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A study of the relevance and validity of an occupational therapy frame of reference in practice : synthesis of the Model of Human Occupation and Bobath Neurodevelopmental Treatment

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Deuel, Elizabeth Ann, M.S.

San Jose State University, 1994

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**A STUDY OF THE RELEVANCE AND VALIDITY OF AN
OCCUPATIONAL THERAPY FRAME OF REFERENCE
IN PRACTICE:
SYNTHESIS OF THE MODEL OF HUMAN OCCUPATION AND
BOBATH NEURODEVELOPMENTAL TREATMENT**

**A Thesis
Presented to
The Faculty of the Department of Occupational Therapy
San Jose State University**

**In Partial Fulfillment
of the Requirements for the Degree
Master of Science**

**by
Elizabeth Ann Deuel
May, 1994**

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ABSTRACT

A STUDY OF THE RELEVANCE AND VALIDITY OF AN OCCUPATIONAL THERAPY FRAME OF REFERENCE IN PRACTICE: SYNTHESIS OF THE MODEL OF HUMAN OCCUPATION AND BOBATH NEURODEVELOPMENTAL TREATMENT

by Elizabeth A. Deuel

This thesis reports the perceived relevance and validity of Bruhns' (1988) Integrated Frame of Reference for occupational therapy for use with adults who have had a cerebral vascular accident. The frame of reference is a synthesis of the Model of Human Occupation and Neurodevelopmental Treatment (NDT), and offers an approach to the therapy for stroke patients that has a theory base specific to occupational therapy.

Qualitative data were gathered from a focus group of four registered occupational therapists. Results show that the frame of reference can be most useful to 1) increase the ability of occupational therapists to articulate their practice in the use of NDT for stroke treatment; 2) serve to reinforce the philosophy of occupational therapy which underlies experienced therapists' use of NDT techniques; 3) serve as a teaching tool for students and new therapists to assist in the formation of their clinical reasoning skills.

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CHAPTER 1

INTRODUCTION

Purpose

The purpose of this study was to determine the perceived relevance and validity of Bruhns' (1988) Integrated Frame of Reference for occupational therapy to be used with adults who have had cerebrovascular accidents (CVA). The frame of reference is a synthesis of the Model of Human Occupation as described by Kielhofner (1985) and Neurodevelopmental Treatment as described by Bobath (1981) and Davies (1991).

Problem

There are several specific treatments described in the literature for patients who have cognitive-perceptual-motor (CPM) dysfunction resulting from CVA. However, none of the documented treatment approaches are based in occupational therapy theory. Kielhofner (1982) has stated that theories concerning the nervous system have much more attention focused on their development as an independent body of knowledge than on their relationship to occupation. Llorens (1984) has discussed the apparent lack of integration of occupation theory and treatment in the area of physical dysfunction, specifically with the use of biomechanical approaches. Integration of occupation theory and the treatment approach used would enhance the occupational therapist's clinical

reasoning process and the body of knowledge for occupational therapy would be reflected directly in the treatment of the individual with CPM dysfunction. This would help define the validity of occupational therapy as a professional service, contributing to its identity as a unique profession (Clark, 1979).

The model proposed by Bruhns (1988) offers a specific treatment approach for occupational therapy with stroke patients that has a broad theory base specific to occupational therapy. This model has been described theoretically, but not studied through research in the clinic. Mosey (1981) described research as a pertinent step in the continuous process of sustaining a relationship between philosophy and practice in occupational therapy. Data or information generated through practice are concerned with the degree to which application of a particular frame of reference leads to successful or unsuccessful intervention (Mosey, 1981). As a frame of reference provides guidance in day-to-day interaction with patients, knowledge about its applicability in practice is crucial before it is advocated for use by other therapists. Thus, the study of the relevance and validity of the Model of Human Occupation and Neurodevelopmental Treatment could provide the data necessary for application of the Bruhns (1988) Integrated Frame of Reference into practice.

Questions

This study was designed to answer the following research questions:

1. To what degree is the Integrated Frame of Reference as discussed by Bruhns (1988) connected with the actual process of treatment of patients with CPM dysfunction following a stroke?
2. How valid is the Integrated Frame of Reference described by Bruhns (1988) for use as a guide for therapists in day-to-day treatment?

Definitions

Cognitive-perceptual-motor dysfunction: A term used to describe the deficits occurring in patients who have had CVAs. Generally, it results in the inability to process sensory data in a meaningful way upon which appropriate motor output can be based (Bruhns, 1988).

Continuum of function-dysfunction: A structural component of a frame of reference, according to Mosey (1981). The continuum is derived from the theoretical base, and describes the range of function-dysfunction seen in patients with whom the frame of reference is to be used (Mosey, 1981).

Frame of reference: A set of interrelated, consistent concepts, definitions, and postulates that provides a description for a therapist's interaction within a particular aspect of a profession's domain of concern (Mosey, 1981). It consists of a theoretical base, a

continuum of function-dysfunction and behaviors indicative of the continuum, and describes postulates of intervention (Bruhns, 1988; Mosey, 1981).

Integrated Frame of Reference: The frame of reference being studied in this research; described by Bruhns (1988), it is a synthesis of an occupation theory based model, the Model of Human Occupation, and a specific treatment approach for CPM dysfunction, Neurodevelopmental Treatment.

Model of Human Occupation: An occupational therapy model which provides explanation of the occupational functioning of persons; it represents various structures and processes that underlie occupational behavior. Based on general systems theory, it encourages holistic treatment of the patient (Kielhofner, 1985). The model serves as one of the theoretical bases for the Integrated Frame of Reference.

Motor behavior concept: A concept defined by DiJoseph (1982) which states that any volitional motor act by a person is an expression involving the mind, body, and environment. The concept serves as one of the theoretical bases for the Integrated Frame of Reference.

Neurodevelopmental Treatment: A neurophysiological treatment approach to CPM dysfunction of patients who have sustained a stroke, developed by Bobath (1981) and further elaborated by Davies (1991). The approach serves as one of the theoretical bases for the Integrated Frame of Reference.

Patients with cerebrovascular accident: Persons who have suffered a CVA, or stroke, and who have been referred to occupational therapy. Strokes result from cerebral infarction, caused by a thrombosis or embolism, and cerebral hemorrhage (Ryerson, 1990).

Person environment: The concept explained by Llorens (1984a) that states the individual is the first level environment, which must be balanced prior to functional interaction with the second and third level environments of family and community. This concept serves as one of the theoretical bases for the Integrated Frame of Reference.

Postulates regarding intervention: The structural component of a frame of reference that describes principles by which the patient is assisted in moving from a state of dysfunction to a state of function (Mosey, 1981).

Relevance of the frame of reference to treatment: The degree to which the Integrated Frame of Reference is connected with the actual process of treatment of stroke patients by occupational therapists in the clinic.

Sensory-motor-sensory loop: A description of CPM function by Pelland (1986) that uses the concept of the central nervous system as an open system. There are seven steps in the loop, and breakdown at any step may lead to maladaptive interaction with the environment (Bruhns, 1988). This concept serves as one of the theoretical bases for the Integrated Frame of Reference.

Theoretical base of a frame of reference: A structural component of a frame of reference that identifies the parameters of the frame of reference such as the concepts, definitions, and postulates necessary to describe and rationalize the type of intervention suggested (Mosey, 1981).

Validity of a frame of reference: The efficacy and degree of soundness of the Integrated Frame of Reference in relation to its practical use and applicability.

Assumptions

1. The therapists participating in the study practiced NDT as it is described by Bobath (1981) and Davies (1991).
2. The therapists participating in the study were familiar with the Model of Human Occupation.
3. The questions asked by the researcher to the participants in regard to the applicability of the frame of reference in practice were sufficient to determine its relevance and validity.

Limitations

1. The generalizability of the results may be limited to the Occupational Therapy Department of Los Gatos Community Hospital.
2. Group dynamics, such as the participants' familiarity with each other, could have influenced the discussion. Some therapists may have inhibited disclosure of valuable insights due to the group environment.

3. Data gathering was reliant on one session with the participants.

4. Although precautions were taken, data analysis was subject to researcher's misinterpretation or bias.

Significance of the Study

This research studied the integration of an occupation-based theory with a specific treatment approach to CPM dysfunction of patients who have sustained a CVA. It has been widely stated that the theoretical concept of occupation is often overlooked and unarticulated in the treatment of physical dysfunctions by occupational therapists who use Neurodevelopmental Treatment, and research in this area is only beginning to emerge (Marmer, 1992). Thus, the uniqueness of this research, as well as the evident need for it, contributes largely to its significance.

CHAPTER 2

LITERATURE REVIEW

The following review covers four major areas of content. First, cognitive-perceptual-motor dysfunctions caused by a stroke are discussed. Next, documented approaches to treatment of CPM dysfunctions are described, followed by a discussion about the importance of integrating occupational therapy theory with clinical practice. Finally, the Integrated Frame of Reference introduced by Bruhns (1988) is explained.

Cognitive-Perceptual-Motor Dysfunction

Cerebral vascular accident is the most common disabling neurologic condition of adulthood. It accounts for at least half of the patients hospitalized with neurologic problems (Pedretti & Zoltan, 1990). CVAs are caused by a compromise in the blood supply to the brain, specifically by a thrombus, embolus, or hemorrhage. Deficits resulting from stroke are treated by occupational therapy, and the clinical picture of a patient who has sustained a stroke can be very involved. In relation to the frame of reference presently being studied, the deficits are described using the term cognitive-perceptual-motor dysfunction (CPM). This term accurately describes the clinical problem caused by a CVA (Bruhns, 1988).

