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EASTERN KENTUCKY UNIVERSITY

Emotionally Unavailable: A Comparison on the Ability of Children with Developmental  
Language Disorders to Interpret Emotions in Humans and Inanimate Objects

Honors Thesis

Submitted

In Partial Fulfillment

Of The

Requirements of HON 420

By

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Department of Clinical Therapeutic Programs

Communication Sciences and Disorders Program

## Abstract

Emotionally Unavailable: A Comparison on the Ability of Children with Developmental Language Disorders to Interpret Emotions in Humans and Inanimate Objects

Savanna B. Gullett

Dr. Jade Robinson, Ph.D., CCC-SLP, Department of Clinical Therapeutic Programs

Developmental Language Disorder (DLD) is a neuro-developmental condition that emerges in early childhood and can persist into adulthood, manifesting as a variety of symptoms that can be significantly different in each individual. It has an estimated prevalence of 7.58% and is nearly 7 times more common in children than autism spectrum disorder (McGregor, 2020). As a population, individuals with DLD are at risk of facing significant issues in associating areas of language, including reading comprehension, problem-solving abilities, and social skills. Professionals have noticed emotional disconnect amongst individuals with DLD, leading to the proposition that those with DLD may have a significant deficiency in emotional interpretation. My research assessed three students' ability to identify emotions in inanimate objects and photos of people. The students were presented with images that illustrated five different emotions and asked to label the emotion. With this experiment, the picture stimuli were presented in a controlled setting and manner. My hypothesis was that children with DLD correctly interpret emotions in inanimate objects easier than in humans, suggesting that toys or picture stimuli with suspected emotions can be a first step into helping provide intervention for those with DLD. The point of the research was to see if the activity involving inanimate emotional recognition can provide an analogous railing to assist in climbing the stairway of communication. I hope that my

research will be able to provide the next step that professionals can take in order to assist in the climbing of the communication staircase for children with DLD.

*Keywords and Phrases:* Developmental language disorders, emotions, inanimate objects, social skills, emotional and behavioral competence.

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## Introduction

Language development is a process resulting from the interplay between biological, cognitive, and environmental factors. Around the age of 10-12 months, children are able to depict the phonemes of their mother's language and can implicitly discriminate them (Sansavini et al., 2021). They also begin to understand and utter their first words and produce representational gestures. Around the age of 3 years is when children should have a rich, developed lexicon to apply in their daily lives. Their utterances are grammatically more accurate and complex and can also be understood by people outside of the familial environment.

Nonetheless, language may not always develop as expected, which can have long-lasting, devastating effects on both the individual and societal levels. Developmental language disorders (DLD), previously known as a specific language impairment, are prevalent in children that show a language delay despite the fact that other aspects underlying language difficulties are within normal rates (Valera-Pozo et al., 2020). Thus, the DLD diagnostic criterion is defined as a persistent language delay that is not resolved by the age of five and typically affects receptive and expressive language abilities. This occurs within the absence of a medical condition, which can include, but is not limited to, brain injury, autism spectrum disorder, intellectual disability, or hearing loss (NIDCD, 2022). DLD is a highly heterogeneous condition and can affect language production and/or comprehension. DLD is primarily noticed during engagement of spoken language amongst others. With an estimated prevalence of 7.58%, it is approximately 7 times more common than autism spectrum disorders and is also 46 times more common than permanent childhood hearing impairment (McGregor, 2020). It also affects a child's social skills, which can overall decrease an individual's quality of life (Valera-Pozo et al., 2020). As well as



impaired communication and social skills, individuals with developmental language disabilities can be exposed to increased levels of emotional difficulties, such as anxiety and depression, compared to their normed peers (C. Forrest et al., 2020). These negative social and emotional outcomes can persist throughout the individual's lifespan.

### **Social Skills in Children with Developmental Language Disorders**

Adolescence is a time of increased social and emotional difficulties in general, however, individuals with DLD may struggle more than their typically developing peers, more specifically in the area of social functioning skills (Forrest et al., 2021). For the purposes of their research, social functioning is based on the quality of friendships and social activities, which assesses both positive and negative aspects to provide a comprehensive picture of adolescents' abilities in this domain (Forrest et al., 2021). Language is a crucial component of social functioning, and the effect is displayed at a young age. Children aged 18-35 months who were identified as "late-talkers" demonstrated lower social competence compared to their typically developing peers (Forrest et al., 2021). Thus, it is logical to assume that individuals with DLD will have increased difficulty with formulation and maintenance of friendships as well as acquiring adequate social skills (Forrest et al., 2021). The struggle from having difficulty with maintaining friendships can result in social withdrawal and isolation (Fujiki, et al., 2019).

