

EFFECTIVENESS OF A PARENT TRAINING PROGRAM ON THE USE OF
COMMUNICATIVE FUNCTIONS IN YOUNG CHILDREN WITH CEREBRAL PALSY

The Discipline of Speech Pathology and Audiology

School of Human Community Development

Faculty of Humanities

University of the Witwatersrand

In fulfilment of the requirements for the degree M.A. Speech Pathology

By

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DECLARATION

I, Marissa Venter, hereby declare that this research report is my own work except as indicated in the references and acknowledgements. I am responsible for the content of this study and the conclusions presented. No part of this research report has been previously submitted for a degree at any other University/Institution. I have included a “Turnitin” report as an appendix (Appendix A).

Signature: 

Date: 23 April 2017

ACKNOWLEDGEMENTS

This research is dedicated to the memory of Disebo Lena Manko who encouraged and supported me throughout my life. She was and will always be my beacon of hope. She continues to inspire me throughout my life.

My sincere thanks go to my supervisor, Miss Andrea Fourie. I am grateful for your exceptional guidance and support. You have constantly inspired me to strive for excellence as a researcher and as a professional in the field. Thank you for everything that you have done to get me here.

I would like to thank the South African Neurodevelopmental Therapy Association for providing me with the funding in order to conduct this research.

Thank you to Dr Gillian Saloojee and Miss Lydia Ngwana for your input and involvement in making the parent workshops a reality. It is inspiring to see how you enrich parents and their children with CP's lives through these workshops.

I thank all the children who participated in the study. I hope that this study will add to the change that is needed for us to help you achieve your potential. May your futures be bright and your abilities go from strength to strength.

All parents and caregivers who participated in this study, your commitment and positive outlook on life despite its challenges is admirable.

Thank you to my research assistants, Miss Kelly Hugill and Miss Demi du Toit. Your time and effort is greatly appreciated.

To my amazing parents, Johannes Venter and Louise Venter, I can make it through anything with you both by my side. You are not only my parents but also my best friends in life. Thank you for the opportunities you have so selflessly allowed to me have in life. I would not be the person I am today without your love, guidance and support.

To my sister and brother in law, Karen and Ludwig, you have always been a beacon of light in my life and I am so grateful for your constant encouragement and love.

To my uncle, Willie Venter, you are my inspiration and reason for my passion in the field of cerebral palsy.

Thank you to Barry Rice, despite being far apart you have always been there to help me through anything that I needed along this journey. Thank you for keeping me sane and reminding me that I can make it through anything. You constantly inspire me to achieve any goal I set my mind to.

To my friends, thank you for always checking up on me and providing encouragement when it was needed most. You all play an important part in my life and I am so grateful for your ongoing support in helping me achieve this goal.

ABSTRACT

Background: The relevance and effectiveness of speech therapy interventions for children with Cerebral Palsy (CP) has come under scrutiny within the CP community. There is a need for evidence based research to be conducted within the CP population. Specifically with regard to the current speech therapy interventions that are being used for this population. There is a dearth of literature in favour of the efficacy of speech therapy interventions for the CP population. Furthermore, research within the South African context is required so as to identify the culturally specific needs of the population. In addition, South Africa faces challenges in providing culturally specific, cost effective and evidence based intervention for this population. This can be attributable to barriers such as the lack of human and financial resources.

Purpose: The main aim of the study was to measure change in the use of communicative functions of nine children with cerebral palsy following a five week parent training program. The main aim was achieved with the following sub-aims; 1) To assess the participant's baseline performance in the use of communicative functions before the commencement of the parent training, 2) To assess the participant's performance in the use of communicative functions after the 5 week parent training had taken place, 3) To assess the participant's performance in the use of communicative functions 3 months after the post intervention assessment and 4) To describe the effectiveness of a parent training program in improving a child with CP's ability to make use of communicative functions.

Method: The parents of nine children underwent a parent training program namely the Malamulel Onward Carer-2-Carer Training Program. The nine children were assessed before, immediately after and 3 months after the intervention. The scales, namely the Preschool Language Scale-5 and the Communication Matrix were used in the baseline assessment and reassessment phases of the study and yielded numerical data that described the children's communication abilities.

Results: All the children ($n=9$) demonstrated a positive increase in communication from test 1 through to test 3 on the Communication Matrix. The p-value for test 1 to test 2 was $p=0.0078$, test 2 to test 3 were $p=0.0313$ and test 1 to test 2 were $p=0.0313$ indicating significant change. The performance on the PLS-5 for majority ($n=8$) of the sample was unexpected. The majority of participants ($n=7$) displayed an increase in the PLS-5 score from test 1 to test 2;

with one participant displaying a positive change across all three testing occasions on the PLS-5. However, a decrease in the PLS-5 score was seen in majority (n=5) of the participants from test 2 to test 3.

Conclusion: Based on the findings of this research, the use of parent training appears to be a viable form of intervention to improve the use of communicative functions in children with CP. However, further steps need to be taken to incorporate an individual follow up component after the parent training to ensure carry over and maintenance of skills covered in the workshops. In addition, due to questions around the efficacy of the PLS-5 with individuals who have CP, assessments need to comprise of a standardized tool in addition to an observational tool so as to acquire a more holistic view of a child with CP's communication skills.

Key words: cerebral palsy, parent training, communicative functions, communication matrix, Preschool Language Scales-5.

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LIST OF ABBREVIATIONS

EI	Early intervention
CP	Cerebral Palsy
GMFCS	Gross Motor Function Classification Scale
FCCS	Functional Communication Classification Scale
AAC	Alternative and Augmentative Communication
PLS-5	Preschool Language Scales-5
ICF	International Classification of Function
WHO	World Health Organization
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immunodeficiency Syndrome
ICDL-DMIC	The Interdisciplinary Council on Developmental and Learning Disorders Diagnostic Manual for Infants and Young Children
QoL	Quality of Life
HRQoL	Health Related Quality of Life
CSBS	The Communication and Symbolic Behaviour Scales Development Profile
HPCSA	Health Professions Council of South Africa
HRH	Human Resources for Health South Africa Strategy
CBR	Community Based Rehabilitation
IQ	Intelligence Quotient
ASD	Autism Spectrum Disorder
NGO	Non-Governmental Organization

CHAPTER ONE

INTRODUCTION

This chapter presents the problem statement and the rationale for the study. It serves to provide an orientation to the research and presents the background information to the study.

An article published by Novak, McIntyre, Morgan, Campbell, Dark, Morton, Stumbels, Wilson and Goldsmith (2013) created controversy with the Cerebral Palsy (CP) community by disputing the relevance and effectiveness of therapy interventions for children with CP. Novak et al. (2013) conducted a systematic review of the best available intervention evidence for children with cerebral palsy (CP). Novak et al. (2013) searched a number of databases so as to source studies based on the following inclusion criteria: the study was a systematic review or the next best available; it was a medical/allied health intervention; and that more than 25% of participants were children with CP. These interventions were then coded with the use of the Oxford Levels of Evidence; GRADE; Evidence Alert Traffic Light; and the International Classification of Function (ICF), Disability and Health (Novak et al., 2013). This study reviewed 166 articles across 64 interventions that were being used for the CP population (Novak et al., 2013). Out of these 64 interventions reviewed, 16% of these interventions were rated as green ‘do it’ interventions, 58% were rated as yellow ‘probably do it’ interventions, 20% were rated yellow ‘probably do not do it’ interventions and 6% were rated as red ‘do not do it’ interventions (Novak et al., 2013). It should however be noted that majority of the green light interventions were aimed at the body structures and function level or the activities level on the ICF (Novak et al., 2013). This finding indicates that there were interventions that were not proven effective in targeting the participation, environment or personal factors of the ICF (Novak et al., 2013). Furthermore, the green light interventions were mostly medically related interventions as opposed to therapeutic interventions (Novak et al., 2013) such as Anticonvulsants, Botulinum toxin, Bisphosphonates, Casting (ankle), Diazepam, Fitness training, Hip surveillance, Pressure care and Selective dorsal rhizotomy (Novak et al., 2013).

The article published by Novak et al. (2013) caused further controversy as it failed to find compelling evidence from systematic reviews to suggest that speech therapy interventions are effective in children with cerebral palsy. The speech therapy interventions that were reviewed

found examples such as the widely used Alternative and Augmentative Communication (AAC) approach to be weak in terms of its effectiveness (Novak et al., 2013). In addition, it was found that communication training and social stories have limited research in support of their efficacy with this population and rated as a yellow intervention meaning that therapists should ‘probably do it’ (Novak et al., 2013 p. 16). Novak et al. (2013) revealed that parent training and communication training, which was aimed at improving parenting skills to facilitate child development, had a poor amount of evidence and literature regarding its efficacy. Novak et al. (2013) emphasized the need for more evidence-based research to be conducted in the interventions provided by speech therapy for children with cerebral palsy (Novak et al., 2013). Recommendations for practice included routine outcome measurement, as speech therapy provides vital services to children with CP and without compelling evidence for its efficacy, there is no evidence to support its practice (Novak et al., 2013). The International Classification of Functioning, Disability and Health (ICF) and its Children and Youth Version (ICF-CY) was introduced by the World Health Organization (WHO) that has been developed based on a number of views of human development (Hwang, Liao, Chen, Hsieh, Simeonsson, Weng & Su, 2014). The ICF-CY comprises of an additional lower level of categories that were developed in order to be more sensitive to the changes that are experienced during growth and development (Hwang et al., 2014). Furthermore, it serves to provide a comprehensive model for investigating the factors of child development within a biopsychosocial perspective (Hwang et al., 2014). The ICF-CY can be used to describe the functionality of an individual with CP therefore allowing a more accurate evaluation of their rehabilitation progress in the follow up consultation (Oliveira, Caldas & Riberto, 2016).

Evidence-based interventions at the activities and participation level that are tailored to the child’s strengths and reflect their interests and motivations, in addition to ultimately seek to assist children live an inclusive and contented life were recommended (Novak et al., 2013). Understanding the optimal intensity of therapy is important for maximizing outcomes, accurately costing services and offering family friendly achievable interventions (Novak et al., 2013).

In addition to ensuring that therapy is evidence-based, it is important to ensure that therapy is context-specific and appropriate to each family and child. The implementation of family friendly services within the South African context poses a number of challenges. One

of the common barriers found within the South African context is that parents have reported that the information provided by the therapists was not understood by them and they were unsatisfied with information provision (Dyke, Buttigieg, Blackmore & Ghose, 2006). This could possibly link to the lack of information transmission between healthcare professional and parents (Dyke et al., 2006). Parental educational level and language are barriers that impact on understanding health information (Dyke et al., 2006).

There is a need to gather culturally specific information to develop appropriate intervention strategies and guidelines (Barratt, 2007). The most recent review on developmental and intervention data is based on normal white mainstream children from middle class two parent families (Barratt, 2007). In South Africa there is often a mismatch between language and culture between therapists and clients and families and this poses as a challenge in intervention and parents understanding what therapy aims to achieve (Barratt, 2007). The aim to emphasize the relevance of context and gathering culturally specific information to develop appropriate intervention strategies and guidelines should be prioritized (Barratt, 2007). Research should focus on encouraging social and community development, specifically those of the parent. This could translate in assisting those children with disabilities to have access to communication training (Barratt, 2007). In addition, Novak et al. (2013) revealed that parent training which was aimed at improving parenting skills to facilitate child development, had a poor amount of evidence and literature regarding its efficacy. The systematic review conducted by Novak et al. (2013) revealed that there were no randomized control trials of parenting interventions for families of children with CP conducted. It was further stated that there is a need for research in this field to be conducted so as to target the behavioural and emotional challenges that face parents who have children with CP (Novak et al., 2013).

Due to these controversies and the need for contextually relevant evidence-based research this research aimed to investigate the effectiveness that a parent training program can have on the communicative abilities of a child with CP.

CHAPTER TWO

LITERATURE REVIEW

This chapter provides a review of the literature pertaining to the study. It outlines the recent developments internationally as well as in the South African context with regard to intervention for children with CP.

2.1 Cerebral Palsy

According to Morris (2007) “Cerebral Palsy (CP) can be defined as a heterogeneous group of permanent disorders affecting movement and posture caused by non-progressive disturbances that occurred in the developing foetal or infant brain.” (Morris, 2007 p. 6). The motor disorders that are characteristic of CP occur together with disturbances of sensation, perception, cognition and communication behaviour (Morris, 2007; Workinger, 2005). Children with CP may also present with seizures and other impairments that have an effect on their speech, vision, hearing and/or intellect (Workinger, 2005).

2.2 Causes and Classification of Cerebral Palsy

The causes of CP can be subdivided into categories namely: prenatal, peri-natal and postnatal (Van Toorn, Laughton, Van Zyl, Livia & Elsinger, 2007). According to van Toorn et al. (2007) a prevalence study conducted in South Africa found that the causes of CP include tuberculous meningitis, cerebral trauma and cerebrovascular accidents.

CP is classified into various types based on the predominant pattern of motor abnormalities and presenting clinical features (Morris, 2007). CP can be classified into the following types: spastic quadriplegic (equivalent or greater spasticity in the upper extremities than lower extremities), hemiplegic (paralysis of one vertical half of the body), diplegic (spasticity in lower extremities greater than in upper extremities), monoplegic (paralysis of a single limb), dyskinetic (variable movements that are involuntary), ataxic-hypotonic (incoordination of movement in the arms, legs, and trunk) or mixed (e.g. spastic and dyskinetic) (Morris, 2007). These motor patterns and clinical features vary depending on which areas of the brain have been affected (Dubovicky, 2010). It is imperative that the correct classification of CP is determined in order to guide the clinical practice for assessment

and management of children diagnosed with cerebral palsy and research (Carnahan, Arner & Hägglund, 2007; Morris, Fisk & Condie, 2009).

One such classification scale is the Gross Motor Function Classification Scale (GMFCS) for cerebral palsy (Palisano, Rosenbaum, Bartlett & Livingston, 2007). The GMFCS is a five level classification system based on self-initiated movement with focus on sitting, transfers and mobility (Palisano, et al., 2007). The distinctions between the five levels of classification are focused around functional limitations, the need for hand-held mobility devices or wheeled mobility and quality of movement (Palisano et al., 2007). The main objective of the GMFCS is to establish which level is most representative of the child's or youth's abilities and limitations in gross motor function (Palisano et al., 2007). The development of the GMFCS is grounded upon the idea of enhancing communication between professionals and families in terms of the use of rehabilitation services, the development of databases and registries and for identifying relationships between results of program evaluations and clinical research (Palisano, Rosenbaum, Bartlett & Livingston, 2008). Research on the GMFCS has revealed evidence of content and construct validity (Palisano et al., 2008).

Another scale used in classifying the abilities of a child with CP, specifically their communicative abilities, is the Functional Communication Classification System (FCCS) (Barty, Caynes & Johnston, 2016). The FCCS classifies how the child communicates with familiar and unfamiliar communication partners (Barty et al., 2016). The FCCS comprised of five levels namely level 1 (effective communicator in most situations), level 2 (effective communicator in most situations), level 3 (effective communicator in most situations and can communicate small ranges of messages and topics to most familiar people), level 4 (assistance is required in most situations, especially with unfamiliar people and environments) and level 5 (communicates using undirected movement, vocalizations and/or behaviour open to interpretation by familiar communication partners) (Barty et al., 2016). Research has found that the FCCS possesses strong construct, content and face validity for the use of observable functional communication (Barty et al., 2016). In addition, the FCCS has been found to produce excellent interrater reliability (Barty et al., 2016).

2.3 Correlates associated with cerebral palsy

According to Morris and Condie (2009) CP is associated with impairments such as difficulties with cognition, communication, behavioural problems, epilepsy, sensation, perception (hearing or vision) and musculoskeletal. In addition, difficulties with feeding and sleeping can also co-occur with CP (Morris & Condie, 2009). The abovementioned correlates indicate that the CP population are a vulnerable group who are at great risk for global developmental delays (e.g. speech, language, hearing loss and motor) (Workinger, 2005).

2.4 Prevalence of Cerebral Palsy and Cerebral Palsy in the South African context

CP is a universal phenomenon that does not discriminate between races or cultures (Andersen et al., 2008). The prevalence of CP in developing countries such as South Africa is up to five times higher than the estimated prevalence of two to four per 1000 live births in developed countries (Couper, 2005). There is a lack of information on the prevalence of CP in South Africa with very few studies conducted (Donald, Samia, Kakooza-Mwesige & Bearden, 2014). When compared to international studies, this Kwa-Zulu Natal study displayed a much higher prevalence in the South African context (O'Shea, 2008; Sullivan, 2008). The studies that have been conducted in South Africa have been conducted in rural areas and the high incidence can be linked to the poverty and poor socio-economic conditions associated with these areas (Schonfeldt, Gibson & Vermeulen, 2010). Therefore, it is evident that the South African context is faced with a unique set of circumstances that predispose its population to the burden of disability (Ataguba & McIntyre, 2009).

2.5 Quality of Life and Cerebral Palsy

Quality of life has been defined as an individual's perception of their position in life within the context of the culture and value systems that they live in (Greitane, Ceicinice, Cibule & Teibe, 2012). Quality of life (QoL) is especially relevant to chronic and disabling conditions such as CP (Davis et al., 2010). Furthermore, there is a paucity of literature that has researched the QoL of children living with CP (Davis et al., 2010). Another study focusing on the quality of life of children with CP and their families was conducted in Malaysia by Lim and Wong (2009). This study was conducted by using the Lifestyle Assessment Questionnaire – Cerebral Palsy on parents of children aged between 3 and 10 years with CP (Lim & Wong, 2009). The study revealed that out of the 27 patients

interviewed, three (11.1%) patients reported severely affected quality of life, seven (25.9%) patients reported moderately affected quality of life and 10 (37%) reported mildly affected quality of life (Lim & Wong, 2009). Limitations associated with study included time constraints, the dynamics of CP and the various aspects of QoL were not analyzed in detail (Lim & Wong, 2009). The study conducted by Lim and Wong (2009) however concluded that disabilities might impact the independence of the child with cerebral palsy and the lives of their parents (Lim & Wong, 2009). Cerebral Palsy can impact the child's ability to carry out activities of daily living (ADL) and thus further impact the QoL of the child and family negatively (Lim & Wong, 2009).

According to Olawale, Deih and Yaadar (2013) the long term affects for a child with cerebral palsy include functional limitations within activities of everyday living and possible long term dependence on others.

A study conducted in Turkey by Yilmaz, Erkin and Ali (2013) investigated the health-related quality of life (HRQoL) in mothers who had children with CP. Functional levels of children with CP were included in the study and the HRQoL of mothers was assessed with 36-Item Short-Form Health Survey (SF-36) and depression levels with Beck Depression Inventory (BDI) (Yilmaz et al., 2013). The findings of the study were that the HRQoL of mothers with children with CP is impaired and that depression is a major symptom prevalent within these mothers (Yilmaz et al., 2013). Furthermore, no link between HRQoL of mothers and functional level of CP children, body involvement of CP, educational status of mothers, level of income, and number of children was seen in the study (Yilmaz et al., 2013). It was recommended that these mothers take part in social activities related to their interests and be psychologically supported (Yilmaz et al., 2013). In light of the findings and recommendations from this study, the limitations include non-generalizability due to the study being a single centered study and only spastic type CP children were included in the study (Yilmaz et al., 2013). It was recommended that all types of CP should be accounted for in order to yield more comprehensive results (Yilmaz et al., 2013).

Having a child with a disability can bring about stress and have a negative effect on a family, it is therefore beneficial if professionals can identify those families who may be at risk for this so that they can be assisted and receive services that would be best suited to the needs of the family (Rentinck, Ketelaar, Jongmans & Gorter, 2006).

The International Classification of Functioning (ICF) states that the health condition of a child with CP can be impacted by two factors that are addressed in the ICF model (World Health Organization [WHO], 2001). Firstly, the “environmental factors” that can be physical, social, cultural or institutional in nature (WHO, 2001). Secondly, the contextual factors which are the “personal factors” that include gender, age, education, and lifestyle (WHO, 2001). The environmental factors comprise of the natural and built environment, products and technology, support and relationships, attitudes and policies (WHO, 2001). In the case where a child with CP is exposed to a facilitative environment, they may experience many activity limitations however they would still be able to participate in everyday activities such as learning and attending school (WHO, 2001). If the environment presents many barriers, it will become challenging for the child to access and take part in everyday activities therefore providing a facilitative environment should be prioritized in this population (WHO, 2001). The personal factors consider the lifestyle and interests of the child amongst others such as what the child enjoys doing or what the interests are of the child (WHO, 2001). These factors are often overlooked when planning intervention and this contextual component needs to be recognised as it will influence the other levels of the ICF such as the body function/structure, activity and participation (WHO, 2001).

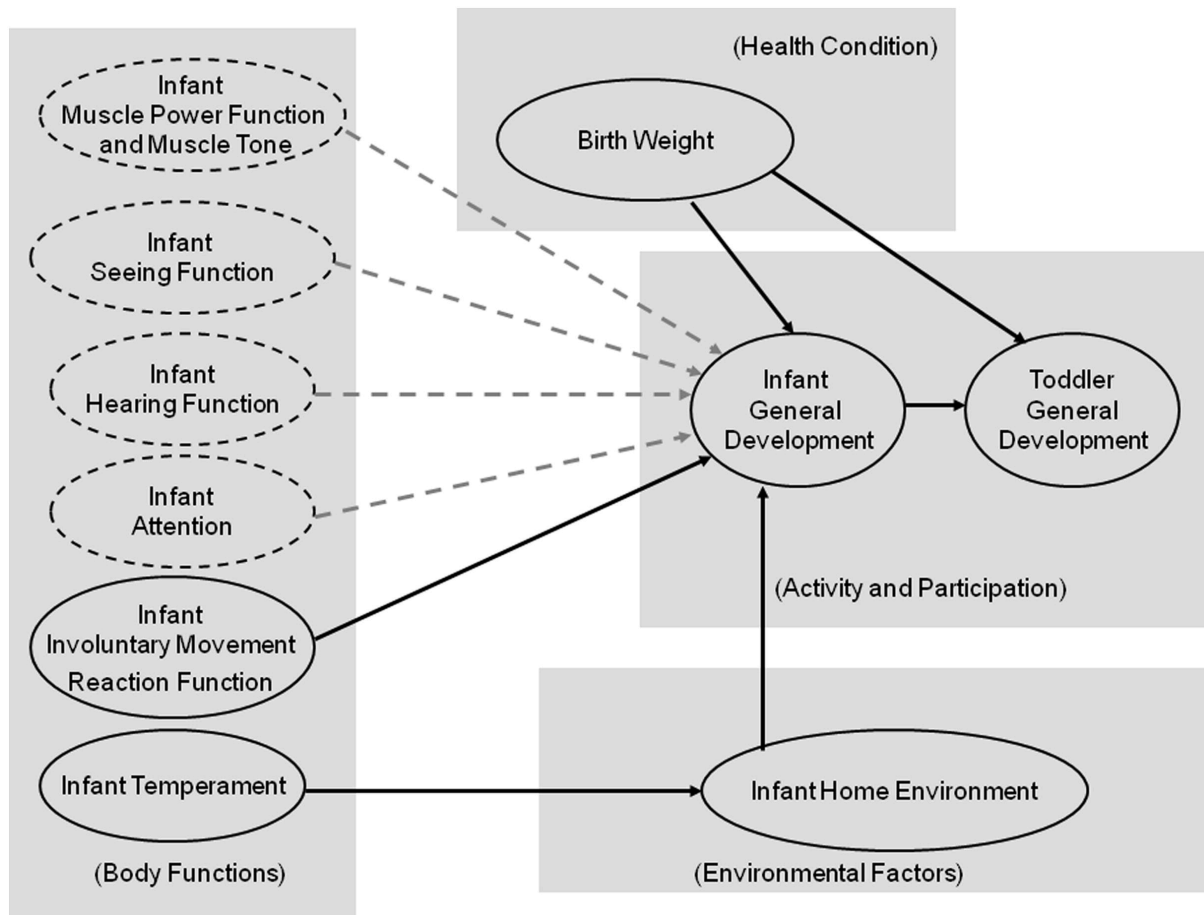


Figure 2.1 The ICF-CY Model (Hwang et al, 2014 p.306)

The ICF-CY model (Figure 2.1) displays developmental outcomes in childhood (Hwang et al., 2014).

The ICF has played an effective role when applied to children with CP with regard to enhancing the activity and participation and preventing the occurrence of secondary impairments (Lahoti, Fairhurst, & Horridge, 2012). An example that demonstrates the applicability of the ICF may be in the case where a child presents with poor oral motor control (Lahoti et al., 2012). The child would ultimately benefit from assessment and intervention that is aimed at targeting his/her motor impairments that cause difficulty in the activities of feeding or speech production (Lahoti et al., 2012). Therefore, intervention that addresses the “activity” of eating and the child’s “participation” in mealtime activities, in addition to alternative communication strategies, is ultimately targeting all aspects of the child’s functioning and health at the levels of “body structure and function”, “activity” and “participation” (Lahoti et al., 2012).

Furthermore, a study conducted by McDougall, Wright, Schmidt, Miller and Lowry (2011) where the ICF framework was used to study the changes in quality-of-life for children with chronic conditions found that it can be useful to investigate the complex ongoing inter-relationships among functioning, complex factors and the individual's perception of their QOL (McDougall, Wright, Schmidt, Miller & Lowry, 2011). By considering the environmental and personal factors that are illustrated by the ICF that can affect the child with CP, it shows that those in their immediate environment such as family and parent also have a role to play in therapy and their ability to complete activities of daily living (Robert & Kaiser, 2011).

2.6 Communication of children with CP

In a study conducted in China a review of 354 cases of children determined that 61.02% of children with CP were diagnosed with speech and language difficulties (Hou, Sun, Shan, Wang, Yu, Zhao & Jiang, 2010). The children reviewed in this study were divided into subgroups according to both neurologic subtype and gross motor functions to detect the occurrence of comorbidities (Hou et al., 2011). This study found that there are correlations between the presence of comorbidities such as auditory or visual impairments, intellectual disability, epilepsy and the cerebral palsy subtype and the gross motor function levels (Hou et al., 2010). Furthermore, this research emphasises the need for clinicians who work with the CP population to be aware of all the comorbidities so as to implement multidisciplinary models to improve the quality of assessment and rehabilitation (Hou et al., 2010).

Language impairments in a child with cerebral palsy may vary depending on the severity of involvement (Schoenbrodt, 2004). According to Workinger (2005) there are however varying levels of functional limitations for communication in individuals with cerebral palsy that should be taken note of before strategies are used to communicate with them:

Difficulties in communication in individuals with Cerebral Palsy	
Group 1	Demonstrate severe speech disorders • Will need some augmentative communication support (To express wants and needs, social interactions and language development) • Therapy targeting verbal skills should be used
Group 2	Individual is generally well understood by their families • Need for augmentative communication to support language learning and social interaction • Use verbal communication to specify basic needs • They tend to not use their augmentative systems in the home
Group 3	Individual speaks well enough to rely on verbal communication in most situations • Augmentative systems may be used to enhance language learning or for classification in challenging situations

Table 2.1: *Difficulties in communication in individuals with Cerebral Palsy*

The use of speech, language and gesture for communication can be compromised in individuals who present with cerebral palsy (Pennington, Goldbart & Marshall, 2005). The communication difficulties that individuals who present with CP have can be due to a number of factors such as motor, intellectual and sensory impairments (Pennington et al., 2005). These difficulties often result in them having severe difficulties in expressing themselves (Pennington et al., 2005).

The primary aim of speech and language therapy for children with CP is to maximise their ability to communicate through speech, gesture and/or supplementary means such as communication aids (Pennington et al., 2005). As the difficulties that are experienced by children with cerebral palsy vary within a wide range, there is no single universally appropriate form of treatment (Pennington et al., 2005). Therapy should also incidentally target the skills of familiar conversation partners to facilitate the child's communication development by creating opportunities for the child to make use of new skills to communicate (Pennington et al., 2005). Cerebral palsy is not a progressive disorder and therefore communication and speech strategies will assist in improving the child's current level of

functioning and quality of life (Schoenbrodt, 2004; Lim & Wong, 2009).

The majority of children who present with cerebral palsy do learn to communicate however there are cases where children with CP are unable to learn to communicate or present with minimal speech (Workinger, 2005). Those who do learn to communicate may be difficult to understand (Workinger, 2005). Those children who do not talk could have the ability to use augmentative/alternative communication such as a communication board (with pictures or symbols) or the use of signing and gestures (Schoenbrodt, 2004). According to Schoenbrodt (2004) the difficulties in communicating for a child with cerebral palsy can be due to a motor speech disorder, cognitive delay and other impairments.

Children with cerebral palsy can present with speech difficulties because the muscles of the mouth may be affected and so some children may find talking a challenging task (Schoenbrodt, 2004). In these cases, an alternative communication system may assist them such as a communication board or book (Schoenbrodt, 2004). It should be remembered that speech that is difficult to understand does not necessarily indicate the presence of an intellectual impairment (Schoenbrodt, 2004). Speech in the child with cerebral palsy can include developmental articulation errors and motor speech disorders (dysarthria and apraxia) (Schoenbrodt, 2004).

Cerebral palsy is not a progressive disorder and therefore communication and speech strategies should assist in improving the child's current level of functioning (Schoenbrodt, 2004). Therefore according to Schoenbrodt (2004) it is important to carry on trying to improve and help the child with CP to communicate and learn as they will benefit from it in the long term and add to their social competence.

2.7 Communication of children with CP and their parents

A study conducted by Sandberg and Liliedahl (2008) investigated the results of speech therapy with three children with CP and severely unintelligible speech who were aged between two years five months and three years four months. None of the children in the study made use of oral language; two of the children in this study communicated with eye gaze and one child communicated with gesture (Sandberg & Liliedahl, 2008). The parents were instructed to engage with their children within play situations that lasted between 10 and 30

minutes long, this was also dependent on how the children engaged in the play activity (Sandberg & Liliedahl, 2008). The parents and children were provided with the same age-appropriate toys to use at home for the child to play with while being recorded with a video camera (Sandberg & Liliedahl, 2008). The materials consisted of coloured cups for motor activity as well as picture books for linguistic communication (Sandberg & Liliedahl, 2008). Observations of parent-child interaction revealed that the parents of three of the children initiated communication more frequently (Sandberg & Liliedahl, 2008). Sandberg and Liliedahl (2008) targeted eleven communicative functions such as confirmation or denial, expression of frustration, request for attention expression of self, request for information, request for object or action, provision of information, helping, interpretation of partner, request for clarification and explicitly leaving the floor. After these communicative functions were targeted then the children were observed in terms of which they made use of and these included five of the above mentioned confirmation or denial, request for attention, expression of self, provision of information, and expression of frustration (Sandberg & Liliedahl, 2008). Typically developing children would have made use of three more communicative functions in comparison to the five that those children with cerebral palsy would make use of (Sandberg & Liliedahl, 2008). The parents of these children made use of communicative functions such as request for information, provision of information, and helping (Sandberg & Liliedahl, 2008). Parents of typically developing children would have made use of the same communicative functions except for the communicative function that indicates helping (Sandberg & Liliedahl, 2008). Furthermore, it was found that the parents of children with CP initiated communication more frequently than those parents who had typically developing children (Sandberg & Liliedahl, 2008). The communication patterns between mothers and children with complex communication difficulties indicated a marked pattern of maternal conversational dominance (Sandberg & Liliedahl, 2008). Given the high levels of conversational dominance by parents when engaging in communication with a child with complex communication difficulties, emphasis should be placed on the need to allow the child to have an equal role in participating in the act of communication (Sandberg & Liliedahl, 2008). In addition, allowing the child an opportunity to participate will also result in independence during play and the completion of everyday activities (Sandberg & Liliedahl, 2008). In conclusion, the findings from the study conducted by Sandberg and Liliedahl (2008) are in favour of including the parent within the intervention process.

The communicative functions used by children with CP can be dependant on the severity of the condition (Balan & Manjula, 2008). Physical limitations can be caused by difficulties in acquiring motor milestones and these physical limitations can impede a child with CP's ability to engage in object-based play and exploration of their environment (Balan & Manjula, 2008). Early language learning relies on a child physically engaging with their environment and a child with CP can face limitations in this regard (Balan & Manjula, 2008). Due to the physical limitations, children with CP acquire language in a different manner (Balan & Manjula, 2008). Children with CP mostly make use of vocalisations, eye-gaze and gestures (Balan & Manjula, 2008).

2.8 Assessment of children with CP

The assessment of speech and language in children with CP can be classified under the body function component of the ICF (Hansson & Nettelbladt, 2007). Assessments of speech and language can comprise of observations of spontaneous speech and language behaviour in addition to standardized tests to establish the severity of the impairment and the course for intervention (Hansson & Nettelbladt, 2007). Standardized tests do however need to be adapted so as to meet the specific needs of a child with CP, such as in the case of pointing to pictures (Hansson & Nettelbladt, 2007). A study conducted to review the current methods used in the assessment of speech and language skills of children with CP revealed that a wide range of standardized tests were being used (Watson & Pennington, 2015). The use of standardized tests will allow for comparison of skills against typically developing children of a similar age (Watson & Pennington, 2015). However, the use of standardized tests with the CP population is questionable as these tests have not been normed on the CP population specifically (Watson & Pennington, 2015). Standardized tests have however been adapted so as to accommodate the needs of a child with CP (Watson & Pennington, 2015). These adaptations include; accommodating the physical impairments by stabilizing the child's arm in order to point to a picture or object and placing the picture manual flat on the table in order for the child to move their arm across the table in order to indicate their response (Zimmerman, Steiner & Pond, 2011). Further adaptations to address visual difficulties may be required where the manipulatives are placed on a sheet of paper of a contrastive colour in order for it to be seen clearly and allow the child to use touch cues to identify the object (Zimmerman et al. 2011). Additional modifications include giving the child an increased response time when completing an item on the test (Zimmerman et al., 2011). However,

adaptations to these standardized tests can invalidate the norms of the test and alter the test items (Watson & Pennington, 2015).

In a study conducted by Watson and Pennington (2015) it was found that standardized tests were not used to assess communication activity or communicative participation (Watson & Pennington, 2015). Communication activity and communication participation was rather assessed using Preverbal Communication Scales such as The Communication and Symbolic Behaviour Scales Development Profile (CSBS), as it yields norms for younger children and has been used successfully in research with children who have CP (Watson & Pennington, 2015). It is recommended by Olswang, Feuerstein, Pinder and Dowden (2013) that a dynamic assessment approach be utilized so as to effectively evaluate a child with CP's speech and language abilities. Dynamic assessment can assist in bridging the gap between standardized tests that are not suited to children with CP and assessment through observation (Watson & Pennington, 2015).

2.9 Therapist implemented intervention

As previously stated by Hansson and Nettelbladt (2007) the assessment process is required in order to determine the course for therapy. Speech therapy services play a role in assisting the CP population in maximizing their communication skills and assist in achieving independence in communicating with others (Pennington et al., 2005). There are a number of approaches and methods used such as augmentative and alternative communication (AAC) systems, symbol charts or speech synthesizers and treating children's natural forms of communication (Pennington et al., 2005). A number of approaches and strategies have been employed to remediate the communication disorders associated with cerebral palsy however there is little evidence of their effectiveness with this population (Pennington et al., 2005).

