

# Effective SLP Interventions for Children with Cerebral Palsy

NDT/Traditional/Eclectic



Fran Redstone, PhD, CCC-SLP, C/NDT



# Contents

<i>Preface</i>	<i>ix</i>
<i>Acknowledgments</i>	<i>x</i>
<i>Contributors</i>	<i>xi</i>
<b>Chapter 1. The Development in Neurodevelopmental Treatment (NDT) for the SLP</b>	<b>1</b>
<i>Fran Redstone</i>	
How a child's motor milestones relate to achievement of functional oral-motor and cognitive/linguistic skills.	
<b>Chapter 2. The ABCs of NDT</b>	<b>31</b>
<i>Fran Redstone</i>	
What is cerebral palsy? What is neurodevelopmental treatment (NDT)? Why is this important for the SLP?	
<b>Chapter 3. ABCs of CP and Accompanying Motor Speech Disorders: An Overview</b>	<b>61</b>
<i>Marilyn S. Workinger</i>	
The underlying neurology and causes of the categories of cerebral palsy are presented along with associated disorders. The characteristics of each category are reviewed, as is their development and functional effect on children with cerebral palsy. Assessment principles, including classification of function, are also provided with implications for intervention.	
<b>Chapter 4. Feeding the Whole Child Using NDT</b>	<b>93</b>
<i>Fran Redstone</i>	
An NDT approach for assessment and intervention for feeding disorders in the child with cerebral palsy is presented. A dual-track method that addresses both feeding therapy and eating during daily routines is described. This intervention includes positioning along with techniques for both sensory and oral-motor challenges.	

**Chapter 5. Feeding in the NICU** **131**

*Marjorie M. Palmer*

Most children with cerebral palsy are premature and begin life in the NICU. The first SLP to see this child/family will necessarily deal with feeding issues.

**Chapter 6. Respiratory Control** **165**

*Fran Redstone*

Respiration for rest, speech, and feeding functions are discussed. The development of the coordination between breathing and swallowing is stressed. Evaluation and treatment using NDT principles are presented.

**Chapter 7. NDT and Speech Sound Production** **187**

*Leslie Faye Davis and Fran Redstone*

Development of the coordination of systems for respiratory/phonatory output of the child with cerebral palsy is presented. Intervention including handling, NDT speech sound production, and other motokinesthetic approaches are discussed.

**Chapter 8. Saliva Control and Drooling in Children with Cerebral Palsy** **225**

*Fran Redstone*

Drooling is a common problem that originates from the primary motor impairment and impacts social interactions as the child matures.

**Chapter 9. Early Language Intervention and Interaction** **245**

*Fran Redstone*

Prior to the need for an AAC device, a child with cerebral palsy can develop early communication and language skills including reciprocity, negation, affirmation, and choice-making. Methods to assess and facilitate these early skills are presented.

- 
- Chapter 10. AAC for Children with Cerebral Palsy** 273  
*Cindy Geise Arroyo*  
Cerebral palsy presents challenges for the development of communication skills. Early development of language through assisted technology is presented along with the motor considerations needed to be addressed by the SLP.
- Chapter 11. Literacy Challenges and Early Intervention for Children Using Aided Communication: Starting Well** 305  
*Martine M. Smith*  
Although children with cerebral palsy may need literacy skills to efficiently use an AAC device, few learn the preliteracy skills necessary at the age-appropriate time. This chapter presents the principles that an SLP needs to address when working with young children with cerebral palsy. Additionally, it encourages the SLPs to do this routinely as they would for other children with early communication disorders.
- Chapter 12. Commentary on Evidence-Based Practice and NDT** 337  
*Fran Redstone*  
This chapter presents *evidence* that NDT is supported by a theoretical base as well as individual studies that demonstrate as much evidence for its use as other approaches and techniques for children with cerebral palsy. Indications of bias in funding, publication, and interpretation are discussed along with the problems of providing high levels of evidence for this heterogeneous group of children. Other important issues are presented that include the differences between providing services in a clinical setting versus a research study and the importance of the clinical relationship in determining positive outcomes.

# Preface

This book was written by clinicians who have spent their professional lives helping children with cerebral palsy. Most of these master clinicians have been trained and certified in neurodevelopmental treatment (NDT). The training provided by NDT subsumes all three disciplines that are typically involved in the treatment of children with cerebral palsy: speech, physical, and occupational therapy. All of the contributors to this book acknowledge the importance of motor control in the typical development of communication and its significance in the treatment of children with neuromotor disorders.