There are conflicting findings about the extent to which language ability influences emotional outcomes in children and young people with DLD; moreover, some studies have found that there is no direct link between language ability and emotional disadvantages (Lindquist, MacCormack, & Shablack, 2015). While the severity of the children's language impairments alone does not predict levels of emotional regulation skills, it can predict reticence

in children with DLD. This finding has led researchers to assume that some children with DLD are fearful of social situations, not just because of their communication disorder, but also due to impairment of their emotional development (Lloyd-Esenkaya et al., 2020). This idea ties in with a previously termed theory called *The Social Deviance Model*. The theory states that “children with DLD might have inherent difficulties with their socioemotional development, independent of their language difficulties, and it is these socioemotional issues which result in challenges with socializing with other people” (Lloyd-Esenkaya et al., 2020). While this is certainly a factor that may play into social withdrawal that is most commonly prevalent in children with DLD, it is not a guarantee that it affects all children with DLD, or to the same degree. A systematic review and meta-analysis has shown that children with low expressive and receptive skills typically display higher levels of behavioral issues, which could possibly point to the underlying reasons for peer problems in children with DLD. Therefore, this issue might extend beyond simply just social withdrawal within a child and could point to some more direct issues that affect more than just language production.

Previous studies have demonstrated an elevated rate of social and emotional problems in children with DLD (Kuiack & Archibald, 2019); however, the research on adolescents and potential mechanism to explain the relationship is lacking. Gathering information on adolescents with DLD can potentially assist in preventative intervention methods that will further help with identification, evaluation, and treatment. Additionally, friendships become more complex as children enter into adolescence. Due to the increase of importance in peer relationships, helping adolescents build a stronger sense of identification will be useful for providing emotional support. There is an array of studies that have proven that friendships are extremely beneficial for overall quality of life. Unfortunately, adolescents with DLD may have an automatic

disadvantage due to potential delays in emotional development. Therefore, poor emotional outcomes in adolescents with DLD may be an indirect result of difficulty with social functioning and not necessarily the direct effect of poor language ability (Forrest et al., 2021). With this in mind, it is important to consider the impact that friendships have on early adolescence. By providing early intervention to a child with developmental language disorders, this can assist in a child's ability to understand emotional competence, which will start the child on the correct path of success as they progress into preadolescence.

More research is needed to fully understand whether these externalizing behaviors, such as reacting defensively in social interactions, are displayed in these social interactions, which could account for some of the "peer problems" that are commonly found in children with developmental language disabilities. Despite the evidence that has been provided, children with DLD receive little to no intervention to support their social development. In a systematic review conducted in 2012, Gerber and her research team in the Department of Linguistics and Communication Disorders of Queens College, found that there were eight assessing interventions that supported social communication in children with language impairments. All of these interventions were exploratory studies, which only involved a sample size of less than 20 children that helped test the feasibility of interventions, which suggests that research in this area is still in its working stage. All eight studies focused on improving the children's discourse skills, thereby assuming that the social skills will directly improve in accordance to the work with discourse skills, in terms of repairing communication breakdowns with their communication partner or monitoring their understanding during conversations (Gerber et al., 2012). Current social skills interventions for DLD build on the understanding that the peer interaction difficulties that take place are a direct result of their language difficulties (Lloyd-Esenkaya et al.,

2020). Therefore, this study showed that current intervention methods work on directly improving discourse skills with an expectation that the social and behavioral aspects of language will automatically fall into place. Unfortunately, this may not always be the case for individuals with DLD. Discourse and “discourse competence” is a general term that refers to “the ability to understand and express oneself in a given language” (Leverkuhn, 2022). There are many different components that assess overall discourse competence. For instance, when examining this kind of skill, it may be beneficial to understand how individuals process many different phrases or verbal exchanges. This may include specific emotions or feelings or a wide range of idiomatic phrases or figurative language that are frequently used in a particular language. When measuring discourse competence in real-time, it can be useful to assess an individual’s areas of growth with any specific component. With previous intervention strategies that have been developed over time, it is assumed that children who work on improving overall discourse will almost certainly begin to understand emotional competence skills in accordance with their discourse skills. Discourse should be implemented once a child has full understanding of emotions and feelings. If an individual struggles with emotional and behavioral competence, then it may not be wise to look at providing intervention with discourse without a child’s full understanding of the impact that specific emotions can have on spoken language.

### **Inferencing Emotions with DLD**

With an ongoing recognition that children with DLD have difficulties with language processing, recent research has also suggested that children with DLD display severe deficits in areas of social and emotional learning. The Collaborative for Academic, Social, and Emotional

Learning defines social and emotional learning as “the process through which children and adults acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions” (CASEL, 2018). Over time, there has been increasing evidence that many children experience difficulties with social and emotional learning that adversely affect their interactions with peers and other professionals. On top of having difficulty with basic emotion understanding tasks, such as identifying emotions on faces and emotions in prosody, these children also have deficits in identifying more complex emotion understanding tasks, such as dissemblance, or hiding an experienced emotion when socially appropriate to do so (Seaberg, n.d.). In Denham’s book titled *Emotional Development in Young Children*, an in-depth breakdown is provided on how emotional competence is developed over time in children. Emotional literacy is as vital as any type of learning, and these abilities continue to develop throughout the lifespan, but preschool-age children are surprisingly adept at several components of emotional competence, including expression, understanding, and regulation. When functioning optimally, these component skills work together in an integrated way to assist in a child’s social milieu. Denham explained in her narrative that emotion understanding involves a number of developmental areas, including identifying facial expressions of emotion, understanding the causes of emotions, interpreting emotions conveyed in vocal prosody, and recognizing more complex emotions which include embarrassment and /or shame (Denham, 1998). In comparison to children with DLD, their disorder may affect one or multiple areas of emotional development, causing deficits in making inferences concerning emotions.