The research on intervention in children with CP has shown that despite the fact that children may present with the same medical diagnosis, they vary widely in their language and communication development (Pennington et al., 2004). Speech and language therapy is thus centered on addressing each individual's unique needs (Pennington et al., 2004). Research on interventions for children with CP documents the diversity in skills amongst children of this population (Pennington et al., 2004). Despite the heterogeneity of this population, similar patterns in communicative abilities have been observed in children with CP who differ in age, cognitive level and motor function (Pennington et al., 2004). These well-researched patterns

include the development of pragmatic skills in addition to the children's functional communication abilities (Pennington et al., 2004).

Children with CP display a respondent role in communication and do not often initiate conversational exchanges (Pennington, Thomson, James, Martin & MacNally, 2009). Children with CP are also known to use their communication for a limited range of functions such as indicating "yes" and "no", acknowledgement and basic requests for objects within their immediate environment (Pennington et al., 2009). These patterns of communication create barriers to social participation, access to education and, later, employment (Pennington et al., 2009). Speech-language therapy thus plays a role in enhancing the communicative abilities of children with CP so as to assist in taking on an independent and active role in conversational activities (Pennington et al., 2009). The focus of therapy is also to equip the child with necessary skills to communicate in order to have control of their environments and increase independence (Pennington et al., 2009).

2.10 Parent implemented intervention

A systematic review conducted by Whittingham, Wee and Boyd (2011) and Novak et al. (2013) found that very few studies have been conducted on the efficacy of parenting interventions for children with CP. Three studies were reviewed that researched the effectiveness of parent interventions with the use of a pre-post test design (Whittingham et al., 2011). The interventions reviewed included the use of parenting interventions together with behavioural intervention, oral motor exercises for children with CP and difficulties in feeding, the It Takes Two to Talk programme and a Functional Communication Training programme designed for parents (Whittingham et al., 2011). All the studies found that parenting interventions may yield positive results for children with CP (Whittingham et al., 2011). Therapy can include children's parents, peers and educators (Pennington et al., 2009). Partner focused intervention is grounded upon the transactional theory of development that states that the child and their conversational partners constantly adapt to each others behaviours (Pennington et al., 2009). Studies have shown that infants with CP are prone to initiating less in interaction with their parents and are less responsive and less independent than typically developing children (Pennington et al., 2004). It is postulated that the difficulties in interaction are due to the infant's difficulties in initiating movements accurately (Pennington et al., 2004). The foundations of early communication are reliant on the use of consistent non-verbal and vocal signs by children that can be interpreted by their parents or

caregivers so as to give rise to early interaction routines onto which meaning can be mapped (Pennington et al., 2004). In the case where parents can understand one or two signals, then interaction can take place in addition to establishing routines for communication (Pennington et al., 2004). It can however become challenging in the event that children do not develop a full range of communication skills therefore limiting their ability to take an active role in interaction (Pennington et al., 2004).

Research has shown that older children with CP also display similar restricted patterns in conversation with familiar partners as younger children with CP do (Pennington et al., 2004). Various models of therapy have been designed so as to target these communication patterns (Pennington et al., 2004). These models focus on teaching children linguistic and pragmatic skills (Pennington et al., 2004). In addition, these models include indirect therapy, training conversation partners in altering their interaction style and stimulating the child's communication development (Pennington et al., 2004). While the majority of research has focused on direct intervention, research on the training for conversation partners has received less attention (Pennington et al., 2004). The training for conversational partners is focused around equipping parents to be more aware and responsive to their child's communicative attempts (Pennington et al., 2004). At the same time, parents are encouraged to create opportunities for communication and focus on enhancing their child's linguistic output (Pennington et al., 2004). These programs have been linked to positive outcomes and progress in terms of facilitation of a child's communicative abilities however; their effectiveness on parents and their children with CP has not been adequately researched (Pennington et al., 2004). It has not yet been established, with the use of research, as to what type of training is most effective for conversational partners (Pennington et al., 2004). A review of the research in terms of conversational partners has revealed that untrained partners did not show any change however; trained partners displayed improved abilities in creating opportunities for communication (Pennington et al., 2004).

The transactional model of development supports the evidence for increased responsiveness of parents being linked to progress in children becoming more active in interaction, turn taking and increased vocabulary repertoire (Pennington et al., 2009). Furthermore, the social interaction theory of communication development postulates that parent's use of simplified language can assist a child in making connections between language and their environment (Pennington et al., 2009).

According to Jeglinsky, Autti-Ramo and Brogren-Carlberg (2011) parent involvement in a child's therapy process is vital as it is paramount to achieving generalization of skills and family satisfaction. Furthermore, the family-centered approach in therapy has been attributed to positive outcomes in health-related quality of life of the child (Jeglinsky et al., 2011). Another principle that should be adhered to when implementing this approach is being aware and having respect for the families culture and allowing the family to decide on how involved they would like to be in the process (Jeglinsky et al., 2011). Different families may want to limit or increase their involvement as some families' may feel that the responsibility is too much and may want to establish an equal partnership between them and the professional (Jeglinsky et al., 2011). The heterogeneous nature of disability in CP requires a multi disciplinary and multidimensional approach (Jeglinsky et al., 2011).

Parent led intervention programs that are directed at creating responsive interaction patterns to enhance opportunities for communication are readily used in early childhood intervention services (Cologon, Wicks & Salvador, 2016). An example of such a parent led program is the Hanen Program It Takes Two to Talk (Cologon et al., 2016). A study conducted by Pennington, Thomson, James, Martin, and McNally (2009) researched as to whether there was a change in the interaction between children with CP and their mothers using the "It Takes Two to Talk - The Hanen Program for Parents of Preschool Children with Cerebral Palsy" (Pennington, et al., 2009). The Hanen Program for Parents was designed for parents who have young children that present with a language delay (Pepper & Weitzman, 2004). The program was developed to train parents in strategies to assist children to learn language naturally within their everyday environments (Pepper & Weitzman, 2004). The Hanen Program has yielded positive results with regard to children initiating more communication and parents making use of responses and strategies to elicit communication more frequently (Pennington et al., 2009). Despite the fact that the "It Takes Two to Talk – The Hanen Program" is associated with improvements in the participant's communication, further research into its clinical effectiveness is needed (Pennington et al., 2009). The findings of the study in terms of the effectiveness of the program revealed that after the mothers were trained, they initiated less and produced more responses and requested less (Pennington et al., 2009). Furthermore, children produced requests and initiations after the training (Pennington et al., 2009). The changes were maintained four months later therefore displaying good retention of skills implemented by the program (Pennington et al., 2009). There were however limitations in terms of bias that need to be noted as this impacts the

conclusion as to whether the program is indeed effective (Pennington et al., 2009). Further limitations included the small sample size that could have an impact on detecting all changes that took place in conversational patterns (Pennington et al., 2009). In addition, all the clinicians and families volunteered thus indicating highly motivated groups (Pennington et al., 2009). The participants hearing was not screened prior to the study and the first coder was not blind to the data collection point therefore posing a threat in terms of overestimation of effect size (Pennington et al., 2009). Lastly, training was provided by different therapists and not all the parents attended all training sessions (Pennington et al., 2009). Treatment integrity was not assessed in this study although the training was carried out according to the Hanen Centre's guidance and the training the parents received would have varied slightly which could account for within-group variation (Pennington et al., 2009).

According to McLaren (2014) there are a few organizations that have focused on the development of community-based caregiver training programs in South Africa. These programs have been designed so as to reach the caregivers of children with disabilities, predominantly having CP, in rural areas (MacLaren, 2014). The rationale behind the development of these programs is the need to develop effective support structures to create opportunities for access to services, care and perhaps education (McLaren, 2014). One such community based caregiver program includes Malamulele Onward who provide therapy services such as physiotherapy, occupational therapy and speech therapy to children with CP who reside in various under-resourced rural areas in Limpopo, Eastern Cape, KwaZulu Natal and Lesotho (McLaren, 2014). The training of the caregivers also focuses on how to continue with the program at home in addition to the issuing and use of equipment and assistive devices for the child (McLaren, 2014). In addition, selected children who reside in these outreach areas attend a two-week block of intensive goal-orientated therapy and caregiver training at the Malamulele Onward center in Johannesburg (McLaren, 2014). Due to the increasing number of children with disabilities in these outreach areas, a parent carer training program was developed namely the Malamulele Onward Carer-2-Carer Training Programme (McLaren, 2014). The Malamulele Onward Carer-2-Carer Training Programme was developed so as to address the caregiver's need for information and basic handling skills (McLaren, 2014).

Another programme is the Hambisela Parent/Caregiver Programme, which was established by the Eastern Cape Cerebral Palsy Association (McLaren, 2014). The main aim

of the programme is to provide support and training so as to empower parents/caregivers of children with CP (McLaren, 2014). Furthermore, this programme also works on empowering therapists to treat children with CP in a more holistic manner in order to support not only the child with CP but also their families (McLaren, 2014). The Parent's Guidance Centre (PGC) based in the North West Province is also involved in the training of caregivers of children with CP (McLaren, 2014). The programme focuses on broadening mothers/caregivers understanding in the terms of what CP is, facilitating acceptance of their child through gaining information on skills in stimulating the child, encouraging childhood development and independence with the use of suitable assistive devices (McLaren, 2014).

It is due to the lack of rehabilitation therapists and assistants in the rural areas of South Africa that the need for training programmes directed at caregivers came about (McLaren, 2014). Furthermore, the development and implementation of such programmes provides insight into the use of community resources to address the delivery of disability rehabilitation services at a national level (McLaren, 2014). Further research is required on the effects of caregiver-training however; there is evidence on the impact of quality of life in children with CP in rural areas (McLaren, 2014). In conclusion, there is a need to identify and develop strategies to address access to health and social services for children with disabilities in rural areas (McLaren, 2014).

Parent implemented intervention is aimed at improving parenting skills to facilitate child development by teaching strategies to parents (Novak et al., 2013). Parent training or parent implemented intervention focuses on the idea of teaching parents or parents techniques of how to promote communication within their child (Robert & Kaiser, 2011). Parent training has shown promising results in the ability to improve and promote communication in children (Robert & Kaiser, 2011). A review conducted by Robert and Kaiser (2011) compared the effects of parent training across a number of different communication difficulties such as autism, specific language impairment and developmental delay (Robert & Kaiser, 2011). The results of this review indicated that parent implemented language interventions had a positive impact on the receptive and expressive language skills of children with and without intellectual difficulties (Robert & Kaiser, 2011). Furthermore, it was found that parents' use of strategies led to improvements in their child's expressive skills (nonverbal communication and speech), understanding, vocabulary, grammar and the frequency of communicative acts (Robert & Kaiser, 2011). The substantial language growth that has been seen with parent

implemented interventions has been seen with young children who do and do not present with cognitive and language impairments (Robert & Kaiser, 2011).

The review conducted by Robert and Kaiser (2011) further found that Early Intervention contributed to the positive progress of those children who received parent implemented intervention (Robert & Kaiser, 2011). EI is defined as a program that has been devised for parents or parents with young children who are at risk for developmental delays or disabilities (Keilty, 2010). The objective of early intervention is to pave a positive influence on a child's development (Keilty, 2010). The premise of early intervention is also based on the fact that the brain possesses a certain degree of neuroplasticity within the early years of life which makes a child's brain susceptible to change when exposed to environmental experiences and stimuli (Moore, 2012).

The appropriate communication between healthcare professionals and patients can determine the effectiveness of information sharing (Protheroe & Rowlands, 2013). Healthcare practitioners should strive to share information pertaining to diagnoses, treatments and health improvement in a simple and understandable manner (Protheroe & Rowlands, 2013). The ability to gain information regarding a patient's health is termed 'health literacy' (Protheroe & Rowlands, 2013). It has been found that individuals who are well educated and literate can have low health literacy however; it is more common amongst individuals who have low literacy skills (Protheroe & Rowlands, 2013). Furthermore, patients only remember half of the information that is provided to them by healthcare professionals (Protheroe & Rowlands, 2013). Research has found that health information is too complex and low health literacy can pose a threat in accessing effective healthcare (Protheroe & Rowlands, 2013). Due to this, it is vital that healthcare professionals make use of communication approaches that accommodate the varying levels of health literacy so as to allow patients to take informed decisions regarding their health (Protheroe & Rowlands, 2013). Healthcare professionals occasionally supplement information given verbally with leaflets and booklets (Protheroe & Rowlands, 2013). The additional material provided to patients can however not be understood should they present with poor health literacy due to the content being of a nature that can not be understood (Protheroe & Rowlands, 2013). There are several steps that can be followed in order to achieve effective communication with patients and these include; speaking at a slower rate, avoiding jargon and repeating the main ideas of the information provided (Protheroe & Rowlands, 2013). Another technique that can be used to assist in effective

information sharing is ‘teach back’ which expects patients to repeat the important information in their own words (Protheroe & Rowlands, 2013). In order to supplement the verbal information provided to patients, healthcare professionals can make use of printed materials that are presented using appropriate language that will be understood by patients (Protheroe & Rowlands, 2013).

2.11 Current state of intervention services for children with CP in South Africa

South Africa is a developing country with an estimated population of 54 002 000 (SSA, 2014). There is a documented difference between the distribution of human and financial resources between the private and public health care systems in South Africa (Lloyd, Sanders & Lehmann, 2010). The private health care system provides medical care for only 16% of the South African population, with 55.6% of health finances being used by this sector (Lloyd et al., 2010). The South African public health care sector faces a great shortage of human resources (Padarath, Ntuli & Berthiaume, 2003). In 2012, 1439 dual-qualified speech therapists and audiologists, were registered with the Health Professions Council of South Africa (HPCSA) (HPCSA, 2012). According to the Human Resources for Health South Africa Strategy (HRH), there is a ratio of 0.08 professionals per 10 000 South Africans (HRH, 2011). Of this number, only 396 professionals were employed in the public health care sector (HRH, 2011). The limited number of professionals poses challenges for the implementation of EI services within the South African context. This is especially true when children present with multiple disabilities.

From a South African perspective, it is imperative that healthcare professionals be sensitive to the various cultures, values and belief systems within our context (Masasa, Irwin-Carruthers & Faure, 2005). Certain belief systems within the South African context can delay the early identification and rehabilitation of children with disabilities (Masasa et al., 2013). Healthcare professionals need to implement disability awareness programmes (Masasa et al., 2013). Healthcare professionals also need to make themselves familiar with the barriers to participation and rehabilitation and that they promote programmes to assist teachers, children and the general public in understanding the rights of a child with a disability and their participation in all aspects of life (Masasa et al., 2013). In addition, the negative attitudes around children with disabilities need to be addressed (Masasa et al., 2013). Community-based rehabilitation (CBR) is a solution in terms of access to services for children with

disabilities (Masasa et al., 2013). The physical and financial difficulties experienced by caregivers of children with disabilities can be alleviated through the implementation of CBR (Masasa et al., 2013).

This review highlights the need for evidence based research to be conducted within the CP population. Specifically with regard to the current speech therapy interventions that are being used for this population. As discussed, there is a dearth of literature in favour of the efficacy of speech therapy interventions for the CP population. Furthermore, research within the South African context is required so as to identify the culturally specific needs of the population. Most of the studies reviewed have been conducted in developing countries and have employed parent programs that have been developed for their specific contexts.

In addition, South Africa faces challenges in providing culturally specific, cost effective and evidence based intervention for this population. This can be attributable to the already mentioned barriers such as the lack of human and financial resources. This research aims to answer the following research question: “Do children with CP display improved use of communicative functions following a five week parent training program?”

CHAPTER THREE

METHODOLOGY

This chapter describes the methodology used for the study and outlines the aims and objectives. It provides an overview of the research design, population sample, inclusion and exclusion criteria. Furthermore, this chapter describes the data procedures put into place so as to derive the results for the study were obtained.

3.1 Aims and Objectives

The main aim of this study was:

To measure the effects on the use of communicative functions in children with cerebral palsy following a five week parent training program.

Sub-aims:

The main aim was achieved with the following sub-aims:

- A) To assess the participants' baseline performance in the use of communicative functions before the commencement of the parent training.
- B) To assess the participant's performance in the use of communicative functions after the 5 week parent training has taken place.
- C) To assess the participants performance in the use of communicative functions 3 months after the post intervention assessment.
- D) To describe the effectiveness of a parent training program in improving a child with CP's ability to make use of communicative functions.

3.2 Research Design

This study employed a quantitative, single group, repeated measures research design to address the research question. An experimental study was used in order to determine if the program or intervention had the intended causal effect on program participants (Maxwell & Satake, 2006). This research made use of measures to specify, observe and measure data numerically (Maxwell & Satake, 2006; Devlin, 2006; Cresswell, 2003). The scales, namely the Preschool Language Scale-5 and the Communication Matrix were used in the baseline

assessment and reassessment phases of the study, yielded numerical data that described the children's communication abilities. A repeated measures design makes use of the same participants throughout all the experimental conditions (Field, 2011). This type of design varies from an independent groups design which makes use of different groups of participants under different experimental conditions (Howitt & Cramer, 2011).

The advantages related to a repeated measures design is that the researcher can study the effects of a treatment programme on the same participant thus eliminating the effects of individual differences that could arise due to two different participants being used (Howitt & Cramer, 2011). An additional benefit of the repeated measures design is that it requires fewer participants than independent groups (Howitt & Cramer, 2011). The repeated measures design may only require 20 participants thus making it easier to recruit the participants (Howitt & Cramer, 2011). Furthermore, variables such as Intelligence Quotient (IQ), ability and age remain the same as the same participant is taking part in each experimental condition (Field, 2011).

There are disadvantages that need to be highlighted when using the repeated measures design (Collie, Maruff, Darby & McStephen, 2003). The use of the same participants under all experimental conditions can cause issues with regard to order effects (Field, 2011). Order effects are better known as the change in performance of a participant due to the order of exposure to the experimental conditions (Field, 2011). Furthermore effects could be due to the repetition of the experimental conditions leading to improved performance due to familiarity with the assessment measures (Collie et al., 2003). Order effects can be reduced by providing breaks in the experiment so as to avoid boredom and loss of concentration (Collie et al., 2003). Order effects were accounted for in the current study by providing the participant with a short break during the assessment session.

3.3 Participant selection criteria

The following inclusion and exclusion criteria were used to select the participants:

There were two participant groups:

- **Participant group 1:** (Children with CP)
- **Participant group 2:** (Parents of the participants in participant group 1)

- **Inclusion and exclusion criteria for participant group 1 (Children with CP)**

Inclusion criteria:

- The children were required to be between the ages of 3 and 9 years.
Rationale: The study reviewed those children between the ages of 3 and 7 years.
- The children were required to have a confirmed diagnosis of CP.
Rationale: The study reviewed those children with a diagnosis of cerebral palsy that had been confirmed by a medical doctor.
- The children were required to have scored a 3 or 4 on the GMFCS.
Rationale: The child had to have scored a 3 or 4 to be included in the study. This was due to the study focusing on those children who had some form of mobility and were able to either walk using a hand-held mobility device (level 3) or have self mobility with limitations and may use a powered mobility device (level 4). The classification was confirmed by the child's school.
- The children were required to have scored a 3 or 4 on the FCCS.
Rationale: The child had to have scored a 3 or 4 to be included in the study. This was due to the study focusing on those children who had some form of communicative intent and were either effective communicators in some situations (level 3) or required assistance in most situations such as communicating with unfamiliar people (level 4). The classification was confirmed by the child's school.
- The children and their caregivers had to reside in Gauteng.
Rationale: To ensure feasibility of the study, the participants had to reside in the Gauteng province.
- The children needed to have a parent/caregiver who was available to attend the parent/caregiver training workshops.
Rationale: The intervention phase of the study required the parents/caregiver to attend the parent workshops to see the effects of use of communicative functions.

Exclusion criteria:

- The child with CP should not have any concomitant neurodevelopmental condition such as Autism Spectrum Disorder (ASD) or Down syndrome.
Rationale: The study focused on children with a diagnosis of cerebral palsy and therefore any other diagnoses were excluded from the study.

- **Inclusion and exclusion criteria for participant group 2 (Parents of children with CP)**

Inclusion criteria:

- The parents had a child with CP that met all of the above mentioned inclusion criteria for participant group one.

Rationale: Parents had to be able and willing to attend the five training sessions. The intervention aspect of the study relied on the parent training and the parents implementing the techniques that they were taught in the workshops. The parent training needed to occur so as to measure if it had any impact on the use of communicative functions in children with CP.

3.4 Participant description

3.4.1 Participant group 1: Children with CP

A total of 9 children were assessed and included in the study. The mean age of the participants was 5.33 years (Range: 3-7 years; $SD = 1.11$). The majority of participants were male 78% ($n=7$) and 22% ($n=2$) were female. The majority of participants presented with a GMFCS level of 4 and a FCCS level of 4.

Table 3.1: *Description of the children with CP (n=9)*

Participant	Chronological Age at baseline assessment (Years:Months)	Gender	GMFCS level	FCCS level
P1	7:3	M	3	3
P2	5:1	M	4	4
P3	6:10	M	4	4
P4	5:0	M	4	3
P5	6:9	M	4	4
P6	6:2	M	4	4
P7	5:6	M	4	4
P8	5:7	F	4	4
P9	3:7	F	4	4

3.4.2 Participant group 2: Parents of children with CP

There were a total of 9 participants' caregivers that took part in the intervention phase of the study.

Table 3.2: *Description of the parents of the children with CP (n=9)*

Participant	Relationship to child with CP	Gender	Language spoken	Province
P1	Mother	F	Sesotho	Gauteng
P2	Mother	F	isiXhosa	Gauteng
P3	Mother	F	English	Gauteng
P4	Mother	F	isiXhosa	Gauteng
P5	Mother	F	Tigrinya/English	Gauteng
P6	Mother	F	English	Gauteng
P7	Mother	F	Isindebele	Gauteng
P8	Mother	F	English	Gauteng
P9	Mother	F	Southern Sotho	Gauteng

3.5 Data collection procedures

- Ethical clearance was obtained from the University of the Witwatersrand Human Research Ethics Committee (Appendix B)
- Permission was obtained from the Sunshine School Craighall programme to conduct the research (Appendix C)
- The participants details were provided to the researcher by the Sunshine School Craighall.
- Participants that met the criteria for inclusion were identified.
- Potential participants were contacted telephonically and the information letter (Appendix D) made available to them prior to data collection – e.g. posted, faxed or e-mailed.
- The participants who agreed to participate in the workshops were contacted telephonically and a letter was sent home.
- The data was then captured and encoded for data analysis.

3.6 Participant sampling strategy

Sampling strategy

Two non-probability sampling strategies were used to recruit participants for this study, namely purposive sampling and convenience sampling. A purposive sampling strategy was utilised to recruit participants for the intervention process. Purposive sampling is the deliberate selection of a participant due to the qualities the participant possesses (Cresswell, 2003). For the purposes of this study, participants were required to present with cerebral palsy and have a rating of 3 or 4 on the Gross Motor Function Classification Scale (GMFCS) and a rating of 3 or 4 on the Functional Communication Classification Scale (FCCS). These specific levels were selected so as to include children who have some form of mobility and communicative intent. Furthermore, the children were recruited from a special needs school namely the Sunshine Associations Craighall and Eldorado Park Early Intervention Centres. The Sunshine Association is a non-profit Non-Governmental Organisation (NGO). This method has the benefit of convenience, but generalizability of results may suffer due to the researcher only investigating the individuals who are residing in one of the nine provinces in

South Africa and who have already received intervention services or are currently in the process of receiving them (Salkind, 2009).

A convenience sampling strategy was used to recruit the parents of the participants. A convenience sample is known as a group of participants that are selected on the basis of being accessible (McMillan & Schumacher, 2001). The advantage of making use of convenience sampling is related to the ease in obtaining the information and that the cost in obtaining them is low (Salkind, 2009). The disadvantage linked to convenience sampling is that the results obtained with this technique are not very generalizable to other settings due to the narrow focus of the technique (Salkind, 2009).

3.7 Research Process

Data collection took place in the following phases:

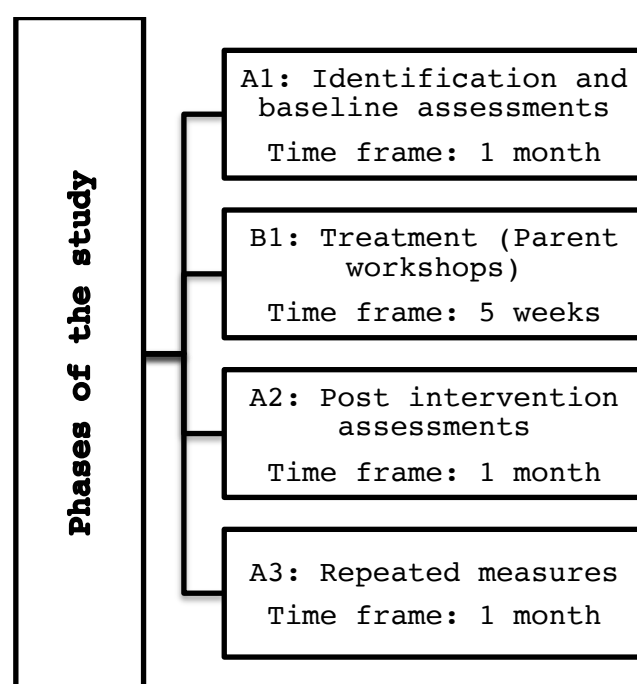


Figure 3.1. Schematic representation of the research design.

Phase 1:

The identification and baseline assessments took place in phase one. The children at the special needs school (N=15) were identified and selected based on meeting the inclusion criteria. These children underwent the communication assessment battery (Appendix E). The

Preschool Language Scales – 5 (PLS-5) and the Communication Matrix were administered in the baseline assessment phase of the study. The baseline assessments were conducted by a qualified speech-language therapist. The baseline assessments were conducted in a quiet room at the school. Modifications such as placing the picture manual flat on the table in order for the child to move their arm across the table to indicate their response was used. In addition, manipulatives were placed on a sheet of paper of a contrastive colour in order for it to be seen clearly and allow the child to use touch cues to identify the object. An increased response time when completing an item on the test was given to those children who required it. Testing was completed in 30-40 minutes depending on when the basal and ceiling of the test was obtained and if a child required a break within the assessment session. Consent was obtained from the participants' caregivers in order to conduct the assessments (Appendix F). Obtaining assent was not feasible based on the developmental level and disability of the children. The time frame in which phase one was completed was one month.

Phase 2:

The Malamulele Onward Carer-2-Carer training program (See Appendix G) took place in phase two of the study. The caregivers of the children that had been identified and assessed in phase one underwent the caregiver training program. A total of 6 participants caregivers were unable to attend the workshops thus excluding those children who were part of the initial sample in phase 1. The reasons that the caregivers could not attend included difficulty in getting time off of work on the weekends and other family responsibilities that did not allow them to attend the workshops. The time frame that phase two was completed in was 5 weeks. The rationale behind the selection of the Malamulele Onward Carer-2-Carer training program was based on the fact that the program was specifically designed for parents, the materials and handouts had been translated into a variety of languages that the parents were able to understand and the program includes a specific section on communication which was the focus of the current study.

Phase 3 and 4:

The post intervention assessments took place in phase three of the study. The children that were assessed in phase one were reassessed in phase three of the data collection period as per the communication assessment battery. The time frame of phase three was one month. A qualified speech-language therapist with 2 and a half years of experience in special needs

conducted the post intervention assessments. This speech-language therapist was not involved in the phase 1 testing. One-on-one training was provided to the assessors. The training session aimed to orientate the assessor to the PLS-5 and the Communication Matrix. Each assessment tool was discussed in terms of what is assessed and how it should be administered. A demonstration of how to administer and score each assessment tool was covered. The adaptations that could be made for the special needs population were demonstrated and discussed. A discussion was held with the assessor after the training in order to answer any questions related to conducting the assessments. The assessor was provided with an opportunity to go through the assessment tools before the assessments with the children took place.

The repeated measures took place in phase 4 of the study, three months after the completion of phase three. The children that were assessed in phase one were reassessed in phase four of the data collection period as per the communication assessment battery. A total of three dropouts occurred at the fourth phase of the study. The reasons for drop out included hospitalization, leaving the school and the tester being unable to assess the one participant who was based at the Sunshine School's Eldorado Park Branch due to logistical reasons. The time frame of phase four was 1 month. A qualified speech-language therapist with one and a half years of experience working with children with special needs conducted the post intervention assessments. This speech-language therapist was not involved in phase 1 or 3's testing. One-on-one training was provided to the assessors. The training session aimed to orientate the assessor to the PLS-5 and the Communication Matrix. Each assessment tool was discussed in terms of what is assessed and how it should be administered. A demonstration of how to administer and score each assessment tool was covered. The adaptations that could be made for the special needs population were demonstrated and discussed. A discussion was held with the assessor after the training in order to answer any questions related to conducting the assessments. The assessor was provided with an opportunity to go through the assessment tools before the assessments with the children took place.

3.8 Measuring instruments and equipment

3.8.1 Measuring instruments

- **Phase 1: Baseline assessment battery** (conducted by a qualified speech-language therapist at the school premises – Sunshine Early Intervention Centre)

A. Preschool Language Scales, Fifth Edition (PLS-5) was used to measure the participants' receptive and expressive language abilities (Zimmerman et al., 2011). The Preschool Language Scale-5 is a play based assessment tool that is individually administered instrument that assesses developmental language skills in children from birth to 6 years, 11 months (Zimmerman et al., 2011). The PLS-5 is a comprehensive developmental language assessment that includes items that assess preverbal, interaction based skills, emerging language and early literacy (Zimmerman et al., 2011). This assessment tool provides standard scores, growth scores, language age equivalents and percentile rank scores (Zimmerman et al., 2011). The areas assessed are Attention: Attention to environment and Attention to People; Play; Gesture; Vocal Development; Social Communication; Semantics: Vocabulary, Qualitative Concepts, Quantitative Concepts, Spatial Concepts, Time/Sequence Concepts; Language Structure, Morphology, Syntax; Integrative Language Skills; and Emergent Literacy Skills (Zimmerman et al., 2011). No studies have been conducted with this assessment tool on the South African population however, it is regarded as a reliable and sensitive assessment tool internationally (Zimmerman et al., 2011). The administrators manual for the PLS-5 does include adaptations for special populations (Zimmerman et al., 2011). Adaptations to accommodate the physical impairments include, stabilizing the child's arm in order to point to a picture or object and placing the picture manual flat on the table in order for the child to move their arm across the table in order to indicate their response (Zimmerman et al., 2011). Further adaptations were made to address visual difficulties where the manipulatives were placed on a sheet of paper of a contrastive colour in order for it to be seen clearly and allow the child to use touch cues to identify the object (Zimmerman et al., 2011). Additional modifications included giving the child an increased response time when completing an item on the test (Zimmerman et al., 2011). The PLS-5 allows for obtaining a Raw Score and converting it into a Standard Score and Age Equivalent (Zimmerman et al., 2011). A Raw Score indicates how many items an individual scored correct on a test whereas a Standard Score is derived from the Raw Score within a distribution of scores (Neukrug & Fawcett, 2006). Furthermore, the Standard Score describes the difference of the Raw Score from a sample mean that is represented in standard deviations (Neukrug & Fawcett, 2006). Using standard scores allows the set of raw scores to be statistically adjusted to fit the normal distribution and thus providing a precise comparison amongst individuals in a sample (Neukrug & Fawcett, 2006). Assessing children with CP and comparing them to the normal distribution is linked to a

great deal of controversy (Geytenbeek, Harlaar, Stam, Ket, Becher, Oostrom & Vermeulen, 2010). The main concern in using standardized assessments with children with CP is that standardized assessments normed on this specific population are scarce (Geytenbeek et al., 2010). In addition, most standardized tests are normed on typically developing children (Geytenbeek et al., 2010).

B. The Communication Matrix was used to assess what the child's function at the earliest stages of communication was and the forms of communication being used (Rowland, 2004). The communication matrix can be used to identify early communication behaviour from a socio-pragmatic perspective, following a progression of expressive skills from mother-child interactions to the use of formal language systems (Rowland, 2004). Due to communication skills being affected by sensory, motor, cognitive and social capacities, and impairments in any of these areas, an early communication assessment should account for skills displayed within a wide range of behaviours (Rowland, 2004). The Communication Matrix includes two major aspects of communication: the reasons that individuals communicate and the behaviors that they use to communicate (Rowland, 2004). The Matrix is then further organized into four major reasons to communicate: to refuse things that we do not want; to obtain things that we do want; to engage in social interaction; and to provide or seek information (Rowland, 2004). The Matrix is then further organized into seven levels of communicative behaviour (Rowland, 2004). These levels are based on the pragmatic approach to communication and include; Pre-Intentional Behavior, Intentional Behavior, Unconventional Pre-symbolic Communication, Conventional Pre-symbolic Communication, Concrete Symbols, Abstract Symbols and Language (Rowland, 2004). This tool can accommodate individuals who make use of "augmentative and alternative" forms of communication (AAC) and pre-symbolic communication (such as gestures, facial expressions, eye gaze and body movements) (Rowland, 2012, p.1). It is an assessment tool that can be used with individuals who present with any type or degree of disability such as severe and multiple disability, intellectual limitations and sensory or physical impairments (Rowland, 2004). This therefore makes the tool appropriate to use on the CP population however it should be noted that the tool was developed in the United States and is not normed on the South African context (Rowland, 2004). No research has been conducted on the use of this tool on the South African context however it was chosen as an assessment measure due to its ability to accommodate any type of communicative behaviour (Rowland, 2004). In order

to account for the use of a United States normed assessment tool within the South African context, it should be noted that communicative functions are not language specific as they are the precursors to language development and therefore should be universal and not specific to one population (The Interdisciplinary Council on Developmental and Learning Disorders Diagnostic Manual for Infants and Young Children [ICDL-DMIC], 2005). Furthermore, the research that has been conducted on this tool has displayed promising results in its ability to be sensitive to change (Rowland, 2004). A study conducted with non-verbal children with pervasive developmental disorders showed a mean gain of 13% in scores from the start to the finish of a school year (Rowland, 2004). The communication matrix has the ability to be sensitive to change due to its ability to document the gains of children who begin at the earliest stages of communication and develop at a slow pace (Rowland, 2004). In addition, the matrix is available in an online version with instructional videos therefore making it accessible for anyone to use (Rowland, 2004).

- **Phase 2: Intervention** (conducted by a trained Malamulele Onward Carer-2-Carer Training Programme facilitator at the Sunshine Early Intervention Centre)

A. The Malamulele Onward Carer-2-Carer Training Programme (C2CTP) was used for the intervention part of this study where parents of the children with CP attended a 5 week workshop (once a week attendance for 1 and a half hours). This programme was developed and piloted for three years with a group of 20 parents of children with CP residing in rural areas in South Africa (Malamulele Onward: Carer-2-Carer Training, 2015). The programme is not aimed at replacing the role of the therapist however, it serves as a means to support and complement the existing services that the children are receiving (Malamulele Onward: Carer-2-Carer Training, 2015). The programme focuses on relaying information from parent to parent and not just therapist to parent which serves as a more influential strategy for sharing of information (Malamulele Onward: Carer-2-Carer Training, 2015). The program was presented in the parents home language in a way that could be understood by them (Malamulele Onward: Carer-2-Carer Training, 2015). Malamulele Onward has worked with over 700 children and their families over the past 9 years in rural areas of South Africa, Lesotho and Rwanda (The Lancet, 2015). The work that Malamulele Onward has conducted with these children and their

families has shown that an effective intervention model needs to include training for parents and families (The Lancet, 2015). In addition to this parent training, training for rehabilitation therapists, provision and fitting of postural equipment, hands on therapy and regular monitoring visits need to be conducted (The Lancet, 2015). In a study conducted by Weyer, Saloojee and Ngwana (2016) over a two year period, parent facilitators from ten rural areas in South Africa and Lesotho, conducted 5 workshops targetted at caregivers in their communities. After the completion of the workshop, caregivers were asked to complete a questionnaire about the workshop (Weyer, Saloojee & Ngwana, 2016). A year after, five focus groups were conducted with parents who had attended the parent training workshops that previous year and the data from the questionnaire's and focus groups was analyzed thematically (Weyer, Saloojee & Ngwana, 2016). A number of themes emerged from the data such as "Improved understanding of their child and of Cerebral Palsy", "Accepting their child and that they, as caregivers, are not alone". "learning practical skills which assisted with daily care activities" and "perceived improvement and progress in their children" (Weyer, Saloojee & Ngwana, 2016). In addition, the study concluded that providing caregivers with training in their own language, that is easy to understand by a parent who has experienced a similar journey assists in creating a positive environment for therapy and discards misperceptions linked to having a child who has CP (Weyer, Saloojee & Ngwana, 2016). The workshops were presented with the use of demonstrations, visual aids and a verbal presentation on each of the topics. The workshops were conducted by Lydia Ngwana, a parent liaison officer at Malamulele Onward. Lydia is also a mother of a child with CP and has extensive experience in the training of parents and caregivers. She has presented numerous workshops with parents from a variety of socio-economic, language and cultural backgrounds. Lydia was proficient in all of the parents home languages and would present the workshop using the materials in English however, she would translate the content as the workshop progressed. Lydia would also ensure that all the parents understood the content of the workshop by revising the content in their home language and answering any questions related to the content.

