure used in the classroom. Discrete trials in a 30 minute 1:1 teaching session were utilized. This is a teaching procedure currently used in this particular school setting and has been identified by Spector (2011) as having a strong methodological rigor. The color preference was utilized by having the background of the target picture card in the field of 3 was Charlie's preferred color and the remaining cards as well as the target sight word card had a white background. During each discrete trial, the student was presented with a field of 3 pictures (e.g., water, bathroom, school), then given the target sight word (e.g., water) and asked, "what word?" The student then matched or pointed to the corresponding picture (the background of the target picture card being the student's preferred color) in the field of 3 (see Figure 1). The behavioral and motivational systems that are used in the classroom (e.g., token boards, direct access to reinforcement, etc.) were continued throughout data collection.

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Charlie was first presented each word without any prompting or corrections to see how well he would independently complete the task, referred to as an initial probe. Therefore, only one word was taught at a time. Water was the first word and he was errorlessly prompted (Waugh, Alberto, & Fredrick, 2011) to the correct response, which was then represented for an independent response and paired with either positive reinforcement or a corrective statement. In this study, positive reinforcement took the form of verbal praise and token(s) on his token board and/or access to a preferred edible.

When an incorrect response was given, a physical correction (e.g., physical prompting to the correct response) with emphasis in the statement when pointing out the correct image as well as when saying the target word (e.g., “Nice trying, *this* is the word *bathroom*”). Charlie began intervention once he had three stable data points with the errorless prompting strategy.

Procedural Fidelity

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A second observer who was trained in all aspects of the teaching procedure (e.g., relevant teaching materials, errorless learning strategies, etc.) observed at least 25% of all experimental sessions. The second observer collected data on accuracy of procedure implementation. In addition, present during all experimental sessions was a checklist of required items (see Appendix). Interobserver agreement was collected on 30% of teaching sessions with a mean agreement of 98% (range = 90% -100%). Procedural fidelity checks were not implemented as the investigator of the study was also the conductor of each of the teaching sessions.

IOA

IOA data was collected for 30% of all baseline and treatment sessions. A trained staff member observed the teaching sessions and indicated a correct or an error for the implementation of the correct teaching procedure as well as the student response. Percent agreement was calculated by dividing the agreements by the number of agreements plus the number of disagreements and then multiplying the result by 100. IOA for this study was 100%.

Social Validity

Charlie was identified as needing a sight word based curriculum goal in his IEP based on academic assessments. IEP goals are determined by a team that includes parents, teachers, administrators, and other specialized professional individuals. The teaching procedure was the current and accepted procedure used in the classroom (except for using the color preference). Many skills that students with disabilities learn are stepping stones to other skills.

Results

Figure 2 displays the results for baseline and intervention conditions. The y-axis is the number of matched sight words and the x-axis is the number of sessions. Charlie had an average

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of 1.5 correct responses during baseline data with a range of 0-3. During intervention he had an average of 2.1 correct responses with a range of 0-3.