Generally, persons with CPM dysfunction have an inability to move the body in space, to accurately perceive the environment, and to manipulate objects in the context of functional tasks (Bruhns, 1988). Symptoms observed can be categorized into cognitive, perceptual, and motor dysfunctions.

Cognitive Dysfunctions

It is difficult to isolate discrete cognitive processes for the purposes of clinical evaluation and treatment, as their separation is arbitrary. However, Zoltan, Siev, and Freishtat (1986) have attempted to categorize cognitive deficits as described in the following section.

Impairments in the person's attention, memory, and initiation skills are observed. Attention helps determine which sensations and experiences are alerting and relevant to the person. Memory, while it involves many components, is essentially perception that has been stored at an earlier time and is then brought forward. Both long and short term memory may be affected. A person with impairments of initiation will have difficulty starting a task, and will often have decreased spontaneity, productivity, and slowness of response to stimuli.

A patient suffering from cognitive deficits may have difficulty planning and achieving goals. Planning involves the ability to conceptualize change from the present situation, think of alternatives, and develop a framework that gives direction to

carrying out the plan. After a stroke, the patient may not have the foresight and sustained attention necessary to achieve these steps.

When patients interpret experiences, objects, and behaviors at very concrete levels, they are viewed as having difficulty with mental flexibility or the ability to abstract. Theoretically, patients with poor abstraction are unable to identify the important features in objects and events, because they cannot keep them in mind. Perseverative behavior may also be observed due to the patient's inability to generate new ideas.

The patient will often show decreased insight into the limitations associated with the disorder. This may result in impulsive behavior and poor safety awareness. In general, the patient is unable to monitor, self-correct, and regulate the quality of his behavior and performance.

An effect of the integration of several cognitive deficits often results in difficulty problem solving. The ability to approach a problem and compare past and present experiences through memory skills is needed to enable the individual to think in an orderly manner. Thus, impairments in attention, information access, organization, planning, and judgement all affect the patient's ability to problem solve.

Perceptual Dysfunctions

Zoltan et al. (1986) describe perceptual problems following CVA in the following categories: body image and body scheme difficulties, spatial relations problems, apraxias, and agnosias.

Additionally, visual problems, aphasias, and sensory loss are explained as deficits that affect the patient's perceptual abilities.

Body image and body scheme disorders are an alteration of the way the patient understands him or herself. Specific disorders include somatognosia, or the failure to recognize one's body parts and their relationship to each other; unilateral neglect, or the inability to integrate and use perceptions from the left side of the body or environment; and right-left discrimination.

Problems with spatial relations include figure ground difficulties, when the patient has trouble differentiating the foreground from the background; the inability to attend to subtle variations in form, for example, confusing the water pitcher and urinal since they have similar shapes; position in space, or the inability to interpret and deal with concepts of spatial positioning of objects; and depth and distance deficits, such that the patient may have difficulty navigating stairs and architectural barriers.

Apraxias are defined as the inability to perform certain skilled purposeful movements in the absence or loss of motor power, sensation, or coordination (Zoltan, et al., 1986). There are several types of apraxias, including constructional apraxia, or impairment in copying, drawing, or constructing designs in two or three dimensions; dressing apraxia, or difficulty dressing oneself because of a disorder in body scheme or spatial relations; motor apraxia, an inability to perform a purposeful motor task on command, despite apparent understanding of the concept and purpose of the task; and ideational

apraxia, an inability to carry out activities automatically or on command despite having the motor capacity to do it.

Agnosias are present when the patient lacks recognition of familiar objects perceived by the various senses. Visual, tactile, proprioceptive, and auditory agnosias may be observed (Zoltan, et al., 1986). For example, the patient may be unable to identify an object by name, despite being able to demonstrate its functional use.

Visual skills are important components or prerequisites to perception and cognition. Therefore, it is necessary to be aware of the patient's deficits in this area. Examples include an inability to obtain or sustain fixation on objects within the environment, an inability to scan the environment, and decreased visual fields.

Aphasias and sensory loss or disturbance, while not considered perceptual problems, may complicate or mask perceptual deficits. Expressive aphasia is the inability to express oneself through speech although comprehension of spoken words is intact, while receptive aphasia is the inability to comprehend the spoken word. Conduction aphasia results in intact comprehension of speech and expressive speech, but an inability to bridge the two divisions. Thus, the patient would be unable to repeat sounds, as that would first involve perception and then related expression. Sensory loss often results in an inability to localize touch, pressure, and pain on the body. This may lead to incoordination or lack of execution that resembles apraxia, or impairment of appreciation for size, shape, form, and texture that resembles agnosia (Zoltan, et al., 1986).

Motor Dysfunctions

The most prominent motor dysfunction seen as a result of CVA is hemiplegia, defined as paralysis of the side of the body contralateral to that of the lesion in the brain. Severity of paralysis varies, as incomplete paralysis, or paresis, is often observed (Wilcock, 1986).

Additional motor difficulties include loss of coordination or control of smooth, rhythmic movement; hypotonicity followed by spasticity, due to disinhibition of primitive reflex activity; disturbances of the normal postural reflex mechanisms which result in poor head control and changes in postural tone; loss of the normal righting, equilibrium, and protective reactions; and loss of selective, discriminative, and isolated movement (Pedretti & Zoltan, 1990).

The above descriptions serve as guidelines based upon recurring observations of the deficits resulting from CVA. Each patient displays a unique combination of CPM dysfunctions. As a result of the variances seen from patient to patient, there is no proven formula of treatment for the therapist to use. There are, however, recommended approaches that can be taken, and these will be discussed in the following section.

Documented Approaches to Stroke Treatment

Approaches to stroke treatment can be described in four categories: functional, transfer of training, sensory integrative, and

neurodevelopmental approaches (Zoltan, et al., 1986). Each approach differs in theoretical background, and there is not one specific approach that has been shown in research to be more effective than the others. In practice, therapists will often use more than one approach, depending upon personal preference, training, and the patient's needs.

Functional Approach

The functional approach involves training the patient to use remaining motor capabilities to compensate for those lost (Dickstein, Hocherman, Pillar, & Shaham, 1986). The emphasis is on treating the symptom rather than the cause of the problem, with the belief that the sooner the patients can be independent, the better will be their social and emotional well-being (Zoltan, et al., 1986). By repetitive practice of particular tasks, usually activities of daily living (ADL), the patient will be more independent in meeting basic needs. For example, a patient with spatial relations and body image problems will have trouble dressing. Using the functional approach, the therapist sets up a routine for the patient and diligently practices this routine with the patient. Eventually, the patient may learn to dress independently, but the spatial relations and body image problems will still exist and will inhibit other areas of daily living. Thus, while the symptom of the problem was alleviated, the cause was not.

The strategies of the functional approach can be divided into two categories: compensation and adaptation. With compensation,

the patient is made aware of the problem and then taught to make allowances for it. For example, patients with left-neglect would be taught to turn their head or scan with their eyes to the affected side. Frequently, one-handed techniques and adaptive equipment are used to compensate for movement dysfunctions (Jongbloed, Stacey, & Brighton, 1989). Adaptation usually goes along with compensation, and involves making changes in the environment of the patient to compensate for the symptoms. For example, if a patient has left-neglect, all food and utensils would be placed on the unaffected side to be sure that they are seen (Jongbloed, et al., 1989). Adapting the patient's "human" environment is important as well, by informing the family about problems so that allowances can be made (Zoltan, et al., 1986).

Abreu and Toggia (1987) stated that a limitation to using the functional approach is its lack of generalization. Splinter skills, or fragmented abilities that are learned by repetition, in conjunction with adapting the environment, can enhance performance only in the specific task that is practiced. Thus, they believe this approach is not very effective for improving overall function. However, since the patient is usually in the hospital for a limited time, working on concrete tasks such as dressing and kitchen activities may enable the patient to go home with more independence in ADL.

Transfer of Training Approach

The essential characteristic of this approach is in training of abstract skills divorced from their functional context. For example, a

patient with spatial relations problems will have difficulty dressing. According to this approach, practice with parquetry blocks will help improve the patient's spatial relations, and thus improve dressing skills (Zoltan, et al., 1986).

Assumptions of this approach are as follows: (a) CPM function can be divided into discrete skill areas, (b) these skill areas can be separately trained and then shaped into more complex chains, and (c) skills acquired through practice with abstract training tasks will generalize to daily living tasks (Bruhns, 1988). For example, to remediate constructional apraxia, recommended tasks include block and matchstick designs, connecting dots, design copying, puzzles, and form boards.

Several studies have found that patients who receive intensive, structured training in specific perceptual skills show greater improvement in the skills addressed by training than do control subjects. However, evidence for generalization of trained skills to functional activities has not been very consistent (Bruhns, 1988). Thus, one argument against the use of this approach is that it only results in developing meaningless splinter skills (Zoltan, et al., 1986). Another limitation is that cognitive skills such as attention, memory, and problem solving are not addressed. Perceptual deficits are perceived as isolated issues with no references as to how they affect the cognitive-perceptual-motor system (Abreu & Toglia, 1987). In general, the sparsity of research on this approach makes it impossible to reach a definitive answer as to its efficacy.