The workshops took on an interactive approach and focused on involving the caregivers in every aspect. Each workshop was structured in the following way:

- 1) Recap of the previous workshops content via the use of a question and answer activity.
- 2) Introduction to the content of workshop.
- 3) Presentation with the use of explanations, visual aids and role playing.
- 4) Demonstrations of the techniques covered in the workshops.
- 5) Key points of the topic covered.
- 6) Questions pertaining to the content of the workshop.
- 7) Parents provided with handouts on the content covered in the workshop (the parent indicated their preferred language and were given a handout that had been translated into that language).

The following workshops were presented in the intervention phase (See Appendix G):

Workshop 1: “Cerebral Palsy”

An introduction to Cerebral Palsy addressing topics on the types and levels of CP, and cause of CP.

Workshop 2: “Caring for a child with CP is a way of life”

Focusing on how to position a child with CP in addition to caring for a child with CP.

Workshop 3: “Eating & Drinking”

Addressing how to effectively and safely feed a child who has CP.

Workshop 4: “Communication”

Addressing how we can help children with CP to understand and communicate better.

Workshop 5: “Cerebral Visual Impairment (CVI)”

Addressing ideas and modifications on how to help a child with CVI to see with less difficulty.

The parent training program was structured in a way that each workshop would build upon the content of the previous workshop. Therefore, the focus of the intervention phase was not to only present the communication workshop in isolation. Establishing an understanding of what CP is and how to care for and position a child with CP played a role in ensuring effective communication and feeding. Postural needs for effective function include head alignment, head position, head control, spinal alignment and hip placement and pelvic

stability (Workinger, 2005). The effects that the correct positioning can have include benefits such as function, learning, interaction and quality of life (Workinger, 2005). The main researcher was present at all of the workshops and coordinated the seating, venue and catering aspects of the workshops. From a subjective standpoint, the main researcher observed the workshops to be highly interactive and accommodating all parents with varying knowledge of CP. The presenter of the workshops had presented each workshop in a understandable and effective way. Parents only had positive feedback regarding the content and presentation of each workshop.

- **Phase 3 and 4: Reassessment of children with CP after the 5 week Carer-2-Carer Training Programme** (conducted by a qualified speech-language therapist at the school premises – Sunshine Early Intervention Centre) – A different therapist from the initial assessment phase.

At the end of the intervention period, a different speech -language therapist who did not perform the pre-intervention testing performed the post intervention testing so as to ensure blinding and that there was no bias in terms of knowing the initial assessment results. The post intervention testing took place on two occasions with two different speech therapists. The first post-testing phase took place one month after the parent training and the second post-testing phase took place three months after the first post-testing phase. The same assessment protocol outlined in the initial assessment battery was conducted so as to measure any change in the abilities that were established in the baseline assessments. One-on-one training was provided to both of the assessors. The training session aimed to orientate the assessor to the PLS-5 and the Communication Matrix. Each assessment tool was discussed in terms of what is assessed and how it should be administered. A demonstration of how to administer and score each assessment tool was covered. The adaptations that could be made for the special needs population were demonstrated and discussed. A discussion was held with the assessors after the training in order to answer any questions related to conducting the assessments. The assessor was provided with an opportunity to go through the assessment tools before the assessments with the children took place. The assessor was introduced to the staff of the school and orientated in terms of the testing environment and the children that they would be assessing. The assessor was provided with a quiet room to conduct the assessment and

was given the necessary equipment such as a chair, table and assessment materials to conduct the assessments.

- A. The Preschool Language Scales, Fifth Edition (PLS-5)** does not specify any parameters as to how soon an assessment can be re-administered therefore allowing a reassessment to take place after 6 weeks (Castilleja, 2007)
- B. The Communication Matrix** has displayed sensitivity to development over time in children with severe communication disorders therefore making it appropriate to use in the reassessment phase (Rowland, 2012).

Once the assessments had taken place, feedback was provided by the assessors. The assessor from the first post testing phase reported that she was able to complete all of the assessments and had all the necessary equipment in order to do so. She reported that she had enough time in which to complete each assessment and was able to implement any necessary modifications. When a child presented with minimal communicative intent or was not compliant with the assessment then it was noted on the record sheet.

The second assessor reported that she was able to complete all of the assessments and had all the necessary equipment in order to do so. She reported that she had enough time in which to complete each assessment and was able to implement any necessary modifications.

3.9 Materials

Assessments:

The assessments took place at the Sunshine School Craighall. A quiet room with a table, chair or assistive device used by the child was used to conduct the pre-test and post-test assessments. The PLS-5 and Communication Matrix were used to conduct the assessments. Consent letters for video recording (Appendix F) of assessment sessions were sent out to the parents/caregivers of the children however, consent was given by parents/caregivers who did not attend the workshops thus excluding them from the study. The rationale for attempting to obtain video recordings of the assessment sessions may have assisted in having an additional rater assess the behaviours displayed by the child in the assessment.

Intervention:

The Malamulele Onward Carer-2-Carer workshops took place at the Sunshine School Craighall in a venue that accommodated all the parents and these workshops were run by a trained facilitator who was able to communicate with the parents in their first language and had previous experience in conducting the workshop and was trained in running the workshops. It should be noted that not all the parents spoke the first same language however, the facilitator was familiar with all the languages spoken by the parents. Clarification of the information presented was done so as to ensure that all the participants understood the information being presented. The handouts that were given at the end of the workshops had also been translated into the official South African languages so as to aid the understanding of the content covered. Refreshments and eats were provided to the parents when they attended the workshops in addition to the parents receiving reimbursement for the travelling costs incurred in order to attend the workshops.

3.10 Research and Data Collection Schedule

The following table indicates the schedule of the research project:

Table 3.3: *Research and data collection schedule*

Month	Activity
October 2015	The research proposal was submitted to the University of the Witwatersrand Non-Medical Ethics Committee.
January 2016	The information and consent forms were submitted to the participants (Appendices C and E).
October 2015 – May 2016	The data collection process took place. <u>January 2016:</u> The pre-test took place with the selected participants. <u>February 2016:</u> The Malamulele Onward Carer-2-Carer Workshops were conducted for five weeks. <u>March 2016:</u> The post-testing of the participants who took part in the pre-test. <u>August 2016:</u> The repeated measures phase was conducted.
September -	The data analysis procedure began.

November 2016	
November 2016 – April 2017	The final research document was written up.
April 2017	The final Masters document was submitted.

3.11 Recording and Management of Data

The record sheets from the various assessments were used in order to document data. The PLS-5 record sheet had a study number on it that corresponded to each participant. The child's name, address, school, grade and teacher was not indicated on the record sheet so as to ensure the participants confidentiality. A list containing the participants details was stored in a locked cupboard on a password protected laptop that was only accessible to the researcher. All participants were coded and all data was stored in a locked cupboard and on a password protected laptop. Only the participants who provided consent had their assessment sessions video recorded and these recordings were saved on a password protected laptop. All data obtained from these assessments will be stored for 5 years in a locked cupboard on a password protected laptop and thereafter will be destroyed.

3.12 Data Analysis

The quantitative data from this study such as the assessment scores (PLS-5 and Communication Matrix) was analysed with the use of a paired sample t-test. Statistical Analysis Software (SAS) was the statistical software used to perform the statistical analysis of the data. The paired sample t-test assisted in comparing mean scores from the pretest and post test to determine if they were statistically significant (Maxwell & Satake, 2006). Making use of a repeated measure design reduced the variance of estimates of treatment-effects therefore making provision for statistical inferences to be made with fewer participants (Goldstein, 2003). The use of this design allowed for a longitudinal analysis where the change in the participants performance could be monitored over time (Goldstein, 2003). In order to determine if the intervention yielded any change in the use of communicative functions, the Wilcoxon matched-pairs signed rank test was used. This test is used in studies involving repeated measures where the same subjects serve as their own control (Maxwell & Satake, 2006).

3.13 Ethical considerations

Ethics involves preservation of the concept of acceptable conduct (Holt & Walker, 2009). The following ethical considerations will be adhered to in this study:

- Ethical clearance was obtained from the University of the Witwatersrand Human Research Ethics Committee (Non-Medical) (Protocol number: H15/09/44).
- *Informed consent*: The involvement of the participants who are children was obtained from their parents.
- *Confidentiality*: Participants were informed that confidentiality would be maintained throughout the research process and that the participant's identity would not be revealed to other parties that were not participating in the study. It was also ensured that all information and video recordings would be secure within the Department of Speech Pathology and Audiology (University of the Witwatersrand). The participants and their families names would not be recorded anywhere and would be given coded information to remain anonymous.
- *Autonomy*: Participants were advised that they were under no obligation to continue with the research process if they decided that they wanted to terminate their participation. Their decision in this regard was respected without any negative consequences. These parents were provided with reimbursements for the travelling costs incurred in getting to and from the workshops.
- *Beneficence and non-maleficence*: Therapeutic techniques and clinic procedures were employed however every precaution was taken to ensure that no harm was inflicted on the participants.
- *Anonymity*: Anonymity was secured by not revealing the participants identity to other parties or participants that did not form part of the study.

3.14 Reliability and validity

Scientific research aims to draw on valid and reliable conclusions about underlying relations among variables based on the empirical test procedures (Maxwell & Satake 2006). Reliability refers to the consistency of a measurement (Drummond, 2003). In order to ensure the reliability of the first phase of the data collection, blinding was used where the therapist who conducted the assessments was not be involved in providing any therapy. Blinding refers to the act of not revealing the group allocation from one or more individuals that are

participating in a clinical research study (Maxwell & Satake, 2006). Blinding is a crucial method used in order to reduce the bias in randomized clinical trials (Maxwell & Satake, 2006). In addition, the assessment tools that were used in the data collection process were deemed reliable as discussed previously. The final phase of testing allowed for the opportunity to investigate if the skills targeted in the intervention were retained by the children with CP. The training provided to the assessors assisted in minimizing interrater inconsistencies (Barrett, 2001). The training provided a context in which the assessment would take place and the training explained the tasks that were expected of each rater (Barrett, 2001). Training for assessors assists in eliminating effects of other variables other than item difficulty from the rating process (Barrett, 2001). The criteria that can be put in place to determine if the rater has been well trained include; stable rating throughout the rating process, ratings need to represent the relative difficulties of the test items and the ratings should indicate the relative difficulties of the test items (Barrett, 2001). In order to ensure the reliability of the first phase of the data collection, blinding was used where the therapist who conducted the initial assessments was not involved in conducting the post test 1 or post test 2. Blinding is a crucial method used in order to reduce the bias in randomized clinical trials (Maxwell & Satake, 2006). In addition, the assessment tools that were used in the data collection process were deemed reliable as discussed previously. The final phase of testing allowed for the opportunity to investigate if the skills targeted in the intervention were retained by the children with CP. The training provided to the assessors assisted in minimizing interrater inconsistencies (Barrett, 2001). The training provided a context in which the assessment would take place and the training explained the tasks that were expected of each rater (Barrett, 2001). Training for assessors assists in eliminating effects of other variables other than item difficulty from the rating process (Barrett, 2001). The criteria that can be put in place to determine if the rater has been well trained include; stable rating throughout the rating process and the ratings should indicate the relative difficulties of the test items (Barrett, 2001). The study was unable to implement interrater measures due to feasibility constraints however, it may have been of benefit to implement an interrater component in the study. The value in ensuring interrater reliability is that it assists in determining the extent to which the data is a correct representation of the variables measured (McHugh, 2012). The study made use of different assessors (raters) at each assessment phase in order to account for blinding however, the risk involved in this is that there is variability among human observers (McHugh, 2012). Rater training was however implemented in the current study in order to reduce the amount of variability in the assessments. The assessors

(raters) were both qualified Speech-Language Therapists and had between 1-2 years of clinical experience. An attempt was made in video recording the assessment sessions however, the caregivers did not provide consent to video record the assessment sessions.

Validity refers to the ability of the instrument to measure what it is intended to measure and includes internal and external validity (Maxwell & Satake, 2006). Internal validity is whether the independent variables can be held responsible for the changes in the dependent variable (Maxwell & Satake, 2006). External validity is the extent to which the results can be generalized to one or more populations (Maxwell & Satake, 2006). Due to the heterogeneous nature of CP, a control group was not included in this study. The challenges associated with not having a control group create difficulties in controlling for other variables such as maturation (Drost, 2011).

The following table contains the reliability and validity information for the assessment tools that were used in this research study:

Table 3.4: *Reliability and validity of the PLS-5 and the Communication Matrix*

Data collection tool	Reliability	Validity
Preschool Language Scales, Fifth Edition (PLS-5)	The reliability of the PLS-5 was determined using the test-retest reliability, internal consistency and interrater reliability (Zimmerman, Violette, Steiner & Pond, 2011).	Extensive evidence of validity reported in the PLS-5 addresses evidence based on the test content, response processes, internal structure, relationships with other variables and consequences of testing (Zimmerman et al., 2011).
Communication Matrix	Interrater reliability between professionals yielded a mean of 90% agreement (Rowland, 2012).	Due to no other communication skills assessments covering the same range of behaviors that the Matrix does, it is not possible to make a meaningful comparison to other instruments (Rowland, 2012). Scores on instruments that

		assess speech and do not include alternatives to speech would not be expected to be similar to Matrix Scores (Rowland, 2012).
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3.15 Conclusion

In this chapter the research design was outlined and discussed. The procedures for data collection were described and the method of blinding was implemented in order to eliminate possible bias in the measurement of communicative functions. The data analysis methods were approved by a statistician.

CHAPTER FOUR

RESULTS

In this chapter the results are presented according to the aims of the study. The data are presented in graphs and tables that provide the reader with an understanding of the findings of the research. While comparison to the literature has been made in this chapter, the comprehensive discussion of the results is covered in chapter five.

4.1 Introduction

The research posed the question as to whether the use of a caregiver training program would bring about positive change in the use of communicative functions of young children with CP. In order to answer this questions, the researcher examined a group of children with CP (N=9) over a period of 6 months. The phases of the study are outlined in Figure 3.1 in chapter 3. The participants ($n=15$) were initially assessed to obtain their baseline performance before the parent training. The parent training was conducted over a five week period. Thereafter, the participants were reassessed in order to determine if there was any change in the children's use of communicative functions. Three months after the post intervention assessment took place a third reassessment was conducted to assess if the participant's skills had been retained 3 months after the parent training had taken place.

The communication assessment battery comprised of two assessments namely, the PLS-5 and the Communication Matrix. For ease of understanding, the results have been presented as follows; the PLS-5 raw scores at the baseline (test 1), post test (test 2) and maintenance probe (test 3) have been illustrated in the form of graphs. The Communication Matrix scores at the baseline (test 1), post test (test 2) and maintenance probe (test 3) have been presented in a table format and described and discussed.

4.2 Overview of the scoring and interpretation of the PLS-5

In order to assist in the understanding of the results that have been presented in this chapter, an overview of the scoring and interpretation of the scores have been discussed. The PLS-5 allows for obtaining a Raw Score and converting it into a Standard Score and Age Equivalent (Zimmerman et al., 2011). A Raw Score indicates how many items an individual scored correct on a test whereas a Standard Score is derived from the Raw Score within a

distribution of scores (Neukrug & Fawcett, 2006). Furthermore, the Standard Score describes the difference of the Raw Score from a sample mean that is represented in standard deviations (Neukrug & Fawcett, 2006). Using standard scores allows the set of raw scores to be statistically adjusted to fit the normal distribution and thus providing a precise comparison amongst individuals in a sample (Neukrug & Fawcett, 2006). Assessing children with CP and comparing them to the normal distribution is linked to a great deal of controversy (Geytenbeek, Harlaar, Stam, Ket, Becher, Oostrom & Vermeulen, 2010). The main concern in using standardized assessments with children who have CP is that standardized assessments normed on this specific population are scarce (Geytenbeek et al., 2010). In addition, most standardized tests are normed on typically developing children (Geytenbeek et al., 2010). As mentioned in chapter three, adaptations made to accommodate the children with CP were implemented to ensure that the child received the best possible assessment measures.

The motivation behind using the Raw Scores (RS) to show the changes in performance is due to the fact that majority of the participants required modifications while being assessed and it is not advised to make use of the normative data once this is the case (Zimmerman et al., 2011). Furthermore, once the raw scores had been converted into a Standard Score (SS), majority ($n=6$) of the participants scored a Standard Score of 50. A Standard Score of 50 is the lowest Standard Score that can be achieved (Zimmerman et al., 2011). The challenge with having a child fall within this Standard Score level is that the Raw Score range that correlates to a Standard Score of 50 is broad e.g. 0-30 as opposed to a Raw Score that is above 30 and has its own Standard Score for each 1 point raw score increment. The Raw Score essentially allows any changes to be seen in performance should that participant be classified at a Standard Score of 50. Therefore, the Standard Score and Age Equivalent were not used to analyze the change in the children's PLS-5 results

4.3 The effect of communication intervention when assessed by the PLS-5

Figures 4.1 – 4.9 indicate the changes in the receptive language scores, expressive language scores and total language scores of the PLS-5 of the nine participants during the baseline assessment (1st month), post test 1 (3rd month) and post test 2 (6th month). When the PLS-5 raw scores were analysed, it was evident that there were two distinct groups of participants that emerged. These two distinct groups will be discussed in order to establish a

further understanding of the results presented in this chapter. Each child's scores are detailed in figures 4.1 – 4.9 below.

4.3.1 Participants that displayed an increase in PLS-5 scores

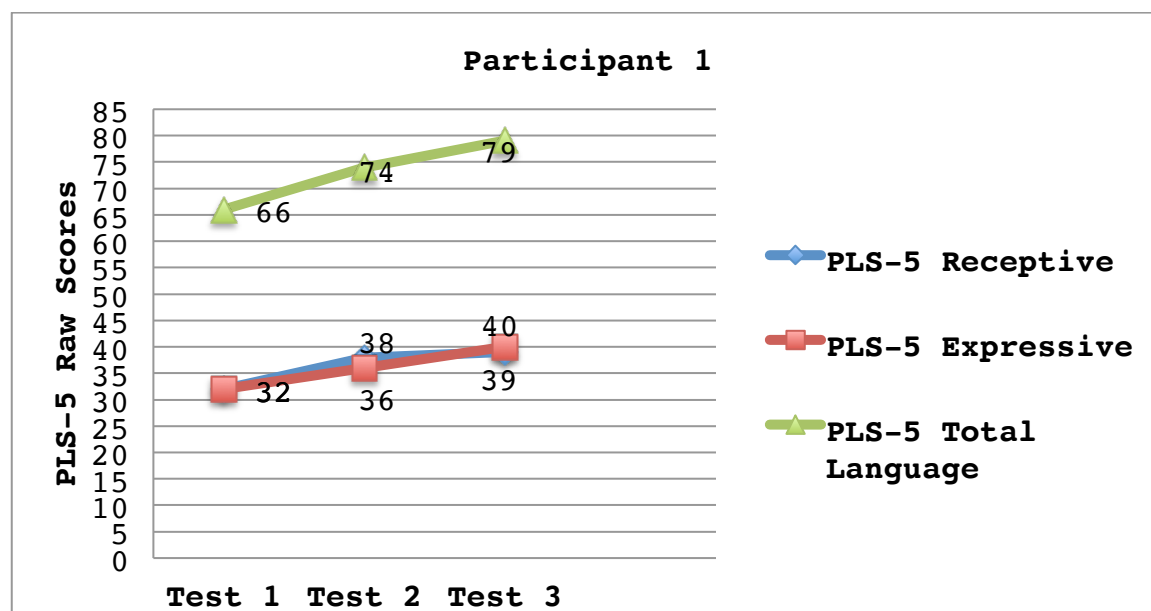


Figure 4.1: Raw scores of PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 for participant 1.

Participant 1 was classified as having a GMFCS level of 3 (able to walk with the use of a handheld mobility device) and a FCCS level of 3 (effective communicator in most situations and can communicate small ranges of messages and topics to most familiar people). Figure 4.1 indicates a steady increase in the PLS-5 receptive language score, expressive language score and total language score, therefore indicative of positive change from test 1 to test 2 to test 3. Overall, the performance of participant 1 on the PLS-5 indicated a positive change during all three testing occasions. It should be noted that participant 1 was the only participant that presented with a level 3 on both the GMFCS and the FCCS. These findings assist the researcher in assuming that the use of a parent training programme may have the potential to be effective in improving the use of communicative functions. This assumption may be true specifically in the case where a child has some communicative abilities at the time of their baseline assessment.

Figures 4.2 – 4.6 display the results of the participants who improved from test 1 to test 2 but unlike participant one, showed a decline at the third assessment. These results

indicate that a positive increase was seen immediately after the intervention phase however, the generalizability and carry over of results was not seen at the time of the last assessment phase. A number of factors that could be associated with these findings are introduced below however, the interpretation of these results will be discussed in detail in chapter five.

Details regarding the raw scores obtained in the PLS-5 are illustrated in the figures below:

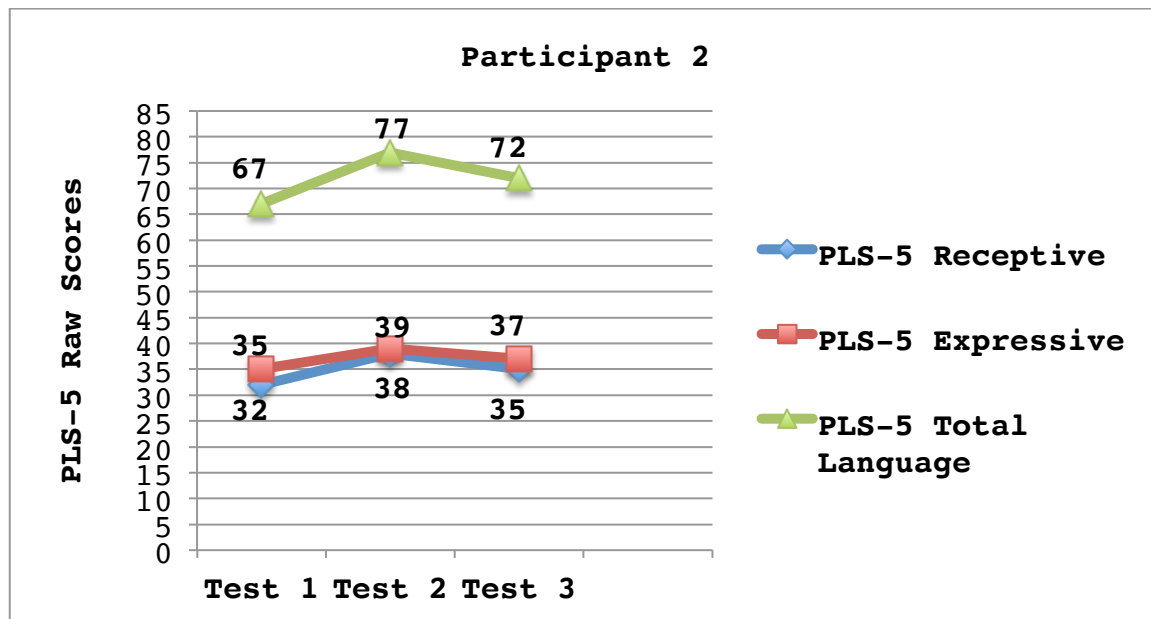


Figure 4.2: Raw scores of PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 for participant 2.

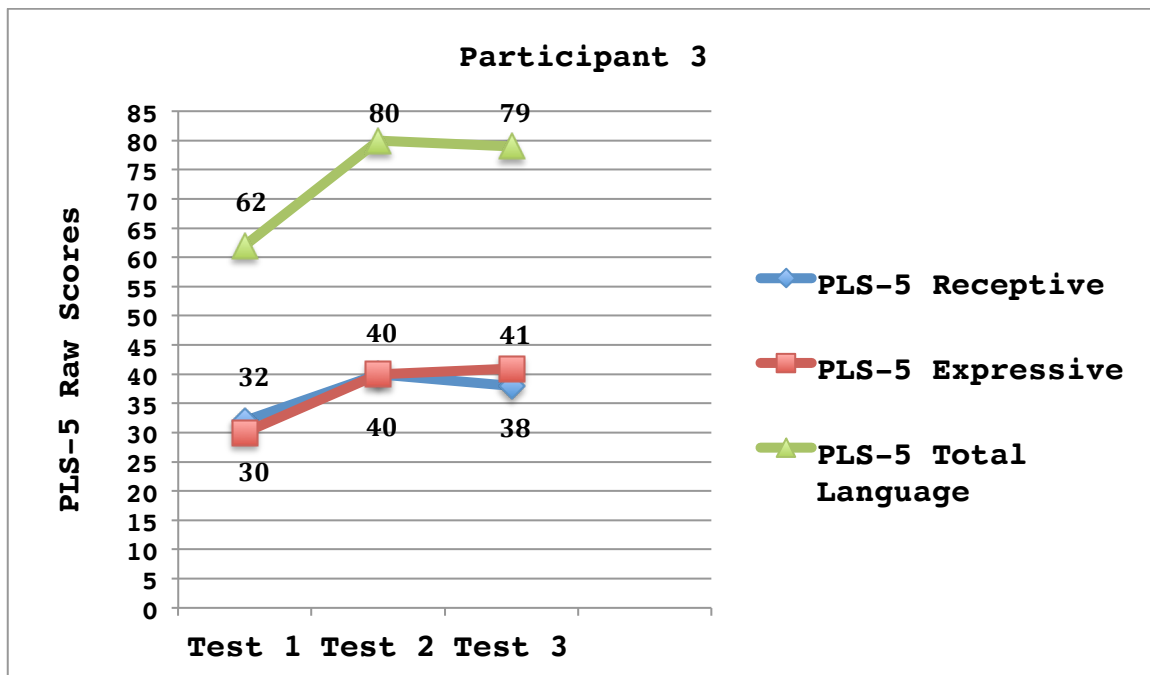


Figure 4.3: Raw scores for PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 of participant 3.

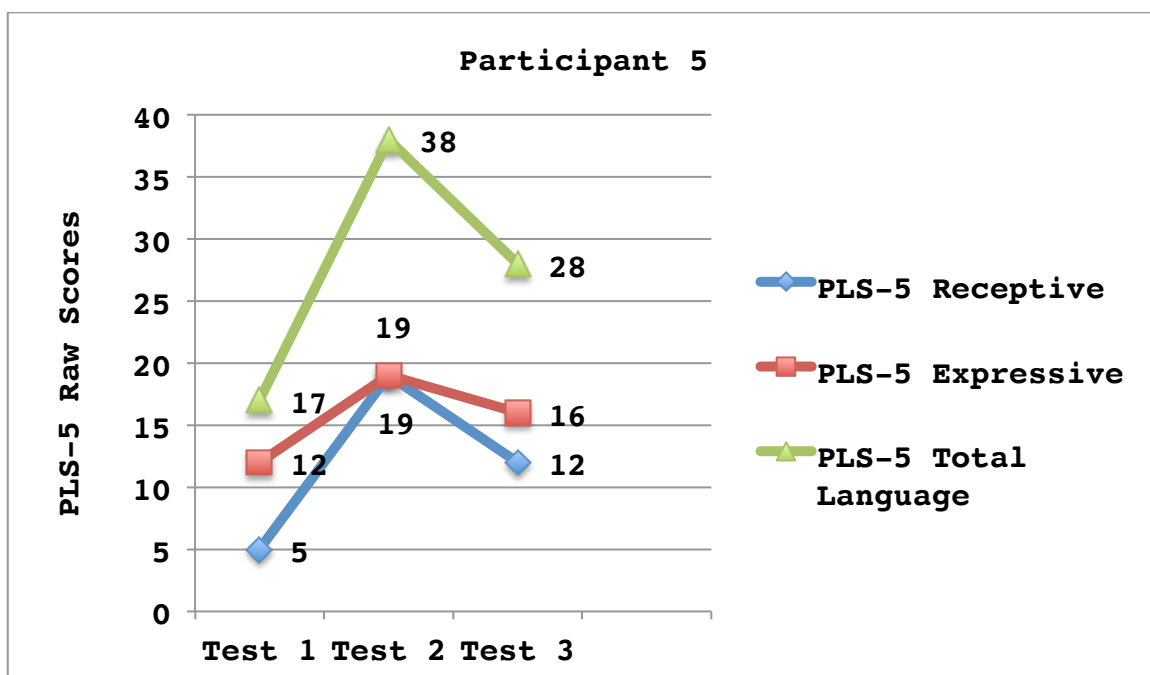


Figure 4.4: Raw scores for PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 of participant 5.

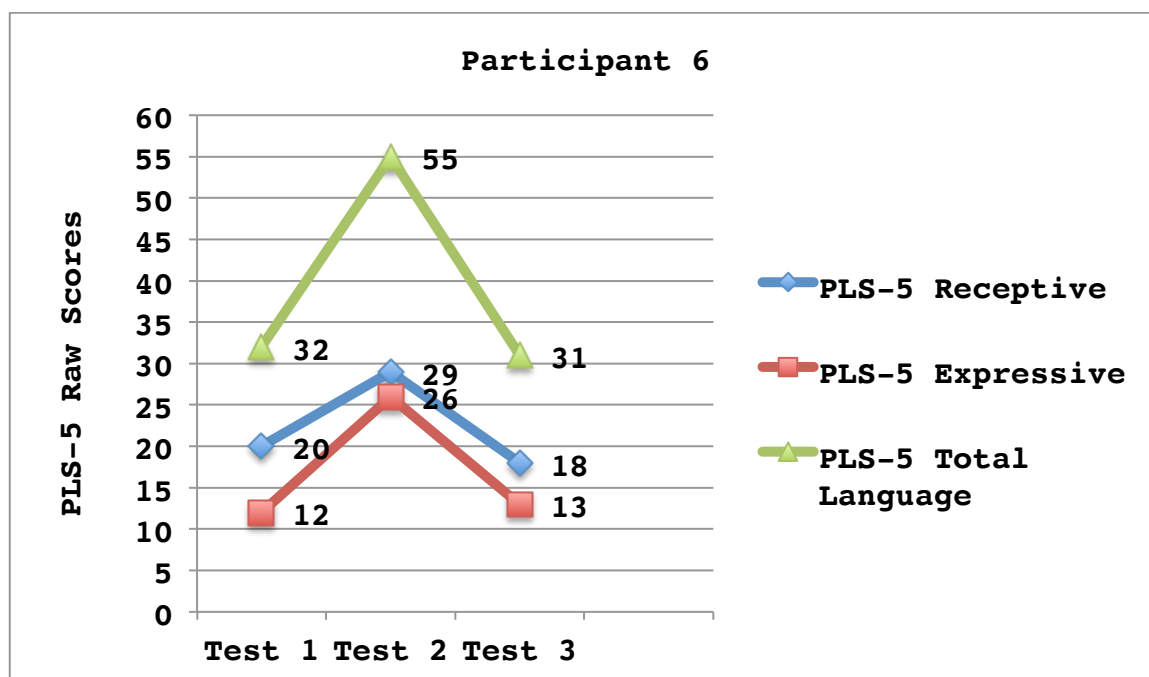


Figure 4.5: Raw scores of PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 for participant 6.

Participant 2, 3, 5 and 6 were classified as having a GMFCS level of 4 (has self mobility with limitations and may use a powered mobility device) and a FCCS level of 4 (assistance is required in most situations especially with unfamiliar people and environments). Figure 4.2 indicates a change in the PLS-5 receptive language score, expressive language score and total language score, therefore indicative of positive change from test 1 to test 2. Although the test 3 results of the PLS-5 receptive language score, expressive language score and total language score is lower than the test 2 score, it is higher than the initial baseline scores from test 1. Figure 4.3 indicates a steady increase in the PLS-5 expressive language score from test 1 to test 2 to test 3. A steady increase can be seen in the PLS-5 receptive language score and total language score, therefore indicative of positive change from test 1 to test 2. Although the PLS-5 receptive score and total language score at test 3 is lower than the score at test 2, it is higher than the initial baseline score at test 1. As can be seen in Figure 4.4 and 4.5 participant's 5 and 6 displayed a positive change from test 1 to test 2. The results obtained at the third testing opportunity for participant 2, 3, 5 and 6 were higher than the initial baseline scores thus indicating that the participant did not regress to a level lower than their baseline skills.

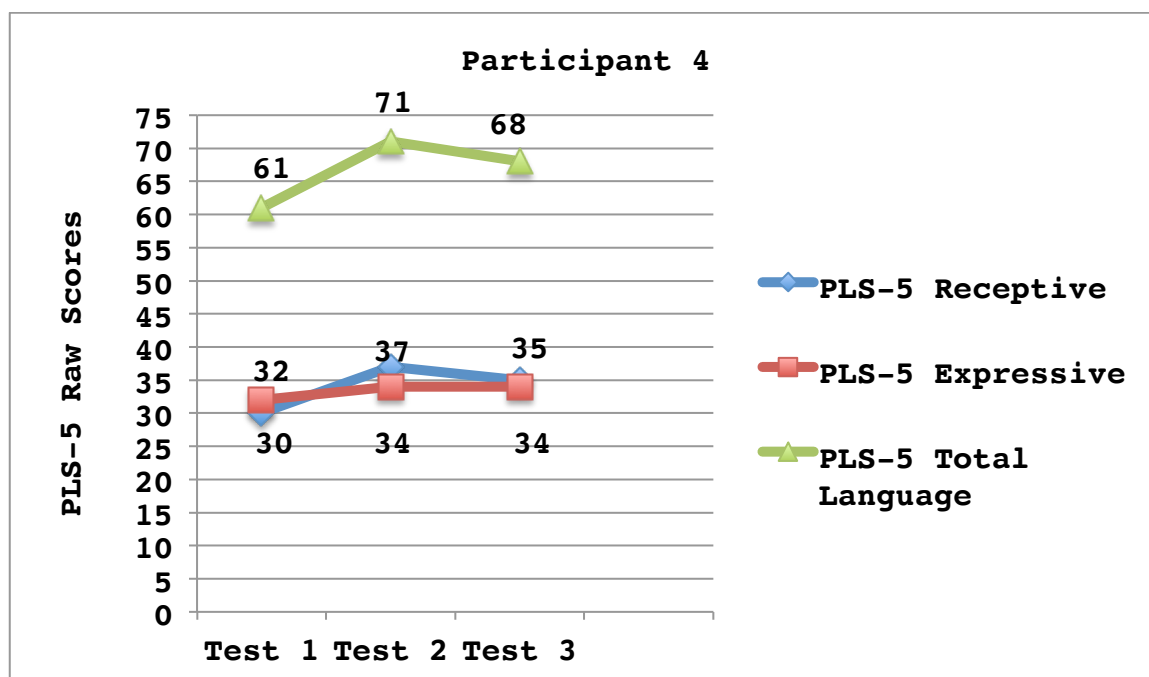


Figure 4.6: Raw scores for PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 of participant 4.