One aspect of emotional understanding that is of particular importance in the research community is the ability to make inferential decisions regarding emotions. In considering this ability, it is vital in recognizing that these children have difficulty with inferencing across the

board. *The Theory of Constructed Emotion* proposes that language is crucial for the acquisition of emotional concepts (Gendron and Barrett, 2018). Critically, the TCE suggests that the role of language in supporting emotion recognition goes beyond acquisition of emotion vocabulary. Precise conceptual alignment can be achieved through the communication interaction with others. Therefore, if an individual has less opportunity to learn about emotion concepts through language, their conceptual alignment would be compromised, which would lead to less accurate emotion identification. Researchers Karasinski and Weismer (2010) conducted a study that involved four groups of children, including a typical language group, a low cognitive group, a group with specific language impairment (SLI) and DLD, and a group with non-specific language impairment. The subjects first listened to an audio-recorded story and then answered four questions about the premise of the story as well as four inferencing questions. There were two distant inferencing questions asked, meaning that it required the participant to recall information presented previously after some time had been passed. The results revealed that the distant inferencing questions were the most difficult to answer, with the typical language group doing slightly better than the other groups. The SLI and DLD group performed significantly worse than the children in the other three groups, which brought the conclusion that comprehension of implied information in audio-recorded stories is particularly difficult for children with deficits in receptive language, working memory, and general cognition (Karasinski & Weismer, 2010). Additionally, this led the authors to believe that these deficits that are found in linguistic comprehension and working memory in children with DLD were predictors of the inability to infer information, which can lead to be a huge issue in the development of emotional inferencing.

Children with DLD also have difficulties making inferences about emotions that appear to extend beyond their linguistic deficits. The inability to inference can affect both a child's receptive and expressive language abilities. In a study conducted by Forbes (2019), a student at *Brigham Young University* in the Department of Communication Disorders, five children with developmental language disorders, ages 6;4 to 11;9, identified emotions in pictured scenarios over a period of 10 weeks. In each scenario, an emotion was characterized, which included *happy, sad, anger, fear, surprise, and disgust* - in each child's response, an analysis was conducted and plotted on a matrix (Forbes, 2019). The study revealed that in few cases, children did not interpret the scenario accurately; even when they interpreted the scenario correctly, all the children either misapplied, overgeneralized, or entirely confused emotion labels in some cases. In addition to these findings, *fear, surprise, and disgust* were almost impossible to distinguish.

Children with DLD may also display difficulties making emotional inferences that extend beyond their primary linguistic issues. Vendeville et al. (2015) evaluated the capacity of children with DLD or other language impairment to infer emotions in a drawing exercise. The study was composed of 22 children with language impairment as well as 22 children with typical development children between the ages of 6 and 10-years old. They were asked to listen to audio recordings of stories and then asked periodically to draw a face that conveyed an emotion that the character in the story was currently feeling. Results revealed that children with language impairment had a difficult time inferring emotions compared to the children with typical development children by mistaking a positive emotion for a negative emotion or vice versa (Vendeville et al., 2015). Children with language impairment or DLD present with deficits in expressive communication, which is adjacent to their ability to communicate what emotions, if

any, that they are able to identify in their peer interactions. These deficits may not be a result of their expressive language impairment; however, may serve as a predictor of expressive communication regarding emotions.

A similar study conducted by Ford and Milosky (2003) tested the ability of children with DLD to infer emotional reactions compared to their typically developing peers. The participants in the study were presented a story and were asked to select a picture of the facial expression that most likely matched the character's emotion. The authors discovered that children with DLD did not infer the emotions correctly or as precisely as typically developing children. This affects their ability to integrate emotion understanding into social contexts, including interactions with peers. This study provides evidence that children with language impairment or DLD more commonly confuse the valence of emotions compared to their age-matched peers (Ford & Milosky, 2003).

### **Victimization in Individuals with DLD**

Bullying is a common issue among children and adolescents that may have long-lasting negative effects on the well-being of both victims and bullies. Bullying can be defined as “a behavior with the intention to harm another person, often, a group of children repeatedly turns against one child, which results in an imbalance of power” (Olweus, 2013). Individuals facing significant communication difficulties, such as DLD, are particularly at risk to be targeted for bullies. In a study conducted by Conti-Ramsden and Botting (2004), between 28% and 50% of preadolescents with DLD are victims of physical or verbal bullying compared with their peers' percentages, sitting between 12% and 22%. In children without DLD, difficulties with emotional competence are a risk factor for victimization. Emotional competence is the umbrella term that



provides the ability to recognize one's own and others' emotions, to understand the causes and meanings of these emotions, and to regulate and express emotions in adaptive ways, to reach personal and social goals (Saarni, 1999). This development is highly dependent on involvement in the social communication realm, therefore, difficulties in emotional competence among children with DLD may be an added risk factor for bullying, over and above their communication issues. Unfortunately to date, it is unclear as to what extent difficulties in emotional competence contribute to victimization in this particular group.