Sensory Integrative Approach

The sensory integrative approach to treatment of adult stroke patients has been adapted from Ayres' (1979) sensory integrative approach to therapy for children with learning disorders (Bruhns, 1988). It is based on the idea that humans learn from sensory input such as auditory, visual, tactile, proprioceptive, and vestibular stimuli (Marmo, 1974). The therapist must select and structure the stimuli presented to the patient, which will help to organize the nervous system. This organization of sensory processing serves as the foundation for cognitive and visual perceptual skills (Abreu & Toglia, 1987). By receiving sensory input, integration converts the initial sensations into meaningful perceptions. For example, spatial organization is based on the integration of an assortment of visual, auditory, and kinesthetic cues (Zoltan, et al., 1986).

In therapy, sensory integration occurs during an adaptive response by the patient. An adaptive response is both a goal directed and purposeful response to the environmental demands, or controlled sensory input, provided by the therapist (Zoltan, et al., 1986). It is through the adaptive response that sensations are integrated into meaningful perceptions.

This treatment approach has been effective for treating perceptual, cognitive, and behavioral problems in children, and there is increased interest on the part of occupational therapists in the use of sensory integrative therapy with brain damaged adults (Zoltan, et al., 1986). Limitations caused by a stroke result in the same

situation as that of a sensory deprived environment. As a result of limited mobility, the patient is often prevented from receiving adequate tactile, proprioceptive, and kinesthetic stimulation. This reduced stimulation has been postulated as the cause of low mental functioning, and demonstrates a need for controlled sensory stimulus as a primary treatment approach for stroke patients (Zoltan, et al., 1986). In addition, sensory integrative therapy utilizes the concept of brain plasticity, or the adaptive capacities of the central nervous system, both in children and adults. This also supports the use of controlled sensory stimuli, followed by adaptive environmental interaction and responses, as a primary treatment approach for adult stroke patients. In summary, it is postulated that through the brain's potential for plasticity, the adult individual is able to register and process sensory stimuli from the environment, undergo functional neurological changes related to this stimuli, and subsequently carry out an adaptive response (Zoltan, et al., 1986). Marmo (1974) stated that if the sensory integrative therapy is effective in improving the patient's cognitive and perceptual skills, self-care skills such as dressing will be learned spontaneously without specific teaching.

Abreu and Toglia (1987) further stated that applying techniques designed for a young developing brain acquiring new skills, to an adult brain that has already acquired such skills is a limitation of using this approach with adult stroke patients. Despite the sound theoretical constructs supporting the use of sensory

integrative treatment with adults, more research is needed before such therapy with stroke patients can be completely justified.

Neurodevelopmental Treatment Approach

Neurodevelopmental Treatment (NDT) was developed by Berta and Dr. Karel Bobath in the 1940's (Pedretti & Zoltan, 1990). The primary goal of treatment is for the patient to relearn the sensations of normal movements, through normalization of tone, posture, and function. Spasticity, sensory impairment, and the release of primitive reflexes from cortical control result in the patient having a distorted body scheme and distorted perceptions of the body's relation to the physical world. In order to have a correct perception of and interaction with objects in extrapersonal space, an accurate body scheme is necessary. To assist the patient in gaining an accurate body scheme, the therapist provides the patient with sensory experiences of normal movement and interactions with objects in the environment. This will lead to normalization of perceptual processing and a higher level of discrimination skills (Zoltan, et al., 1986).

As neurodevelopmental treatment is a theoretical component in the frame of reference studied in the present research, there will be a more detailed discussion of this approach later in the literature review.

Integrating Occupational Therapy Theory with Clinical Practice

The above discussion covered four major approaches used by occupational therapists in the treatment of stroke patients. While it may be inconclusive, the most commonly used approaches and beliefs were discussed. In analyzing the approaches, it is evident that the theoretical base of each one is not that of occupational therapy, per se. Kielhofner (1982) has stated that theories concerning the nervous system have much more attention focused on their development as an independent body of knowledge than on their relationship to occupation. In some cases, he suggests that the theme of occupation is irrelevant to the clinical application of neurologically based concepts and that some of present practice reflects such a position.

Llorens (1984) has discussed the need for integration of the theoretical conceptualizations that support the biomechanical approaches in occupational therapy with occupation theory. The biomechanical approaches are practiced as the application of kinetic principles concerning forces, motion, and the maintenance of equilibrium and movement of the human body. This includes several of the concepts described in the above approaches. This apparent lack of integration with occupation theory is not consistent with the articulation of theory in other aspects of occupational therapy practice.

A connection between theory and practice could be made by integrating a treatment approach with an occupational therapy frame of reference. A frame of reference can be defined as a set of interrelated, internally consistent concepts that provides a description of a therapist's interaction within a particular area of a profession's domain of concern (Mosey, 1981). Thus, frames of reference are derived from a profession's model and provide guidance in day-to-day interaction with patients. The particular aspect of concern is that of treatment for CPM dysfunction in stroke patients. While the above approaches provide guidance about how to interact with the patients to minimize dysfunction, they are not derived from an occupational therapy model. Rather, they are derived from neurophysiological and developmental models.

The importance of having a frame of reference that makes a connection between occupation theory and an approach to stroke treatment is demonstrated by considering how it could enhance the therapist's clinical reasoning process. Clinical reasoning can be defined as the process one uses to transform occupational therapy's body of knowledge into clinical practice, seen as clinical decisions and actions. It is also the method used to understand the techniques and concepts within a professional field, and to understand the current situation in which the clinical decisions will accumulate into actions (Paulazzo, 1992). By integrating an occupational therapy framework into practice, the therapist's clinical reasoning is clearly a transformation of occupational therapy's body of knowledge into

clinical practice (Paulazzo, 1992). Such use of theory in practice can define the validity of occupational therapy as a professional service (Clark, 1979).

Therapists who treat patients who have CPM dysfunction often find it difficult to justify occupation-based therapies because the approaches they use are not defined in terms of their relationship to occupation (Kielhofner, 1982). Williamson (1982) stated that neurobehavioral frames of reference must reflect occupational therapy's heritage of activity and view of the individual as an active agent engaged in life tasks. By directing treatment toward functional application in the environment and having activities serve to integrate performance subskills into purposeful action, the treatment approach will reflect the unique perspective of the profession (Williamson, 1982).

A survey by Pasquinelli-Estrada (1984) indicated that 82.6% of surveyed occupational therapists recognize an agreement of NDT with occupational therapy's philosophical base. In her study, the use of purposeful activities which are meaningful to the patient, lead to goal achievement, and require active patient participation in the treatment process was defined as the key concept in the philosophical base of occupational therapy. However, NDT is used across many professions, and it is necessary to differentiate its use in occupational therapy from the other disciplines. The frame of reference being researched in the present study attempts to do this

by integrating the concepts of NDT with the concepts of an occupation based model, the Model of Human Occupation.

Description of a Frame of Reference Synthesizing the Model of Human Occupation and Neurodevelopmental Treatment

Schkade and Schultz (1992) stated that new frames of reference in occupational therapy must meet the criteria of (a) adding a unique perspective on the current body of knowledge on the efficacy of occupational therapy and (b) providing a guide to the assessment, treatment, and evaluation stages of practice. The frame of reference described in the following section adds a unique perspective to treatment of CPM dysfunction in stroke patients, as it attempts to define treatment in terms of occupation. It also provides guidance to the assessment, treatment, and evaluation stages of practice, the validity of which was studied in the present research.

Yerxa (1992) discussed the need for occupational therapy to develop fresh models and frames of reference for practice that create intelligibility and that are generative rather than positivistic. In accordance with this statement, the Integrated Frame of Reference is not an explanation for treatment, but rather generates a tool to guide therapists in treating patients who have sustained CVAs and have CPM dysfunction.

Mosey's (1981) Structural Components of a Frame of Reference

Mosey (1981) stated that the following components must be included in the structure of a frame of reference: the theoretical base, function-dysfunction continuum, behaviors indicative of function-dysfunction, and postulates regarding intervention. The theoretical base identifies the parameters of the frame of reference such as the concepts, definitions, and postulates necessary to describe and rationalize the type of intervention suggested. The function-dysfunction continuum, derived from the theoretical base, describes the degree of function from total inability to engage in a particular function to complete mastery of that function. Behaviors indicative of function-dysfunction are specifically defined in order to enable assessment and measurement of behaviors relative to the stated continuum. Postulates regarding intervention describe principles by which the patient is assisted in moving from a state of dysfunction to a state of function (Mosey, 1981). Bruhns (1988) constructed the Integrated Frame of Reference using these four components.

The Theoretical Base of the Integrated Frame of Reference

The following elements are included in the theoretical base of the Integrated Frame of Reference: the Model of Human Occupation; Neurodevelopmental Treatment theory; cognitive-perceptual-motor function and dysfunction, categorized in terms of the sensory-motor-sensory loop described by Pelland (1986); the concept of motor

behavior; and the concept of the person environment (Bruhns, 1988). Each element will be discussed in the following section.

The Model of Human Occupation

The Model of Human Occupation is a frame of reference that organizes key concepts from the emerging paradigm of occupational therapy. This paradigm, occupation, preserves the early themes of occupational therapy by representing concern with the occupational nature of human beings and with the use of occupations as therapy (Kielhofner, 1985).