Participant 4 was classified as having a GMFCS level of 4 (has self mobility with limitations and may use a powered mobility device) and a FCCS level of 3 (effective communicator in most situations and can communicate small ranges of messages and topics to most familiar people). Figure 4.6 indicates a steady increase in the PLS-5 receptive language score, expressive language score and total language score, therefore indicative of positive change from test 1 to test 2. No change was noted between test 2 and test 3's PLS-5 expressive language score. Although the PLS-5 receptive language score and total language score at test 3 is lower than the score at test 2, it is higher than the initial baseline score at test 1.

4.3.2 Participants that were not able to undergo the final phase of testing

Three participants were not able to undergo the final testing phase (test 3). The individual reasons for not being able to complete the final phase of testing has been indicated in the individual descriptions in Figures 4.7 – 4.9.

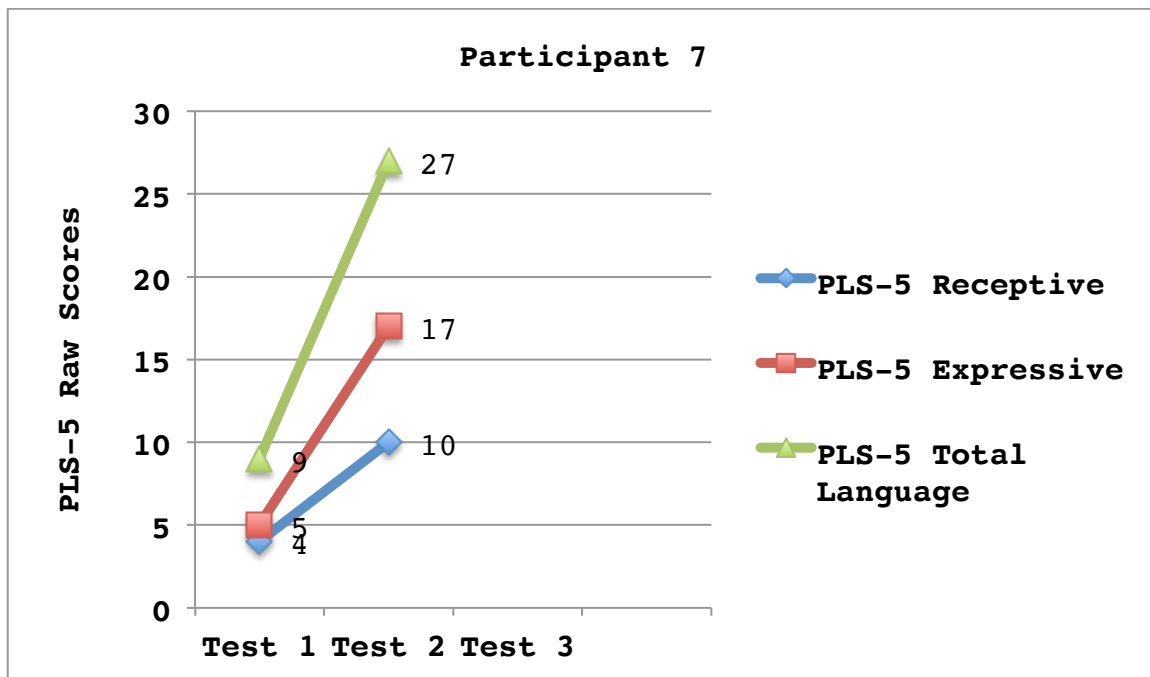


Figure 4.7: Raw scores of PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 for participant 7.

Participant 7 was classified as having a GMFCS level of 4 (has self mobility with limitations and may use a powered mobility device) and a FCCS level of 4 (assistance is required in most situations especially with unfamiliar people and environments). Figure 4.7 indicates an increase in the PLS-5 receptive language score, expressive language score and total language score, therefore indicative of positive change from test 1 to test 2. Due to the participant being hospitalized during the time that the final assessment (test 3) was conducted, the PLS-5 receptive language score, expressive language score and total language score could not be obtained.

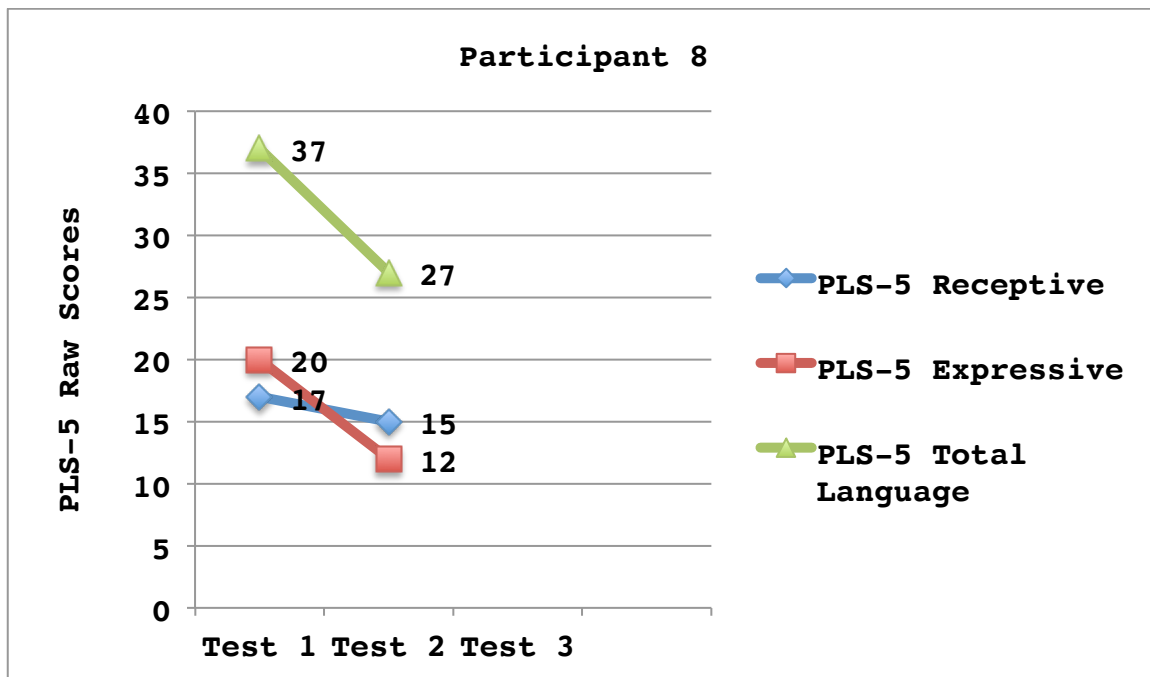


Figure 4.8: Raw scores of PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 for participant 8.

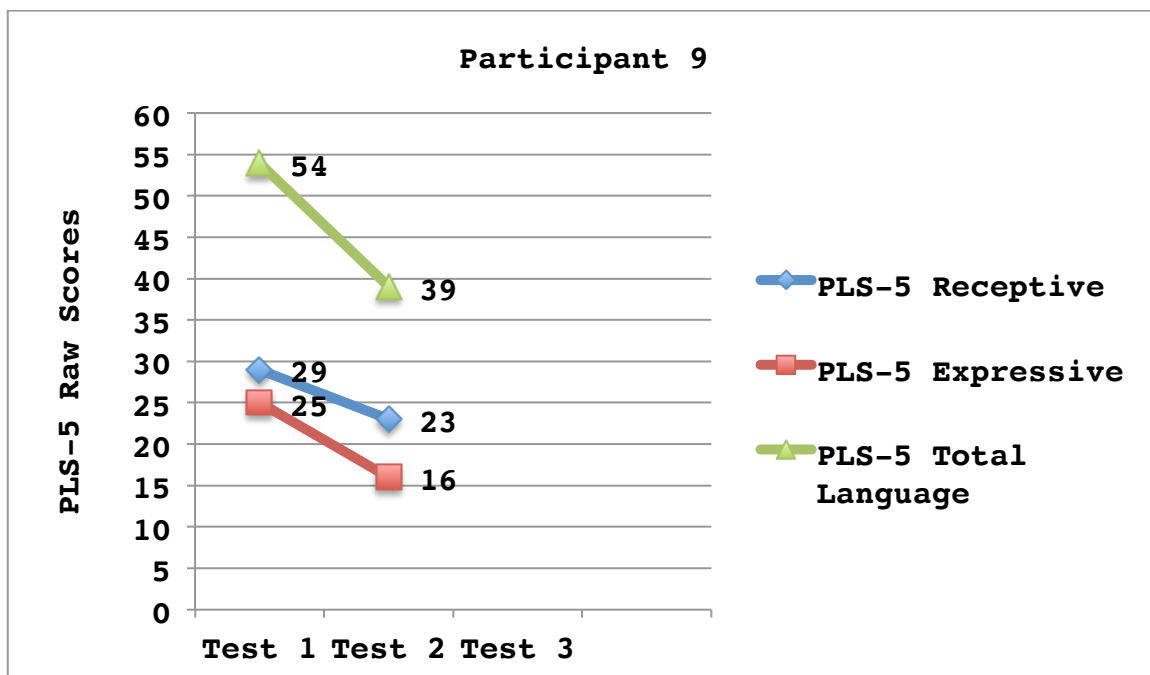


Figure 4.9: Raw scores of PLS-5 receptive, expressive and total language subsections at test 1, test 2 and test 3 for participant 9.

Participant's 8 and 9 were both classified as having a GMFCS level of 4 (has self mobility with limitations and may use a powered mobility device) and a FCCS level of 4

(assistance is required in most situations especially with unfamiliar people and environments). Participant 8 and 9's results were fascinating as they differed to all the other participants. As can be seen in Figure 4.8 and Figure 4.9, participant 8 and 9 experienced a decline in language skills. It was reported by the assessors that the participant's presented with minimal communicative intent on the day of testing. While the minimal communicative intent could have effected the results obtained during test 2, a number of other factors could have played a role in why a decline in language skills occurred. These factors will be discussed and explored in further detail in chapter five as these results are worrisome and unexpected. Participant 8 had left the school before the final assessment (test 3) was conducted. The assessor was unable to travel to the school to complete the final assessment (test 3) for Participant 9. Therefore, the PLS-5 receptive language score, expressive language score and total language score could not be obtained.

In conclusion, the performance of the participants on the PLS-5 indicate a general trend in terms of majority of the samples results being unexpected. While majority of the participants displayed an increase in score from test 1 to test 2; a decrease was seen at the third test. In contrast, one participant did display an increase in communicative abilities from test 1 through to test 3. Two participants displayed a decrease in score from test 1 to test 2 which was an unexpected result. The decline in the PLS-5 scores are of concern and these will be discussed in further detail in chapter five in order to establish an understanding as to why their communication skills had not been retained or improved at the other testing occasions.

4.4 Participants performance on the Communication Matrix

The Communication Matrix was the second measure utilized to assess the change in the use of communicative functions at the pretest, post test and maintenance probe phases. The Communication Matrix is a direct observational tool that is able to assess an individuals communication skills. It is an assessment tool that can be used with individuals who present with any type or degree of disability such as severe and multiple disability, intellectual limitations and sensory or physical impairments (Rowland, 2004). The PLS-5 and the Communication Matrix were administered in the same assessment session. Once the results from the Communication Matrix were obtained, a total score was derived. This total score was calculated based on the level mastery for a communicative skill. The levels of mastery

included ‘Not used’ which indicated a 0 point score, ‘Emerging’ which indicated 1 point score and “Mastered/Surpassed” which indicated a 2 point score. The points were added up in order to obtain a total score, which ranged from 0 to 160. The motivation behind making use of the total score in the results is that it is very sensitive to change over time as it will increase should a skill progress from “not used” to “emerging” or from “emerging” to “mastered” (Rowland, 2004). The total scores at each testing phase were presented in this section. In addition, these values were further analyzed with the use of a non-parametric statistical test namely the Wilcoxon Signed Rank Test.

4.4.1 Change in communication when assessed with the Communication Matrix

Table 4.1

Changes in the Communication Matrix total scores from the pretest, post test and the maintenance probe phases.

Participant	Test 1	Test 2	Test 3
1	97	116	125
2	57	75	108
3	34	44	77
4	91	108	118
5	10	14	24
6	7	12	24
7	11	11	-
8	12	14	-
9	70	85	-

The majority of the participants ($n=6$) displayed a positive change in score from test 1 to test 2 to test 3. Three participants were only assessed at the test 1 and test 2 phases as mentioned previously. One participant did not show an increase or decrease between the test 1 and test 2 phases. Two of the participants displayed a positive change from test 1 to test 2.

The Communication Matrix results indicate that the parent training yielded a positive change in the use of communicative functions. Due to the Communication Matrix not being a standardised test and more of a direct observational tool, it does not place great emphasis on

the use of speech in order for it to be administered therefore being a more appropriate assessment tool for those children who present with minimal communicative utterances and present with FCCS scores of 3 or 4 (Rowland & Fried-Oken, 2010).

4.4.2 Non-parametric analysis of the Communication Matrix results

Table 4.2

Significance of change in the pretest, post test and repeated measures Communication Matrix scores (Wilcoxon Signed Rank Test).

Measure	T1-T2	T2-T3	T1-T3
	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value
Comm. Matrix	0.0078*	0.0313*	0.0313*

**p*-values are significant if $p < 0.05$

*T1=Pretest

*T2=Post test

*T3=Repeated measures

In order to determine if the intervention yielded any change in the use of communicative functions, the Wilcoxon matched-pairs signed rank test was used. This test is used in studies involving repeated measures where the same subjects serve as their own control (Maxwell & Satake, 2006). The *p*-values presented in Table 4.2 display that a significant change in the use of communicative functions was observed between test 1 and test 2. In addition, a significant change can be seen from test 2 to test 3 and from test 1 to test 3. This indicates that the intervention had a positive impact on the use of communicative functions in young children with CP immediately after the intervention had taken place. The improvements in the use of communicative functions had also been retained three months after the intervention had taken place thus suggesting that the intervention was effective in maintaining the improvements. Furthermore, these findings assist in answering the research question regarding the effectiveness that a parent training program can have in improving the use of communicative functions in young children with CP.

There was a trend observed in the progression of results in the Communication Matrix. As discussed in the methodology, the Communication Matrix places focus on communicative functions such as the ability to refuse items that we do not want; to obtain things that we do want; to engage in social interaction; and to provide or seek information. There were eight participants who displayed an improvement in the use of communicative functions from test 1 through to test 3. The participants displayed an improvement in terms of the mastery of the communicative function. The levels of mastery included “Emerging” and “Mastered”.

Participant 1 and 2 displayed an improvement in the communicative behaviours such as refusing, requesting, choice making, answering ‘yes’ or ‘no’ questions, naming objects and commenting. All of these communicative functions progressed from emerging to mastered after the intervention had taken place. These improvements were maintained three months later once the third assessment had taken place. Communicative functions that did not improve with participant 1 and 2 related to asking questions and using polite social forms.

Participant 3 displayed an improvement in the use of requesting attention, greeting, refusing, requesting, choice making, answering ‘yes’ or ‘no’ questions, naming objects and commenting as all of these communicative behaviours progressed from emerging to mastered after the intervention had taken place. Participant 3’s improvements were maintained three months later after the third assessment occurred however, improvements were not observed in the communicative behaviour of offering or sharing an object.

Participant 4 displayed an improvement in the ability to comment, request, reject, display affection, greet people, direct another individuals attention to an activity, use of polite social forms and answering ‘yes’ or ‘no’ questions. These communicative behaviours progressed from emerging to mastered after the intervention had taken place and were maintained three months later.

Participant 5 displayed an improvement in the ability to continue an action, request more of something, attract attention, refusing and rejecting and requesting attention. These communicative behaviours progressed from emerging to surpassed after the intervention had taken place and were maintained three months later however, Participant 5 did not show an improvement in the ability to make choices.

Participant 6 displayed an improvement in the mastery of protesting, continuing an action, obtaining more of something, attracting attention, refusing or rejecting and requesting. Participant 6's improvements were maintained three months later.

Participant 7 did not show any change in the ability to use requesting more, protesting and attracting attention as the score remained the same from test 1 to test 2. A third assessment could not be conducted due to the participant being hospitalized during the third assessment phase.

Participant 8 displayed an improvement in the use of communicative behaviours such as protesting, continuing actions, obtaining more and requesting attention as these progressed from emerging to mastered immediately after the intervention had taken place. A third assessment could not take place as the participant had left the school during the time that the third assessment phase had taken place.

Participant 9 displayed an improvement in the use of requesting more, protesting, continuing actions, obtaining more and gaining attention. These behaviours had progressed from emerging to mastered immediately after the intervention had taken place. Participant's 8 and 9 retained the abovementioned skills three months after the intervention had taken place. Participant 9 did not show an improvement in the ability to show affection, name items and commenting.

It is evident that a trend in improvements in the use of communicative functions such as requesting, gaining attention, obtaining more and rejecting can be seen in the participants performance on the Communication Matrix. Communicative functions that did not show much improvement were choice making, offering or sharing, using polite social norms and asking questions.

4.5 Overall performance of participants on the PLS-5 and the Communication Matrix

In summary, four trends were observed in the results:

- a. One participant displayed an increase in the PLS-5 scores across all testing phases.
- b. The majority of the participants displayed an increase in PLS-5 scores from test 1 to test 2.

- c. The majority of the participants displayed a decrease in the PLS-5 scores from test 2 to test 3.
- d. The majority of the participants displayed an increase in the Communication Matrix scores at all three phases of testing.

When comparing the results from the PLS-5 and the Communication Matrix, the differences in performance highlight the heterogeneity of children who have CP. What was promising to note was that positive change was noted in the majority of the participants in terms of communicative functions. When analysing the results from the two assessment measures it was noted that all the participants ($n=9$) displayed a positive increase in communication from test 1 through to test 3 on the Communication Matrix. However, the performance on the PLS-5 for majority ($n=8$) of the sample was unexpected. The majority of participants ($n=7$) displayed an increase in the PLS-5 score from test 1 to test 2; with one participant displaying a positive change across all three testing occasions on the PLS-5. However, a decrease in the PLS-5 score was seen in majority ($n=5$) of the participants from test 2 to test 3. A decrease in the PLS-5 score from test 1 to test 2 was seen in two participants however, they appeared to be anomalies and the assessor reported that the participants displayed minimal communicative intent and interaction on the day of testing. These results further highlight the importance of observing communication in optimal conditions and on multiple occasions. If a child is unwell or fatigued their results may not be specifically representative of the child's skills or potential. According to Betz, Eickhoff and Sullivan (2013) changes in mood, health or motivation can be linked to minimal interaction during an assessment. Based on these findings, it is evident that there is great variation in scores between the PLS-5 and the Communication Matrix. Based on the results presented above, there appears to be factors that may have contributed to the results including "which measures are appropriate in assessing children with CP?", "which measures are the most sensitive to change and monitor progress appropriately?", "how should intervention be structured so as to ensure positive results?" and "what measures should be put in place to ensure generalizability and carry over of skills?". The trends observed in the data indicate that the participants displayed improved results when assessed with an observational assessment tool as opposed to a standardized assessment tool. The results from the standardized assessment tool indicated poor generalizability and carry over of skills. The use of and appropriateness of using a standardized tool is questioned with children who have CP.

The trends and contributing factors will be addressed and interpreted in further detail in chapter 5.

CHAPTER FIVE

DISCUSSION

In this chapter the results are interpreted and discussed. This chapter commences with the discussion of results obtained at the pretest and post test phases of the study. The data have been interpreted so as to draw upon conclusions regarding the efficacy of a parent-training programme in improving the use of communicative functions in young children with CP. This chapter will also focus on the strengths and limitations of the study as the results are interpreted.

As previously mentioned in Chapter Four, this research study yielded some interesting results. Overall, the majority of the participants displayed some degree of positive change in their communication abilities regardless of whether this change was sustained or not. The rationale for the development of this study was based on the findings by Novak et al. (2013) who determined that there was a predominant lack of evidence for interventions of children with CP. More specifically, the evidence for the effectiveness of parent training and communication training aimed at improving parenting skills to facilitate child development. As discussed in the literature review, research within the South African context is required so as to identify the culturally specific needs of the population. Most of the studies reviewed were conducted in developing countries and employed parent programs that were developed for their specific contexts. South Africa faces challenges in providing culturally specific, cost effective and evidence based intervention for the CP population. This can be attributable to the already mentioned barriers such as the lack of human and financial resources. This research investigated the effectiveness of a chosen intervention program, namely parent training, in improving the communicative abilities of a child with CP.

The results from this study proved that a parent-training program was statistically significant in enhancing the communication functions of almost all of the children with CP as seen on analysis of the results from the Communication Matrix. This reinforces prior research conducted by Jeglinsky, Autti-Ramo and Brogren-Carlberg (2011) who determined that parent involvement in a child's therapy process is vital as it is paramount to achieving generalization of skills and family satisfaction. Furthermore, this confirmed the findings that untrained communication partners showed no change in their child's communication skills; whereas trained partners displayed improved abilities in creating opportunities for

communication (Pennington et al., 2004). In addition, the seminal work conducted by Hanzlik (1989) looked at experimental and control groups of mothers and their children with CP. The intervention included 15 minutes of free play while being recorded along with one hour of verbal instruction from the therapist and a follow-up two weeks later to determine the effects of the intervention (Hanzlik, 1989). It was found that caregivers used less physical guidance and more face-to-face contacts during communication with their children after the parents had undergone parent training (Hanzlik, 1989). Another study by Girolametto, Weitzman, Wiigs and Pearce (1999) found that parents can be used effectively in intervention so as to elicit imitation, expansion, and turn-taking as maternal language input has been found to be effective in facilitating a child's development (Girolametto et al., 1999). Pennington, Thomson, James, Martin and McNally (2009) discovered positive changes in mother-child interaction and pragmatic functions after parent training. The intervention aspect of this study by Pennington et al (2009) comprised of seven to eight 150 minute group sessions and three home visits over the period of 13 weeks. A combination of teaching methods was implemented to provide parents with information along with the use of active learning such as role-play. The current study had a similar structure in terms of the intervention aspect of the study where group sessions were implemented and a variety of methods were used in order to demonstrate techniques and provide information. Given the positive results that were seen with a group workshop method, similar gains in communicative functions were also realized to some degree with the participants in the current study.

The majority of the participants in the current study displayed a steady increase in score from the test 1 to test 2 to test 3 phases when assessed using the Communication Matrix. The positive increase on the Communication Matrix suggests that the caregiver training has the potential to be effective in improving the use of communicative functions in young children with CP. However, the variability in results between the PLS-5 and the Communication Matrix needs to be addressed further in order to investigate the properties and appropriateness in using the Communication Matrix in assessing children with CP. The reasons that individuals communicate, also known as communicative functions, was the main focus of the current study therefore indicating that the Communication Matrix was equipped to assess this area. The participants in the current study were classified at a FCCS level of 3 or 4, which indicates that the use of pre-symbolic communication may be present. The Communication Matrix is able to accommodate individuals who make use of AAC devices and pre-symbolic communication (Rowland, 2004). It is an assessment tool that can be used

with individuals who present with any type or degree of disability such as severe and multiple disability, intellectual limitations and sensory or physical impairments (Rowland, 2004). In review of the properties of the Communication Matrix, it is evident that the assessment tool is able to accommodate and assess children who have CP in the current study. In studies conducted by Rowland and Schweigert (1989, 2000, 2005a and 2005b) it was revealed that the Communication Matrix has proven to be sensitive to change in a child's development.

Pennington and McConachie (1996) conducted a study on training teachers, therapists and classroom assistants on factors that need to be considered when communicating with a person with physical disabilities. While the participants in this study may not have been the children's parents, they still qualified as communication partners. The findings from this study found that there was a positive change in the way the staff facilitated communication with the children after they had attended the workshop.

In a study conducted by Pennington et al. (2009) improvements such as mothers initiating less and producing fewer requests were seen after parent training. Another study conducted by Basil (1992) found that there was an increase in parent responsiveness with regard to communication with their children after parent training had taken place. The study by Basil (1992) was a group study that implemented a family program where family members were instructed to respond to all types of communication that their child produced. After the family program had been implemented, the adult and child responses were measured and increases in parent responsiveness after the program had been completed (Basil, 1992). It was noted from the results from this study that the change in the child's communicative function use was unfortunately often not sustained after the training program had ended. This was seen in five of the children with CP's PLS-5 scores in this research study. Similar trends in terms of poor generalization were observed in a study by McCollum (1984) that found that after parent training, in the form of 10 weekly home visits had taken place, the parent displayed increased imitation of the child's vocalizations and the child also displayed an increase in vocalizations. However, these skills were not maintained after therapy. Therefore it is apparent that the training that is provided to parents needs to be structured in such a way that it ensures sufficient carry over of what has been taught. Factors that can be considered in terms of parent training include; "booster" workshops to ensure that skills are retained and follow ups via telephone or face to face to assist each parent with the individual needs of their child. This suggestion is supported by a study conducted by Gilboa and Roginsky (2010) that

found that a feedback session with the parent in addition to a follow up interview a month after the intervention had taken place, had shown positive results in terms of the child's communication with their parent. However, with the positive improvements noted in parent training, there are limitations in terms of generalization that can accompany this approach. Wulz, Hall and Klein (1983) reported on limitations in that parents need to be on board in terms of implementing the strategies covered in the parent training. The needs of the parents also need to be met in terms of implementing strategies that are not too time consuming and can be integrated within activities of daily living (Wulz et al., 1983). It is however the responsibility of the speech therapist to ensure that the parent is familiar with the goals and how to elicit and create opportunities for communication (Wulz et al., 1983).

Additional efforts to assist parents in maintaining progress may assist in achieving progress as well as maintaining it. The caregiver training in the current study was designed as a once off course with no immediate follow up with the families after the completion of the five week workshop. Factors such as whether the parents continued to work with their children at home after the completion of the parent training could potentially have played a role in the child's progress. A "booster" workshop may have been beneficial before the last assessment to ensure that the parents were coping and implementing what they had been trained on. In a study conducted by Pennington et al (2009) it was found that the success within parent training also relied on the consistent need to create opportunities for communication on and after the parent training had taken place. However, the study by Pennington et al (2009) did not possess enough statistical power in order to investigate the post hoc effects related to change in conversational structure once the parent training had occurred. A possible limitation of this study could be that measures were not put in place in order to ensure that the parents were creating consistent opportunities for communication outside of the workshop environment. Pennington et al (2004) found that parent training has been associated with positive outcomes however, the progress needs to be maintained by consistently working with the child in their everyday environment. Furthermore, the voluntary involvement of the parents in using the home program consistently plays a role in how successful the program will be in yielding change (Tabor, 2011). Additional efforts in ensuring that the parents are aware of the rationale behind the activities and how to implement them can assist in the generalisation of target behaviours (Tabor, 2011).

The improvements in communicative abilities noted in the current study could also be linked to the parent training workshops having addressed other areas of development in addition to communication. These areas included caring for a child with CP, feeding a child with CP and positioning a child with CP. These are all activities that form part of the child's daily routines within a naturalistic setting. In the study conducted by Wulz et al. (1983) it was found that working on children's communicative abilities within situations where the child needs to communicate has been found to assist in developing the spontaneous use of communicative behaviours. In relation to the current study, intervention and how it is structured needs to be relooked when working with children who have CP. A parent training program may show positive results however, as previously mentioned the effects of adding a direct one on one component in conjunction with parent training may be worth looking into. Therapeutic intervention in children with CP needs to result in functional changes in a child's performance and ability to participate in activities of daily living (Palisano & Murr, 2009).

According Palisano and Murr (2009) a distinction between intensity of therapy and practice of activity in natural environments is crucial. Furthermore, this relates back to the amount of time spent by the parent in implementing the training program at home. The parent-training program used in the current study encouraged the parents to make use of these strategies in everyday situations. However, more emphasis could be placed on the 'dosage' of intervention provided by parents outside of the training environment. For example, it may be worth including a 'how often should I implement intervention at home' component to the workshops in addition to establishing an understanding that the strategies need to be practiced occasionally in order to see results and the generalization of skills. Palisano and Murr (2009) were able to find evidence for the effectiveness of direct speech therapy in addition to details regarding the frequency and intensity of therapy that is recommended in order to see change. However, little research has been conducted in order to establish a standard dosage in terms of frequency and intensity of parent training and implementation of parent directed therapy in the home environment (Pennington et al., 2004).

The sample group in the current study was heterogeneous in nature therefore each child did present with unique abilities. A workshop appeared to be a useful platform to address the general difficulties that children with CP experience however, it may be of benefit to have an individual follow-up session with each parent so as to ensure that their needs are also met at an individual level. In a study conducted by Pennington et al. (2009) the

use of direct therapy in conjunction with parent training yielded positive results in terms of the effectiveness of speech therapy for children with CP. While the effectiveness of individual therapy for children with CP was not the focus of this research, parent training may be an effective adjunct to individual therapy. As stated in the study by Pennington et al. (2009) there is a need for further research in determining the effects of direct therapy in conjunction with parent training, as these studies carry methodological flaws and a number of variables that can not be controlled for. Baxendale and Hesketh (2003) explored the effectiveness of the Hanen Parent Program versus traditional clinical therapy. The findings from the Baxendale and Hesketh (2003) study found that over a 12-month period, the Hanen Parent Program yielded better results in communication as opposed to traditional clinical therapy. In a study conducted by Pennington et al. (2009) it was found that children produced more requests and provisions of information, after parent training had taken place. Similarly, it was found in this research that the children with CP displayed an improvement in communicative functions such as requesting and gaining attention. In a historical study conducted by Wulz, Hall and Klein (1983) it was found that parental training in conjunction with individual therapy encouraged children to use targeted behaviours within their natural environments. Furthermore, it was found that the training of children throughout daily routines provided the parent with the opportunity to elicit functional communication from the child (Wulz et al., 1983). The study by Wulz et al. (1983) further revealed that educating parents on strategies has been associated with an increased frequency of verbalizations, increased use of target utterances and engagement and responsiveness in target tasks. What was noted from the results of the current study was that the children displayed improved communicative abilities immediately after the training had taken place which supports the effectiveness of parent training in improving a child with CP's communication skills. The communication component of intervention should focus on empowering parents with the ability to effectively manipulate the environment so as to create a conducive and stimulating setting for learning (Kaiser & Trent, 2007). When the environment is optimal for learning, it has been found that children are able to increase their ability to communicate effectively (Kaiser & Trent, 2007). It was found in the current study that communicative abilities improved immediately after the parent training had taken place however, measures to ensure that these attempts in ensuring that stimulating environments were created within the home environment months after the intervention had taken place may need to be prioritized. This could be incorporated into the follow up sessions with the parents to ensure that they are

supported not only at the time of the parent training however, after the parent training had taken place.

One of the findings from the current study was also that the child's initial GMFCS and FCCS level appeared to influence the effectiveness of the parent training. In the case of the current study, participant 1 presented with a level 3 on the GMFCS and the FCCS thus indicating the ability to walk using a handheld mobility device and being an effective communicator in most situations. The GMFCS level could be linked to the positive results displayed by participant 1. According to Workinger (2005) children with CP who have limited mobility will not necessarily be able to access their immediate environment. In addition, it is important to make sure that language stimulation incorporates experiences that a child will not be able to learn through exploring the environment by themselves or by interacting with other people in their environment (Workinger, 2005). Due to participant 1 having some form of mobility and access to the environment, this could have contributed to the positive increase in results seen in the PLS-5 scores. Positioning was also covered in the intervention phase which equipped the caregiver with the ability to assist the child in accessing the environment in a more effective way so as to be able to engage and interact in their everyday surroundings and activities of daily living. The access to the environment in addition to the parent creating a stimulating environment with opportunities for communication may have played a role in why this particular participant displayed an increase throughout all three testing occasions. In addition, the FCCS level could also be linked to the positive results displayed by participant 1. Participant 1 was classified as a level 3 on the FCCS indicating that the child was an effective communicator in most situations and had some form of communicative intent at the time of the baseline assessment. Due to participant 1 already having some form of communicative skills, this served as a positive factor for prognosis. It should be noted that the GMFCS and FCCS were used to determine inclusion in the study and not used to measure change in the child's communicative and gross motor abilities.

In this research study, communicative change was assessed by two assessment measures that differed considerably in administration and skill assessment. The results from these assessment measures was interesting and unexpected. These differing findings highlighted that perhaps the way in which communication is assessed in children with CP needs to be reviewed. As highlighted by previous studies Hansson and Nettelbladt (2007) and

Watson and Pennington (2015), there is a dire need for a standardized assessment that can effectively assess communication in children with CP. Many adaptations need to be made when using standardized tests that are normed on the broader population (Watson & Pennington, 2015). However, these adaptations alter the normative data set out by the assessment thus impacting the accuracy of the assessment. The structure and appropriateness of the PLS-5 is worth looking into, as the results obtained from the PLS-5 in the current study were mostly unexpected. The challenges with the use of a structured standardized assessment show that it can be very 'rigid' in its design. Furthermore, standardized tests can place emphasis on the use of speech in order for them to be accurately administered (Rowland & Fried-Oken, 2010).

In the case of the current study, the PLS-5 did require a verbal response to stimuli in order to administer the expressive communication subtest (Zimmerman et al., 2011). The participants within this study were required to have some form of communicative intent in order to be included in the sample however; it was not always the case that the participants would solely make use of verbal communication. The participants within this study would make use of a variety of forms of communication such as gesture and verbal communication. Modifications were implemented so as to accommodate the child within the expressive component of the PLS-5 however; this did put the reliability of the results at risk as it may have invalidated the normative data. In addition, it should be noted that the standardization sample of the PLS-5 required the test to be administered with no modifications (Zimmerman et al., 2011). However, when working with children who have CP, adaptations and modifications often need to be made to accommodate this specific population (Watson & Pennington, 2015). The need for adaptations and modifications are due to the fact that children who have CP are a vulnerable group who present with delays in other areas of development (e.g. speech, language, hearing loss and motor) (Workinger, 2005). The participants in the current study required adaptations and modifications in order to accommodate their specific needs so as to manipulate an object and indicate which item they have chosen. The adaptations that were implemented in the current study were similar to those described by Zimmerman et al (2011) which included accommodating the physical impairments by stabilizing the child's arm in order to point to a picture or object and placing the picture manual flat on the table in order for the child to move their arm across the table in order to indicate their response. Additional modifications that were similar to those of Zimmerman et al (2013) included giving the child an increased response time when

completing an item on the test. It was found that this was mostly required within the standardized assessment component of the assessment battery. Similar to the findings of Downing, Hanreddy and Peckham-Hardin (2015) it was evident in the current study, that the children with CP did not display promising results on the standardized component of the assessment battery. The reason associated with the poor performance on standardized tests is that these tests have been designed upon a developmental framework, this essentially means that it is used to establish where the student is performing along the developmental hierarchy (Downing et al., 2015). Such as in the case of the current study, it was seen that the children did not display gains in their communicative abilities when assessed with a standardized test such as the PLS-5. Similar to the structure of the PLS-5, challenges faced with standardized testing are that the test items are direct questions that are asked out of context, which is in agreement with the findings of Downing et al (2015). Children with disabilities often require contextual cues and therefore a child may not understand the request or be motivated to demonstrate the required skill (Downing et al., 2015). Due to the assessments in the current study being conducted in a quiet room in a one on one setting, the contextual cues that are required for a child to display improved performance on a standardized test was not met which may have impacted their scores. The population in the current study presented with communication, cognitive and/or physical disabilities and therefore it was evident that there were challenges experienced when it came to accommodations during the use of a standardized test. These findings were in agreement with the findings from Downing et al (2015) which found similar challenges in the use of standardized assessments with children who present with communication, cognitive and/or physical impairments. In the case of the current study, it was found that participant's presented with expressive language difficulties and physical impairments which made it challenging for them to participate in aspects such as providing a verbal response or pointing to test stimuli that was required in the standardized component of the assessment battery. Therefore, based on the findings of the current study it was questioned as to whether these standardized tests were sensitive in detecting what a child is able to do in a different and more natural environment. The questions around the sensitivity of standardized assessments with this specific population were in agreement with those findings of Downing et al (2015). The majority of the sample in the current study comprised of children who speak English as their second language however, their Language of Learning and Teaching (LoLT) is English. The children's exposure to the English language was not formally investigated however; the duration of their school day is about 5-6 hours per day. The rest of the day would be spent with a parent or caregiver and thus possibly exposed to

another language that is not English. The standardization sample of the PLS-5 required English to be the primary language for all subjects (Zimmerman et al., 2011). While making use of a translator to assist in overcoming the language barrier, this may have further invalidated the norms and the test items of the PLS-5. The test items in the expressive component of the PLS-5 do require the participant to provide a verbal response which puts the child at a disadvantage should English not be their primary language. In order to account for the use of a United States normed assessment tool within the South African context, it should be noted that communicative functions are not language specific as they are the precursors to language development and therefore should be universal and not specific to one population (ICDL-DMIC, 2005).