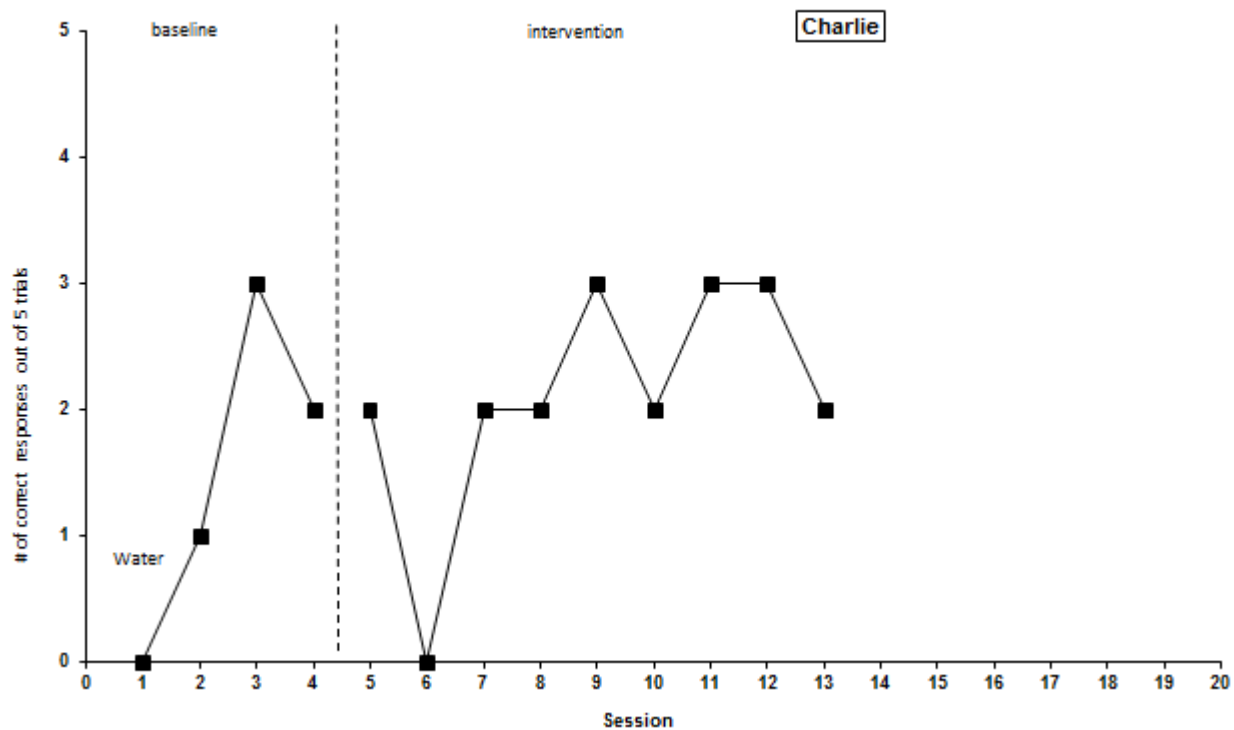


Figure 2. Graph representing Charlie's number of correct responses. He had an average of 1.5 correct responses with white background and an average of 2.1 correct responses with the preferred color background

Discussion

The purpose of this study was to assess the effect of utilizing color preferences in teaching stimuli in an attempt to increase the acquisition rate of sight words for students with autism. For Charlie, there was no functional relation demonstrated, as there was a large percentage of overlapping data. This is most likely due to his learning profile and his specific challenges when learning new skills. It is likely that Charlie needs errorless prompting, reinforcement, and additional attentional cues (besides color) to help him learn his sight words and meet his IEP goal.

Additionally, Charlie's history with discrete trial may also influence the results of this study; as Charlie has been instructed to give a response each time he is prompted. Therefore, he may be likely to give the first response that comes to mind and because students with autism need additional instruction time (Biddulph et al., 2006) to acquire skills. It would be important to try this intervention with Charlie again, taking into account the previously mentioned student needs.

Anecdotally speaking, this intervention has been used with other students in the setting and has been effective. Those students do not have the challenges with inattention and guessing that Charlie does. Additionally, they typically did not need as long to learn a new skill.

There were many limitations with this study. First is the sample size of the study. With only one participant, the study was not able to complete a replication even if the intervention had been effective for Charlie. The design of the study was another limitation. The current study was only able to utilize an AB design. Future studies could utilize a more rigorous design such as multiple baseline, an ABAB, or changing criterion design.

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Future areas of research should include implementing preference assessments across teaching materials. This study focused on the acquisition of sight words, while there are many other areas in which the discussed intervention could be evaluated, such as number value correspondence, matching tasks, following schedules, and receptive identification, just to name a few. Additionally, future areas of research should concurrently run target sight words with and without a color preference intervention to directly compare intervention versus no intervention for each student involved in the study to rule out or confirm the effect on acquisition rate of the corrective statement or the increased amount of practice.

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Appendix A

Interobserver checklist:

- € All relevant teaching materials presented to student
- € Correct verbal direction presented to student
- € Students individualized motivational system utilized
- € Corrective or reinforcement statement given
- € Teaching session ended on an independent response