It is anticipated that the knowledge and expertise of these therapists will shorten the learning curve for new clinicians who are interested in working with this very special group of children. In addition, it is hoped that the dedication and enthusiasm of the contributors for their chosen field of expertise will engage the reader. It is this enjoyment that has been the impetus for their many years of practice. Although other professionals often experience burnout, these therapists have found fulfillment from the growth and progress they see in their young clients and their families.

The goal of this book is for all readers to become acquainted with the impact of a motor disorder on the development of communication. Perhaps some readers will become interested and will be motivated to work with these unique and very special youngsters.

# CHAPTER 1

## **The Development in Neurodevelopmental Treatment (NDT) for the SLP**

Fran Redstone

### **The SLP and CP**

---

Is it reasonable to expect a child with shallow breathing, open-mouth posture, and a tongue thrust, whose body is fixed in extension, to manipulate toys or interact with peers in a stimulating home or school environment? No, of course not, it is an exercise in frustration for the child and in futility for the child's unprepared speech-language pathologist (SLP). I know this because I've been there. Graduate training prepares educators and speech practitioners for dealing with the communication disorders of physically typical children, but this preparation seldom equips them to treat children with cerebral palsy who have sensorimotor impairments central to their speech/language/feeding disorder. These impairments affect respiration and feeding, as well as a child's interactions with the environment, family, and peers.

The goal of this text is to provide an understanding of how a sensorimotor impairment like cerebral palsy influences a child's speech/language/feeding, and to demonstrate how the SLP can use the knowledge of development and motor control to enhance speech and language development for the youngster with cerebral palsy. This information will be presented along with techniques that have been developed by highly skilled, experienced therapists. It is hoped that this book will facilitate the learning curve for the SLP treating children with neuromotor problems.

This book presents many areas of intervention that have been successfully addressed with Neurodevelopmental Treatment (NDT) principles including feeding, saliva control, sound production, interaction, augmentative and alternative communication (AAC), and literacy. NDT is one of the primary intervention approaches for children with cerebral palsy. It addresses the sensorimotor aspects of the disorder through the clinician guiding the child's motor output during functional activities. NDT was initially pioneered by Karl and Berta Bobath in the 1940s. But it has evolved significantly since that time because of the extensive clinical experience and increasingly sophisticated theoretical understanding of its practitioners.

The chapter authors will demonstrate how they use the knowledge and skills gained through NDT in functional activities and contexts. This has often led to the development of new approaches. The goal is to broaden the base of knowledge of SLPs who work with children with neuromotor deficits. However, it is also hoped that those who work primarily with children with cerebral palsy may consider taking continuing education courses to further this basic knowledge.

The information in this book should be integrated into the techniques generally cited as worthwhile for typically developing children. The approach whose principles are being presented is NDT. The present chapter deals with one aspect that is basic to this approach: the components of development and movement. This subsumes information about the coordination of the subsystems of the speech production system as well as the motor system. The second chapter describes the principles of motor learning and the theoretical bases for NDT. Other chapters

illustrate the specific implications of cerebral palsy on function and how the principles of NDT enhance assessment and treatment. This book also includes techniques that have been developed by the authors over the years for addressing the needs of children with neuromotor problems. These techniques emphasize the importance of individualization for each and every child and the problem-solving nature of NDT.

The SLP must remember that children with cerebral palsy are not typically developing children. Cerebral palsy is a disorder of the central nervous system. It leads to neuromuscular impairments that interfere significantly with their development. This disorder is caused by a nonprogressive lesion in the immature brain that leads to motor functioning deficits (Bartlett & Palisano, 2000; Bax, 1964, 2001; Bennett, 1999) and has been described as a common developmental disability with motor impairment (Badawi et al., 2005; Treviranus & Roberts, 2003). Although the diagnosis of cerebral palsy is based on the movement characteristics and the distribution of muscle tone throughout the body (Bartlett & Palisano, 2000; Finnie, 2001; Langley & Thomas, 1991; Solomon & Charron, 1998), the International Workshop on the Definition and Classification of Cerebral Palsy has suggested that the traditional descriptions be used along with the functional consequences of the movement disorder, which include speech and feeding (Bax, Goldstein, Rosenbaum, Leviton, & Paneth, 2005).