While the Communication Matrix may have provided details regarding the performance of the child during interaction, thus mimicking more of a naturalistic environment, the PLS-5 is structured in a way that it asks direct questions. In support of the difficulties that children with disabilities experience in completing standardized tests, the current study found that children with CP could be inconsistent in their performance on these tests. The trends identified in the bank of literature on the use of standardized testing in children with CP, indicate that these tests are not deemed appropriate for this population. However, the PLS-5 was selected on the basis that it was deemed appropriate to use with the special needs population as adaptations and modifications were allowed to be implemented (Zimmerman et al., 2011). When the results and trends in the performance on the PLS-5 of the current study were analyzed, it was found that the performance on the PLS-5 was not favourable thus questioning as to whether it is able to accurately measure the communication abilities of children with CP.

The challenges associated with standardized tests and their ability to accurately depict a child's abilities as identified in the current study, are questionable and therefore could account for why the PLS-5 results dropped at the maintenance probe phase of testing. As previously discussed, a number of factors could have played a role in why the scores dropped at the last phase of testing however, it is evident that the use of a standardized test may not be appropriate in accurately determining the baseline performance and more so the follow up assessments to measure any change.

Finally, standardized assessments are unable to provide the intervention team with practical information required to plan the way forward in terms of goals for intervention

(Downing et al., 2015). However, should the need arise to make use of a standardized assessment, it is recommended that additional assessments that are based on the ecological model be implemented so as to acquire a complete picture of the child's communicative strengths and weaknesses (Downing et al., 2015). The ecological model involves making use of observational techniques to determine the skill demands of the child's natural environment and ascertain how the student performs within these environments (Downing et al., 2015). The current study made use of an observational tool to supplement the standardized scores and as seen on the analysis of the results, the observational tool was able to provide a more complete picture of the child's abilities. The Communication Matrix presents with properties that assist in determining the child's skill demands within a natural environment thus motivating the need for an observational tool in conjunction with a standardized test in order to arrive at a more robust picture of the child's communicative abilities. This could possibly account for why the participants displayed improved results on the Communication Matrix as it was able to appropriately assess the participant's communicative abilities within meaningful situations. The ecological model places emphasis on investigating what the child's needs and wants are that he or she wants to communicate, where the communication will take place and with whom the child will need to communicate with (Downing et al., 2015). Observational techniques allow for a more comprehensive and specific estimate of the child's given abilities in addition to identifying those skills that require remediation (Downing et al., 2015). While an observational tool cannot provide the assessor with a cognitive or mental age, it is able to provide valuable information with regard to how the child typically performs and how he or she is expected to perform (Downing et al., 2015).

According to Ogletree, Bruce, Finch, Fahey and McLean (2011) an assessment based on observational techniques is said to motivate the child to communicate, as they understand the reason and purpose for communicating in a familiar and typical situation. Within the current study it was found that when a child was presented with the opportunity to display the communicative function of requesting, the reason behind the need to communicate was due to the child wanting a desired object. This would therefore motivate and encourage them to communicate more readily as they showed some awareness of the reason to communicate. According to Beukelman and Mirenda (2013) it was found that the benefits associated with employing the principles of an ecological assessment is that it assists in developing an appropriate intervention plan. The assessment is able to provide information regarding the specific needs and desires of the child as they perform meaningful activities (Downing et al.,

2015). Given the characteristics of children who have CP and their communicative abilities, a standardized assessment such as the PLS-5 may not necessarily be the most sensitive or accurate in assessing these children. For the most part, it should not be used in isolation as the added benefit of an observational tool such as the Communication Matrix can assist in providing a more “complete picture” of the child’s abilities. In addition, measures to implement the maintenance of skills with additional workshops may have allowed the carry over of skills and maintenance thereof to be seen at the time of the second assessment phase which took place after the month long school holiday.

In review of the findings of the current study, a proposed model of considerations for the assessment and intervention of children with CP has been developed. Based on the discussed challenges faced in the assessment and intervention phases of the current study, these considerations may be implemented in assisting a therapist with the structuring of an assessment and determining the way forward in terms of intervention. The considerations for the assessment and intervention of children who have CP have been outlined in Figure 5.1 and Figure 5.2 below.

Assessment:

- Standardized assessments should be used in conjunction with an observational tool.



- The use of a standardized assessment within an assessment battery allows for a more comprehensive understanding of a child's language abilities. In addition, the use of an observational tool allows for a socio-pragmatic approach to be utilized in order to place emphasis on the functional uses of communication in a social world.
- The value in assessing functional communication allows for an understanding as to whether the child is able to effectively convey or communicate his/her everyday needs, wants, feelings and preferences within a natural setting.
- Adaptations and modifications need to be considered when making use of a standardized test however, standardized norms can not be used should adaptations and modifications be needed.
- Enough time must have elapsed in order for sufficient change to be seen before a reassessment takes place.
- The assessment needs to be dynamic in nature and should take place on more than one occasion and in various naturalistic settings.

Figure 5.1 Considerations for the assessment of children who have CP.

Intervention:

- Parent training workshops focusing on various topics (e.g. communication, positioning, feeding and caring for a child with CP).
- The communication aspect of the intervention should not focus primarily on linguistic accuracy however, functional communication skills should be prioritised with children who have CP.
- Use of a variety of modalities in the presentation of the workshops (e.g. powerpoint presentations, pamphlets and practical demonstrations)
- Addressing the importance of implementing the techniques consistently and practicing them across a number of daily activities.
- Individualized follow-up consultations to ensure individual needs are addressed and to assist in the carry over of skills.
- Monitoring progress throughout the intervention process by performing reassessments of the child's communicative abilities.

Figure 5.2 Considerations for the intervention of children who have CP.

The applicability of the results of this study to the South African context need to be addressed in order to inform the way forward for the provision of services of children with CP. The findings in terms of the assessment component of this study raise questions as to what assessment methods are appropriate in children with CP in the South African context. The use of standardized assessments that have not been normed on the South African population have carried much controversy in terms of the cultural sensitivity of their results (Mdlalo, Flack & Joubert, 2016). Within this current study it was found that the gains in communication skills were not reflected in the results of the standardized assessment however, the gains were more evident in the results obtained on the observational tool. These findings are in support of the need for the use of an informal observational component in the assessment battery so as to bypass the aspects that are not culturally sensitive to the South African context. Specifically within the current study, it was possible to include an observational tool that focused on the use of communicative functions that are not language

specific as they are the precursors to language development and therefore should be universal and not specific to one population (ICDL-DMIC, 2005). The intervention aspect of this study addressed a number of relevant key aspects for the caregivers of children who have CP. The understanding of what CP is relevant as cultural beliefs within the South African context may have a negative impact on the timely identification and implementation of intervention services for a child with a disability (Masasa et al., 2013). Furthermore, the need for the training of caregivers based on the community based rehabilitation model is of relevance within the South African context so as to educate and access those caregivers who may not have access to individual therapy services or any therapy services at all. Furthermore, speech therapists are experiencing high caseload volumes within the South African government sector due to staff shortages and lack of resources (Strasheim, Kritzinger & Louw, 2011). The high caseload volumes thus prevent children with CP and their parents from receiving therapeutic services (McLaren, 2014). The community based rehabilitation model may be the answer to improving access to allied healthcare services. A larger group of individuals can be reached when intervention is provided in the form of group trainings (McLaren, 2014). Based on the results from the current study and previous studies conducted by McCollum (1984); Basil (1992) and Baxendale and Hesketh (2003) a group training model with one on one follow up sessions may be a more effective form of therapy and yield greater gains in communication skills as opposed to irregular one on one therapy.

This chapter focused on the interpretation of the results presented in chapter 4. The implementation of the caregiver programme may have played a role in terms of generalization and maintenance of skills. It may have been beneficial to arrange follow up workshops so as to ensure the retention of skills taught at the initial parent training. The limitations of using a standardized test with children who have CP needs to be taken into consideration as there is literature in support of these limitations (Watson & Pennington, 2015). There is a need to develop a standardized test specific to the population as studies have shown that current tests are not consistent in diagnosing communication disorders (Dollaghan & Horner, 2011). The Communication Matrix possesses the ability to bridge the gap in terms of assessment by offering an observational and informal component, which is often missing in standardized assessments (Rowland, 2012).

CHAPTER SIX

CONCLUSION

In this chapter the conclusions are presented according to the aims of the study. This is followed by a discussion of the implications of the findings of this research and the recommendations for future research and clinical practice. A discussion of the strengths and limitations of the study in addition to the final comments are covered in this chapter.

The main aim of the study was to evaluate whether the use of a parent-training program would have any effect on the use of communicative functions in children with CP. Overall, the results were indicative of some degree of improvement in the participant's use of communicative functions. Furthermore, the results of this study provide experimental evidence in support of the efficacy of parent training in improving the use of communicative functions of children with CP (Wulz et al., 1983; Hesketh, 2003; Pennington et al., 2009). Findings from the current study found that the use of parent training to improve the use of communicative functions in children with CP led not only to positive change directly after the treatment phase however, these improvements were maintained to some degree after the five week parent training had taken place. As highlighted previously, the results from the Communication Matrix displayed promising results in terms of improvements seen immediately after the intervention had taken place and maintained three months later. The overall performance on the PLS-5 had indicated an improvement immediately after the intervention phase however these improvements were not maintained three months later.

An important finding from this research is the discrepancy in results between the Communication Matrix and the PLS-5 results. This discrepancy created a platform for a discussion around the topics of "how children with CP should be assessed" in addition to "how therapy should be provided so as to achieve the optimal level of effectiveness". As discussed in chapter 5, the way that children with CP are being assessed may need to be reviewed as standardized assessments may not have the sensitivity required to accurately assess a child with CP (Downing et al., 2015). Furthermore, an observational component to the assessment battery appeared beneficial due to its sensitivity proving more appropriate for this specific population. This is further supported by previous studies conducted by Downing et al. (2015) that found that assessments that include observational techniques allow for a more holistic view of the child's abilities. The discussion around as to how therapy should be

structured concluded that group training in addition to follow up sessions might be more effective and yield greater gains in therapy. This recommendation is supported by previous studies conducted by McCollum (1984); Basil (1992) and Baxendale and Hesketh (2003) that found a group training model with one on one follow up sessions may be a more effective form of therapy.

In terms of recommendations for further research, a more rigorous research design with multiple baselines would be recommended. In addition, a large sample size could not be attained in the present study due to some parents not being able to attend the workshops and children either having left the school or were hospitalized. The small sample size results in poor generalizability of results. It would be recommended that in future research a larger sample size be attained so as to gain greater generalizability of results. Furthermore, due to the heterogeneous nature of CP, a control group was not included in this study. The challenges associated with not having a control group create difficulties in controlling for other variables such as maturation. Therefore, it is recommended that future research implement a control group in order to compare intervention effects in addition to time effects.

It is recommended that the assessments be scheduled in such a way that the results are not effected by factors such as lengthy school holidays. In the case of the current study, the last assessment did take place a month after the school holidays which could have impacted the child's performance at the last assessment due to not having been exposed to their usual routine and structured classroom environment. It may be worth considering the possibility that the participants could have possibly retained the skills should they have had the opportunity to be assessed before the holiday break.

The current study made use of different assessors (raters) at each assessment phase in order to account for blinding however, the risk involved in this is that there is variability among human observers. Rater training was however implemented in the current study in order to reduce the amount of variability in the assessments. The criteria that can be put in place in future studies in order to determine if the rater has been well trained include; stable rating throughout the rating process and the ratings should indicate the relative difficulties of the test items (Barrett, 2001). The value in ensuring interrater reliability is that it assists in determining the extent to which the data is a correct representation of the variables measured (McHugh, 2012). Due to the time constraints of this study, more comprehensive interrater

reliability measures were not able to be conducted. It is therefore recommended that in future research, the study be replicated with an interrater component.

Future studies should replicate this study in the other South African provinces so as to account for a larger demographic and provide context specific data. These studies could attempt to make use of larger sample sizes and create a base of information that could be extrapolated across different contexts and allow for the results to be more generalizable. Future studies could also be done on other comorbid disabilities within the South African context so as to further investigate the effectiveness of parent training. Future research could also look at the effects of parent training versus direct therapy in improving the use of communicative functions.

In conclusion, the trends observed in the data indicate that the participants displayed improved results when assessed with an observational assessment tool as opposed to a standardized assessment tool. The results from the standardized assessment tool indicated poor generalizability and carry over of skills. The use of and appropriateness of using a standardized tool is questioned with the CP population based on the findings of the current research. Furthermore, an observational component to the assessment battery appeared beneficial due to its sensitivity proving more appropriate for this specific population. This is further supported by previous studies conducted by Downing et al. (2015) that found that assessments that include observational techniques allow for a more holistic view of the child's abilities.

The findings of the current study indicate that there is evidence for the effectiveness of parent training as an intervention for children with CP. However, these findings indicate the need for further research in the field of effective speech therapy interventions for children with CP (Novak et al., 2013). More specifically, the need for further context specific research is warranted so as to further inform the methods of assessment and intervention used by allied healthcare services with individuals who present with CP.

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APPENDIX A – TURNITIN REPORT

4/25/2017

Turnitin

Turnitin Originality Report		Document Viewer				
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APPENDIX B - ETHICS CLEARANCE CERTIFICATE



Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

R14/49 Venter

CLEARANCE CERTIFICATE

PROTOCOL NUMBER: H15/09/44

PROJECT TITLE

Effectiveness of a caregiver training program on the use of communicative functions in young children with cerebral palsy

INVESTIGATOR(S)

Ms M Venter

SCHOOL/DEPARTMENT

Human & Community Development/

DATE CONSIDERED

18 September 2015

DECISION OF THE COMMITTEE

Approved unconditionally
This protocol has been approved by the HREC (Medical) Sub-Committee

EXPIRY DATE

26 November 2018

DATE

27 November 2015

CHAIRPERSON


(Professor J Knight)

cc: Supervisor : Ms A Fourie

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature _____

Date / /

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX C – PERMISSION LETTER FROM SUNSHINE ASSOCIATION



16 November 2015

Re: Research on the Effectiveness of a caregiver training program on the use of communicative functions in children with Cerebral Palsy

To whom it may concern

Miss Marissa Venter has been given permission to conduct research with the children and the parents/caregivers of the children at the Sunshine Association Craighall & Eldorado Park Early Intervention Centres.

Miss Venter has been informed that all information provided to her is to be kept strictly confidential and that contact information of the parents of the children with Cerebral Palsy is not to be shared (in any form).

Data for analysis is to be stored (by Miss Venter) in a manner that will not allow access to identifying or confidential information.

Parents will first be contacted by the Sunshine Association Craighall & Eldorado Park Early Intervention Centres to determine if they consent to their child and themselves participating in the research project. Contact information for those parents agreeing to participate will be provided to the researcher.

It is understood that Miss Venter is applying for ethical clearance relating to the aims of her particular study.

Regards

Shannon O'Keefe
General Manager
0839730422
craighall@sunshine.org.za

supporting and strengthening families and communities of children with special needs



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NPO Number: 009 281 NPO • Fundraising Number: 01 100135 0009 • PBO: RG/0225/08/04

APPENDIX D- INFORMATION LETTER



SPEECH PATHOLOGY & AUDIOLOGY
THE SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT (SHCD)



Study title: EFFECTIVENESS OF A CAREGIVER TRAINING PROGRAM ON THE USE OF COMMUNICATIVE FUNCTIONS IN CHILDREN WITH CEREBRAL PALSY

Dear parent/caregiver

My name is Marissa Venter. I am doing research on the effectiveness of caregiver training on communication abilities in children with Cerebral Palsy (CP). Research is just the process to learn the answer to a question. In this study we want to learn if caregiver training can improve a child with CP's ability to communicate.

We are inviting you and your child to take part in a research study. There are two parts to this research, a parent training program and three evaluations of your child's communication abilities. The parent training will occur on six consecutive Saturday mornings, we require you to attend all six sessions in order for you and your child to participate in the study. You will be remunerated for your travel to the workshop venue.

Before the training starts your child will be assessed in terms of his/her communicative abilities. After the five week training your child will be evaluated on two more occasions (an assessment will take place after the caregiver workshops and then another assessment will take place three months later) to see whether there has been any change in his/her communication abilities.

There are no risks to you or your child in order to be involved in this study. With regard to the workshops, you are under no obligation to continue with the research process if you decide you want to terminate your participation. Your decision in this regard will be respected without any negative consequences.

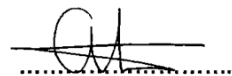
Confidentiality will be maintained throughout the research process and your identity will not be revealed to other parties. All information will be secure within the Department of Speech Pathology and Audiology (University of the Witwatersrand). The data will also be kept for five years and thereafter it will be destroyed. Permission to conduct the interviews will be obtained from you as the parents and you will not be negatively affected if you decline to participate.

For further information or the reporting of study related adverse events you are welcome to contact Marissa Venter on 082 343 9100 or my supervisor, Andrea Fourie at Tel: 011 717 4584 or andrea.fourie@wits.ac.za.

Should you have any questions or concerns on your rights as a research participant or require any additional information you are welcome to contact the secretary of the Non-Medical Ethics Committee at the University of the Witwatersrand, Lucille Mooragan on 011 717 1408 or e-mail: Lucille.Mooragan@wits.ac.za.

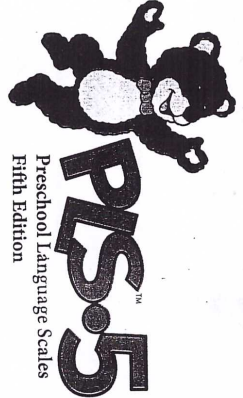
Sincerely


.....
Marissa Venter


.....
Andrea Fourie

APPENDIX E – ASSESSMENT PROTOCOL

Preschool Language Scales, Fifth Edition (PLS-5)



Record Form

Test Date	Year	Month	Day
Birth Date			
Chronological Age			

Score Summary			
	150		
+3SD	145		
	140		
	135		
+2SD	130		
	125		
	120		
+1SD	115		
	110		
	105		
Mean	100		
	95		
	90		
-1SD	85		
	80		
	75		
-2SD	70		
	65		
	60		
-3SD	55		
	50		

Child's Name: _____ Address: _____

Age: _____ Sex: _____ Grade: _____ School: _____

Examiner: _____ Teacher: _____

Raw Score Calculation			Norm-Referenced Scores			
Auditory Comprehension	Last AC item administered		Standard Score (SS)	SS Confidence Interval (% level)	Percentile Rank (PR)	PRs for SS Confidence Interval Values
	Minus (-) number of 0 scores	-				
AC Raw Score				to		to
Expressive Communication	Last EC item administered		EC Raw Score	Minus (-) number of 0 scores		
	Minus (-) number of 0 scores	-				
AC Standard Score				to		to
Plus (+) EC Standard Score		+		to		to
Standard Score Total				to		to
AC Raw Score + EC Raw Score						

Discrepancy Comparison	AC Standard Score	-	EC Standard Score	=	Difference	Critical Value	Significant Difference (Y or N)	Probability of Significant Difference
							Y or N	.15 / .05

**See Table D.1 in the Administration and Scoring Manual to determine if the difference between AC and EC scores is significant.

Supplemental Measures		Growth Scale Values (GSV)			
Articulation Screener Raw Score		Date: / /	Date: / /	Date: / /	Date: / /
☐ Typical		AC	EC	AC	EC
☐ Further evaluation indicated		1st administration	2nd administration	3rd administration	4th administration
☐ Further evaluation strongly indicated					
Language Sample Checklist		Notes:			
☐ Reinforces PLS-5 results					
☐ Differs greatly from PLS-5 results					
Home Communication Questionnaire					
☐ Reinforces PLS-5 results					
☐ Differs greatly from PLS-5 results					

General Directions

Suggested Start Point: Start at the  corresponding to the child's chronological age.

Basal: Three consecutive scores of 1. Reverse to the previous age start point until 3 consecutive scores of 1 are achieved. Continue testing from this point forward.

Ceiling: 6 consecutive scores of 0.

Scoring: Record a response for each part of the item. (+) = Correct; (-) = Incorrect. For each item, add the number of correct responses and compare to the pass criteria. Then, circle the appropriate score (1 or 0) in the score area. For ACI-19, EC1-25, and EC27, circle the method(s) of assessment used to score the item: CR (Caregiver Report), O (Observation) and/or E (Elicitation). See the Administration and Scoring Manual for detailed scoring and recording information.

Auditory Comprehension

Score

Developmental Tasks for Ages 0:0-0:2

Start: Ages 0:0-0:2 and 0:3-0:5

1. Glances momentarily at a person who talks to him or her

Materials: none

Score: 1 = Glances at the speaker for one second

2. Enjoys caregiver's attention

Materials: none

Score: 1 = Smiles, coos, relaxes

3. Reacts to sounds other than voices in the environment

Materials: loud squeaky toy

Score: 1 = Reacts to the sound (startles, eyes open wide, etc.)

CR 0 E 1 0

CR 0 E 1 0

CR 0 E 1 0

Expressive Communication

Score

Developmental Tasks for Ages 0:0-0:2

Start: Ages 0:0-0:2 and 0:3-0:5

1. Has a suck/swallow reflex

Materials: bottle and nipple or pacifier provided by caregiver

Score: 1 = Has coordinated suck/swallow sequence; no coughing/choking/spilling

2. Vocalizes soft, throaty sounds

Materials: none

Score: 1 = Makes soft, throaty, gurgling sounds

3. Varies pitch, length, or volume of cries

Materials: none

Score: 1 = Vocalizes or cries with varying pitch, duration, or volume

CR 0 E 1 0

CR 0 E 1 0

CR 0 E 1 0

Developmental Tasks for Ages 0:3-0:5

4. Turns head to locate the source of sound

Materials: loud squeaky toy

Score: 1 = Turns head to locate the sound

5. Responds to a new sound

Materials: sheet of paper, keys on a key ring

Score: 1 = Blinks, startles, or searches for the new sound

CR 0 E 1 0

CR 0 E 1 0

Start: Ages 0:6-0:8 and 0:9-0:11

4. Responds to speaker by smiling

Materials: none

Score: 1 = Smiles in response to speaker leaning toward, holding or talking to him or her

5. Vocalizes pleasure and displeasure sounds

Materials: infant toys provided by the caregiver

Score: 1 = Two correct (1 pleasure sound and 1 displeasure sound)

CR 0 E 1 0

CR 0 E 1 0

 Start: Ages 0:6-0:8 and 0:9-0:11

6. Actively searches to find a person who is talking

CR 0 E 1 0

Materials: none

Score: 1 = Looks from face to face or turns head to find the voice

7. Mouths objects

CR 0 E 1 0

Materials: rattle, loud squeaky toy

Score: 1 = Takes the toy or rattle and mouths it

Developmental Tasks for Ages 0:6-0:8

8. Shakes and bangs objects in play

CR 0 E 1 0

Materials: rattle, spoon, keys on a key ring, bowl, infant toy

Score: 1 = Shakes or bangs one or more objects

9. Anticipates what will happen next

CR 0 E 1 0

Materials: none

Score: 1 = Laughs, closes eyes, tenses body, etc. in anticipation

10. Looks for object that has fallen out of sight

CR 0 E 1 0

Materials: toys or objects the child has previously shown an interest in (e.g., rattle, loud squeaky toy)

Show the child the toy/object and say, *Oops!* while dropping it, so the child has to look for it.

Score: 1 = Looks for dropped or fallen object

Developmental Tasks for Ages 0:9-0:11

11. Understands what you want when you extend your hands and say, *Come here*

CR 0 E 1 0

Materials: none

Hold out your hands, palms up, and say, *Come here.*

Score: 1 = Responds by moving forward into your arms or clinging to the caregiver

6. Vocalizes when talked to, moving arms and legs during vocalizations

CR 0 E 1 0

Materials: none

Score: 1 = Vocalizations paired with arm flapping, leg churning, or other involuntary arm and leg movements

7. Protests by gesturing or vocalizing

CR 0 E 1 0

Materials: toy of interest to child

Child's behavior: _____

Score: 1 = One example of protesting behavior or vocalization

8. Attempts to initiate facial expressions and movements

CR 0 E 1 0

Materials: none

Score: 1 = Attempts to move face or tongue in response to caregiver's facial expressions and movements

Auditory Comprehension

Start: Ages 1:0-1:5

Score

12. Interrupts activity when you call his or her name

Materials: toys or objects that the child has previously shown an interest in (e.g., rattle, loud squeaky toy)

Score: 1 = Stops playing and looks or moves toward the person who called his or her name

CR 0 E 1 0

Expressive Communication

Start: Ages 1:0-1:5

Score

9. Seeks attention from others

Materials: none

Child's behavior: _____

Score: 1 = Acts to gain or maintain attention

CR 0 E 1 0

10. Vocalizes two different vowel sounds

Materials: toy of interest to child

Vowels the child produced: _____

Score: 1 = Produces two different vowel sounds

CR 0 E 1 0

11. Combines sounds

Materials: infant toys (e.g., ball, bubbles)

Sound combinations the child produced: _____

Score: 1 = Produces a sound combination or syllable (V-V, C-V, or V-C)

CR 0 E 1 0

Developmental Tasks for Ages 1:0-1:5

13. Looks at objects or people the caregiver points to and names

Materials: toys or objects that the child has previously shown an interest in (e.g., rattle, loud squeaky toy)

Ask the caregiver to point to an object or family member and say, Look at _____ (name of the object or person).

Score: 1 = Looks at the toys, objects, or people the caregiver indicates

CR 0 E 1 0

Items 14 and 15 Administer simultaneously, using the same procedure.

Materials: toys or objects that caregiver thinks the child knows words for

Note: Refer to the Administration and Scoring Manual for complete administration directions.

14. Responds to an inhibitory word (e.g., No)

Score: 1 = Stops, withdraws, or pauses briefly before reaching for object

CR 0 E 1 0

15. Understands a specific word or phrase without the use of gestural cues

Score: 1 = Responds appropriately to one word/phrase

CR 0 E 1 0

Score

12. Takes multiple turns vocalizing

Materials: none

Score: 1 = Takes two turns vocalizing in response to caregiver's vocalizations

CR 0 E 1 0

13. Plays simple games with another while using appropriate eye contact

Materials: infant toys (e.g., blocks, car, ball, bubbles, box, book, cloth)

Score: 1 = Participates with another in play while using appropriate eye contact

CR 0 E 1 0

Start: Ages 1:6-1:11

14. Vocalizes two different consonant sounds

Materials: infant toys (e.g., teddy bear, rattle)

Circle the consonant sounds the child produced: b d m n p

CR 0 E 1 0

Score: 1 = Produces two different consonant sounds

➡ **Start: Ages 1;6-1;11**

Items 16-18 Administer simultaneously, using the same procedure.

Materials: 2 cups, spoon, car, 6 blocks, comb, ball

Note: Refer to the Administration and Scoring Manual for complete administration directions.

Place the objects in front of the child. Say, **Look at all these things.** I'm going to play with the blocks. Stack three blocks. Gesture and say, You play too. If necessary, demonstrate playing with the car.

16. **Demonstrates functional play**

CR 0 E 1 0

Score: 1 = One example of using objects appropriately

17. **Demonstrates relational play**

CR 0 E 1 0

Score: 1 = One example of using two objects together in play

18. **Demonstrates self-directed play**

CR 0 E 1 0

Score: 1 = One example of using objects toward self

Note: If the child demonstrates other-directed play (e.g., feeding the caregiver, combing the caregiver's hair), credit the child for self-directed play.

➡ **Start: Ages 2;0-2;5**

19. **Follows routine, familiar directions with gestural cues**

CR 0 E 1 0

Materials: ball, box without lid, keys on a key ring

a. Put the ball in the box (point to where the ball goes).

b. Throw the ball (model throwing the ball).

c. Give me the keys (hold out your hand).

d. other: _____

Score: 1 = Two correct

Developmental Tasks for Ages 1;6-1;11

15. **Babbles two syllables together**

CR 0 E 1 0

Materials: bubbles, infant toys the child has previously shown an interest in

Two syllable combinations the child produced: _____

Score: 1 = Babbles a two-syllable combination (e.g., *mama, dada*)

16. **Uses a representational (symbolic) gesture**

CR 0 E 1 0

Materials: infant toys and objects

Score: 1 = Uses one representational gesture (e.g., waves bye-bye, claps hands, moves body)

Note: Refer to the Administration and Scoring Manual for complete administration directions.

17. **Uses at least one word**

CR 0 E 1 0

Materials: toys and objects the child has previously shown an interest in

Words the child produced: _____

Score: 1 = Demonstrates meaningful use of one word

➡ **Start: Ages 2;0-2;5**

18. **Produces syllable strings (two to three syllables) with inflection similar to adult speech**

CR 0 E 1 0

Materials: toys and objects the child has previously shown an interest in

Syllable strings the child produced: _____

Score: 1 = Produces one two- to three-syllable string with inflection similar to adult speech

19. **Participates in a play routine with another person for at least 1 minute while using appropriate eye contact**

CR 0 E 1 0

Materials: stopwatch or watch with second hand

Score: 1 = Attends, using appropriate eye contact for 1 minute

Auditory Comprehension

Score

Expressive Communication

PLS-5 Record Form 6

Score

20. Imitates a word

CR 0 E 1 0

Materials: bubbles, teddy bear, crayon and paper

a. bubble

b. bear

c. crayon/paper

d. other:

Score: 1 = Imitates one word

21. Produces different types of consonant-vowel (C-V) combinations

CR 0 E 1 0

Materials: toys and objects the child has previously shown an interest in

Consonant-vowel combinations the child produced:

a. C-V:

b. C-V-C:

c. C-V-C-V:

d. other:

Score: 1 = Produces three different consonant-vowel combinations (e.g., C-V, C-V-C, C-V-C-V)

Start: Ages 2;6-2;11

22. Initiates a turn-taking game or social routine

CR 0 E 1 0

Materials: cloth, ball, teddy bear

Child's behavior:

Score: 1 = One instance of child-initiated activity with you, caregiver, or other person

23. Uses at least five words

CR 0 E 1 0

Materials: toys and objects the child has previously shown an interest in

While playing with the child, point to objects and ask, What is this?

Words the child produced:

Score: 1 = Produces five or more words

Developmental Tasks for Ages 2;0-2;5

20. Identifies familiar objects from a group of objects without gestural cues

1 0

Materials: (first set) car, ball, cup, keys on key ring, spoon; (replacement objects) block, bowl, duck, loud squeaky toy

Line up the first set of objects in front of the child. Extend your hand palm up and say, Give me the ____.

Note: After the child gives you an object, say, Thank you, and remove it from sight. Replace each object that the child gives you with one of the replacement objects.

Note: Refer to the Administration and Scoring Manual for complete administration directions.

- ____ a. ball ____ b. cup ____ c. car ____ d. spoon

Score: 1 = Two correct

21. Identifies photographs of familiar objects

1 0

Materials: Picture Manual pp. 1-3

(practice) Tell the caregiver, I'm going to ask you to point to some pictures, so your child can see what to do. Turn to the caregiver and say, ____ (child's name for the caregiver), look at these pictures; point to the ball. Wait for the caregiver to point. Point to the spoon. Wait for the caregiver to point. Turn the page and tell the child. Your turn. Look at all these pictures! Point to the...

- ____ a. cookie ____ b. bird ____ c. balloon
____ d. kitty ____ e. shoe ____ f. apple

Score: 1 = Four correct

22. Follows commands with gestural cues

1 0

Materials: book, duck, teddy bear

- ____ a. Get the book and bring it here please. Hold out your hand.

As the child picks up the book, hold up your hand to signal stop, and say,

- ____ b. Wait!

- ____ c. I meant to say, the duck. Get the duck and bring it here please.

- ____ d. After the child gives you the duck, say, Now get the bear and give it to ____ (point to and name the person in the room, for example, *mama, daddy*).

Score: 1 = One correct

Items 24 and 25 Administer simultaneously, using the same play activity.

Materials: windup toy, bubbles, book

Place 2 or 3 objects near the child but out of reach. Say, Look at these things.

Observe the child to see if he or she points or reaches for the object, vocalizes, and looks back and forth between the object and person.

24. Uses gestures and vocalizations to request objects

CR 0 E 1 0

Score: 1 = Two instances of using gestures and vocalization to request objects

25. Demonstrates joint attention

CR 0 E 1 0

Score: 1 = Looks back and forth between person and object

➡ Start: Ages 3;0-3;5

26. Names objects in photographs

1 0

Materials: Picture Manual pp. 50-52

Point to each picture and say, Look at this picture. What is this?

- ____ a. ball ____ b. baby
____ c. bird ____ d. cookie
____ e. shoe ____ f. dog/doggie/puppy/puppy-dog
____ g. balloon ____ h. spoon
____ i. apple ____ j. cat/kitty/kitten/kitty-cat

Score: 1 = Five correct

Auditory Comprehension

Start: Ages 2:6-2:11

Score

23. Identifies basic body parts

1 0

Materials: teddy bear

Using the wording the child is most comfortable with, say, Show me your ____;
Point to my ____, or Where's the bear's ____?

- ____ a. nose ____ b. eye(s) ____ c. foot/feet
- ____ d. hand(s) ____ e. mouth

Score: 1 = Four correct

24. Identifies things you wear

1 0

Materials: none

Using the wording the child is most comfortable with, say, Show me your ____;
Point to my/Mommy's ____, or Where are/is your Mommy's ____.

- ____ a. shoes ____ b. shirt ____ c. socks ____ d. shorts/pants
- ____ e. other (e.g., hat, coat, skirt) _____

Score: 1 = Three correct

Expressive Communication

PLS-5 Record Form 8

Score

Developmental Tasks for Ages 2;6-2;11

Items 25 and 26 Administer simultaneously, using the same procedure.