Dealing with conflict is an important skill that is developed during childhood to master regulating and expressing negative emotions (Von Salisch & Zeman, 2017). However, unequal power in peer relationships can make conflict more problematic, which is evident in bullying. The main objective of bullying is to dominate and strive to grow in popularity and status at the expense of their victim. Because of this, bullies often pick victims who are seemingly more vulnerable in their perception, such as peers with communication deficits (Olthof et al., 2011). According to the *Social Adaptation Theory*, "a child experiences social difficulties when the communicative demands of the environment exceed the communication abilities of the child" (Redmond & Rice, 1998), which further explains the higher reported levels of victimization in young individuals with DLD. If a social interaction overwhelms their communication ability, a child with DLD may remove themselves from the situation or become passive during these interactions. They may also exhibit externalizing behaviors, which in turn results in fewer and/or shorter social interaction amongst their peers. This gives the individual less opportunity to exercise their social and language skills (Redmond and Rice, 1998). Unfortunately for children with developmental language disorders, this may be a frequent reality.

Factors, such as severity and type of communication problems, can be associated with victimization or peer problems in general, although results vary. In a longitudinal study, more expressive language problems identified at 8-years of age led to higher levels of bullying by age 11 (Conti-Ramsden & Botting, 2004). Within the same study, there were reported issues with pragmatics at age 11 years, which were unrelated to peer competence as rated by teachers. This finding is consistent with a later study that found pragmatic problems in children with DLD at 11-years of age contributed to the prediction of teacher-rated peer problems at 16-years of age (St. Clair et al., 2011). Overall, the severity and type of DLD only explain a small portion of the variance in reported victimization, therefore it cannot be assumed that there is a direct link between language problems and social deficits in children with DLD, however, this relation is mediated by other factors.

### **Victimization and Emotional Competence**

Focusing on communication problems alone will limit our understanding of the development of victimization in children with DLD. Research has shown that negative peer interactions are more common in children with less emotional competence. Common symptoms amongst victims have been described as children who experience a deficit in understanding their own emotions as well as the emotions of others, and they oftentimes exhibit higher levels of negative emotions, including fear, sad, and anger (Camodeca & Goosens, 2005; Cook et al., 2010). It is important to note that high emotionality can result from victimization, but it can also trigger bullying since bullies often target children who are more easily provoked. The high incidence of victimization of children with DLD can also be explained by difficulties in their emotional competence, which is indirectly affected by their communication needs. Emotions

play a huge role in communication. They signal importance in both a verbal and nonverbal manner. Usually, the development of emotional use and competence is evident in typically developing children around the second 6-months of life and will expect to have full vocabulary for basic emotions by 4-6 years of age (Griffiths, Goh, Norbury and SCALES, 2020; , Trentacosta, 2020.). Throughout adolescence, the development in identifying nonverbal emotional cues continues to improve into late adolescence (Grosbras et al., 2018). As infants gain rudimentary cognitive and memory capacities, they begin to express particular emotions based on the context of situations. These emotions begin to emerge dynamically as the individual is exposed to a more direct role in emotional communication with caregivers. Poor early language can predict poor emotion recognition skills later in life (Eisenberg, Sadovsky, & Spinrad, 2005).

While there is no research that has investigated the bullying behavior of individuals with DLD, it has been noted that the general population of young individuals who are continuously bullied will also reciprocate that behavior and bully others, especially when their inability to understand others' emotions comes into play (Cook, Williams, Guerra, Kim, and Sadek, 2010). In a study conducted by van den Bedem et al. (2018), the longitudinal relationship between emotional competence, victimization, and bullying in preadolescents with and without DLD were examined. This study helped to understand which factors put individuals with DLD at risk for negative peer interactions and could inform future interventions in order to subside this issue.

### **Long-Term Effects: Why We Should Care**

The communication problems of individuals with DLD negatively affect academics as well as lead to higher levels of emotional and social issues compared to their peers (van den Bedem et al., 2018). During their preadolescent years, research has shown that children with DLD have reduced friendship quality and more peer rejection (Botting & Conti-Ramsden, 2008). For some children with DLD, these social issues may further increase in adulthood, which is a worrying finding. During adolescence, young people are more sensitive to negative connotations brought upon them by peers, which in turn can lead to increasing levels of internalizing psychopathology in youth. It is critical to understand and address the underlying mechanisms that contribute to the development of these social problems in young adolescents with DLD could be helpful for mental health advocacy (van den Bedem et al., 2018).

In order to gain a holistic understanding of the impact of DLD, all relevant information needs to be taken into account. As stated previously, speech and language disorders as well as DLD often result in economic effects for the individual and society. The societal economic burden may be substantial if the individual progresses to criminal behaviors, needs increased mental health services, or is unemployed and requires ongoing support. In addition, a disproportionate number of cases regarding DLD are experienced by socio-economically disadvantaged populations, which often means that economic barriers inhibit access to appropriate assistance services.

In a study conducted by Langbecker et al. (2020), the long-term effects of speech and language disorders and DLD were examined to understand the impact on an individual as they progressed into adulthood. The results ascertained that having a childhood diagnosis of an SLD or DLD appeared to be associated with mental health outcomes, with evidence most consistently

indicating associations with personality disorders and behavioral issues (Langbecker et al., 2020). This is crucial information for professionals to be aware of, as they are well equipped to refer individuals to other support services during early intervention. In this review, researchers found a high association between SLDs and behavioral disorders, however, the authors were unable to discover whether this relationship was incidental or directly related. While there are other factors to consider, such as social, cognitive, and generic risks, more research aimed at these constructs will provide a better understanding of these issues in individuals with SLDs and how treating professionals can support them.