The model organizes concepts of occupation into a framework based on general systems theory. This theory describes an open system as interacting with the environment by way of a process of input, output, throughput, and feedback (Kielhofner & Burke, 1980). Input is the information that comes into the system from the environment. Throughput is the internal organizational process of the flow of information from the input. Output consists of mental, physical, and social aspects of occupation, and feedback informs the system about the results of its output. Both input and feedback are the means by which the system can organize itself to adapt to the environment, and throughput links the processes of input, output, and feedback to complete the cycle (Kielhofner & Burke, 1980, see Figure 1).

The Model of Human Occupation describes humans as open systems. Individuals constantly produce action and information (output); they constantly receive information from the environment

Figure 1. The open system. Adapted from "The Model of Human Occupation, Part I. Conceptual Framework and Content," by G. Kielhofner and J. Burke, 1980, American Journal of Occupational Therapy, 34, p. 575. © (1980) by the American Occupational Therapy Association, Inc. Reprinted with permission.

(input), including information about the results of their own behavior (feedback). The internal process of organizing and adapting to this information is the throughput, which results in a changed capacity for output. New behaviors generate new feedback, which lead to further changes in output (Cubie & Kaplan, 1982). Since the throughput process is the critical link of the person to the environment, it must be examined in clinical practice. The Model of Human Occupation conceptualizes throughput as three hierarchically arranged subsystems: performance, habituation, and volition (Kielhofner & Burke, 1980).

The performance subsystem functions to produce skilled action, which requires both physiological and symbolic functions. Perceptual-motor skills enable interpretation of sensory information and manipulation of self and objects. Process skills are abilities directed at managing events in the environment. These include problem solving and planning skills. Communication/interaction skills are used with other people and enable sharing and receiving of information. Constituents of these skills include the nervous system, the muscular and skeletal systems underlying human movement, and symbolic rules or images which one acquires through experience (Padilla, 1992). This subsystem occupies the lowest level, as it is governed by both the habituation and the volition subsystems. Thus, it functions to produce behavior that is called upon by the higher level systems (Kielhofner & Burke, 1980).

The habituation subsystem consists of images which trigger and guide performance of routine patterns of behavior. It is composed of internalized roles and habits. Roles are images one holds of oneself as occupying certain positions in social groups and the expectations that accompany being in these roles. These images are influenced by the person's perceived incumbency, internalized expectations, and role balance. Habits guide the typical ways in which a person performs behaviors within a role. Habits are influenced by the person's degree of organization, social appropriateness, and flexibility (Padilla, 1992). The formation of habits and roles is governed by the components of the volition subsystem.

Volition, the highest level subsystem, produces conscious choice for behavior. There are three components of this subsystem: personal causation, values, and interests. Personal causation refers to beliefs and expectations about one's effectiveness in the environment, and determines whether persons will expect success or failure from their actions. Values reflect a person's images of what is good, right, and important. Meaningfulness of activities, occupational goals, and personal standards are affected by a person's values. The third component, interests, determines occupations that one finds pleasurable (Kielhofner & Burke, 1980).

To summarize, the subsystems are conceptualized as working together in the following way: the volition subsystem responds to the human being's innate urge to master and explore the

environment by choosing actions; the habituation subsystem organizes these actions into patterns of behavior for everyday life; the performance subsystem provides the skills necessary to build routines of behavior and to explore the environment (Kielhofner & Burke, 1980). Thus, the interaction of the three subsystems is critical in ultimately producing one's output (see Figure 2).

The Model of Human Occupation also describes aspects of the person's environment that influence the open system process. The environment is conceptualized as having four concentric circles or layers: objects, tasks, social groups and organizations, and culture. Objects form the core layer, as the materials and artifacts of daily life. The next layer, tasks, refers to the activities that comprise play, work, and self-care, thus determining one's use of objects. Social groups and organizations delineate roles and their relationships with tasks necessary to the group's functioning. The final layer, culture, consists of the beliefs that govern the actions of groups of people. These layers influence the decisions made when encountering one's surroundings (Barris, Kielhofner, Levine & Neville, 1985). Because interaction with the environment affects the human open system, the therapist must understand the way in which this interaction influences the patient's input, throughput, output, and feedback (see Figure 3). An understanding of the patient's environment will enable the therapist to manipulate it as necessary to facilitate occupational behavior (Barris, et al., 1985).

Figure 2. The human open system. Adapted from A model of human occupation: Theory and application (p. 35) by G. Kielhofner (Ed.), 1985, Baltimore : Williams & Wilkins. © 1985 by Williams & Wilkins. Reprinted with permission.

Figure 3. Layers of environment that affect the human open system. Adapted from Back to basics: Can theory help integrate occupational therapy practice? by R. Padilla, 1992. Paper presented at the Occupational Therapy Association of California State Conference, Los Angeles, CA. Reprinted with permission.

In summary, the Integrated Frame of Reference being studied is concerned with the human open system with its three subsystems, the layers of the environment, and the dynamic relationship between them as defined in the Model of Human Occupation (Bruhns, 1988).

Neurodevelopmental Treatment

NDT was developed by Karel and Berta Bobath, a neurologist and physical therapist, respectively. In the context of the Integrated Frame of Reference, NDT prescribes intervention for dysfunction of perceptual-motor skills, one level of the performance subsystem as described in the Model of Human Occupation (Bruhns, 1988).

As described in a previous section of this review, a primary goal of NDT is for the patient to relearn the sensations of normal movements, through normalization of tone, posture, and function. Spasticity, sensory impairment, and the release of primitive reflexes from cortical control result in the patient having a distorted body scheme and distorted perceptions of the body's relation to the physical world. It is assumed that an accurate body scheme is necessary in order to have a correct perception of and interaction with objects in extrapersonal space. To assist the patient in gaining an accurate body scheme, the therapist provides the patient with sensory experiences of normal movement and interactions with objects in the environment. This will lead to normalization of perceptual processing and a higher level of discrimination skills (Bobath, 1981; Bruhns, 1988; Zoltan, et al., 1986). In the Integrated

Frame of Reference, the concepts of NDT just described are conceptualized as an open system, as in the Model of Human Occupation. Figure 4 diagrams this open system.

Assessment using the NDT approach focuses on the quality of the patient's movement rather than quantitative measures (Bruhns, 1988). Tonus, postural reactions, balance and protective reactions, and sensation are typically assessed. However, in NDT, assessment and treatment are not mutually exclusive. The therapist observes changes in the patient's quality of movement during each treatment session, and adjusts treatment accordingly.

Davies (1991) stated that NDT is not a prescription for treatment. Rather, it is a concept that advocates anything which results in a new ability for the patient, or enables movement in a more normal way. There are, however, principles of treatment consistent among all sources that serve as guidelines for treatment using NDT (Bruhns, 1988). They are as follows:

1. Many repetitions are necessary for the patient to learn to move again with an unfamiliar body. Ideally, the patient will learn to inhibit spasticity independently and produce normal movement patterns automatically.

2. Abnormal movement patterns will be reinforced if the patient experiences them. Thus, the therapist should provide the patient with experiences of normal movement, specifically, the sensation of normal righting and equilibrium reactions, normal postural adjustments, and volitional movement patterns.

Figure 4. Bobath Neurodevelopmental Treatment as an open system. Adapted from Synthesis of the model of human occupation and Bobath neurodevelopmental treatment: A frame of reference and its clinical application (p. 129) by L.R. Bruhns, 1988. Unpublished master's project, San Jose State University, San Jose, CA. Reprinted with permission.

3. Bilateral activities should be used in order to include the whole body in treatment. Compensatory methods which rely on the sound side should be avoided; rather, symmetrical movement patterns for daily living activities should be learned by the patient. This will help to normalize the patient's body scheme and retain recovery potential.

4. Treatment must be implemented twenty-four hours a day. If the patient moves in abnormal patterns that worsen spasticity throughout the day, gains made in therapy will be lost.

5. Too much effort and stress leads to increased spasticity and abnormal movement patterns.

6. The environment can be structured in order to elicit an automatic response from the patient. In addition, the therapist uses direct contact with the patient through tactile-kinesthetic channels to communicate the expected response. Verbal directions are kept to a minimum (Bruhns, 1988).

Some specific techniques used during treatment are correct positioning in bed, sitting, and standing to inhibit spasticity; weight bearing on the affected extremities to normalize muscle tone; weight shifting to elicit equilibrium responses; trunk rotation and crossing midline to integrate the two sides of the body; using key points of control such as the neck, spine, shoulder girdle, and pelvis in order to facilitate patterns of normal movement (Bobath, 1981; Bruhns, 1988; Davies, 1991).

The principles and techniques described above help alleviate cognitive-perceptual-motor dysfunctions. While the motor dysfunctions are the most visible to the therapist and patient, the cognitive and perceptual problems must be recognized and addressed in treatment as well. Relearning cognitive and perceptual skills takes place through repeated experience with the environment via the tactile kinesthetic sensory system (Affolter & Stricker, 1980; Davies, 1991). By guiding the patient through activities while applying the appropriate techniques and principles described above, the patient's perceptual skills will improve, leading to enhanced performance of functional activities.