Materials: teddy bear, cloth, spoon, cup, bowl

25. Understands the verbs *eat*, *drink*, and *sleep* in context

Here's my friend Mr. Bear. Mr. Bear is...

- a. hungry. Give him something to eat.
- b. thirsty. Give him something to drink.
- c. tired. Make him go to sleep.

Score: 1 = One correct

26. Engages in pretend play

Score: 1 = One example of pretend play

27. Uses words more often than gestures to communicate
Materials: toys and objects the child has previously shown an interest in
Note: Refer to the Administration and Scoring Manual for complete administration directions.

- a. uses neither words nor gestures
- b. uses gestures only
- c. uses gestures more often than words to communicate
- d. uses gestures about as often as words
- e. uses words more often than gestures to communicate

Score: 1 = Uses words more often than gestures to communicate. (e)

28. Uses words for a variety of pragmatic functions

Materials: sealable bag with a snack provided by caregiver or a toy inside; a windup toy; toys and objects

Note: Refer to the Administration and Scoring Manual for complete administration directions.

- a. requests actions or objects: _____
- b. labels actions or objects: _____
- c. requests repetition: _____
- d. requests assistance: _____
- e. answers yes/no questions: _____
- f. uses a word to get attention: _____

Score: 1 = Uses words to express five pragmatic functions

29. Uses different word combinations

Materials: toy or objects the child has previously shown an interest in
Word combinations the child produced:

- a. noun/pronoun + verb: _____
- b. verb + noun/pronoun: _____
- c. noun/pronoun + verb + location: _____
- d. noun/pronoun + verb + adjective: _____
- e. other (noun/pronoun + noun, possessive + noun, etc.; e.g., *Dis mine*): _____

Score: 1 = Verbalizes three different word combinations

Start: Ages 3:0-3:5

Auditory Comprehension

Score

Items 27-29 Administer simultaneously, using the same procedure.

Materials: teddy bear, 3 cups, box with lid, small pitcher, spoon, bowl, 8 blocks

Note: Do not use gestures when presenting the item directions.

If you are continuing administration from Items 25 and 26 say, Mr. Bear is finished with his nap. Now Mr. Bear wants to play hide-and-seek. He's going to hide now.

If you are beginning test administration with Item 27, say, Here is my friend Mr. Bear. Mr. Bear wants to play hide-and-seek. He's going to hide now.

Put the pitcher and teddy bear inside the box and replace the lid. Make sure the child watches you do this and also sees the bear and pitcher inside the box before you replace the lid. Then put the box, cups, and spoon on the table.

- a. Open the box and give Mr. Bear to me.

Say, We found Mr. Bear!

Put Mr. Bear on the table. Take the pitcher out of the box and put it next to the cups and spoon.

Say, Now let's get something to drink. You pour.

Encourage the child to use the pitcher and cups.

Mr. Bear says he likes cold drinks. Here are some ice cubes.

Show the blocks in your open hand and then put them on the table.

- b. Get an ice cube and put it in a cup for Mr. Bear.

Say, I want a drink too.

- c. Please give me a cup. d. Put an ice cube in my cup. e. Where's your cup?

Say, Put an ice cube in your cup. (Do not score.)

- f. Let's drink. Pretend to drink.

Say, Mmmmm. That was good. Please help me clean up now.

27. Understands pronouns (*me, my, your*)

1 0

Score: 1 = Two correct on parts c, d, e

28. Follows commands without gestural cues

1 0

Score: 1 = Two correct on parts a, b, c, d

Expressive Communication

PLS-5 Record Form 10

Score

29. Engages in symbolic play

Score: 1 = Two examples of symbolic play

30. Recognizes action in pictures

Materials: Picture Manual pp. 4-5

Look at all of the children. Show me the child who is...

a. sleeping _____ b. eating _____ c. playing _____

Now look at all these children. Show me the child who is...

d. drinking _____ e. washing _____ f. running _____

Score: 1 = Four correct

31. Understands use of objects

Materials: Picture Manual p. 6

Look at all of these pictures. Show me what you...

a. use to drink water. _____ b. wear on your foot. _____

c. can ride. _____ d. use to watch cartoons. _____

Score: 1 = Three correct

Start: Ages 3:6-3:11

32. Understands spatial concepts (*in, on, out of, off*) without gestural cues

Materials: teddy bear, cloth, box with lid, duck, ball

Put the ball in the box, and place the box with the lid on your lap so the child can see and touch the box. Put the bear, covered with the cloth, on the table.

This is Ms. Duck and this is Mr. Bear. We are going to play with them. Mr. Bear is sleeping. Let's wake him up.

a. Take the blanket off Mr. Bear. _____ b. Put Ms. Duck in the box. _____

c. Put the box on the table. _____ d. Now take the ball out of the box. _____

Score: 1 = Three correct

Start: Ages 3:6-3:11

30. Names a variety of pictured objects

Materials: Picture Manual pp. 53-54

Look at these pictures. Point to each and ask, What is this?

a. teddy bear/bear _____ b. scissors _____

c. cookie/star _____ d. banana _____

e. refrigerator/fridge _____ f. spoon _____

g. fish _____ h. elephant _____

Score: 1 = Five correct

31. Combines three or four words in spontaneous speech

Materials: toys and objects the child has previously shown an interest in

Three- or four-word combination the child produced: _____

Score: 1 = Produces one three- or four-word combination

32. Uses a variety of nouns, verbs, modifiers, and pronouns in spontaneous speech

Materials: toys and objects the child has previously shown an interest in

a. 10 nouns the child produced: _____

b. 10 verbs the child produced: _____

c. 2 modifiers the child produced: _____

d. 1 pronoun the child produced: _____

Score: 1 = Produces required number of words for 3 of the 4 word categories

Auditory Comprehension

Score

Developmental Tasks for Ages 3:6-3:11

Expressive Communication

Score

PLS-5 Record Form 12

33. Understands quantitative concepts (*one, some, rest, all*)

1 0

Materials: teddy bear, 8 blocks in sealable plastic bag

Sit the bear on the table and hold out the open bag of blocks to the child.

- a. Give Mr. Bear one block. b. Give me some blocks.

If the child gives you all of the blocks, place some of them back in the bag.

- c. You take the rest of the blocks. d. Now put all the blocks in the baggie.

Score: 1 = Two correct

34. Makes inferences

1 0

Materials: Picture Manual pp. 7-9

Look at these pictures. Show me which picture answers my question.

- a. Anna hurt her knees and elbows. How do you think Anna got hurt?
b. Charlie played outside and got his shoes wet. How do you think Charlie's shoes got wet?
c. Sandra was very hungry when she came home after school. What do you think Sandra did when she got home?

Score: 1 = Two correct

Start: Ages 4:0-4:5

35. Understands analogies

1 0

Materials: Picture Manual pp. 10-12

Look at these pictures and show me which one finishes my sentence.

- a. You sleep in a bed. You sit on a (chair)
b. You eat with a fork. You cut with a (knife)
c. You hear with your ears. You see with your (eyes)

Score: 1 = Two correct

33. Produces one four- or five-word sentence

0 E 1 0

Materials: none

Do you have any pets/friends/boys? Tell me about them.

Sentence the child produced: _____

Score: 1 = Produces one four- or five-word sentence

Start: Ages 4:0-4:5 and 4:6-4:11

34. Uses present progressive (verb + -ing)

1 0

Materials: Picture Manual p. 55

(practice) Point to the picture of the girl in the sandbox and say, This girl is playing.

- a. Tell me about this girl (point). She is (eating)
b. Now tell me about this girl (point). She is (sleeping)

Score: 1 = Two correct

☐ Response influenced by dialect

Note. Refer to Appendix E of the Administration and Scoring Manual for correct dialectal variations.

35. Uses plurals

1 0

Materials: Picture Manual p. 56

Point to each picture and ask, What are these?

- a. babies
b. horses
c. cats/kitties

Score: 1 = Two correct

☐ Response influenced by dialect

Note. Refer to Appendix E of the Administration and Scoring Manual for correct dialectal variations.

36. Understands negatives in sentences

Materials: Picture Manual pp. 13-15

- a. Look at all the babies. Show me the baby who is not crying.
- b. Look at all the chickens and the nests. Show me the nest with no eggs.
- c. Look at all the toys. Show me a toy that is not in the basket.
(Child must point to one or both of the toy's outside of the basket.)

Score: 1 = Two correct

1 0

36. Answers *what* and *where* questions

Materials: Picture Manual p. 57

- a. Look at this boy. What is he doing? (washing/drying dishes)

- b. He is not in the bathroom (point to the boy). Where is he? (kitchen)
If the child says here/there, prompt with, What room is he in?

Now I want you to answer some other questions.

Note: There are no visual stimuli for c and d.

- c. What did you eat for breakfast (or lunch)?

- d. Where did you eat breakfast (or lunch)?

Score: 1 = Three correct

Developmental Tasks for Ages 4:0-4:5

37. Identifies colors

Materials: 8 crayons (red, yellow, blue, green, black, brown, orange, purple)

Note: If the child has partial or total color blindness, do not administer this item and do not include it when applying the discontinuance rule.

Scatter the crayons on the table.

Say, Look at these crayons. Show me...

- a. blue
- b. purple
- c. red
- d. green
- e. orange
- f. yellow

Score: 1 = Four correct

1 0

37. Names described object

Materials: none

(practice) Now I want you to try to figure out what I'm talking about. What animal chases mice and has whiskers? It says meow. (cat)

Cue as needed for practice only. Let's try some more.

- a. What toy is round and bounces? You play catch with it. (ball)

- b. What do you use after a bath or shower? You dry yourself with it. (towel)

- c. What do you use to draw a picture? They come in a box. (crayons, markers, pencils)

Score: 1 = Two correct

1 0

Auditory Comprehension

38. Understands sentences with post-noun elaboration

Materials: Picture Manual pp. 16-17

(practice) Look at this picture. Point to each kitten and say, This kitten is black, this kitten is orange, and this kitten is white. Show me the orange kitten. Show me the black kitten. Show me the white kitten. Cue as needed for practice only. Now look at these kittens. Point to...

- a. the white kitten that is sleeping.
- b. a kitten that is not black.
(Child may point to any kitten that is not black.)
- c. the small black kitten that is in the box.

Score: 1 = Two correct

Start: Ages 4:6-4:11 and 5:0-5:5

39. Understands spatial concepts (*under, in back of, next to, in front of*)

Materials: teddy bear

If this is the first time you are presenting the bear to the child, introduce it by saying, Here is Mr. Bear. I'm going to put Mr. Bear on the table. Now I want you to put Mr. Bear...

- a. under the table/chair
- b. in back of you
- c. next to you
- d. in front of me

Score: 1 = Three correct

Expressive Communication

38. Answers questions logically

Materials: none

(practice) What do you do when you are hungry? (eat)
Cue as needed for practice only.

- a. What do you do if your hands are dirty? (clean them/wash them)
- b. What do you do when you are cold? (get a blanket /wear a jacket)
- c. What do you do when you are tired? (go to bed/sleep)

Score: 1 = Two correct

39. Uses Possessives

Materials: Picture Manual p. 58

- a. Look at the children. This is the boy's cat. Whose cat is this? (the girl's, hers)
- b. Look at the animals. This is the dog's food. Whose food is this? (the cat's)

Score: 1 = Two correct

☐ Response influenced by dialect
Note: Refer to Appendix E of the Administration and Scoring Manual for correct dialectal variations.

40. Understands pronouns (*this, her, he, she, they*)

1 0

Materials: Picture Manual pp. 18-20

(practice) Look at these children. They are wearing shoes. Show me his shoes. Show me her shoes. Cue as needed for practice only.

Let's try some more. Show me...

a. her shirt. b. his toys.

Now look at these children. Show me...

c. she is on the stairs.

Show me...

d. they are in the pool. e. he is in the pool.

Score: 1 = Four correct

41. Understands quantitative concepts (*more, most*)

1 0

Materials: teddy bear, 8 crayons (red, yellow, blue, green, black, brown, orange, purple)

Here are some crayons for you (put 6 crayons in front of the child) and some for me (put 2 crayons in front of you.)

a. Who has more crayons?

Gather and redistribute the crayons. Give the child 3 crayons and yourself 5.

b. Who has more crayons now?

Here's my friend Mr. Bear. He likes crayons too. I'll give him some.

Redistribute the crayons so the bear has 5, you have 1, and the child has 2.

c. Who has the most crayons?

Redistribute the crayons so the child has 4, you have 2, and the bear has 2.

d. Who has the most crayons now?

Score: 1 = Three correct

Start: Ages 5:0-5:5

40. Tells how an object is used

1 0

Materials: Picture Manual p. 59

(practice) Look at this picture. It's a pencil. What do you do with a pencil? Cue as needed for practice only. Now look at this picture. This is a _____. What do you do with a _____?

a. coat (put it on/wear it) _____

b. towel (dry off/wipe) _____

c. cup/glass (drink with it) _____

Score: 1 = Three correct

41. Answers questions about hypothetical events

1 0

Materials: none

(practice) Ask, What would you do if you couldn't find your shoes in the morning? (ask Mom or Dad) Cue as needed for practice only.

What would you do if...

a. you felt sick? (take medicine, go to the doctor)

b. you got food on your shirt? (clean it, get a new shirt)

c. you want to play with your friend's toy? (ask, tell them to share, grab it)

Score: 1 = Two correct

Auditory Comprehension

Score

42. Identifies shapes (*star, circle, square, triangle*)

1 0

Materials: Picture Manual pp. 21–22

Look at all of these pictures. These things are different shapes.

For a–d, prompt one time if the child points to only one or two pictures by asking, Is that all of them?

Note: Do not correct the child if he or she points to an incorrect picture. Mark the subitem incorrect (–).

Show me...

- a. all of the things that look like a star. (starfish, badge, cookie)
 - b. all of the things that look like a circle. (pot lid, soccer ball, plate)
- (Turn the page.) Now look at all of these pictures. These are different shapes too. Show me...

- c. all of the things that look like a square. (clock, block, slice of bread)
- d. all of the things that look like a triangle. (tree, triangle musical instrument, cookie)

Score: 1 = Two correct

Expressive Communication

PLS-5 Record Form 16
Score

42. Uses prepositions (*in, on, under*)

1 0

Materials: spoon, box with lid

Place the box in front of the child. Put the spoon in, under, and on the box. Each time, ask, Where is the spoon?

- a. in/inside
- b. under/below
- c. on (top of)

Score: 1 = Three correct

Developmental Tasks for Ages 5:0–5:5

Start: Ages 5:6–5:11

43. Points to letters

1 0

Materials: Picture Manual p. 23

Look at these letters. Show me the letter...

- a. o
- b. x
- c. b
- d. z
- e. A

Score: 1 = Three correct

Start: Ages 5:6–5:11

43. Uses Possessive pronouns (*hers, his*)

1 0

Materials: Picture Manual pp. 60–62

(practice) This is his ice cream. This is _____ (hers, her ice cream) If the child says "the girl's" or "the boy's," say, Tell me another word. Cue as needed for practice only.

- a. This is her picture. This is _____ (his, his picture)
- b. This is his ball. This is _____ (hers, her ball)

Score: 1 = Two correct

☐ Response influenced by dialect

Note: Refer to Appendix E of the Administration and Scoring Manual for correct dialectal variations.

44. Identifies advanced body parts	1 0	44. Names categories	1 0
Materials: none		Materials: none	
Show me your...		(practice) Listen: <i>dog, cat, horse, pig, cow</i> . These are all animals. Now you tell me what these are.	
a. elbow		a. cereal, oranges, mashed potatoes, pizza: these are all _____ (food; things you eat)	
b. forehead		b. blocks, doll, ball, puzzle: these are all _____ (toys; things you play with)	
c. eyelashes		c. water, milk, juice, soda: these are all _____ (drinks/liquids; things you drink)	
d. wrist			
Score: 1 = Three correct		Score: 1 = Two correct	
45. Understands quantitative concepts (3, 4)	1 0	45. Formulates meaningful, grammatically correct questions in response to picture stimuli	1 0
Materials: Picture Manual pp. 24–25		Materials: Picture Manual pp. 63–66	
a. Look at the baskets. Show me the basket with 3 puppies.		(practice) Look at this picture. Luisa is getting ready to go shopping with her mother. She can't find her other shoe! What should she ask her mother? She could ask her mother, "Can you help me find my shoe?" Let's look at some more pictures.	
b. Look at the crayons and paper. Show me the paper with 4 crayons.		a. Darlene wants a cookie. What should she ask her mother?	
Score: 1 = Two correct		b. Kathy wants to play outside. What could she ask her father?	
		c. Christopher wants the cereal. What should he ask his mother?	
		Score: 1 = One grammatically correct and pragmatically appropriate question ☐ Response influenced by dialect Note: Refer to Appendix E of the Administration and Scoring Manual for correct dialectal variations.	

Auditory Comprehension

Score

Start: Ages 6:0-6:5

46. Understands complex sentences

Materials: Picture Manual pp. 26-29

(practice) I'm going to tell you something about these pictures. Find the picture that I'm talking about. *Sara was sad because her bicycle had a flat tire and she couldn't go for a ride.*

Cue as needed for practice only.

Let's try some more.

a. While walking home, Nancy saw a dog with white spots.

b. When he woke up, Steve found his teddy bear that had fallen on the floor.

c. Because it was cold outside, Sam put on a sweater and closed the window.

Score: 1 = Two correct

1 0

Expressive Communication

Score

PLS-5 Record Form 18

46. Completes analogies

Materials: none

(practice) Show me your hand. (put your hand next to the child's) Your hand is little; my hand is _____. (big) Let's do some more. Cue as needed for practice only.

a. Ice is cold; fire is _____ (hot)

b. I sit on a chair; I sleep in a _____ (bed)

c. An apple is red; a banana is _____ (yellow)

d. A turtle is slow; a rabbit is _____ (fast)

Score: 1 = Four correct

1 0

Developmental Tasks for Ages 5:6-5:11

47. Uses qualitative concepts (*short, long*)

Materials: Picture Manual p. 67

(practice) Look at these pictures. This chain is long; this chain is _____ (short) Cue as needed for practice only. Let's do some more.

a. This dress is short; this dress is _____ (long)

b. Her ribbons are long; her ribbons are _____ (short)

c. This rope is short; this rope is _____ (long)

Score: 1 = Two correct

1 0

Start: Ages 6:0-6:5

48. Names letters

Materials: Picture Manual p. 68

Look at these letters. Point to each letter and ask, What is this letter?

Note: If the child responds with the sound of the letter, ask for the name of the letter.

a. s _____ b. M

c. E _____ d. f

e. T

Score: 1 = Four correct

1 0

47. Demonstrates emergent literacy through book handling and concept of word

1 0

Materials: 2 children's books

Show the child the two books. Say, Look at my books. This one is about _____. This one is about _____. Point to the book you like. After the child selects a book, remove the other book from the child's view.

Hand the selected book, upside down and back cover up, to the child.

a. Here, you hold the book. Credit if child corrects orientation of book.

Let's look at the book.

b. Show me the front cover.

c. Show me a page in the book.

Turn to a page in the book.

d. Point to a word on this page.

Score: 1 = Four correct

48. Understands modified nouns

1 0

Materials: Picture Manual p. 30

(practice) I want you to look at all of the dogs. Show me the big brown dog.

Cue as needed for practice only.

Let's try some more. Show me...

a. the small black dog.

If the child points to the small black dog with spots, ask, Are there any other small black dogs?

b. the big white dog.

If the child points to the big white dog with spots, ask, Are there any other big white dogs?

c. the small spotted dog.

Score: 1 = Three correct

49. Uses modifying noun phrases

1 0

Materials: Picture Manual pp. 69-72

(practice 1) Here's a mouse (point) and here's an elephant (point). I will tell you something about one of the animals, and you point to it. Then, you can tell me something about one of the animals, and I'll point to it. I'll go first. Point to the one with little ears. Wait for the child's response.

(practice 2) OK. Now it's your turn. Tell me something about one of the animals so that I know which one to point to. Say, Point to _____. Wait for the child's request.

If the child names the animal, or says, "the second one," "this one," or "that one," say, Tell me something about it. Let's try again. Say, Point to _____

Cue as needed for practice only.

a. Here are two cars. Tell me which car to point to. Say, Point to _____
(the dirty/clean one; the car that is dirty/clean)

b. Here are two dogs. Tell me which dog to point to. Say, Point to _____
(the dog that is wet/dry)

c. Here are two girls. Tell me which girl to point to. Say, Point to _____
(the girl with the short/long hair)

Score: 1 = Two correct

Auditory Comprehension		Expressive Communication		PLS-5 Record Form 20	
Start: Ages 6:6-6:11		Developmental Tasks for Ages 6:0-6:5		Score	
49. Orders pictures by qualitative concept (<i>biggest, smallest</i>)	1 0	50. Responds to <i>why</i> questions by giving a reason	1 0		
Materials: Picture Manual pp. 31-33 (practice) Here are three dogs. I will point to the dogs in order, from the biggest dog to the smallest dog. Point to the dogs in order from biggest to smallest. Now you try one.		Materials: none (practice) Now I want you to tell me <i>why</i> we do some things. <i>Why</i> do we wear shoes? (keep our feet clean/protect our feet) Cue as needed for practice only. If the child responds with "Mama told me," ask, What other words can you use to tell me...? a. <i>Why</i> do we brush our teeth? (because teeth are dirty/we don't get cavities)			
a. Here are three elephants. Point to the elephants in order from biggest to smallest. b. Here are three trucks. Point to the trucks in order from smallest to biggest.		b. <i>Why</i> do we go to sleep? (we're tired/we need to rest)			
Score: 1 = One correct		c. <i>Why</i> do we eat? (we're hungry/to get energy)			
50. Understands quantitative concepts (<i>each, every</i>)	1 0	Score: 1 = Two correct			
Materials: Picture Manual p. 34 Look at these pictures. Point to...		51. Repairs semantic absurdities	1 0		
a. each animal. (giraffe, tiger, elephant, monkey) b. every toy. (blocks, car, doll, ball)		Materials: none (practice 1) I'm going to tell you something that doesn't make sense. I want you to change it so that it makes sense. Let's try one. (<i>Child's name</i>) is a (<i>incorrect gender</i>). Is that right? No! I should have said (<i>Child's name</i>) is a (<i>correct gender</i>). (practice 2) Let's do another one. <i>The boy drank some frogs.</i> Does that make sense? No! I could say, <i>The boy drank some milk</i> or <i>The boy saw some frogs.</i> right? Cue as needed for practice only by saying, Does that make sense? Change it so it makes sense. Let's try some more. Change what I say so it makes sense.			
51. Identifies initial sounds	1 0	a. The boy ate a big car.			
Materials: Picture Manual pp. 35-38 (practice) Say, Look at the pictures and listen to the words. Point to each picture and say, knot, dog, pig, cap. Show me the picture that begins with /p/ like pot. Emphasize the initial /p/ in <i>pot</i> . Cue as needed for practice only. Let's try some more.		b. The girl sleeps on a bicycle.			
a. frog, nest, door, sticks Show me the picture that begins with /n/ like nose. (nest)		c. The boy put a dog on his head.			
b. sun, girl, book, tree Show me the picture that begins with /s/ like sit. (sun)		Score: 1 = Two correct			
c. shoe, feather, car, flower, chair, cat, bear, bed Show me two pictures that begin with /k/ like cup. If child points to only one picture, say, Show me another. (car, cat)					
Score: 1 = Two correct					

➡ Start: Ages 7:0-7:5 and 7:6-7:11

52. Understands time/sequence concepts (*last, first*)

Materials: Picture Manual p. 39

Look. These pictures show a boy who took a bath. The boy filled the tub with water. He washed his face and body. He played with his toys. Then he got out of the tub and dried off. Show me...

- ___ a. what the boy did last.
- ___ b. what the boy did first.

Score: 1 = Two correct

1 0

52. Uses -er to indicate one who

Materials: none

(practice) A person who works on a farm is a farmer. A person who drives a car is a _____. (driver) Cue as needed for practice only.

Let's do some more.

- ___ a. A person who teaches is a _____ (teacher)
- ___ b. A person who paints is a _____ (painter/artist)
- ___ c. A person who wins a game is the _____ (winner)
- ___ d. A person who swims is a _____ (swimmer)

Score: 1 = Three correct

➡ Start: Ages 6:6-6:11 and 7:0-7:5 and 7:6-7:11

53. Rhymes words

Materials: none

(practice) Listen to these words. *Be, tea, sea*. All these words rhyme with me. Now think of words that rhyme with *rock*. That's right, _____ rhymes with *rock*. If the child's response is incorrect, say *sock, lock*, and *clock* rhyme with *rock*. Cue as needed for practice only.

Now think of a word that rhymes with...

- ___ a. hat _____ b. no _____ c. light _____

Note: Nonsense words and names are acceptable. Two-syllable words are acceptable if the second syllable rhymes with the stimulus word.

Score: 1 = Two correct

54. Deletes syllables (elision)

Materials: none

(practice 1) Do you know what an airplane is? The word *airplane* has two parts: *air* and *plane*. Say the word *airplane*. Now say *airplane* without the word *plane*. (air)
(practice 2) Let's try another one. Say *helpful*. Now say *helpful* without *ful*. (help)
Cue as needed for practice only.

Let's do some more.

- ___ a. Say cowboy. Now say cowboy without boy. _____ (cow)
- ___ b. Say bluebird. Now say bluebird without blue. _____ (bird)
- ___ c. Say walking. Now say walking without ing. _____ (walk)

Score: 1 = Three correct

1 0

1 0

Auditory Comprehension

Score

Expressive Communication

PLS-5 Record Form 22

Score

Developmental Tasks for Ages 6:6–6:11

55. Completes similes

1 0

Materials: none

(practice) Think of something that is very hot. The sun is hot; a fire is hot.
If something is very hot, I could say that it is as hot as _____.
If the child's response is incorrect, say, A heater is hot. If something is very hot,
I could say that it is hot as a heater. Cue as needed for practice only.
Let's do some more.

- a. If I swim really well, I could say I swim like a _____
(fish, shark)
- b. If something is very cold, I could say it is as cold as _____
(ice, inside a freezer)
- c. If something is very sharp, I could say it is as sharp as _____
(knife, thorn, tooth)

Score: 1 = Two correct

56. Repeats nonwords

1 0

Materials: none

I'm going to say some made-up words for you to repeat. Say it just like I do. Some of the words are short, and some are long. Listen carefully, because I can only say each word one time. Pronounce the nonword vowels using the real-word vowels listed in parentheses.

Note. Verbatim response = +; any errors = –

- a. tay-dah _____ (vowels same as say-ma)
- b. ko-guh-teen _____ (vowels same as so-uh-seen)
- c. dee-po-nass _____ (vowels same as see-go-mess)
- d. kay-do-saff _____ (vowels same as say-go-laugh)
- e. noop-ay-ko-min _____ (vowels same as soup-say-go-in)

Score: 1 = Four correct

Auditory Comprehension
Developmental Tasks for Ages 6:6–6:11
continues on page 24

57. Repeats sentences

1 0

Materials: none

(practice 1) Listen and say what I say. *I like ice cream.*(practice 2) Here's another one. *Can I have a drink?*

Cue as needed for practice only, by saying Now you say it. Record responses by noting changes on the printed sentence or writing the child's response verbatim.

Let's do more.

a. Where is my new marker?

b. Can my friends come over to watch TV?

c. The girl who is crying is my sister.

d. I like to go swimming with my friends, don't you?

e. When he came home from school, Joey ate a snack.

Score: 1 = Four correct

AC53-57 and EC58-60: Retells a story and answers comprehension questions

Refer to the **Administration and Scoring Manual (AC53-57)** for the required materials and administration procedures. Use your notes from the child's retelling to score EC58-60.

Materials: Picture Manual pp. 40-41

Tell the story, then flip back to the first page of the story in the Picture Manual (p. 40) and say, "Now you tell me the story."

After the child retells the story, close the Picture Manual and ask the comprehension questions (AC53-57).

Note: Circle, underline, and make notes on the story on the Record Form to record the information the child provides. Record a + for each part of the story that the child retells. Use this information to score the child's retelling of the story (EC58-60).

This is a story about two children and their dog Buddy. Listen to the story. I want you to tell me the story after I'm finished.

— (1) Mike and Pam have a dog named Buddy. Buddy liked to sleep on an old, blue blanket by the door.

— (2) One night it rained and rained and Buddy got soaking wet!

— (3) Mike told his sister that Buddy was getting all wet in the rain. "What can we do for Buddy?" he asked Pam. "He's getting all wet!"

— (4) The next day, Mike and Pam decided to build a doghouse for Buddy. They found a big, sturdy box they could use.

— (5) They worked hard making the perfect little house. Mike cut a door in the box. Next, they used a piece of metal to make a roof.

— (6) When they finished, Mike called, "Here, boy! Come see your new house!" But when Buddy saw the house he ran away.

— (7) "Maybe he doesn't like it," said Pam. But soon Buddy came back dragging his old, blue blanket to put in his new house.

— (8) The next time it rained, Buddy was warm, dry, and happy in his new house. Now you tell me the story.

Auditory Comprehension

Developmental Tasks for Ages 6:6-6:11

Score

Items 53-57 Comprehension Questions

53. Recalls story detail

What color is Buddy's blanket? (blue)

Score: 1 = Identifies correct color

1 0

54. Identifies a story sequence

What do Mike and Pam do first to solve the problem?
(They get a box to make a doghouse for Buddy/make him a house)

Score: 1 = Identifies what's done first to solve problem

1 0

55. Identifies the main idea

What is Buddy's problem?
(Buddy doesn't have a house/bed; Buddy gets wet when it rains.)

Score: 1 = Identifies the main idea/problem

1 0

Expressive Communication

Developmental Tasks for Ages 7:0-7:11

Score

Items 58-60 Retells a Story

58. Retells a story with introduction

Score: 1 = Introduces story/characters (including information from story parts #1 and/or #2)

1 0

59. Retells a story with four sequenced events

Score: 1 = Includes 4 events from story parts #2-7 in a logical sequence

1 0

60. Retells a story with a logical conclusion

Score: 1 = Concludes story logically (including information from story part #8)

1 0

56. Makes an inference

How do you think Buddy feels about his new home? (happy/glad)

Score: 1 = Identifies a logical feeling or condition

1 0

57. Makes a prediction

What do you think Buddy will do the next time it rains? (sleep in his box/doghouse)

Score: 1 = Makes a logical prediction

1 0

58. Identifies a picture that does not belong

Materials: Picture Manual pp. 42-45

(practice) Look at these pictures: cookie, t-shirt, shorts, dress. Show me the one that doesn't belong with the others. Cue as needed for practice only.

Let's try some more.

a. Look at these pictures: car, truck, boat, chair. Show me the one that doesn't belong with the others. (chair)

b. Look at these pictures: paintbrush, pencil, ruler, marker. Show me the one that doesn't belong with the others. (ruler)

c. Look at these pictures: screwdriver, spoon, wrench, hammer. Show me the one that doesn't belong with the others. (spoon)

Score: 1 = Three correct

59. Identifies words that rhyme

Materials: Picture Manual pp. 46-48

Words that rhyme sound almost the same at the end, like *dog* and *log* or *bake* and *cake*. Now I want you to find the words that rhyme. Look at these pictures. Point to each picture as you say the word.

a. sun, fork, bird, lamp

Find the one that rhymes with *fun*. (sun)

b. train, fan, match, frog

Find the one that rhymes with *man*. (fan)

c. dog, ball, pan, cat

Find the one that rhymes with *bat*. (cat)

Score: 1 = Two correct

1 0

61. Formulates sentences

Materials: none

(practice 1) I'm going to make a sentence about a cat and a mouse. Listen. *The cat is chasing the mouse.* Now you make a sentence about a dog and a cat.

Cue as needed for practice only.

Let's try some more. Make a sentence with the words _____ and _____.

a. girl, running _____

b. boy, bicycle _____

(practice 2) Now I'm going to make a sentence with three words: *milk, little, and brother*. Listen. *My little brother drank milk.* Now you make a sentence with these words:

cookies, sisters, big.

Cue as needed for practice only.

Let's try some more. Make a sentence with the words _____ and _____.

c. school, boy, late _____

d. Billy, hungry, very _____

Score: 1 = Three correct

1 0

Auditory Comprehension

Developmental Tasks for Ages 7:0-7:11

Score

60. Follows multistep directions

1 0

Materials: 4 blank sheets of paper, box of crayons or markers, book (opened)

(practice) I am going to ask you to follow some directions with these things: a book, some paper, and crayons/markers. Listen carefully and do what I say in the order I say. Are you ready? Close the book, give it to me, and stand up. Cue as needed for practice only. Once the child has finished, put the closed book on the table away from the child but still in his or her line of vision.

Say, You can sit down now. Let's try some more.

- a. Get the book. Open it to page ____ (name a page that includes a sentence) and point to the first word on the page.

- b. Get a sheet of paper, write your name on it, and then raise your hand.

- c. Before you give me the paper with your name on it, write an X in the middle of the page and fold the paper in half. It does not matter if the child folds the paper from top to bottom or from right to left.

Score: 1 = Two correct

61. Understands false beliefs

1 0

Materials: teddy bear, box with lid, ball

Here's my friend Mr. Bear. Mr. Bear is playing with his favorite ball. He needs to go eat lunch, so he put his ball in this box. That way it won't roll away, and he can find it when he wants to play again.

Have the bear put the ball in the box and replace the lid. Then put the bear behind you. Mr. Bear has gone to eat. I'm going to move his ball and put it under the table. Take the ball out of the box and place it under the table, either in your lap or on the floor. Move Mr. Bear out from behind you and say, Here comes Mr. Bear!

- a. Where do you think he will he look for his ball? (in the box)

- b. Why will he look there? (That's where he put it)

Now, you tell Mr. Bear where the ball really is. Do not score.

Score: 1 = Two correct

Expressive Communication

PLS-5 Record Form 26

Score

62. Uses synonyms

1 0

Materials: Picture Manual pp. 73-74

(practice) Look at this elephant. Elephants are really large animals. What's another word for large? (big, huge, gigantic, enormous) If the child responds correctly, say, You're right, ____ is another word for large.

If the child responds incorrectly, or does not respond, say, Other words for large are big, huge, gigantic, and enormous. Cue as needed for practice only.

Let's try these. Point to each picture as you read the corresponding sentence. After reading each sentence, say, What's another word for ____?

Note: Italics are used to indicate the target words. Do not emphasize the target words when you say them.

- a. He was really angry. ____ (mad, furious)

- b. We watched the small bird. ____ (little, tiny)

- c. I gave my mom some beautiful flowers. ____ (pretty, lovely)

- d. The puzzle was simple. ____ (easy)

Score: 1 = Three correct

63. Uses irregular plurals

1 0

Materials: Picture Manual pp. 75-76

(practice) Look at these pictures and finish my sentence. Point to the pictures as you say each sentence. Here is one glass. Here are two ____ (glasses) Cue as needed for practice only.

Point to the appropriate part of each picture as you describe it. Say, Here is...

- a. one leaf. Here are three ____ (leaves)

- b. one child. Here are three ____ (children)

- c. one foot. Here are two ____ (feet)

Score: 1 = Two correct

☐ Response influenced by dialect

Note: Refer to Appendix E of the Administration and Scoring Manual for correct dialectal variations.

62. Makes grammaticality judgments

Materials: Picture Manual p. 49

Here's a picture of a girl named Mary and her little brother. He just learned how to talk and sometimes he says things wrong. I'm going to tell you something he said, and let's talk about if it sounds right or wrong. Listen: Mary's little brother said, *I eated*. That sounds wrong, doesn't it? He should have said *I ate*.