Little information remains available regarding the distinct challenges faced by adults with DLD, specifically for those in college. In a study conducted by Del Tufo and Earle (2021), the cognitive skill profiles of 352 college students were examined using standardized and research-validated measures of reading, spoken language, nonverbal cognition, and self-reported childhood diagnostic case history. Using a structural equation model, the cognitive, language, and reading measures were predicted. The findings revealed that DLD status in college was negatively associated with verbal word memory, nonword repetition, and reading fluency; there were also associating problems with phonology-based problems (Del Tufo & Earle, 2021). The measure of reading fluency assessed the participants' ability to read quickly and accurately as well as make a semantic judgment regarding each statement. Importantly, the students did well with comprehension when they were not under timed conditions. On top of difficulty with reading fluency, poor verbal word memory has been linked to difficulty in processing spoken language during lectures (Becker & McGregor, 2016). With both poor reading fluency and difficulty with verbal word memory, there may be two critical accommodations for college students with DLD, including audio or video-recorded lectures as well as unlimited testing.

Striving for the equity of students rather than equality can provide students with DLD and other language delays to receive the opportunity to succeed in fair environments that promote success in all aspects.

## **My Research**

### **Purpose**

The purpose of this research was to see if the activity involving inanimate emotional recognition can provide an analogous railing to assist in climbing the stairway of communication. I hope that my research will provide speech-language pathologists and educators with ideas for assisting children with DLD in successfully climbing the communication staircase. By conducting this study, I hope to learn more about whether the interpretation of emotions in illustrations of inanimate objects is easier to detect compared to the detection of human emotion in photographs. With the results of this study, I hope to utilize this information to further develop intervention strategies to assist with children who may struggle to detect emotions in their peers, which will further help with the social communication skills of children with DLD.

### **Hypothesis Development**

Our brains detect and respond emotionally to illusory faces the same way they do with real human faces. This phenomenon is known as face pareidolia and it's a process by which our brains can distinguish a face and emotional response from an object (Lachlan, 2020). As I was developing a study to analyze the true effect of emotional responses to facial expressions, I took into account this phenomenon to see if this would be prevalent within children who have DLD.

For my research, I decided to analyze the interpretation of emotions through inanimate objects to see if the incorporated images can provide a specific emotion in the participants of my study.

With the results of this study, it can provide an analysis on the interpretation of how those with DLD read emotions in human facial expressions compared to suspected facial expressions found in inanimate objects. My hypothesis was that children with DLD can correctly interpret emotions in inanimate objects more quickly and accurately compared to emotions in photos of human facial expressions. Furthermore, I believe my research may suggest that toys, animations, or picture stimuli with suspected, personified emotions can be a first step into helping provide intervention for those with DLD who specifically struggle with emotional inferencing.

## **Methods**

### **Participants**

Selection criteria stated that participants must be students at Model Laboratory School in grades 3<sup>rd</sup>, 4<sup>th</sup>, or 5<sup>th</sup> with a diagnosis of a developmental language delay or disorder or having a suspected language delay based on concerns shared by a teacher, family member, or related service provider (e.g., speech-language pathologist). For exclusion of participants in the study, the student whose primary language was something other than English was not included. Those who were absent of a developmental language disorder, language delay, or suspected language delay were also excluded from this research. A population of students with DLD were selected by Model Laboratory School's elementary principal with assistance from the school speech-language pathologist. Advertisement flyers and consent forms were then distributed by the administrative staff to the prospective participants through private and protective consideration.

All participants and their parents/legal guardians were provided an informed consent form prior to participation, in accordance with procedures approved by Eastern Kentucky University's IRB. Upon selection, participants were provided a child assent form prior to beginning the study. A total of 3 students participated in the study. Two of the participants were females in 5<sup>th</sup> grade and the third participant was a 3<sup>rd</sup> grade male. The age of participants ranged from 8 years to 11 years. Gender, ethnicity, and health status was not considered in subject selection.

### **Procedures**

Participants completed the study within 30 minutes of administration. All testing was conducted by the primary investigator, who is also the author of this paper. Data collection took place at Model Laboratory School on Eastern Kentucky University's campus. Participants were administered 20 images, with 10 of the images representing facial expressions found in inanimate objects and the remaining 10 containing human facial expressions. During this study, there were five different emotions that were analyzed: happy, anger, sad, fear, surprised. The images were labeled on the back of the laminated cards, with items 1-10 being the inanimate objects and items 11-20 representing the human facial expressions. In an attempt to remove bias, the images were provided in a randomized order. The time it took in seconds for the student to provide a quick and accurate response to the image was recorded.

### **Findings and Results**

Student A was a 5<sup>th</sup> grade female. Her times were recorded, and results revealed that the average time it took to provide an accurate answer for the inanimate objects, items 1-10, was



9.283 seconds. For the human facial expressions, items 11-20, the student had an average time of 9.411 seconds. With a slight difference of 0.128 seconds, the student was able to identify the emotions within inanimate objects more quickly and accurately compared to those emotions found in human facial expressions.