CPM Dysfunction Categorized in Terms of the Sensory-motor-sensory Loop

In the earlier section of this review that describes CPM dysfunction following CVA, symptoms were divided into categories of cognitive, perceptual, and motor dysfunction. For the purposes of the Integrated Frame of Reference, CPM dysfunction is described in terms of the sensory-motor-sensory loop defined by Pelland (1986). This description utilizes the concept of the central nervous system as an open system, similar to the structure of the Model of Human Occupation. Thus, the central nervous system can be thought of as having input, throughput, output, and feedback, all of which are affected by CPM dysfunctions.

As in the Model of Human Occupation, throughput is broken down into several levels. These include (a) unimodal sensory

processing, (b) intermodality integration, (c) perception, and (d) planning and/or selection of a motor response. Output is described as motor execution, and feedback becomes new input and continues the loop (Bruhns, 1988). In the following description of the sensory-motor-sensory loop, examples of CPM dysfunctions seen in patients who have had a stroke are given with the part of the open system to which they most correspond. Many of the symptoms of CVA involve several of the steps; the divisions are somewhat arbitrary. Therefore, some of the dysfunctions may span over several levels of processing, not just the one in which it is described.

Input is the level of sensory and perceptual processing that enables the person to receive and respond to sensory stimuli. Impairments in a person's ability to attend or sustain attention to a task or the environment are defined as disturbances at this level.

Unimodal sensory processing refers to the ability to register specific information about the body and the environment; for example, sensory loss and visual skills deficits.

Intermodality integration refers to integration of input from several sensory modalities. This enables the person to perceive objects in the environment and their relationships to each other and to oneself. Body image and body scheme disorders apply here.

Perception occurs when integrated sensation takes on meaning in relation to the person's previously developed view of the environment. Difficulties with spatial relations and agnosias occur here.

At the level of *planning and selection of motor responses*, apraxias, decreased ability to abstract, perseveration, impulsivity, and decreased ability to solve problems occur.

Difficulties at the level of *motor execution* include hemiparesis, hypo-/hypertonicity, and any of the motor dysfunctions described in the earlier section of this review.

Feedback is information about the self interacting with the environment. As the person executes a movement, new sensory input is created for processing. Disruption at any step in the sensory-motor-sensory loop may result in faulty feedback, leading to a cycle of maladaptive motor behavior. The therapist must structure the patient's environment and activities so that feedback will be adaptive and able to be processed by the patient (Bruhns, 1988).

It is important to recognize that the loop represents a continuum, and dysfunction anywhere in the cycle may affect other areas (see Figure 5). The open system of the sensory-motor-sensory loop serves as a system within the larger open system described in the Model of Human Occupation. The loop is part of the performance subsystem, including perceptual-motor skills and process skills related to interaction with the environment of objects and tasks (Bruhns, 1988).

Figure 5. Cognitive-perceptual-motor dysfunction, categorized according to Pelland's (1986) sensory-motor-sensory loop and open system. Adapted from Synthesis of the model of human occupation and Bobath neurodevelopmental treatment: A frame of reference and its clinical application (p. 130) by L.R. Bruhns, 1988. Unpublished master's project, San Jose State University, San Jose, CA. Reprinted with permission.

The Concept of Motor Behavior

DiJoseph (1982) discussed the concept of motor behavior as being that a person acts purposefully within and upon the environment. Any volitional motor act, or intentional lack thereof, is an expression of a complex set of events involving the mind, body, and environment.

Factors such as motivation, arousal, attention, role dysfunction, or temporal adaptation must be considered as to their influence on motor behavior when using techniques such as NDT (DiJoseph, 1982; Marmer, 1992). For example, one does not move without motivation, and motivation is best achieved through the presentation of understandable and meaningful tasks for the patient. Thus, in order to achieve the goals of NDT, the therapist must consider other factors about the patient; factors that apply to the habituation and volition subsystems of the Model of Human Occupation. In the Integrated Frame of Reference, Bruhns (1988) used this concept to provide the necessary link between NDT's emphasis on motor control and the primacy of volition in the Model of Human Occupation.

The Concept of the Person Environment

Llorens (1984a) discussed the importance of the dynamic interaction between the individual and the environment upon prevention of dysfunction. However, she stated that the individual is the first level environment. This first level must be balanced in order to enable interaction with the second and third level environments of family and community. Such balance is achieved by

direct interaction between the therapist and patient, during which factors relating to the individual as an environment must be considered. For example, biological, psychological, and intrapersonal environment components of sensory, motor, psychological, sociological, and cognitive functions need to be viewed (Llorens, 1984a).

This concept supports the use of NDT in treatment of the person environment, as a way to help the patient maintain balance in the whole environment system, or the layers described in the Model of Human Occupation. Direct therapeutic handling and other neurofacilitation and inhibition techniques, used in the context of meaningful occupation, will allow the person to willfully interact with the objects, tasks, social groups, and culture of the external environment (Bruhns, 1988). This emphasis on direct, hands-on therapeutic intervention serves to strengthen the connection of NDT and the Model of Human Occupation for the Integrated Frame of Reference.

Summary of the Theoretical Base

Figure 6 is a schematic representation of how the theoretical components described above synthesize to form the Integrated Frame of Reference. The concepts of motor behavior and the person environment strengthen the connections between the interrelated set of feedback loops formed by the Model of Human Occupation, NDT, and the sensory-motor-sensory loop. The output of the sensory-

Figure 6. Schematic representation of the Integrated Frame of Reference. Adapted from Synthesis of the model of human occupation and Bobath neurodevelopmental treatment: A frame of reference and its clinical application (p. 132) by L.R. Bruhns, 1988. Unpublished master's project, San Jose State University, San Jose, CA. Reprinted with permission.

motor-sensory loop is motor behavior, and is under the influence of the volition and habituation subsystems (Bruhns, 1988).

NDT influences the sensory-motor-sensory feedback loop by balancing the person environment to enable interaction with the outside environment. The context in which the feedback loop will be influenced is determined by the occupational history of the person, or the past experience of the open system through time and its environment (Bruhns, 1988, see Figure 6).

Continuum of Function-Dysfunction and Behaviors Indicative of Function-Dysfunction

The continuum of function-dysfunction and behaviors seen on the continuum is organized on two levels. Level 1 relates to the components of the human open system, as described in the Model of Human Occupation, and level 2 relates to the concrete steps of the sensory-motor-sensory loop. Level 2 is needed in order to describe aspects of the performance subsystem in greater detail, as the Integrated Frame of Reference focuses on the needs of persons who have had CVAs with resultant CPM dysfunction.

The two levels of the continuum are described by defining the end points of function (+) and dysfunction (-), with a global description of function described for both levels. Listings of behaviors indicative of function (+) and dysfunction (-) follow each continuum and are meant to provide examples of behaviors, not an exhaustive list. The following description of the continuum has been

taken directly from Bruhns (1988), to which the reader is referred for more detailed examples.

Level 1: Competent Occupational Behavior

Globally, function at this level implies volitional traits, roles, habits, and skills which are in balance with one another and with the demands of the environment. This balance allows satisfaction of the intrinsic urge to explore and master the environment. The continuum of function-dysfunction for the components of occupational behavior include the following:

Personal Causation

(+) Realistic sense of internal control; realistic sense of one's assets and limitations.

(-) Hopelessness and lack of recognition of what one can control, or denial with unrealistic belief in skill.

Examples of behaviors indicative of function and dysfunction in this area include:

(+) Willingness to explore new possibilities for function with altered capacities.

(+) Verbal expressions of determination to overcome disabilities.

(-) Refusal to participate in therapy.

(-) Verbal or nonverbal expressions of hopelessness and helplessness.

(-) Expression of belief that problems will disappear once specific physical problems clear up--for instance, when the person can walk, or when the arm gets better.

(-) Denial that anything is wrong; insistence that skills are intact despite evidence to the contrary.

Values

(+) A developed set of values congruent with personal assets and limitations and with necessary changes in roles and habits.

(-) Undefined values, or values incongruent with one's capabilities and environment.

Behaviors indicative of function or dysfunction in this area include:

(+) Ability to describe values and valued goals, either spontaneously or in response to the therapist's inquiry.

(+) Ability to recognize a variety of activities and occupations as meaningful.

(-) Refusal to consider alternative ways of performing tasks or structuring habit patterns.

(-) Insistence on return to premorbid status as the only acceptable goal of rehabilitation.

(-) Refusal to alter personal standards to accommodate permanent limitations in personal capacity.

Interests

(+) Interests sufficient in number and potency to structure time and to provide feelings of pleasure and accomplishment.

(-) Paucity of interests, or interests incongruent with personal capacities or with social and financial limitations.

Behaviors indicative of function and dysfunction in this area include:

(+) Ability to discriminate tasks as more or less interesting.

(+) Ability to indicate interests, either spontaneously or in response to inquiry from the therapist.

(+) Willingness to explore new interests, or to modify former interests to allow participation within present limitations.

(-) Lack of participation in interests premorbidly; inability to derive pleasure from interests.

(-) Interests which are exclusively work-related or achievement-related.

Roles

(+) Roles sufficient in number and variety to structure time and to provide a sense of social usefulness.

(-) Absence of roles, or limitation to roles which are not valued.

Behaviors indicative of function and dysfunction in this area include:

(+) Ability to identify incumbency in several distinct roles, either spontaneously or with appropriate cueing from the therapist.

(+) Willingness to explore modification of role expectations, or alternate ways to fulfill them.

(-) Expected role behaviors incongruent with current personal capacities.