Although I fervently hope that improved prenatal care and medical technology will put me out of business, I have found that most studies cite a relatively stable incidence of cerebral palsy of about 2 per 1,000 births (Andersen, Mjoen, & Vik, 2010). This figure is not diminishing probably due to the improved ability to save children in the NICU. Prematurity or low birth weight is the most prominent factor, leading to 40 to 50% of the cases of cerebral palsy. Half of the children who develop cerebral palsy have birth weights of 2,500 grams or less. The neural damage typically results from periventricular leukomalacia. Table 1-1 may facilitate triggering your memory from the last neurology course you took. The white matter (upper motor tracts) in the area around the ventricles of the developing fetus is quite vulnerable (Rais-Bahrami & Short, 2007). It might be worthwhile

**Table 1-1.** Neurology Terminology Pertinent to Cerebral Palsy

<b>Terms</b>	<b>Definitions</b>
Basal ganglia	Subcortical structures that are considered part of the extrapyramidal system. Consists of putamen, globus pallidus, and caudate nucleus.
Contralateral	On the opposite side.
Extrapyramidal tracts	Indirect system. Regulates reflexes, tone, and posture. Consists of several short pathways connecting many parts of the CNS.
Ipsilateral	On the same side.
Lower motor neuron system	Lies in the PNS. Consists of 12 cranial nerves and 31 spinal nerves. Originates in brainstem or spinal cord. Innervates muscle.
Periventricular leukomalacia (PVL)	Damage of the white matter near the lateral ventricles. More common in premature infants.
Pyramidal tracts	Direct motor system. Consists of corticospinal (for trunk and limbs) and corticobulbar tracts (for speech muscles).
Thalamus	Relay station for sensory information going to the cortex.
Tracts	Groups of axons within the CNS. Often referred to as pathways.
Upper motor neuron system	Part of the CNS that is responsible for skilled voluntary movement. Consists of pyramidal and extrapyramidal tracts.
White matter	Axons that are covered with myelin.

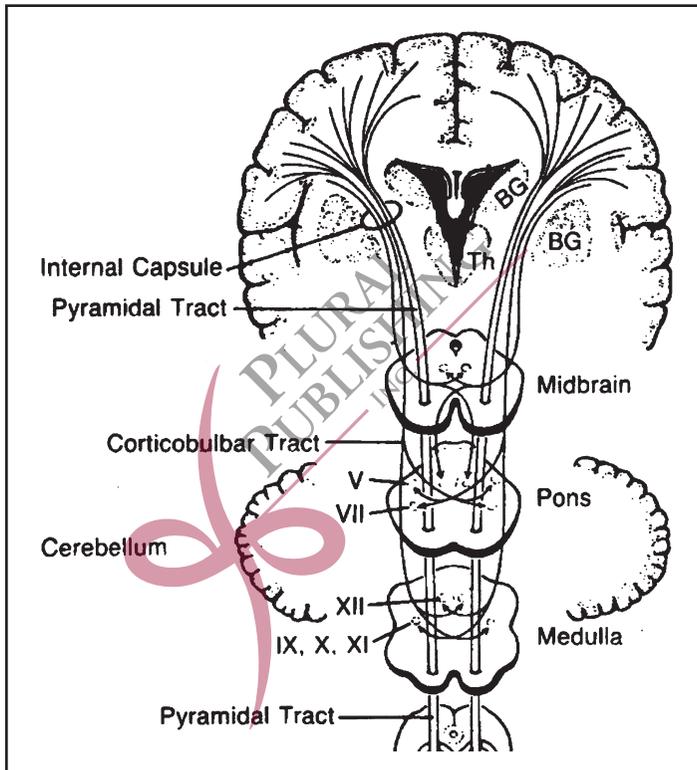
now to digress and discuss the neurology of cerebral palsy to emphasize the impact of damage or dysfunction within the central nervous system.

## **Basics of Cerebral Palsy**

---

Children who are diagnosed with cerebral palsy all have damage to the central nervous system (Yeargin-Allsopp, Boyle, Van Naarden Braun, & Trevathan, 2008), specifically to the upper

motor neuron (UMN) system. Figure 1–1 may facilitate visualizing the relationship between neural structures. The UMN system includes the pyramidal and extrapyramidal tracts and control circuits of the cerebellum and basal ganglia, which are described nicely by Halpern and Goldfarb (2013). The corticospinal and



**Figure 1–1.** The upper motor neuron system beginning at the cortex. The corticobulbar tract and corticospinal tracts descend through the internal capsule and innervate lower motor neurons. Note subcortical, periventricular structures of the thalamus (Th) and the basal ganglia (BG) around the black area, which is the lateral ventricle. (Modified Figure 9–1. From *Treating disordered speech motor control, 2nd ed. [For Clinicians by Clinicians Series]* [p. 324], by D. Vogel and M. P. Cannito [Eds.], 2001, Austin, TX: Pro-Ed. Copyright 2001 by Pro-Ed, Inc. Adapted from *Clinical Management of Neurogenic Communicative Disorders* [pp. 1–96] by D. F. Johns [Ed.], 1985, Austin, TX: Pro-Ed. Copyright 1985 Little, Brown. Reprinted with permission.)