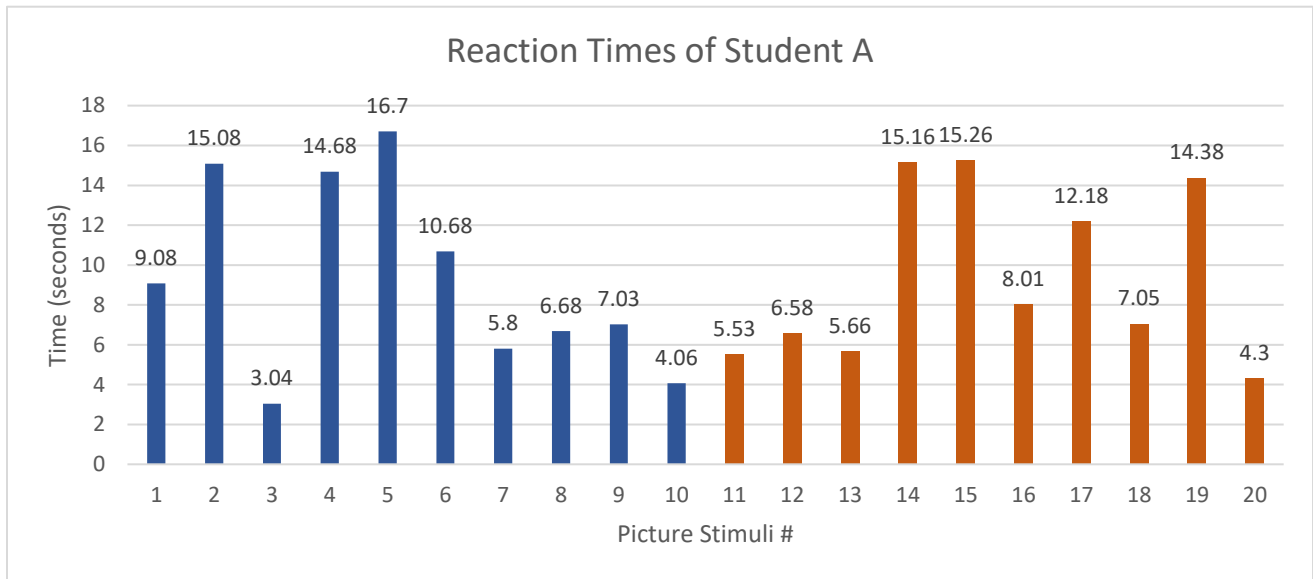


Figure 1: Results of Student A

Student B was another 5<sup>th</sup> grade female. The images were provided to the student in a randomized order and the time it took for the student to provide an accurate answer was recorded. Her results revealed that the average time it took in seconds for the student to provide an accurate response for items 1-10 was 8.043 seconds. The average time it took for the student to provide accurate answers for items 11-20 was 6.453 seconds. With a difference of 1.59 seconds, Student B was able to identify emotions more quickly and accurately within human facial expression compared to those found in inanimate objects.