(practice) Say, Mary's little brother said, *My puppy am eating*. Does that sound right or wrong? (wrong) Say, *My puppy am eating* sounds wrong. How would you say it? Pause for the child's response. *My puppy is eating* sounds right. Cue as needed for practice only.

Listen to what Mary's little brother said. Tell me if it is right or wrong. If it is wrong, tell me how to say it right. If the child says the sentence is wrong, ask, How would you say it? Do not provide any additional cues.

Note. Examples of correct response are provided in the parenthesis. Refer to the Administration and Scoring Manual for the scoring guidelines and additional examples of correct responses.

- a. *They are going to the store*. Does that sound right or wrong? If the child says the sentence is wrong, ask, How would you say it?
- b. *Her can eat cookies*. Does that sound right or wrong? If the child says the sentence is wrong, ask, How would you say it?
(She can eat cookies. /She ate cookies.)
- c. *Did the girl saw him walking?* Does that sound right or wrong? If the child says the sentence is wrong, ask, How would you say it?
(Did the girl see him walking?)
- d. *The girl runs fast*. Does that sound right or wrong? If the child says the sentence is wrong, ask, How would you say it?
(The girl ran fast./The girl is running fast./The girl runs fast.)

Score: 1 = Three correct

☐ Response influenced by dialect

Note. Refer to Appendix E of the Administration and Scoring Manual for correct dialectal variations

1 0

64. Uses past tense forms

Materials: none

Now I want you to tell me about things you have done.
Record the child's past tense verbs.

- a. If the child goes to school say, Tell me what you did to get ready for school this morning.

If the child does not go to school, say, Tell me what you did after you woke up this morning.

Prompt for response with these questions: What did you do first?

What did you do next?

- b. Have you ever made a sandwich?

If the child says "yes," say, What type of sandwich did you make? Tell me how you made the sandwich. If the child does not know how to make a sandwich, say, What do you know how to make? Tell me how you made it.

Prompt for response with these questions: What did you do first?

What did you do next?

Score: 1 = Two different past tense verbs in either description

☐ Response influenced by dialect

Note. Refer to Appendix E of the Administration and Scoring Manual for correct dialectal variations.

1 0

Auditory Comprehension		Score
63. Demonstrates emergent literacy through book handling and print awareness	1	0
Materials: 2 children's books		
Look at my books. This one is about _____. This one is about _____. Pick the book you like. Let's look at the book you picked. Show me...		
a. the author's name.		
b. the title of the book.		
c. who wrote the book.		
Turn to a page in the book. Show me...		
d. where I would start reading on this page.		
e. where I would stop reading on this page (the child points to the last word or the punctuation mark at the end of the sentence)		
Score: 1 = Four correct		
64. Identifies a word that does not belong in a semantic category	1	0
Materials: none		
I am going to say some words. One of the words does not belong. Listen to the words and tell me the word that does not belong: <i>yellow, green, blue, eat</i> . If the child does not respond correctly, say <i>Eat, Eat</i> does not belong because <i>eat</i> is not a color. Listen to some more words.		
a. banana, milk, orange juice, water (banana)		
b. soft, green, sticky, rough (green)		
c. newspaper, eraser, book, magazine (eraser)		
Score: 1 = Two correct		
65. Understands prefixes	1	0
Materials: none		
Listen to this sentence: <i>The baby is crying</i> . Is he happy or unhappy? If the child does not respond correctly, say, <i>The baby is unhappy</i> . Let's try some more.		
a. It is not too hot or too cold outside. Is the temperature comfortable or uncomfortable? (comfortable)		
b. The child never saw the mouse again. Did the mouse reappear or disappear? (disappear)		
c. The boy replayed the song. Did he play the song more than one time or just one time? (more than one time)		
Score: 1 = Three correct		

Expressive Communication		Score
65. Describes similarities	1	0
Materials: none		
(practice) We're going to talk about how two things are alike or how they are the same. A spoon and a fork are alike or the same because _____ (you eat with them) Cue as needed for practice only. Let's do some more. How are...		
a. a bird and an airplane alike or the same? (fly/in the sky/have wings)		
b. a rock and a brick alike or the same? (hard/heavy)		
c. milk and juice alike or the same? (drinks/liquid)		
Score: 1 = Three correct		
66. Uses quantitative concepts (<i>empty, more</i>)	1	0
Materials: Picture Manual p. 77		
Now I'm going to start a sentence and I want you to finish it. Point to the appropriate part of each picture as you describe it.		
a. This boy's glass is full. This boy's glass is _____ (empty)		
b. The boy didn't get a lot of noodles (or spaghetti). He got less than she did. She got _____ (more)		
Score: 1 = Two correct		
67. Uses time/sequence concepts (<i>late, before</i>)	1	0
Materials: Picture Manual pp. 78-79		
Now I'm going to start a sentence and I want you to finish it. Point to the appropriate part of each picture as you describe it.		
a. This boy got to school early. This boy got to school _____ (late)		
b. Both girls brushed their teeth in the morning. This girl brushed her teeth after she got dressed for school, but this girl brushed her teeth _____ (before/before she got dressed for school)		
Score: 1 = Two correct		

Articulation Screener

Administer all items to children ages 2;6–7;11.

Note. Some words have more than one target sound.

Turn to the Articulation Screener section of the Picture Manual.

Point to each picture and ask the child, *What is this?*

For Item 3, ask, *What are these?*

For Item 14, point to the car and ask, *What color is this?* For children who have color blindness, say, *This car is red. Say red.*

Item	Score	Response
1. pan / pot	___	
2. b ir d	___	
3. teeth (What are these?)	___	
4. dog	___	
5. monkey	___	
6. h or se	___	
7. fea th er	___	
8. chicken	___	
9. shoe	___	
10. lamp	___	
11. sun	___	
12. zebra	___	
13. car	___	
14. red (What color is this? [point to car])	___	

Score 1 if the target sound (indicated by bold type) is articulated correctly.
Score 0 if the child substitutes, distorts, or omits the target sound.

Articulation Screener Raw Score

Age	Articulation Screener Raw Scores		
	Performance Typical of Age-Level Peers	Further Evaluation Indicated	Further Evaluation Strongly Indicated
2;6–2;11	6 or more	1–5	0
3;0–3;5	10 or more	5–9	4 or less
3;6–3;11	13 or more	5–12	4 or less
4;0–4;5	14 or more	12–13	11 or less
4;6–4;11	15 or more	12–14	11 or less
5;0–5;5	16 or more	12–15	11 or less
5;6–5;11	17 or more	15–16	14 or less
6;0–6;5	17 or more	15–16	14 or less
6;6–6;11	18 or more	16–17	15 or less
7;0–7;5	20 or more	18–19	17 or less
7;6–7;11	21 or more	19–20	18 or less

Language Sample Checklist

Directions: Check all the descriptors that apply to the language the child produced spontaneously during testing.

Syntax (Structure)

The child:

- ☐ did not talk spontaneously
- ☐ spoke in one-word utterances
- ☐ spoke in successive single-word utterances
- ☐ spoke in two- to three-word utterances
- ☐ spoke in four- to five-word utterances
- ☐ used expanded sentences
- ☐ used complex sentences
- ☐ used *wh*-questions (*who, what, where, when, why*)
- ☐ used *yes-no* questions (*is/are, can/could, do/does, will/would*)

Morphology (Structure)

The child used:

Tense markers

- ☐ present tense (3rd person -s)
- ☐ past tense (-ed)
- ☐ irregular past tense (e.g., *ran, won*)
- ☐ future tense (e.g., *will, gonna*)
- ☐ auxiliary/copula (e.g., *is/are*)

Pronouns

- ☐ subjective (e.g., *he, she, it, we, they*)
- ☐ objective (e.g., *him, her, them*)
- ☐ possessive (e.g., *his, her, hers, its, their, theirs, your, yours*)

Plurals

- ☐ regular (-s, -es)
- ☐ irregular (e.g., *feet, children*)

Possessive markers

- ☐ 's

Articles

- ☐ *a, an, the*

Negatives

- ☐ *no, not, don't*

Total number of morphemes	_____	+
Total number of utterances	_____	=
Mean Length of Utterance (MLU)	_____	
(See chapter 1 in the Administration and Scoring Manual for interpretation of the MLU)		
Age: _____	to _____	months

Semantics (Content)

The child:

- ☐ named objects/pictures (e.g., *baby, puppy*)
- ☐ used action words (e.g., *eat, running*)
- ☐ used words denoting possession (e.g., *Daddy's shoe, Mommy's coat, mine*)
- ☐ used words denoting recurrence (e.g., *more, again*)
- ☐ used words to describe objects/people (e.g., *little ball, pretty baby*)
- ☐ used words denoting time (e.g., *now, in a minute, before*)
- ☐ used words denoting place (e.g., *here, in the box, up*)
- ☐ used words denoting quantity (e.g., *five, lots, few*)
- ☐ used words to give reasons (e.g., *so, because*)

Social Language (Use)

Using gestures or words, the child:

- ☐ directed your attention to something
- ☐ tried to get you to do something
- ☐ tried to get your attention
- ☐ talked about what he or she was doing
- ☐ named an object
- ☐ greeted someone or said goodbye
- ☐ played with you
- ☐ protested or complained
- ☐ answered when you talked to him or her
- ☐ "practiced" or repeated words
- ☐ asked a question

Using words, the child:

- ☐ told you about an event or object
- ☐ talked about recent experiences (e.g., volunteered information, answered your questions, and stayed on topic briefly)
- ☐ maintained a conversation (e.g., answered you, gave additional information) or asked a question and paused to let you respond
- ☐ used language to control others' behavior
- ☐ used language to interact with another person
- ☐ repeated or reworded messages you didn't understand
- ☐ stayed on topic
- ☐ used indirect requests or hints
- ☐ role-played familiar themes (e.g., played house, pretended to be a superhero)

Connected speech was usually:

- ☐ organized
- ☐ disorganized
- ☐ on topic
- ☐ off topic
- ☐ appropriately sequenced
- ☐ out of sequence

Speech Intelligibility

- ☐ poor
- ☐ fair
- ☐ good

PLS-5 Profile

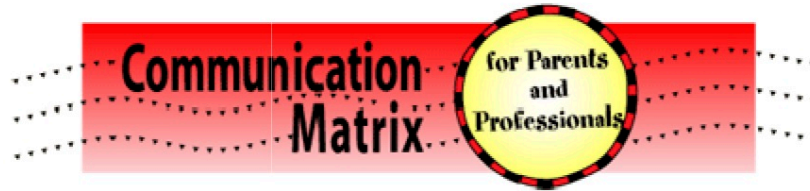
Directions: Draw a line across the profile at the child's chronological age. Circle the items failed.

Age	Auditory Comprehension				Expressive Communication				Emergent Literacy Skills
	Attention to Environment	Attention to People	Gesture	Play	Vocabulary/ Connected Speech	Qualitative Concepts	Spatial Concepts	Quantitative Concepts	
0;0-0;2	3	1, 2							
0;3-0;5	4, 5	6		7					
0;6-0;8	9, 10	9		8					
0;9-0;11		12	11		11				
1;0-1;5		13	16, 17	13, 14, 15					
1;6-1;11		19	18	19					
2;0-2;5		22		20, 21, 22, 23, 24					
2;6-2;11			26	25, 27, 28				27	
3;0-3;5			29	30, 31		32			32
3;6-3;11				34, 35, 36		33			33, 34, 35, 36
4;0-4;5					37, 38	39			38
4;6-4;11				40	42		41	40	41
5;0-5;5				44			45		43
5;6-5;11				46	48			46	46, 48
6;0-6;5					49		50	52	49
6;6-6;11				58	53		54		53, 54, 55, 56, 57, 58
7;0-7;11				61, 62, 64, 65	60	60		65	60, 61, 62, 64, 65

Note: Some item numbers are included in more than one category.

Age	Auditory Comprehension				Expressive Communication				Emergent Literacy Skills
	Vocal Development	Gesture	Social Communication	Vocabulary/ Connected Speech	Qualitative/ Quantitative Concepts	Spatial Concepts	Time/ Sequence Concepts	Morphology	
0;0-0;2	1, 2, 3								
0;3-0;5	5		4, 5						
0;6-0;8	6, 7	7	6, 7						
0;9-0;11	10, 11		8, 9						
1;0-1;5	12, 14, 15	16	12, 13, 16	17					
1;6-1;11	18, 21		19, 22	20, 23					
2;0-2;5		24	24, 25	26					
2;6-2;11			27, 28, 29	27, 28, 29				29	
3;0-3;5			30, 31, 32						
3;6-3;11			33, 36				34, 35	33	
4;0-4;5			37	38			39		37, 38
4;6-4;11			40, 41		42		42		40, 41
5;0-5;5		45	43, 44	46			43	45	44, 45, 46
5;6-5;11				47, 49				49	49
6;0-6;5			50, 51, 52				52	51	50, 51, 53, 54
6;6-6;11				55				57	55, 57
7;0-7;11			61	62, 65, 66		59, 67	63, 64	61, 64	58, 59, 60, 61, 62, 64, 65

Communication Matrix



Handbook: Online Communication Matrix
(www.communicationmatrix.org)

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THE BASICS

What is the Communication Matrix?



The Communication Matrix is an assessment tool designed to pinpoint exactly how an individual is communicating and to provide a framework for determining logical communication goals. It was first published in 1990 and was revised in 1996 and 2004 by Dr. Charity Rowland of Oregon Health & Science University. It was designed primarily for speech-language pathologists and educators to use to document the expressive communication skills of children who have severe or multiple disabilities, including children with sensory, motor and cognitive impairments. The original version for professionals is still available in print for purchase at www.designtolearn.com. It uses a concise format that is designed for rapid administration by persons familiar with the assessment.



A new version was developed especially for parents in 2004. This newer version is designed to be more "user friendly". It is available for purchase (in English and Spanish) through www.designtolearn.com.



Why an Online Version?

www.communicationmatrix.org is based on the parent version of the Matrix. It was developed for several reasons:

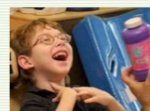
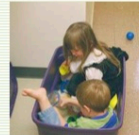


- It's easy to use. It guides you step-by-step through the process of entering information, so you do not have to leaf through pages that are irrelevant for your child, student or client.
- It generates clear results: a one-page Profile, a comprehensive Communication Skills and animated views of progress. You can easily share the results with others.
- It's free! This is a free service that is available to anyone.



List

Target Population



The Communication Matrix is appropriate for individuals of all ages who are at the earliest stages of communication. In the typically developing child the range of communication skills that the Matrix covers would occur between 0 and 24 months of age. The Matrix accommodates any type of communicative behavior, including "augmentative and alternative" forms of communication (AAC) and pre-symbolic communication (such as gestures, facial expressions, eye gaze and body movements). It is appropriate for individuals who experience any type or degree of disability, including severe and multiple disabilities, intellectual limitations and sensory or physical impairments. The Communication Matrix is NOT suitable for individuals who already use some form of language meaningfully and fluently.

Throughout the Matrix material, the person being assessed is referred to as "your child". Please note that the Matrix is equally applicable to adults who are functioning at the earliest stages of communication.



Who Uses this Service?

People all over the world use the online Communication Matrix. At this writing, about 43% of users are speech-language pathologists, about 43% are educators, and about 9% are family members. One of our goals is to encourage professionals and parents to complete a Matrix on the same child so that they can compare and discuss the similarities and differences that they see at home and at school.

How Long Will It Take?



to complete the
on how many

It will probably take you from ten minutes to an hour Communication Matrix for the first time, depending on how many communicative behaviors the individual uses. If you run out of time, you may save a partially completed Matrix and resume it later.

Your Contribution

When you complete the Matrix online, the information you provide will be stored. This information will provide valuable data about the communication skills demonstrated by individuals with various disabilities. This information may be summarized in scientific reports, professional presentations, articles in professional journals and book chapters.

Your Privacy



The information you enter into an assessment is completely secure and cannot be identified. When you use this free service, we ask you to provide some very basic information about the individual you are assessing (gender, age, ethnic background, country of residence, disability and specific impairments) and your relationship to that person. However, we DO NOT request any identifying information and we have no way of indentifying who has used this service. Your email address is only retained briefly in our database, just long enough to send you a confirmation email with your login and password. Your email address is then encrypted. The encrypted version is stored for login purposes and to make it possible to retrieve a lost password. This information is never associated with any other information that you enter.

You may enter identifiable information into Custom Reports at your own discretion. The data entered to create a Custom Report stays in our database, but it is not used for research purposes or for any other any purpose. If you are concerned about leaving identifiable information in our database, you may create the Custom Report, save the PDF to your own computer, and then delete the report from our database.

The Buzz: What Users are Saying

"The Communication Matrix has had such a huge impact on my practice in our center program! Your work is simply wonderful." (Speech-Language Pathologist)

"Very valuable tool, I think, and wonderful with the most involved and challenged communicators out there." (Speech-Language Pathologist)

"I discovered this tool when I was desperately lost about my multiply disabled child...It [is] very easy...and you can see your child very successful even in the tiny steps. Thank you." (Parent)

"I haven't been able to find the 'perfect' assessment tool to begin an introduction into what communication looks like—but yours does seem ideal!" (Professor, Researcher, Speech-Language Pathologist)

"I saw your Communication Matrix—it is the clearest, most user-friendly, detailed, with explanations—test I have seen." (Special Education Teacher)

"I am very excited about using this matrix as part of our assessment and treatment plan for students with ASD." (Special Education Teacher)

Languages

The Communication Matrix is available online in English, Spanish, Chinese (traditional), Russian, Korean, and Vietnamese. The non-English languages were chosen because there are large groups of individuals in the U.S. who speak those languages and who also have limited English skills. If you are interested in discussing a new translation, please contact us.

What's Next?

This web site is currently supported by a grant from the U.S. Department of Education which was awarded to underwrite evaluation and marketing. We are seeking sponsors to underwrite the cost of maintaining this service.



DESIGN and ORGANIZATION of the Communication Matrix

The Communication Matrix involves four major aspects of communication: four of the earliest reasons for communicating; seven levels of communication; 24 specific messages that someone expresses (such as "I want that"); and nine categories of behaviors that someone uses to communicate (such as simple gestures).

Four Reasons to Communicate

The Matrix is organized into four major reasons to communicate that appear across the bottom of the Profile: to **REFUSE** things that we don't want; to **OBTAIN** things that we do want; to engage in **SOCIAL** interaction; and to provide or seek **INFORMATION**.

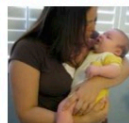
Seven Levels of Communication

Level I. Pre-Intentional Behavior



Behavior is not under the individual's own control, but it reflects his general state (such as comfortable, uncomfortable, hungry or sleepy). Caregivers interpret the individual's state from behaviors such as body movements, facial expressions and sounds. In typically developing children, this stage occurs between 0 and 3 months of age.

Level II. Intentional Behavior

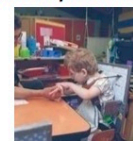


Behavior is under the individual's control, but it is *not yet used to communicate intentionally*. Individuals at this stage do not yet realize that they can use these behaviors to control another person's behavior. Caregivers interpret the individual's needs and desires from behaviors such as body movements, facial expressions, vocalizations and eye gaze. In typically developing children, this stage occurs between 3 and 8 months of age.

INTENTIONAL COMMUNICATION BEGINS HERE, AT LEVEL III

Level III. Unconventional Communication (pre-symbolic)

Unconventional pre-symbolic behaviors *are used intentionally to communicate*. Communicative behaviors are "pre-symbolic" because they do not involve any sort of symbol; and they are "unconventional" because they are not socially acceptable for us to use as we grow older. Communicative behaviors include body movements, vocalizations, facial expressions and simple gestures (such as tugging on people). In typically developing children, this stage occurs between 6 and 12 months of age.



Level IV. Conventional Communication (pre-symbolic)



Conventional pre-symbolic behaviors are used intentionally to communicate. Communicative behaviors are “pre-symbolic” because they do not involve any sort of symbol; they are “conventional” because they are socially acceptable and we continue to use them to accompany our language as we mature. The meanings of some gestures may be unique to the culture in which they are used. Communicative behaviors include pointing, nodding or shaking the head, waving, hugging, and looking from a person to a desired object. Note that many of these gestures (and especially pointing) require good visual skills and may not be useful for individuals with severe vision impairment. Some vocal intonations may also be used at this stage. In typically developing children, this stage occurs between 12 and 18 months of age.

SYMBOLIC COMMUNICATION STARTS HERE, AT LEVEL V

(symbols represent, or stand for, something else)

Level V. Concrete Symbols



“Concrete” symbols that physically resemble what they represent, are used to communicate. Concrete symbols look like, feel like, move like or sound like what they represent. Concrete symbols include pictures, objects (such as a shoelace to represent “shoe”), “iconic” gestures (such as patting a chair to say “sit down”) and sounds (such as making a buzzing sound to mean “bee”). Most individuals skip this stage and go directly to Level VI. For some individuals concrete symbols may be the only type of symbol that makes sense to them; for others they may serve as a bridge to using abstract symbols. Typically developing children use concrete symbols in conjunction with gestures and words, generally between 12 and 24 months of age, but not as a separate stage.

Level VI. Abstract Symbols



Abstract symbols such as speech, manual signs, Brailled or printed words are used to communicate. These symbols are “abstract” because they are NOT physically similar to what they represent. They are used one at a time. In typically developing children, this stage occurs between 12 and 24 months of age.

Level VII. Language



Symbols (concrete or abstract) are combined into two- or three-symbol combinations (“want juice”, “me go out”), according to grammatical rules. The individual understands that the meaning of symbol combinations may differ depending upon how the symbols are ordered. In typically developing children, this stage begins around 24 months of age.

24 Specific Messages

Under each of the four major reasons to communicate are more specific messages that people express: these correspond to the 24 questions that you must answer as you complete the Matrix. The specific messages are arranged by Level and Reason in the table below.

Level	Refuse	Obtain	Social	Information
I	-Expresses discomfort	-Expresses comfort	-Expresses interest in other people	
II	-Protests	-Continues an action -Obtains more of something	-Attracts attention	
III		-Requests more of an action -Requests a new action	-Requests attention -Shows affection	
IV		-Requests more of an object -Makes choices -Requests a new object		-Answers "Yes" and "No" questions -Asks questions
V	-Refuses or rejects something		-Greet people -Offers things or shares -Directs someone's attention to something -Uses polite social forms	
VI		-Requests objects that are absent		-Names things or people -Makes comments
VII				

Nine Categories of Communicative Behavior

Behaviors are classified into 9 categories: some categories span several levels of development, while others are unique to one level, as shown in the table below:

Level	Behavior Category				
I	 Body Movements	 Early Sounds	 Facial Expressions		
II	 Body Movements	 Early Sounds	 Facial Expressions	 Visual	
III	 Body Movements	 Early Sounds	 Facial Expressions	 Visual	 Simple Gestures
IV					 Conventional Gestures & Vocalizations
V					 Concrete Symbols
VI					 Abstract Symbols
VII					 Language

Results

The information that you provide is used to generate two major products: a one-page Profile and a Communication Skills List.

Profile

The Profile provides a one-page visual summary of the information that you have entered about an individual's communication skills. The Profile contains 80 cells, each representing a particular message at a particular level of communicative behavior. Each cell is color coded to show skills as mastered, emerging, not used or surpassed.



Communication Skills List

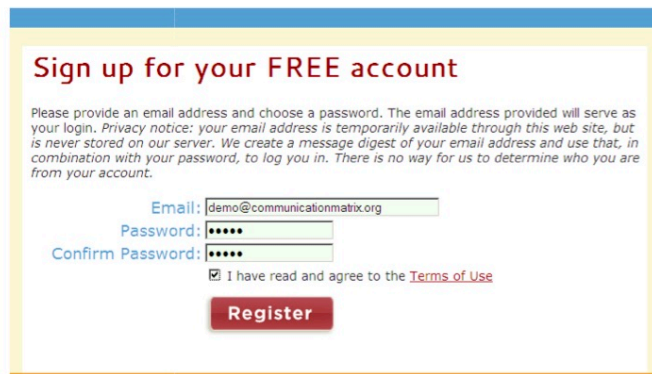
The Communication Skills List simply lists each message (such as "Obtains More of Something"), the categories of behavior that the individual uses to communicate that message (such as Body Movements or Facial Expressions), the specific behaviors used under each category (such as Leg Movements or Smile) and the level of mastery (Mastered or Emerging). This list shows you exactly which behaviors your child uses to communicate which messages.

Message	Category	Behavior	Mastery
C1: Releases or Rejects Something	Body Movements	whole body movements (twist, turn away)	Mastered
	Body Movements	arm or hand movements	Mastered
	Body Movements	leg movements (kick, stamp feet)	Mastered
C2: Shows	Body Movements	stare, stare	Mastered
	Facial Expressions	frown, grimace	Mastered
C3: Pushes away object or person	Body Movements	pushes away object or person	Mastered
	Facial Expressions	gives unwanted item to you	Mastered
C4: Shakes head "no"	Body Movements	shakes head "no"	Mastered
	Facial Expressions	specific vocalizations ("uh-uh")	Mastered

GETTING STARTED

It's easy to register for this service or to log in as a returning user.

New user registration. New users can register for this free service by providing an email address and a password.



Sign up for your FREE account

Please provide an email address and choose a password. The email address provided will serve as your login. *Privacy notice: your email address is temporarily available through this web site, but is never stored on our server. We create a message digest of your email address and use that, in combination with your password, to log you in. There is no way for us to determine who you are from your account.*

Email:

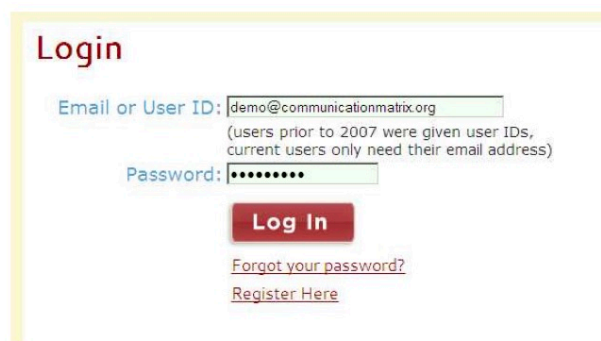
Password:

Confirm Password:

☒ I have read and agree to the [Terms of Use](#)

Register

Returning users. Returning users may login with their email address and password.



Login

Email or User ID:
(users prior to 2007 were given user IDs, current users only need their email address)

Password:

Log In

[Forgot your password?](#)

[Register Here](#)

User ID (for users of earlier versions). Individuals who used an earlier version of this service may already have a “User ID” and password: if that is the case, you may continue to log in with your old User ID instead of an email address. Or, after you log in you may use the “Change email” link at the top of the page to enter your email address for future logins.

Forgot your password? If you forget your password, use this link to have it emailed to you.

Login

Email or User ID: (users prior to 2007 were given user IDs, current users only need their email address)

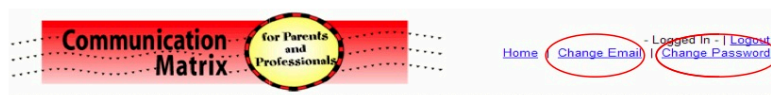
Password:

[Log In](#)

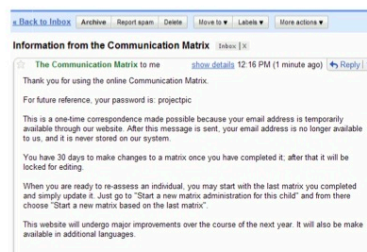
[Forgot your password?](#)

[Register Here](#)

Changing email address or password. After logging in, you may change your email address or password at any time by clicking on the links at the top of the page.



Log in confirmation email. To protect your privacy, your email address is only retained briefly in our database, just long enough to send you a confirmation email with your login and password.



ENTERING DATA

The data you will enter includes demographic information (for a new child) and information about the child's communication behaviors.

Demographic information. After logging in, you will provide some basic information about the individual you are assessing. First, you will enter a personal identifier to help you keep track of your assessments. **Please do not use full names here, since we do not want any identifiable information to appear in our database.**

Where to start. Next, you will answer from 1 to 3 questions to determine whether to start at Section A (Level I), Section B (Level II) or Section C (Levels III and above). These are:

Statement A

My child doesn't seem to have real control over his body yet. The only way I know that he wants something is because he fusses or whines when he's unhappy or uncomfortable, and he smiles, makes noises or calms down when he's happy and comfortable. Does this statement describe your child?

- ☐ Yes
- ☐ No, my child has surpassed this stage

Statement B

My child has control over her own behaviors, but she doesn't use them to try to communicate to me. She doesn't come to me to let me know what she wants, but it's easy for me to figure out, because she tries to do things for herself. She knows what she wants, and her behavior shows me what she wants. If she runs out of something to eat, she will just try to get more, rather than trying to get me to give her more. Does this statement describe your child?

- ☐ Yes
- ☐ No, my child has surpassed this stage
- ☐ No, this stage is beyond my child's ability

Statement C

My child clearly tries to communicate his needs to me through gestures, sounds or language. He knows how to get me to do something for him. He uses some of the kinds of behaviors below to communicate:

- Gestures such as pointing, shaking his head, tugging at my arm or looking back and forth between me and what he wants
- Sounds such as squealing to show you he wants something or fussing when he doesn't want something
- Language or symbolic forms of communication such as speech, written words, Braille, picture symbols, 3-dimensional symbols or sign language

Does this statement describe your child?

- ☐ Yes
- ☐ No, this stage is beyond my child's ability

Answering questions. Once you have been directed to Section A, B or C, you will answer from 3 to 24 questions (depending on where you started) about what specific messages the individual communicates. Each Question has a sample photo and video clip. These samples present only one of many ways that someone might communicate each message.

Section C

At this stage, your child knows that if he does certain things, you will react in certain ways, and he uses his behaviors to communicate very intentionally. There are many different ways that a child may communicate intentionally. Some involve symbols (speech, sign language, picture symbols, 3-dimensional symbols); others involve specific gestures or body movements; some involve early sounds that aren't yet speech. Some children with severe physical impairments may use electronic devices to communicate. Whatever the behavior the child uses to communicate, what's important here is that he uses those behaviors on purpose, obviously trying to communicate something specific to you. Remember that some children may access symbols through a communication device.

C.2 Requests More of an Action

[\[view image\]](#) | [\[view video\]](#)

Does your child intentionally show you that s/he wants more of an action (such as peek-a-boo or making a toy go) that you have just stopped doing?

☒ Yes ☐ No

Entering specific behaviors. When you indicate that the individual CAN communicate a specific message (by checking "Yes" under the question), you will then indicate exactly what behaviors he or she uses to express that message.

C.1 Refuses or Rejects Something

[\[view image\]](#)

Does your child intentionally show you that s/he doesn't want a certain thing or a certain activity?

☒ Yes ☐ No

What does your child do to refuse or reject something?

LEVEL 3

Body Movements	
☒ Not Used ☐ Emerging ☐ Mastered	whole body movements (twist, turn away)
☐ Not Used ☒ Emerging ☐ Mastered	head movements (turn head away or to side)
☒ Not Used ☐ Emerging ☐ Mastered	arm or hand movements
☐ Not Used ☐ Emerging ☒ Mastered	leg movements (kick, stamp feet)
Early Sounds	
☐ Not Used ☐ Emerging ☒ Mastered	scream, whine
Facial Expressions	
☐ Not Used ☒ Emerging ☐ Mastered	frown, grimace
Simple Gestures	
☒ Not Used ☐ Emerging ☐ Mastered	pushes away object or person

Scoring. For each behavior that the individual uses to communicate, you must decide whether it is “emerging” or “mastered.”

- **Emerging** behaviors are used inconsistently or only when prompted or encouraged. They are used only in one or two contexts or with only one person. For example, greeting others is considered emerging if the individual only greets his or her father.
- **Mastered** behaviors are used independently most of the time, when the opportunity arises. They are used in a number of different contexts, and with different people. For example, greeting others is considered mastered if the individual greets family, friends, and unfamiliar people.

Adding Notes. At the bottom of each question screen is a text box in which you may enter notes.

Correcting information. You may go back at any time to a previous Question and change your answers.

Next Question. Use the Next button to continue to the next question.

Next Section. When you complete Sections A and B you are asked questions to determine whether to proceed to the next Section or whether you have gone as far as is appropriate for the individual you are assessing.

Section Complete!

Does your child also have a few behaviors that he or she clearly uses with the purpose of communicating something to you? If so, go on to Section C and see if you can answer "Yes" to any of those questions.

- ☐ Yes, take me to the next section
- ☐ No, I am finished. Generate my profile.

Saving a Matrix. You may Save a Matrix at any time, whether you have completed it, or whether you plan to return and resume it later. You may also Cancel at any time. If you have completed all appropriate questions, the Matrix will be considered complete and you will be able to view the results. If you have not completed all the questions, you will not be able to see results. You may resume an incomplete Matrix at any time. **A completed Matrix may be edited for up to 30 days after its completion.**

Social Expressions
☒ Not Used ☐ Emerging ☐ Mastered smile

Visual
☒ Not Used ☐ Emerging ☐ Mastered looks at desired item

Notes: He only sees this at mealtimes.

Previous Next Cancel **Save & Exit**

HELPFUL HINTS

Interpreting Communicative Intent

It is very important to make an accurate assessment of the individual's intentionality. If you assume that someone is communicating intentionally when he or she isn't, then you will score at a level that is too high. And if you assume that someone is not communicating intentionally when he or she is, then you will score at a level that is too low. Some of the indicators that behavior is intentionally communicative (and thus should be scored at Level III or higher) are these:

- The individual performs the behavior only when he knows that another person is present. The exception, of course, is for distance behaviors like vocalizing, that are designed to gain the attention of someone who is relatively far away (such as when a child yells for someone in another room).
- The individual directs the behavior to another person, perhaps by establishing eye contact or by touching the person or orienting toward the person.
- The individual waits for the other person to respond to the behavior and stops the behavior when the person makes a response.
- The individual persists if the other person doesn't respond, or perhaps tries another way to get the message across.
- If an individual asks for one thing and you give her another thing, there should be some indication that she realizes something is wrong. You may deliberately sabotage the situation to see whether someone really understands the meaning of her behaviors. For instance, when a child makes a signal that you think means she wants to be rocked, start singing to her instead, and see if she shows surprise or frustration.

It is often especially difficult to evaluate intent when an individual is at the earliest stages of **symbolic** communication, whether it involves spoken words, manual signs, pictures, or any type of symbol. Just making a speech-like sounds, making a sign-like hand motion or pointing to a picture doesn't necessarily mean that it is used with meaning. Below are some indicators that symbols are used with understanding:

- Specific symbols are used only under appropriate circumstances. For instance, an individual doesn't continue to sign "eat" after you know he is full.
- The individual doesn't run through a small repertoire of symbols every time that somebody looks expectantly at her. Sometimes an individual figures out that symbols are somehow communicative, but without understanding the meaning of each one. She just knows that if she uses one symbol after another, eventually she will hit on one that someone will respond to.
- If you respond incorrectly to the use of a symbol, the individual should show surprise or frustration. For instance, if someone gives you a symbol for music and you give him a book, he should make some indication that you have misread him. You might deliberately sabotage the situation to make sure that an individual understands the symbols he is using.

Use of High Tech Communication Devices

Note that for any sort of communication that involves symbols, those symbols may be embedded into some sort of communication device. This might be an elaborate computerized device with voice output or just a very simple little electronic device with only 2 options. The device provides **physical access** to the symbols as well as speech output in some cases. When you use the Matrix, what is recorded is **the symbolic system that is embedded into the device** (such as the picture or written label that identifies each message), **not** the type of device that is used to access the symbols.