- (-) Statements that all valued roles are lost.
- (-) Identification with patient role exclusively.

Habits

(+) Habit patterns adequate to maintain valued roles and sufficiently congruent with personal capacities to preserve a balance between work, self-care, and leisure pursuits.

(-) Disorganization of habit patterns due to diminished personal capacity or environmental constraints; habit patterns which lead to imbalance in energy available for work, self-care, and leisure.

Behaviors indicative of function and dysfunction in this area include:

- (+) History of organized and balanced use of time.
- (+) Flexibility, or willingness to explore alternative habit patterns.
- (-) Use of time which is under exclusive external control; inability to manage unscheduled time.
- (-) Complaints of insufficient time for valued activities.
- (-) Excessively rigid habit patterns; unwillingness to modify habits in response to changes in personal capacity and environmental constraints.

Performance

(+) Perceptual-motor, process, and communication-interaction skills adequate to support interests, habits, and valued roles within the person's accustomed or anticipated environment.

(-) Inability to communicate, to plan, or to interact with the environment of objects and tasks which prevents or inhibits production of those behaviors necessary to support interests, habits, and valued roles.

Examples of behaviors will not be given here, as this area is further examined in level 2.

Level 2: CPM Function

Globally, CPM function may be defined as the ability to move within and manipulate the environment of objects and tasks, sufficient to produce the motor behavior which supports occupational role performance and adaptive habit patterns. This implies balance within the person environment and the sensory-motor-sensory loop, as well as congruence between the performance of the CPM system and the demands of the external environment. The continua of function-dysfunction for the steps of the sensory-motor-sensory loop are described; behaviors indicative of function and dysfunction at each of the levels were described in the earlier section explaining the sensory-motor-sensory loop, and will not be repeated here.

Input

(+) Ability to maintain an appropriate level of arousal, alert to stimuli, select relevant stimuli, and sustain attention to a task within a variety of environments.

(-) Inability to control level of arousal, deficiencies in alerting, selective attention, and concentration, rendering one unable to function within accustomed environments.

Unimodal Processing

(+) Recognition of and ability to compensate for primary sensory deficits.

(-) Unrecognized sensory deficits or inability to compensate.

Intermodality Integration

(+) Ability to integrate information about the internal and external environment from more than one sensory modality, sufficient to form the basis for movement and for perception; ability to process and integrate information from both sides of the body simultaneously.

(-) Inability to process and integrate information from more than one sensory modality, leading to disturbed postural and movement patterns and distorted perception; inability to process more than one task or element of motor behavior simultaneously.

Perception

(+) Ability to assign meaning to sensory information in relation to one's previously developed view of the environment.

(-) Distortion in the interpretation of sensory information which prevents or interferes with the performance of valued occupational role behaviors.

Planning and Selection of Motor Response

(+) Ability to select and sequence motor behaviors on the basis of perceptions, sufficient for competent manipulation of the environment; ability to perform tasks at the production level.

(-) Inability to select and sequence motor behaviors which prevents manipulation of the environment for competent occupational behavior.

Motor Execution

(+) Reflex inhibition, postural control, and selective motor control adequate for production of valued occupational role behaviors.

(-) Primitive reflexes, postural instability, and absent or abnormally patterned movement which prevents or interferes with production of valued occupational role behaviors.

(+) Initiative and intrinsic motivation sufficient to enact the motor behavior required by accustomed or expected occupational roles and habits.

(-) Difficulty with task initiation; motivation inadequate to enact expected role behaviors.

Feedback

(+) Ability to recognize and to process information regarding the effect of one's behavior on the internal and external environment, and to modify one's behavior in response to that information.

(-) Inability to recognize feedback as information about the consequences of one's behavior, with resultant inability to modify behavior in response to it.

Postulates Regarding Intervention

This section focuses on specific principles by which the therapist can treat the patient. The postulates described here suggest new ways of applying modalities which already exist. They have been deduced from the theoretical base, and range from the global to the specific. The following description of the postulates has been taken directly from Bruhns (1988).

Postulates regarding overall integration/balance

- * Integration and balance in all subsystems are enhanced by providing the opportunity to engage in occupations which the patient has designated as interesting and meaningful and which are within the patient's capacity to perform.

- * The patient's engagement in therapeutic occupations is enhanced by structuring the environment, including the type and intensity of stimuli, to enable participation in occupations which the patient values and experiences as meaningful.

- * Engagement with the environment of objects, tasks, social groups, and culture is enabled by providing interventions which enable the patient to balance the person environment.

- * Balance in the person environment may be facilitated by the therapist's handling and other therapeutic use of self within the context of tasks which are familiar and meaningful to the patient.

- * The patient's commitment to therapy is increased by honoring the patient's choice of goals.

Postulates regarding subsystems of occupational behavior

- * Personal causation is enhanced by giving permission to explore capabilities in a safe environment and by providing supports for emerging capabilities--for example, NDT facilitation/inhibition, guiding, and careful grading of therapeutic tasks.

- * Development of appropriate interests is facilitated by exposure to a variety of potentially enjoyable activities in an environment which encourages exploration and which provides appropriate supports for deficient performance skills.

- * Perceived incumbency in valued roles is enhanced by providing the opportunity to explore avenues for reorganization of habit patterns which support roles.

- * Development of efficient habit patterns for self-care and other activities of daily living is facilitated by application of NDT facilitation, inhibition, and guiding procedures in the context of daily living task performance.

- * Retrieval of performance skills is enhanced by providing the opportunity to produce skills in the context of familiar tasks and habit patterns, with appropriate facilitation, guidance, and environmental modifications.

Postulates regarding CPM function

- * Retrieval and integration of cognitive-perceptual-motor rules is facilitated by providing repeated encounters with objects and tasks the patient recognizes as meaningful, in an environment geared to the patient's ability to attend, and with supports provided

according to NDT principles to normalize feedback from somatosensory systems.

- * Integration of normalized tone, postural adjustments, and volitional movement is enhanced through immediate use of the pattern in an occupation which is meaningful to the patient.

- * Attention is engaged by tasks which occur at the patient's performance ceiling, presented in an environment controlled for complexity and arousal level, with guidance by the therapist as needed.

- * Unimodal sensory processing may be enhanced by structuring the task environment to fit the patient's capacity for intake in an affected modality.

- * Intermodality integration is enhanced by providing the sensation of normal movement and normal encounter with objects in the environment, through NDT facilitation/inhibition procedures and guiding in the context of a task which provides sensory information through more than one modality or from both sides of the body.

- * Accurate perception is facilitated by providing the experience of normal movement in interaction with the environment, and simple and familiar tasks which provide inherent feedback about the results of one's interaction with objects.

- * Flexibility in planning and selection of motor behavior is promoted by providing optimal variability in therapeutic occupation; the tasks in which the patient is engaged should be familiar, but never performed in exactly the same way.

- * Motor behavior is evoked by tasks and routines which are familiar to the patient as components of valued roles; a smooth and effortless quality of movement is facilitated by application of NDT principles to movement in the context of those tasks and routines.

- * Recognition and processing of feedback are facilitated by repeated exposure to an environment of tasks and objects structured so that the patient's actions upon it will produce feedback in a form which the system is able to process.

Summary

This literature review has covered four major areas related to the present research: (a) CPM dysfunction caused by stroke, (b) documented approaches to stroke treatment, (c) the need to integrate occupational therapy theory with clinical practice, and (d) a description of a frame of reference that integrates the Model of Human Occupation and NDT. The review demonstrated a need for the concept of human occupation, as the philosophy and theoretical basis of occupational therapy, to be integrated with the specific approaches to stroke treatment. This study was completed to demonstrate the applicability in the clinic of a frame of reference that has such an integration. By uniting the Model of Human Occupation with NDT, the therapist is able to address the CPM dysfunctions of the patient while maintaining the unique philosophy of occupational therapy.

CHAPTER 3

RESEARCH METHODOLOGY

Questions

The following research questions were addressed in this study:

1. To what degree is the Integrated Frame of Reference as described by Bruhns (1988) connected with the actual process of treatment of patients with CPM dysfunction following a stroke?
2. How valid is the Integrated Frame of Reference described by Bruhns (1988) for use as a guide for therapists in day-to-day treatment?

Participants

Participants were four registered occupational therapists who practiced at Los Gatos Community Rehabilitation Center (see Appendix A). The therapists at this center were a direct inspiration for Bruhns' (1988) development of the Integrated Frame of Reference. They demonstrated that "a focus on meaningful occupations is a viable option in occupational therapy for persons with neurological dysfunction" (Bruhns, 1988, p. iv).

Criteria for participant selection were: trained in NDT, currently use NDT in the context of functional activities, and practice in the area of stroke rehabilitation. Therapists were asked to volunteer for participation, after which they signed the Informed Consent in Appendix B.

Design

Focus group research was used to gather the data. A focus group is a group interview, reliant upon interaction within the group, that provides access to forms of data that are not obtained easily with either individual interview or participant observation in groups (Krueger, 1988; Morgan, 1988). For example, it enables the researcher to get closer to participants' understandings of the topic of interest, and to learn about their experiences and perspectives (Krueger, 1988; Morgan, 1988).

Three weeks prior to the scheduled group interview, each participant was given information about the Integrated Frame of Reference to read in preparation for the focus group (see Appendix C). This information included descriptions of the structural components of the frame of reference, its continuum of function-dysfunction, behaviors indicative of the levels of the continuum, and the postulates of intervention. Therapists were asked to reflect on how the Integrated Frame of Reference applied to their clinical reasoning experiences in practice.