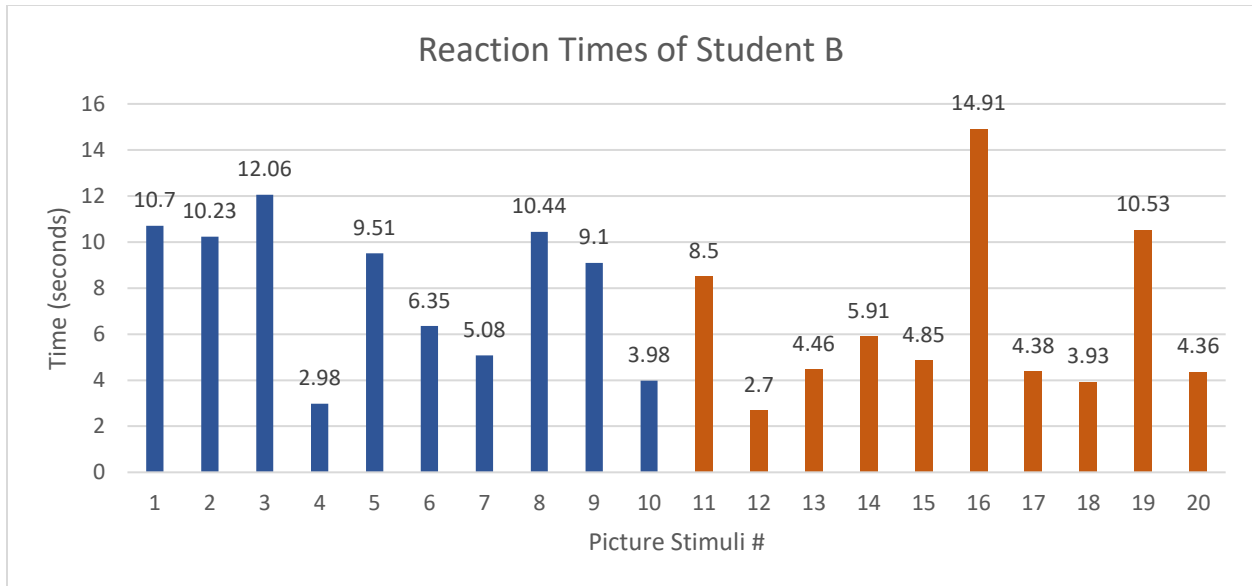


Figure 2: Results of Student B

Student C was a 3<sup>rd</sup> grade male. The images were provided to the student in a randomized order and the time it took for the student to provide an accurate answer was recorded. His results revealed that the average time it took in seconds for the student to provide an accurate response for items 1-10 was 7.578 seconds. The average time it took for the student to provide accurate answers for items 11-20 was 5.631 seconds. With a difference of 1.947 seconds, Student C was able to identify emotions more quickly and accurately within human facial expression compared to those found in inanimate objects.

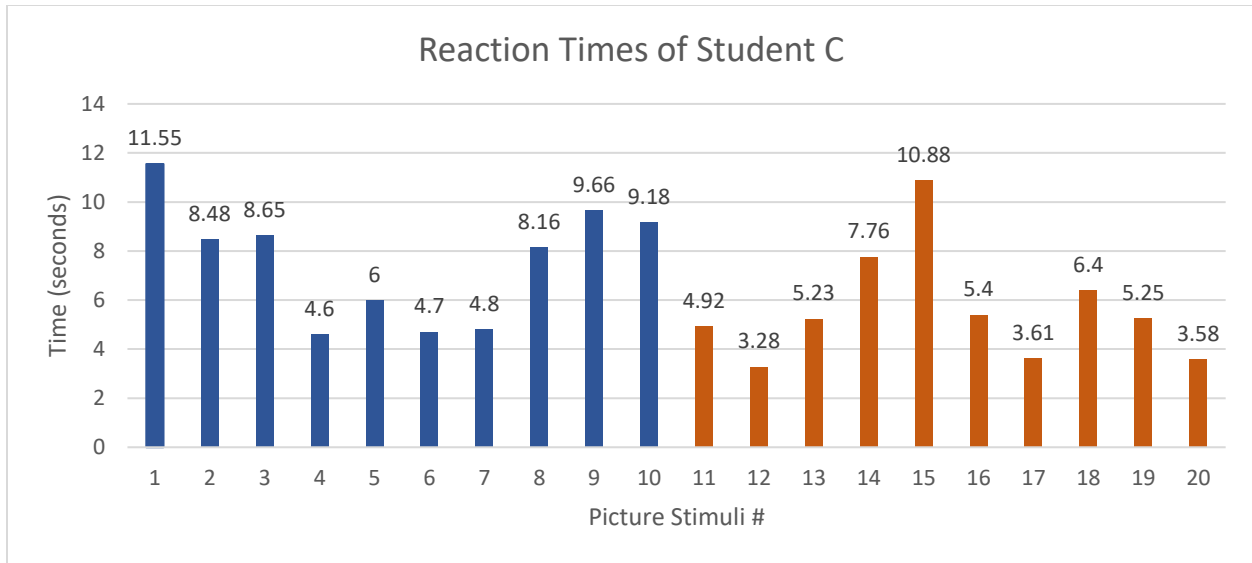


Figure 3: Results of Student C

To examine the performance of all three students who participated in the study, a master bar graph was created to capture an average time for correct responses to all 20 picture cards used in the study. The average time to provide a correct answer for items 1-10 (inanimate objects) amongst all three students was 8.3 seconds. The average time to provide an answer for items 11-20 (human faces) amongst all three students was 7.13 seconds. Thus, there was a slight difference in the average times for inanimate objects compared to human faces.

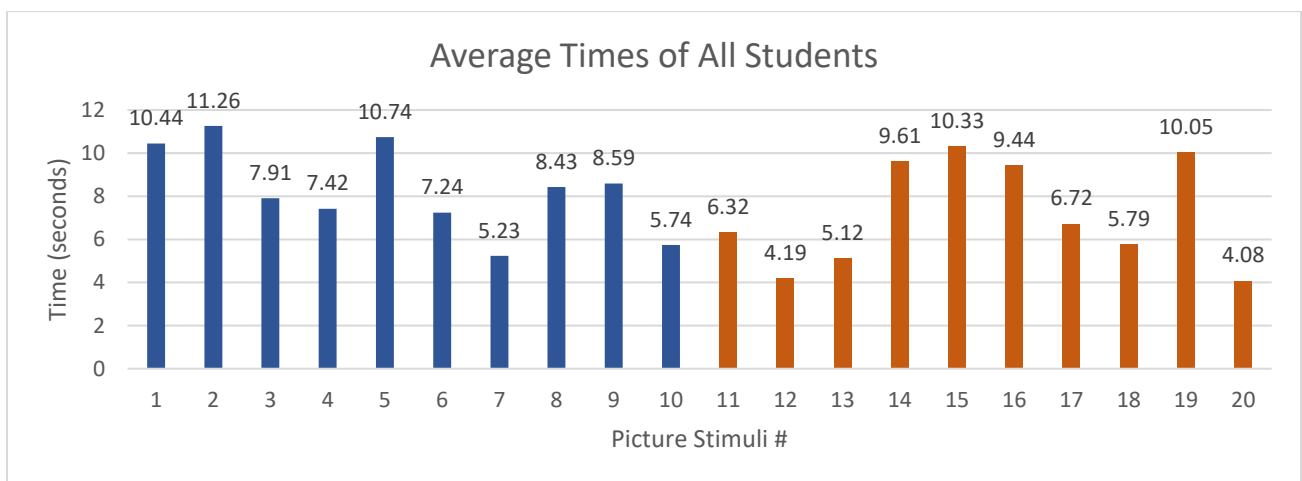


Figure 4: Results of all students and their average times (seconds)