Use of Single Switch Devices

If you have a device that is simply used for one purpose, such as a calling device, that takes a simple gesture to activate it (such as tapping it), the behavior that is used to activate the switch would be scored. Generally this will be a Simple Gesture, Body Movement or Visual behavior (eye gaze).

The use of switches for purposes not related to communication is **never** scored on the Matrix, as when children are given switches connected to mechanical toys to learn "cause and effect". That is not considered communicative behavior, since the switch is not used to communicate a specific message to someone else.

GENERAL NAVIGATION

My Home. If you have previously used this service, you will go directly to your Home page when you log in. Here you will see every Matrix you have begun or completed. Your home page gives you access to a number of options for editing, resuming, viewing and sharing your matrices.

Welcome to the Communication Matrix

On this page you will see information about any Matrix data you have already entered. The ID numbers for all children for whom you have entered data are listed below. You may click on an ID number to see what data you have entered for that child. From there you may:

- View or Delete a previously completed Matrix
- Resume an unfinished Matrix
- Update a child's communication skills starting with a previously completed Matrix
- Start a new Matrix from scratch for a child

Note: Matrices are editable for 30 days from the date of completion.

Help Videos
[The Communication Matrix](#) | [Filling Out the Communication Matrix](#) | [Understanding Your Results](#)

[Add a New Child](#) [Download The Matrix Questions](#) [Create Report](#) | [Email Results](#) | [Edit](#) | [Delete](#)

Matrix ID	Entered	Administered	Actions
414	12/8/2004	12/8/2004	View Profile Skills List Delete
415	12/8/2004	12/8/2004	View Profile Skills List Delete
418	12/8/2004	12/8/2004	View Profile Skills List Delete
419	12/8/2004	12/8/2004	View Profile Skills List Delete

[Start a New Matrix Administration For This Child](#)

Report ID	Created	Last Updated	Days Left to Edit	Report Date	Actions
209	1/5/2010	1/5/2010	0	1/5/2010	Edit PDF Main PDF Summary Delete
805	1/21/2011	1/21/2011	0	1/21/2011	Edit PDF Main PDF Summary Delete
806	1/21/2011	1/21/2011	0	1/21/2011	Edit PDF Main PDF Summary Delete

My Home

Email Results. Use the *Email Results* button to the right of the Personal ID to email a link to the Profile and Communication Skills List to someone else with whom you have permission to share information. The recipient will receive an email from commatrix@communicationmatrix.org with links to the results and to information about the Communication Matrix.

« [Back to Inbox](#) | [Archive](#) | [Report spam](#) | [Delete](#) | [Move to](#) ▼ | [Labels](#) ▼ | [More actions](#) ▼

Communication Matrix Online Share from Jana Dawson [Inbox](#) | X

★ **The Communication Matri** [show details](#) 2:24 PM (2 minutes ago) [Reply](#) ▼

Jana Dawson (jdaw1894@silverfalls.k12) would like to share results from the online Communication Matrix with you.

Please click on the following link:
<http://www.communicationmatrix.org/share/?guestkey=2A7C88D82E83FEE2319A457FB868DDB5-81998092FF1AF31F3F4650E72351868C>

Mr. and Mrs. Harvey, please use this link to view the results for Travis. We can discuss them when we get together next week.

Thanks,
 Jana

For more information, please visit our home page at <http://www.communicationmatrix.org>.

The online Communication Matrix is a service of Design to Learn Projects at Oregon Health & Science University
 copyright 2009 Charity Rowland, Ph.D.

Edit demographic information. Click on Edit to the right of the Personal ID to change or add demographic information about this individual.

Delete child. Click on Delete to the right of the Personal ID to permanently delete all data on this individual.

Resume a partially completed matrix. Click on Resume to finish a Matrix that you did not complete earlier.

Edit Matrix data. A Matrix completed within the last 30 days may be edited. Click on Edit to the right of the Matrix # that you want to change.

View profile. Click here to view or print the one-page profile of results and gain access to unique online viewing options.

Skills list. Click here to view or print the Communication Skills List.

Delete Matrix. Click on Delete next to a specific Matrix that you want to delete permanently.

Start a New Matrix Administration for This Child. When you are ready to re-assess an individual, click here. You then are given a choice of starting a completely new Matrix from scratch or simply updating the last completed Matrix. When you start a new Matrix "from scratch" you may be entering data from a printed copy of the Matrix that you completed earlier. If this is the case, you will have the opportunity to enter the administration date, since it may be different from the date that you enter the data.

Start a New Matrix Administration

Please select a statement below that describes the type of matrix administration that you would like to begin.

☐ I am starting a new matrix from scratch.

☒ I am entering data from a printed version of the Communication Matrix.
When was the printed version administered?

☐ I am updating based on the last completed matrix for this child.

Next Cancel

Add a New Child. Click here to assess a new individual.

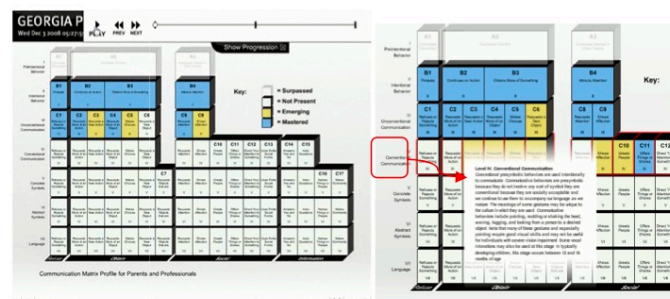
NOTE: 30 days to edit. Once you have completed a matrix you may edit it for 30 days after it is saved. Until that point, you may edit a completed matrix to change data in it. After that it is locked.

REVIEWING YOUR RESULTS

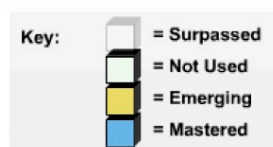
We provide a number of exciting options for reviewing your results. It is our hope that families and professionals will be able to view the results together on a computer to get the most out of the features that can only be appreciated online. There are several options for viewing your results; you may print out results, you may email them to someone else, and you may review them online using special animation features.

Profile: Standard View

The **Standard View** of the Profile provides a 1-page printable overview of results. It shows a matrix with 80 cells, each representing a particular message at a particular level of communication. When you first complete a Matrix you are automatically guided to this view. You also may get to this view from your Home. When you “mouse over” the name of a level, you will see a description of the level.



Each cell is shown as mastered, emerging, not used, or surpassed. Here's the key:

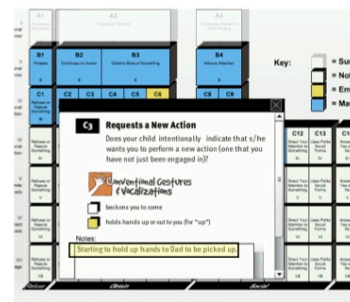


The designation is based on the HIGHEST score for any behavior in that cell: in other words, if ANY behavior is scored as mastered for a particular cell, then the entire cell will appear as mastered, even if you also checked other behaviors as emerging or not used for that cell. If you indicated that Section A or B has been surpassed, that section is grayed out.

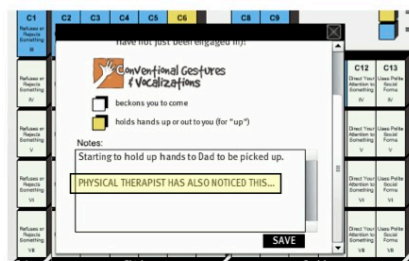
The Standard View provides a quick overview of the communicative messages that the individual uses. In this view, you may also click on each cell to see exactly how each behavior was scored for that message.



You will also see any notes that you made as you answered the questions.



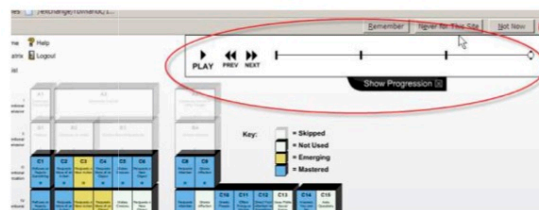
Note that you may add and save NEW notes when you are in the Standard View.



Show Progression. Choose **Show Progression** to review the development of an individual for whom you have completed two or more assessments.



Choose **Play** to view an animated sequence of the matrices completed for that individual. Choose **Next** to step forward through the matrices one at a time, or choose **Previous** to step backwards through them.

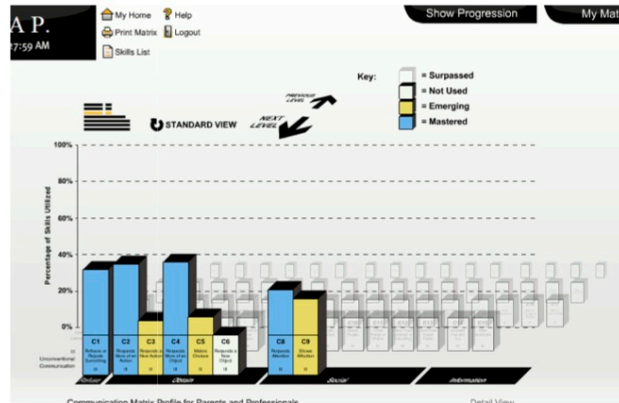


Profile: Mastery View

This **Mastery View** shows you the degree to which the individual has mastered each of the seven Levels of communication. To access this view, click on the name of the Level that you want to view (to the left of the Standard Profile).

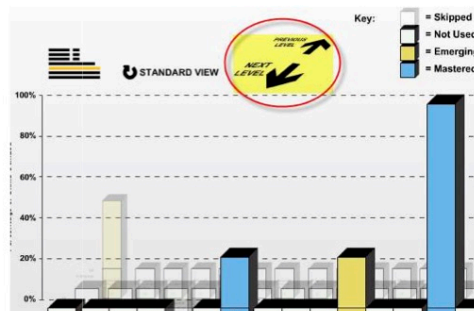
I Proximal Behavior	A1 Expresses Discomfort	A2 Expresses Comfort				A3 Expresses Interest in Other People
	B1 Protects	B2 Continues an Action	B3 Obtains Most of Something			B4 Attracts Attention
II Intentional Behavior	C1 Refuses or Requests Something	C2 Requests More of an Action	C3 Requests a New Action	C4 Requests Most of an Object	C5 Requests a New Object	C6 Requests a New Object
III Unconventional Communication	C7 Refuses or Requests Something	C8 Requests More of an Action	C9 Requests a New Action	C10 Requests Most of an Object	C11 Requests a New Object	C12 Requests a New Object
IV Conventional Communication	C13 Refuses or Requests Something	C14 Requests More of an Action	C15 Requests a New Action	C16 Requests Most of an Object	C17 Requests a New Object	C18 Requests a New Object
V Concise Symbols	C19 Refuses or Requests Something	C20 Requests More of an Action	C21 Requests a New Action	C22 Requests Most of an Object	C23 Requests a New Object	C24 Requests a New Object

Here's the Mastery View for Level III of a sample Profile:

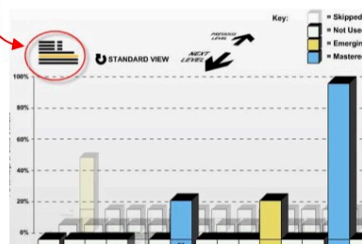


Each bar represents a message at the chosen level, represented by one of the 80 cells on the profile. The height of each bar reveals the degree of mastery of all possible behaviors that might be used to express each message at that level. This score is calculated by allowing 2 points for each *mastered* behavior and 1 point for each *emerging* behavior. The total score for each cell is divided by the maximum possible score for that cell to obtain a percent. In the example above, the first bar on the left shows mastery of C1 ("Refuses or Rejects Something") at Level III (Unconventional Communication). There are seven behavior options in this cell, so the maximum possible score is $2 \times 7 = 14$. For this individual, two behaviors are scored *mastered* and one is scored *emerging*, for a total score of five (5). 5 divided by 14 is 36%, so the bar goes to that level.

Use the **Next** and **Previous** arrows to step through the levels.



This icon shows you which of the seven levels you are currently viewing.

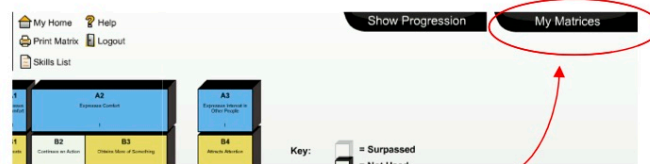


NOTE: Remember that an individual with severe physical limitations may not be able to use many behaviors and would not be expected to show a high degree of mastery using this view.

Note that the Progression features also work in the Mastery View.

You may choose to print out the Mastery Views for each level of the Profile for a complete record of results.

View a Different Profile. When in the Standard or Mastery Profile view, choose **My Matrices** to view all the individuals you have assessed. From here you may choose to view the profile of a different individual. You may also choose a Matrix administered on a different date if you have completed more than one Matrix on an individual.



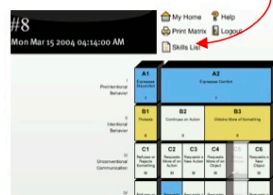
Communication Skills List

The printable **Communication Skills List** shows exactly what behaviors the individual uses to express each message.



Message	Category	Behavior	Mastery
B1. Protests	Body Movements	head movements (turn head away, pull head back)	Mastered
	Body Movements	arm movements (bat arms, push, throw away)	Mastered
	Body Movements	moves away from person or object	Emerging
	Early Sounds	whine, fuss, scream	Mastered
	Social Expressions	frown, grimace	Emerging
B2. Continues an Action	Body Movements	arm movements (bat arms)	Emerging
	Early Sounds	coo, squeal, fuss	Mastered
	Social Expressions	smile	Mastered
	Visual	looks at person	Emerging

You may find it either from your Home page or by clicking on **Skills List** at the top left of a Profile.



If more than one Matrix has been completed on an individual, you will see a tab for each Skills List.



Skill	Behavior	Mastery
Body Movements	head movements (turn head away, pull head back)	Mastered
Body Movements	arm movements (bat arms, push, throw away)	Mastered
Body Movements	moves away from person or object	Emerging
Early Sounds	whine, fuss, scream	Mastered

SCORING the COMMUNICATION MATRIX

Sometimes you need to generate a score for the Matrix. Scores may be useful to quantify progress from one administration of an assessment to another, or may simply be a requirement. There are a number of ways to score the Matrix. Below we describe four ways to score the Matrix.

Total Score

The simplest score is the Total score. There are 80 cells on the Matrix profile. Each cell may be scored according to its level of mastery: "Not used" (a blank cell) gets 0 points, "Emerging" gets 1 point and "Mastered" (or Surpassed) gets 2 points. Add up the points to get the total score, which may range from 0 to 160. You also may take a percent of the total score out of 160: so if you got a total of 80 points, that would be 50% of 160.

Each of 80 cells on the profile is scored as:

- *0 (not used)*
- *1 (one or more emerging behaviors)*
- *2 (one or more mastered behaviors, or surpassed)*

Total score = sum of these 80 scores

Maximum score = 160 (or calculate % out of 160)

The

Total score is very sensitive to change over time, since it will increase whenever a cell moves from "Not used" to "Emerging" or from "Emerging" to "Mastered". However, it really doesn't tell you anything about exactly how the individual is communicating; you just know that the higher the score is, the better.

Primary Level

A second way to score is to identify the Primary Level at which the individual is operating. The primary level would be the one at which the highest percentage of cells are scored as mastered. For instance, a child might have surpassed the first two levels and have mastered 7 out of 8 cells on Level 3 (or 88%), 10 out 14 cells on Level 4 (or 71%) and 5 out of 17 cells at Level V (or 29%). The Primary Level would be Level III,

since the greatest percentage of cells have been scored as mastered at that Level. Note that you could also be more liberal with this approach and count both emerging AND

Level (1-7) at which the highest % of intents is scored as Mastered (can also count Emerging + Mastered)

mastered cells.

Another way to interpret Primary Level would be to designate the level at which the individual communicates **most frequently**.

Highest Level

You can also look at the Highest Level mastered, perhaps in combination with the Primary level. Most individuals operate on several levels at the same time, using some behaviors at a higher level than the Primary level. We define Highest level as the highest level at which at least one intent is mastered.

Highest level (1-7) at which at least one intent is mastered (can also count Emerging + Mastered)

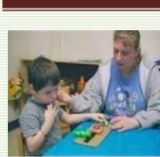
For example, you might say that an individual's Primary level is IV and his highest level is VI. This gives you a little better idea of how the individual is functioning. As with the Primary Level, you may choose to be more liberal with this approach and count emerging as well as mastered cells.

Reason-Pattern Score

Finally, there is a more complicated way to score that provides more useful information. We call this the Reason-Pattern Score. It shows what percent of cells are scored mastered for each of the 4 major Reasons to communicate: to Refuse (which has 7 cells), to Obtain (which has 31 cells), for Social interaction (which has 28 cells), and for Information (which has 14 cells). As an example, an individual might have a Reason-Pattern Score of 100:60:35:0. This means that the individual has a 100% score for Refusing, 60% for Obtaining, 35% for Social Interaction and 0% for Information. This pattern gives you a general idea of the sorts of things that the child can express.

% cells (intents) scored as Mastered under each of the four Reasons to communicate (in order of Refuse:Obtain:Social:Information).

USING RESULTS to PLAN INSTRUCTION



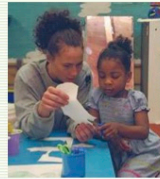
The Communication Matrix results may help parents and educators to decide upon general communication goals that are appropriate, given the individual's current skills. You may develop a general intervention goal (what **level** of communication to target), as well as specific intervention goals (what specific communicative **behaviors** and **messages** to target).



In general, an individual should be allowed to perform at his or her current level of communication, while being steadily encouraged to progress to the next logical level of communication.



The first decision to make is whether to focus primarily on increasing competence at the current Level (which you would do if the individual has a very small number of communication behaviors or messages at the current Level) and/or whether to target some behaviors at the next higher Level.



The next decision is which specific communicative behaviors to target. Should you target only existing behaviors or strive for new ones? This decision must take into account the individual's motor, fine motor, vocal and sensory abilities and any limitations that may make it difficult or impossible for the individual to produce certain behaviors. You must also consider any cognitive limitations that may prevent an individual from understanding certain types of symbols.

Finally, you must decide exactly which messages to target. Refer to the Profile to determine where there are gaps in the individual's communication skills and consider targeting new messages that the individual really needs to learn to express.

As a rough guide, you may use the table below to suggest a general level of intervention to target, based on where the individual is currently operating.

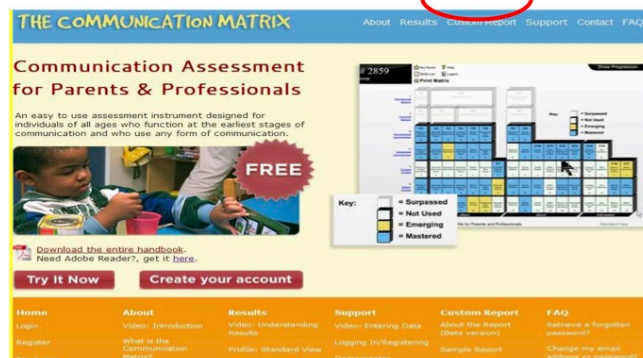
Generic Intervention Goals

Primary Level of Functioning	Generic Goal
I. Pre-intentional Behavior	Establish purposeful behavior by creating highly responsive environments
II. Intentional Behavior	Respond to potentially communicative behaviors so that the child becomes aware of their communicative purpose
III. Unconventional Communication (pre-symbolic)	Shape nonconventional gestures into conventional gestures and/or target symbol use
IV. Conventional Communication (pre-symbolic)	Teach 1:1 correspondence between symbols (concrete or abstract) and referents
V. Concrete Symbols	Teach 1:1 correspondence between abstract symbols and referents.
VI. Abstract Symbols	Teach the combination of symbols into two- and three-symbol utterances.
VII. Language	Expand semantic and syntactic abilities.

The Custom Report feature, described on the next page, steps you through this process.

CUSTOM REPORT

The Custom Report feature of the online Matrix allows you to generate a completely customized report of assessment results with educational recommendations. The basic components are personal information about the client, a summary of current functioning, a report of recent progress (if there has been more than one Matrix administered) and educational recommendations. The report can be as long or as short as you wish. You pick and choose the elements that appear in the report and you may add your own impressions and suggestions. A sample report is available for viewing or downloading. This feature is available only in English.



To create a report, go to My Home and click on “Create Report”. If you have already created reports for that individual, they will be listed at the bottom, underneath the assessments you have completed. Here you have options to Edit or Preview the report, open it as a PDF for printing, or Delete it.



The fees charged to use the Custom Report feature go to supporting the continued availability of the assessment service.

CONTACT INFORMATION

Suggestions?

Thank you for your interest in the Communication Matrix. You may send feedback and suggestions to info@communicationmatrix.org

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APPENDIX F – CONSENT FORM (Video Recording)



SPEECH PATHOLOGY & AUDIOLOGY
THE SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT (SHCD)



Private Bag 3, Wits, 2050 • Tel: 011 717 4577 • Fax: 011 717 4572 • E-mail: sppa.SHCD@wits.ac.za

EFFECTIVENESS OF A CAREGIVER TRAINING PROGRAM ON THE USE OF COMMUNICATIVE FUNCTIONS IN CHILDREN WITH CEREBRAL PALSY

Written Consent Form: Video recording of assessment sessions

The assessment sessions will be video recorded for the purpose of data analysis. The video footage will be kept strictly confidential in a locked cupboard on a password-protected laptop. The video footage will be stored for 5 years and thereafter will be deleted. The researcher will be the only individual that will have access to the video footage.

I hereby consent to video recording of the assessment sessions. I understand that confidentiality will be maintained at all times and that the recordings will be destroyed after completion of the study.

Name of Participant:

Date:

Signature:

APPENDIX F (Continued) – CONSENT FORM (Participation in study – Parent)



SPEECH PATHOLOGY & AUDIOLOGY
THE SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT (SHCD)



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Written Consent Form

I (we) grant permission to be included in the *Effectiveness of a parent-training program on the use of communicative functions in children with cerebral palsy* research study. The purpose and procedures of the study have been explained to me. I understand that my participation is voluntary and that I may refuse to answer any particular items or withdraw from the study at any time without any negative consequences. I understand that my responses will be kept confidential.

Name of Participant:

Date:

Signature:

I have explained the purpose and procedures of the study as well as the rights of research participants. I agree with the conditions mentioned in the Information Sheet and Consent Form/s and undertake to adhere to them.

Name of researcher:

Date:

Signature:

APPENDIX F (Continued) – CONSENT FORM (Participation in study - Children)



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EFFECTIVENESS OF A CAREGIVER TRAINING PROGRAM ON THE USE OF COMMUNICATIVE FUNCTIONS IN CHILDREN WITH CEREBRAL PALSY

Written Consent Form

I (we) grant permission for my child to be included in the *Effectiveness of a parent-training program on the use of communicative functions in children with cerebral palsy* research study. The purpose and procedures of the study have been explained to me. I understand that my child's participation is voluntary and that I may withdraw my child's participation from the study at any time without any negative consequences. I understand that any data from the study will be kept confidential.

Name of Participant:

Date:

Signature:

I have explained the purpose and procedures of the study as well as the rights of research participants. I agree with the conditions mentioned in the Information Sheet and Consent Form/s and undertake to adhere to them.

Name of researcher:

Date:

Signature:

APPENDIX G – The Malamulele Carer-2-Carer Training Programme (C2CTP)

Permission letter from Malamulele Onward



P.O. Box 52641
Saxonwold
2132
South Africa

Malamulele Onward Building
Children's Memorial Institute
Gate 10
13 Joubert Street Extension
Braamfontein
Johannesburg

Tel. (011) 484.9456
www.CPchildren.org

Malamulele Onward NPC
Reg. No. 2006/033287/08
Registered with the Department of
Social Development as a Non-Profit
Organisation 056-807-NPO
Public Benefit Organisation
930025084

10 November 2014

Ms. Marissa Venter
Discipline of Speech Pathology and Audiology
Faculty of Humanities
University of the Witwatersrand
JOHANNESBURG

Dear Marissa

PERMISSION TO USE THE MALAMULELE ONWARD CARER-2-CARER TRAINING MATERIAL

Permission to use the Malamulele Onward Carer-2-Carer Training Programme material for the purposes of your study "The effectiveness of a Carergive Training Programme on the use of communicative functions in young children with Cerebral Palsy" is hereby granted.

I confirm that Malamulele Onward has signed written informed consent from the caregivers and where appropriate, from the children themselves, for the children's photographs to be used in the Carer-2-Carer Training Material.

All good wishes for your study and I look forward to seeing the results.

Yours sincerely

Gillian Saloojee

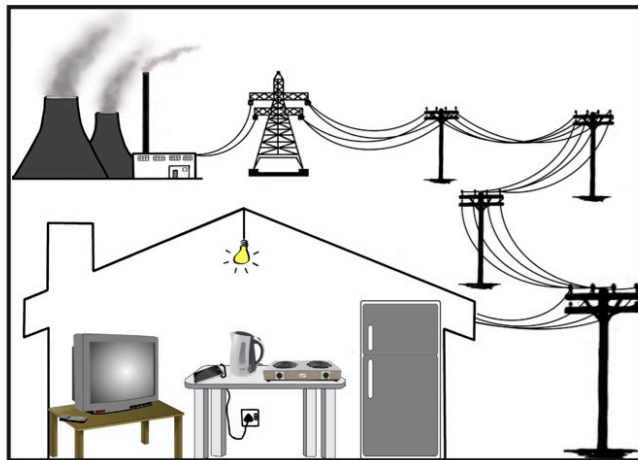
Dr Gillian Saloojee
Executive Director

Parent Handout

CP = Cerebral Palsy

CP is short for cerebral palsy. The word 'cerebral' means having something to do with the brain. The word 'palsy' means a weakness or problem in the way a person moves or positions his or her body.

The power station



The different groups of CP:

Spastic

Choreoathetoid

Dystonic

Mixed

The different levels of CP:

1

2

3

4

5

The parts of the body involved:



Quad



Di



Hemi

Parent Handout

Most of the time the cause of a child's CP is not known, because it is difficult to tell exactly when the damage to the brain happened.

Things that can happen to the mother that can cause CP:

- Illness or infection
- Very high blood pressure
- Early labour
- Having twins
- Taking pills which could harm the baby
- Any situation where the baby cannot get out
- An accident that injures the baby's head

Things that can happen to the baby that can cause CP:

- Born very early (*before 8 months*)
- Bleeding in the brain
- An infection in the brain (*meningitis or TB meningitis*)
- Fitting soon after birth

Things that do not cause CP:

- Sex during pregnancy
- Emotional stress
- Angry ancestors
- Unfaithfulness in marriage
- Inherited from a family member
- Witchcraft
- Bad spirits
- Punishment from God

1. CP is lifelong. A child will always have CP and it will not go away.
2. All children with CP have problems with movement.
3. Although we cannot cure CP, all children have the potential to change.

Remember:
CP is not a parent's fault.
It is something that no parent can control.

Parent Handout

Caring for a child with CP is a way of life.

Children with CP will become adults with CP and as they grow, they will change. They can either change in a good way or a bad way, depending on how they spend their day.

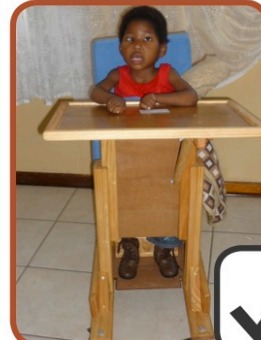
We spend some of the day either moving, holding or carrying our children, but most of their day is spent in different positions. The way that children with CP are positioned is important, especially for level 4 and 5 children, because they cannot move on their own.

Children can change in a good way over time.

This change is small in children who are level 4 or 5, but we can prevent them from becoming worse.

This change is easier to see in children who are level 1-3, but this change cannot happen if we do not care for the child in a way that is helpful during the day.

Positioning a child with CP:



When we leave a child in a position, we need to make sure that the knees are facing the same way as the body.

If we do not position them well, their hips will dislocate over time.

If they are lying on their side, we need to support the top leg.

This is important for all positions, not only when the child is lying down.

Parent Handout

Caring for a child with CP:

Here are some helpful points to remember when caring for a child with CP:

- Move the child slowly and give them time.
- Do not force the child's body to move.
- Tell the child what you are doing.

A child that is stiff:

If a child is stiff, we need to loosen their body.



Moving and Twisting



Massaging and Stretching

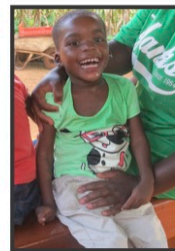
A child that pushes back:

If a child pushes back or moves too much, we need to calm the body and help the child to become soft and there are some helpful ways to do this.

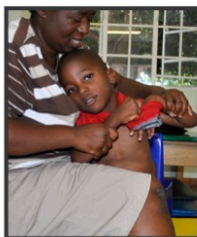
1. Do not fight the child.



2. We need to support their body to help them feel safe.



Dressing and undressing



Parent Handout



Eating & Drinking:

A good position:

- The child must be sitting upright.
- Their chin must be close to their chest.
- Their arms and shoulders should be forward.
- Their hips should be bent.
- Their feet should be supported.
- They should feel comfortable.

A good position is important for a child with CP to be able to eat and drink safely and comfortably.

A child cannot eat and drink safely if their head is tilted back.

It is important that you are also comfortable when feeding your child.

Bring the food from below the child's eyes and in front of the child so that their head does not tilt back.

Make sure that the child stays in an upright position for at least 30 minutes after meals.

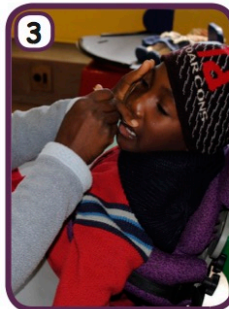
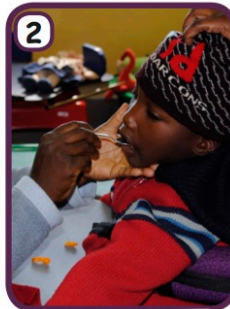
Children with CP need to be fed slowly.

Use a shallow spoon that fits the child's mouth.

Feed small amounts at a time.

Feeding with a spoon:

Before you begin, the child must be in a good position for feeding. Support the child's jaw lightly. Then gently press the spoon down on the tongue wait for the child to try and use their lips to take the food off the spoon.



It is very important that we give the child the opportunity to use their lips to take the food off the spoon.

If the child does not respond, you can help bring the lip down gently.

Parent Handout

Helping a child to chew:



- *It is important for a child to learn how to chew.*
- *When teaching the child to chew, always use soft foods that can dissolve easily if a piece breaks off, so that the child does not choke.*
- *We support the jaw to stop the mouth from opening too wide, we do not open and close the child's mouth.*
- *Be patient and give the child time to chew.*
- *Give the child something to try to chew at every meal.*
- *Ask your therapist to help you practise.*

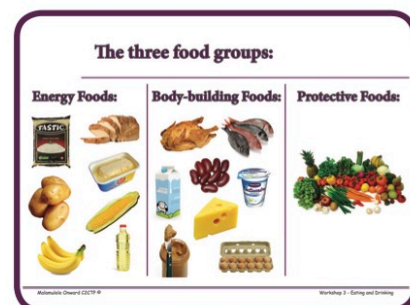
Drinking from a cup:



- *Using thicker liquids can make it easier and safer for a child to drink.*
- *A cut out cup helps a child to drink without tilting their head back.*
- *It is important to wait for a child to use their lips.*
- *Allow the child to drink small amounts at a time.*

Healthy eating:

- *Firstly, children should be fed small meals 5-6 times a day, not 3 large meals.*
- *For children with CP to be healthy we need to make every meal count and we can do this by making sure that we give them at least one food from each food group every day.*
- *It is also important that children with CP drink enough water during the day.*
- *The next helpful idea is that junk foods should only be given on special occasions or as treats every now and then because they are not important for the child's health.*

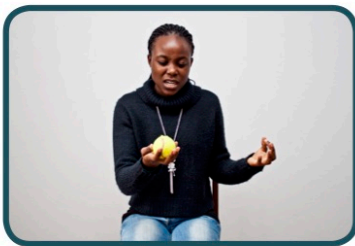


Parent Handout

Communication

Communication is what we use to get messages to each other and there are two parts to communication: talking and understanding.

Remember that even if your child cannot talk, they can still listen and understand. All children with CP can communicate and they all use different ways to do it, even if they cannot talk.



How we can help children with CP to understand better:

When we talk to a child during different activities, we want them to learn many new words. We do not want them to only talk about the names of things. We can also describe them and talk about the actions that we can do with them.

- *We first want the child to know what the object is. So what is it called?*
- *Then we want to describe it. Let us start with what does it look like?*
- *What does the ball feel like?*
- *If we are talking about a food, we can also talk about what it tastes like and what it smells like.*
- *After we have described the object, we can talk about the actions. What actions can you do with a ball?*

Children are learning all the time from words that they hear, so it is important for us to talk to them.

Children learn to understand words before they learn to say them, so even if they cannot talk, we can still help them to understand words.

There are many things that we can talk about. We do not only have to talk about what things are called.

While playing with a ball, a child can learn many different words.

Parent Handout

How we can improve a child's talking:

- *Know your child well and look for how they are trying to communicate.*
- *Call their name.*
- *Ask them questions.*
- *Do not give them instructions when playing.*
- *Respond every time.*

Giving children opportunities to choose:

- *For a child who can talk, it is easy. We just ask: "What would you like to eat?"*
- *For a child who cannot talk, we can give them the choice between two foods. If they can point, it is easy for us to see which one they want. If they cannot point, then we have to watch carefully to see if they either use their eyes to point or move their body towards the food they want.*
- *For a child who can show YES/NO, we can ask: "Do you want carrots? Do you want meat?" Then we have to watch carefully to see their answer. They can either nod/shake their head, move their body or show it on their face.*

It is important to give a child the chance to say something, even if they cannot talk, because if we do not give them a chance to talk, they will stop trying to communicate.

Children use different ways to tell us what they want, but we need to watch carefully to see what they are trying to say.

Always get the child's attention before you ask them a question.

Remember that ALL children with CP can communicate, we just have to work out how they are trying to do it.

It is important to give children the opportunity to make choices.

We can help children with CP to communicate better through what we do during everyday activities.

Parent Handout

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Parent Handout

CVI = Cerebral Visual Impairment

When the brain has been damaged, like in children with CP, the problem with seeing is because of the damage to the brain, not because the eyes are damaged. The eyes are working, but the brain cannot understand what the eyes are seeing. We call this Cerebral Visual Impairment and we say CVI for short.



There are many signs that can tell us that a child has CVI. Children with CVI are all different and so some of them can see more than others.

Helping children who have a CVI:

When working with children with a CVI we must make sure that the child is positioned well and is supported as much as possible.

We must also make sure that the room is quiet, and that we are patient and give the child enough time to respond.

We must remember that it is tiring for the child when we are doing these activities to encourage him/her to look and so we must give the child breaks.

When we show an object to a child with CVI, it is important to remember that we need to hold it close enough for the child to see it, but we do not want to hold it right in front of their face. Often it is easier for a child to see objects when they are held to the side of the child's eyes.

Parent Handout

We should try use the same objects so that the child gets to know them well and can see them more easily.

It is easier for children with a CVI to see bright colours, colours that are very different from each other, light and reflected light:



We can make it easier for the child with a CVI to see by making sure that there is a plain background.



We can make it easier for the child with a CVI to see an object if we move it.

When we are using light to help a child with a CVI to see, we should make sure that the lights are off and that the child is not facing a door or a window.