The focus group was scheduled for a specified time, outside of work hours in a private room at Los Gatos Community Rehabilitation Center. The four therapists, the researcher, and two assistants gathered together for the interview. The researcher acted as the moderator, guiding the discussion by asking the necessary questions and redirecting the group as necessary. The assistant moderators took comprehensive notes, operated the tape recorders, and

responded to unexpected interruptions. Appendix D outlines the interview agenda and questions. The entire interview required three hours, with one 10 minute break.

Data collection

The primary data for the research consisted of transcripts from the audio tapes of the focus group. Notes taken by the moderator and assistants during the group interview were used to supplement the transcript data. Transcripts were analyzed in reference to the research questions in order to obtain the qualitative results.

CHAPTER 4

DATA AND RESULTS

These data were collected at one focus group session with four participants on September 16, 1993. The entire session took three hours, including a ten minute break. Each participant brought the packet they had been given three weeks prior, for their reference (Appendix C). In addition, they were given a handout defining key terms (Appendix E).

Participants

The participants were four registered occupational therapists who were employees at Los Gatos Community Hospital at the time of the group interview. Their experience in the profession of occupational therapy ranged from eight to seventeen years, and their employment at Los Gatos Community Hospital ranged from five to fourteen years. All participants were working with patients who had cerebrovascular accidents (CVA), as well as with persons with conditions such as head injury, peripheral nerve disorder, orthopedic problems, spinal cord injury, cardiac dysfunction, Parkinson's Disease, and Alzheimer's Disease. All participants had experience working with patients who had CVAs prior to their employment at Los Gatos Community Hospital. One participant held a Master of Science degree in Occupational Therapy while the other three held Bachelor of Science degrees in Occupational Therapy. All four participants had received certification in Neurodevelopmental

Treatment (NDT) and had taken several continuing education courses in NDT. Two of the participants had taken courses or attended presentations on Kielhofner's Model of Human Occupation. The above information about the participants was retrieved from the demographic information form (Appendix F).

Focus Group

The agenda of the focus group was as follows (Appendix D): following introductions of the two assistant moderators, the packet describing the Integrated Frame of Reference (Appendix C) was reviewed. Specifically, the theoretical components were explained to ensure a congruent understanding of the theoretical base.

With the review of pertinent information completed, the interview questions were asked in an effort to determine the applicability of the Integrated Frame of Reference to practice. The questions were organized in terms of the parts of the frame of reference. Thus, the theoretical components were discussed first, then the continuum of function-dysfunction followed by the postulates regarding intervention. Finally, the participants were asked about the overall relevance and validity of the Integrated Frame of Reference, and were invited to add any comments.

The following section describes the specific questions asked and summarizes the participants' responses.

The Theoretical Base of the Integrated Frame of Reference

The Model of Human Occupation

Question: *Do you find that it is important to look at the patient's personal causation, interests, values, habits, and roles during treatment?*

The immediate response to this question by all participants was "all the time." However, as the discussion progressed, specific details regarding the subsystems of the Model of Human Occupation as they apply to treatment were discussed.

One participant stated that her first priority in treatment planning for patients with a CVA was what they needed physically. For example, if a patient needed shoulder stability, that would be the goal of her treatment. If she could utilize the patient's values and interests while accomplishing shoulder stability, she would, but it was not the priority. This therapist saw shoulder stability as having a direct effect upon the patient's future progress; thus, it was viewed as a valuable goal for the patient, whether the patient understood this at the time or not. In terms of the Model of Human Occupation, this participant looked at areas of the performance subsystem first, and if possible, treated these areas while considering the other subsystems.

All participants agreed that, while the patient's interests were important to incorporate into treatment, at times it could backfire. For example, an accomplished woodworker may be insulted by the wood projects in the clinic, and discouraged by the fact that he has so

much difficulty with what would have been a simple project in his past. One participant stated that in this situation, she would try to vary the activity by incorporating the interest but not actually doing the task. For example, she may have a golfer clean golf clubs.

The participants also stated that sometimes, the patient does not have any significant interests. For example, the person's sole interest may have been his work, and after retirement he never developed new ones. In these situations, it becomes increasingly difficult to incorporate interests into treatment.

In terms of values, the participants agreed that often the patients' images of what activities are meaningful or important to them may change throughout their inpatient rehabilitation stay. For example, new patients will frequently not see the value of learning self-care skills because they think that when they get home, they will be able to perform them. This attitude changes, however, as the patients begin getting involved with their environment and start receiving feedback. In time, it becomes apparent that they can not perform as easily as they expected. Being able to dress themselves suddenly becomes a valued goal for them. As a result, the therapists have found that during the initial stages of rehabilitation, activities such as self-care still need to be addressed, despite the possibility that the patient does not value it at that time.

At the same time, the participants commented that it is difficult for patients to get direct and accurate feedback about their level of functioning in the hospital setting. The sheltered

environment and the constant care from the staff can not provide a real picture of the environment to which the patient will go, despite therapeutic efforts to simulate the home set-up and environment. One participant, who had experience in home care, stated that this was especially evident when treating the patient at home. The patient may have left the hospital needing supervision in self-care tasks, but at home he or she either did not wish to perform so the family performed the tasks or the patient forgot how to do the tasks taught in the hospital. Thus, while it was important to teach the patient new habits in self-care, it was difficult to know how well they would carry-over what was learned when in a different environment.

The participants agreed on the importance of culture as an environmental aspect that affected their treatment planning. For example, independence in dressing and grooming may not be important in some cultures, while in others, the family members may refuse to assist the patient in these tasks for cultural reasons.

One participant summarized the use of the concepts of the Model of Human Occupation in treatment by saying that "as therapists, we always consider those things [interests, habits, . . .] How much we can integrate them into treatment depends on a lot of factors."

Neurodevelopmental Treatment

Question: *How much are the principles of treatment as described in the packet utilized in practice?*

Each principle is listed below, followed by the participants' comments.

1. Many repetitions are necessary for the patient to learn to move again with an unfamiliar body. Ideally, the patient will learn to inhibit spasticity independently and produce normal movement patterns automatically (Bruhns, 1988).

The phrase "many repetitions" was questioned. One participant stated the importance of random situations and change in treatment, in order to facilitate learning. Doing the same thing every day in the same order does not facilitate learning. For example, the participant described her recent experience leading a "movement group", an exercise group for the patients who had had a stroke that was held every day at the hospital and involved a specific set of exercises. In leading this group, not one patient could recall an exercise, despite having participated in the group day after day. When she led the group, she performed the exercises in random order and tried to involve the patients in leading the group as much as possible, in order to facilitate learning.

All participants agreed that the term "spasticity" was frequently used inaccurately. Often, muscle tone would be

documented as "spastic," when it was actually better described as "abnormal muscle tone." The participants' definition of spasticity was that it referred to the muscle's response to a quick stretch. They agreed that in treatment, they rarely saw true spasticity, rather, they saw abnormal muscle tone. Therefore, in documentation, the participants felt that it would be more accurate to describe what was observed, ie: higher tone vs. lower tone, or to describe where resistance was felt to movement. In the above principle, the term "spasticity" would be more accurate if replaced with "abnormal tone."

2. Abnormal movement patterns will be reinforced if the patient experiences them. Thus, the therapist should provide the patient with experiences of normal movement, specifically, the sensation of normal righting and equilibrium reactions, normal postural adjustments, and volitional movement patterns (Bruhns, 1988).

All participants agreed with this principle. One participant described how her focus on abnormal movement patterns has changed since she began using NDT many years ago. She stated that with stroke patients, she was now looking at their ability to volitionally move isolated body parts in directions she wanted them to, as opposed to having them perform gross mass movements at isolated joints. To facilitate this, it was important to spend a lot of time looking at how the patients were moving. Specifically, she

studied bony alignment, symmetry throughout the whole skeletal system, and quality of muscle tissue as opposed to only looking at tone related problems such as flexor and extensor patterns. Thus, the range of "abnormal movement" could be very refined to specific problems in soft tissue, the skeletal system, and muscle tone.

Another participant stated that having the patients use normal righting reactions to come to a midline position and facilitating their ability to shift weight are two key concepts that specifically apply to the above principle of providing experiences of normal movement.

3. Bilateral activities should be used in order to include the whole body in treatment. Compensatory methods which rely on the sound side of the body should be avoided; rather, symmetrical movement patterns for daily living activities should be learned by the patient. This will help to normalize the patient's body scheme and retain recovery potential (Bruhns, 1988).

All participants agreed that it was important to avoid compensatory methods that relied on the soundly functioning side of the body, however, the term "symmetrical" was questioned. In treatment, they agreed that it was more important for the movement to be bi-manual than symmetrical, especially if symmetrical movement was not the normal way to participate in the task. For example, in grooming, it would be normal to have one hand on the sink, in a weight bearing position, while brushing one's teeth with

the other hand. If the patient had no movement in the arm with hemiplegia, it could be incorporated as a stabilizer to assist in the task. If the patient was having return of some movement, it could be guided through functional movement; either situation would be considered therapeutic. Weight bearing on the arm with hemiplegia was stated by the participants to be an important step toward an eventual regain of movement and sensation, and should be incorporated into the above principle.