## Discussion

Upon completion of my study, my original hypothesis was not accepted. I did, however, discover some important information that I believe can be used to expand upon this study to assist in development of similar research studies. Within all of my participants, there were outliers that are important to consider when analyzing the data. For Student A, the outliers were items 2, 5, 14, and 15. Item 2 was identified as an angry emotion that was detected within an inanimate object, while item 5 was a sad emotion. Item 14 was an angry emotion and item 15 was a human facial expression displaying “fear.” Student B’s outlier included item 16, which contained a human facial expression displaying “fear.” Lastly, Student C’s outliers included item 1 and item 15. As previously stated, item 15 was of a human displaying the facial expression of “fear” while item 1 was another inanimate object that contained “anger” in the image. After completion of this study, I began to look at these outliers and identify some common characteristics of each image. It seems as though the items that contained emotions with negative connotations attached to them were more difficult for the students to identify compared to the other emotions that were presented in the study. The outliers that were discussed above were negative emotions, such as anger, fear, and sadness. When conducting the study, the students who presented with difficulties in identifying the images associated with the outliers on the bar graphs took a longer time to provide an accurate answer to the image. For instance, if the image was one that depicted the emotion “anger” and the true answer was “fear,” the time would not be recorded until the appropriate answer was provided. Thus, many of the students who presented difficulties in identifying the appropriate emotion on the first try would misapply an emotion and then change their answer after looking at the image more carefully. For emotions that had positive connotations, such as “happiness” or “surprise,” the students had an overall easier time

identifying these expressions accurately. The times were reflective of their ability to distinguish these emotions in both the inanimate objects and the human facial expressions. I believe this finding can be expanded upon to look at the social and behavioral needs of children with developmental language disorders as well as those in other populations, including autism spectrum disorder or intellectual disabilities. This information can be useful in understanding what specific areas of emotional competence children struggle with by taking a closer look into the specific emotions and expressions that children struggle to differentiate. Thus, the results of a study like the one conducted for this research can help develop personal goals to assist the specific needs of the student during social situations.

As with every study, there were some limitations. First and foremost, the time constraint proved to be the biggest limitation; with only a traditional semester to receive IRB approval, formulate procedures, and conduct the study, there proved to be very little time to adequately collect the appropriate amount of data that would be ideal for this research project. With that being said, the number of total participants was another limitation to this study. Given how small the DLD population is at Model Laboratory School, it was predicted that approximately 3-5 students would agree to participate in the study. When only focusing on students between grades 3<sup>rd</sup>-5<sup>th</sup>, that limited the population size down tremendously. Another limitation to this study was that there was no control group that consisted of typically developing children. Ideally, a control group would rule out any inconsistencies and provide a more comprehensive picture of the results that were provided in this research paper.

Although the studies discussed above show that children with DLD have particular difficulty making inferences about emotions, few studies have examined interventions to improve the ability of children with DLD to infer emotions. In part, I hope that the results of my

study can be further expanded on and will eventually assist in the development of research-based interventions to improve those skills that may be absent within a child who has a language impairment or a DLD. This may be considered a reflection of the relatively small number of studies that have been conducted examining social communication skills in children with DLD in general; however, even as the number of social communication intervention studies have expanded, there are few studies from this pool that have examined emotion inferencing.

### **Conclusion: A Call to Action**

Children with DLD may not be receiving the interventions they need to address their social, emotional, and behavioral needs due to a lack of awareness about the global needs of this population. There is too little research devoted to improving the quality of life for those with DLD. These problems – lack of awareness, lack of services, and lack of research – feed off of one another, resulting in a need of a paradigm shift.

In the United States, school SLPs work closely to assess the management of DLD, but this should not be a task that only a school SLP should be in charge of. Those who work within the medical and education community, researchers, and policy makers must support the continued efforts of school SLPs to provide excellent intervention services to children with DLD. This work will require an immense amount of advocacy and collaboration with our community organizations, clear communication with the families we serve, the development of new tools and strategies, and the strong development of partnerships outside the community. In association with intervention strategies, there must be an implementation of models for prevention and service delivery that take place both inside and outside of the classroom and school environment.

No one action will remedy our failures to support the social and behavioral needs of this population of individuals, but with the combined actions, it may enable innovative solutions to provide long-standing results that provide child-specific services, knowledge, and advocacy for these children and their families. With the research conducted, there is hope to learn more about the emotional interpretation abilities of those with DLD. Today's research will continue to provide a steppingstone for assisting the emotional needs of children with DLD as well as other populations of students to improve overall quality of life by simply understanding the importance of emotions in language.

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