4. Treatment must be implemented twenty-four hours a day. If the patient moves in abnormal patterns that worsen spasticity throughout the day, gains made in therapy will be lost (Bruhns, 1988).

The participants agreed that the principle would be more accurate if the phrase "that worsen spasticity" was removed, and the principle read "if the patient moves in abnormal patterns throughout the day, gains made in therapy will be lost."

All participants firmly believed this principle to be true. One participant shared an experience she had when working at another facility that did not have cohesive use of NDT. She had spent an hour working on stabilizing a patient's shoulder and normalizing the tone. Then, the patient was treated by another therapist and placed on a machine to strengthen her leg. As a result, the patient's shoulder

was "up to her ear"; everything the occupational therapist had worked on had been undone.

5. Too much effort and stress leads to increased spasticity and abnormal movement patterns (Bruhns, 1988).

The term "increased spasticity" should be changed to "alterations in muscle tone" to make this principle more accurate. All participants agreed that this principle was true, and the story described above exemplifies it.

6. The environment can be structured in order to elicit an automatic response from the patient. In addition, the therapist uses direct contact with the patient through tactile-kinesthetic channels to communicate the expected response. Verbal directions are kept to a minimum (Affolter & Stricker, 1980; Bruhns, 1988).

This principle was agreed to be accurate; however, the participants stated that it was strictly a concept from the Affolter theory and could not simply be blended into the NDT concepts. While they agreed that the two concepts compliment each other well, with Affolter being based on a perceptual model and NDT being perceptual-motor, they felt a distinction needed to be made between the two concepts.

The participants discussed the importance of cognitive/perceptual skills on the patient's motor performance. For example, sometimes a patient has good movement in the affected arm but does not use it and frequently positions it poorly. However, when both arms are incorporated into a task in treatment, the patient sees that he can use it, and does. Therefore, cognitive/perceptual problems such as initiation, concentration, or neglect may be causing the patient to treat his or her arm as if it were completely paralyzed.

Comments on the Six Principles

The participants discussed changes that were occurring regarding the concepts of the NDT approach, as described in the six principles. First, the neurological concepts about cortical control over primitive reflexes was being challenged. The hierarchical model of spinal reflexes, brain stem, and cortical involvement was being questioned as to its accuracy.

Also being challenged was the concept that normal sensation was necessary for normal movement. Several participants agreed that they have treated patients who learned to move well although they had experienced severe proprioceptive loss.

Two of the participants had worked at Los Gatos Community Hospital since it was a newly developed hospital, and vividly remembered what their patients who had had a stroke looked like at the end of a three month rehabilitation stay, before they were using NDT. The patients "didn't weight bear on their hemiplegic side, they

walked like the tower of Pisa, they had quad canes, they had massive perceptual problems, they didn't know how to take care of their hemiplegic arms, and they looked terrible aesthetically." With the use of NDT, even with an average rehabilitation stay of six weeks, the patients were more in midline, functioned much better perceptually, and in general, they looked better. All participants agreed that a patient who followed the NDT concepts for six weeks versus one who had not followed these concepts at all were entirely different.

Cognitive-perceptual-motor Dysfunction Categorized in Terms of the
Sensory-motor-sensory Loop

***Question:** How accurate do you feel this loop is in conceptualizing the dysfunctions you see in stroke patients; not so much with the details of the categories, but with the concept of the open system within the nervous system?*

The participants had difficulty with the idea of identifying symptoms as being input, throughput, output, and feedback. Many of the symptoms listed in the throughput section the participants considered as output, because that was what they saw in treatment. One participant stated that she envisioned "throughput" as being the actual processing of the information, and this was not something that she felt could be identified in treatment. Because there are so many variables involved with the dysfunctions of a patient with a stroke, the participants felt it was most effective to describe the output as what was observed in treatment; this may have been something resembling apraxia or agnosia, but nonetheless, it was output. In the

sensory-motor-sensory loop, these symptoms were described as throughput.

The issue of putting a "label" on a symptom was discussed in reference to the CPM dysfunction categories of the sensory-motor-sensory loop. All participants agreed that in treatment, it was very difficult to identify the problem and place it into a category. For example, a male patient may have thought that his toothbrush was a hair brush, but he knew exactly what to do with his razor. Did he have agnosia? Similarly, a patient may have had difficulty handling utensils, but other automatic tasks came immediately. Was he apraxic? If a patient had difficulty on a paper/pencil task that tested spatial relations or figure ground perception, but was able to pick out his clothes from the closet or take silverware out of a drawer, was he visuospatially impaired? Or was it a decreased attention span that affected his performance on the paper/pencil task? The participants pointed out that even an assessment as seemingly straightforward as range of motion could be complex because of other variables. For example, a patient may have had full active range of motion when positioned by the therapist correctly for the assessment, but if he had poor trunk control, his range of motion would be limited in functional activities. Thus, the participants concurred that it was most accurate to describe what was observed in treatment. For example, documentation may read as follows: "The patient began to use his toothbrush as a hairbrush"; or "Motor

planning problems were observed while handling the utensils"; or "The patient was able to pick his clothes out of his closet."

One participant discussed a problem with the idea of simply describing what was seen in treatment. She stated that medical personnel, case managers, physicians, and insurance companies needed terms and classifications; these were familiar to the medical community. The other participants agreed. This therapist also suggested that, to compromise, the behavior could be described as what was seen for several treatments before placing a label on it. For example, she recently treated a high level stroke patient who appeared to have hemianopsia. However, it was only after four 45-minute sessions of observing that she felt comfortable identifying and labeling his problem as hemianopsia.

In general, all the participants agreed that they were most comfortable describing observed behavior in functional terms, and if it needed to be objective for insurance documentation, they would make it objective by specifying the functional activity in which the behavior was performed (i.e., "the patient has increased his range of motion so that he can put his shirt over his head"). That was the outcome.

Motor Behavior Concept

Question: *Does this concept seem accurate, judging from your experiences using NDT with stroke patients?*

One participant had difficulty with the term "motivation," as it was used in the Motor Behavior concept (Appendix E); the other

participants agreed. She reported that motivation implies intent; in other words, stating that the patient was not motivated implies that he or she chose not to participate, when actually, the patient may not have understood the task, or simply was unable to participate for other reasons. "Intrinsic gratification" was decided as being a more appropriate term for this concept than motivation.

One participant stated that she saw the Motor Behavior Concept as applying most when the treatment deviated from exercise. It seemed to her that most patients understand the purpose of exercise and therefore may already have a vested interest in the task. However, to accomplish the same goal in treatment through an activity, it needed to be meaningful and applicable to the patient. At the same time, it was discussed that patients learned more when the skills were placed in contexts other than rote exercise. This raised a discussion of Motor Learning Theory, a relatively new theory concerning treatment of neurologically impaired people.

Motor Learning Theory states that meaningful tasks and environments should be integrated into treatment, and that movement is action oriented, so that patients use movement to complete actions. This needs to be considered when planning treatment. The movements need to be applied to something real because it is difficult for the patient to generalize, and it is important to allow the patient to make mistakes and "problem-solve." For example, in the "movement group" discussed earlier, one exercise involves bending the trunk forward with the arms outstretched

toward the shoe, similar to the movement used to tie a shoe. Often, despite being able to perform this exercise perfectly during the movement group, the patient does not have the functional skill to tie his shoe. To complete the actual task, not only is the movement that was practiced in the group utilized, but the patient is forced to weight shift and stay in that forward position longer, and the patient is presented with a perceptual challenge. Thus, practicing the actual task is not the same as practicing the movement in an exercise group; it is more challenging and will most likely be more beneficial to the patient.

This brought out the question of why exercise groups were led at all, but the participants agreed that they were necessary as maintenance programs for the patients' discharge home. Exercise programs maintain range of motion, ability to shift weight, and overall flexibility and movement control. If someone is not facilitating function while the patient is at home, at least the exercises in the home program which were practiced in the groups during the rehabilitation stay would help maintain the biomechanical aspects of function.

In general, the participants agreed that it was important to provide a purpose for treatment. One participant pointed out that therapists previously used such things as blocks, sequencing beads, table top activities, and figure-ground cards much more in treatment at Los Gatos Community Rehabilitation than they do now. She had found that by using daily living tasks in treatment, the patients

seemed to better understand the purpose of the task, and could perform at higher levels of function.

Person Environment Concept

Question: *Do you think the person can be considered as an environment? How relevant do you think this is in treatment with patients who have CPM dysfunction?*

The participants agreed that NDT was a way to facilitate the patient's recovery in the sensory, motor, and cognitive components of the person. However, they had difficulty with the idea that the patient needed to be "balanced" in these areas in order to enable interaction on the higher levels of the environment, that being objects, tasks, and social groups. An example they used was the stereotypical patient with left hemiplegia. The participants stated that they had all worked with people with left hemiplegia who continued to have sensory, motor, and cognitive problems but they interacted well with their environment. Good social skills and supportive families were enabling factors in the patient's ability to interact well with the environment, despite having problems within the person environment. "They may not be able to get dressed, but they can go down to church and play bingo," quoted one participant.

Additionally, they had found that a patient's sense of balance was contingent upon each individual's internal personality structure and coping skills. For example, they had seen patients in rehabilitation who were at similar levels of function. However, one patient may have been severely distressed while the other appeared

to be handling things well. In general, however, the participants felt unsure about how to identify when a patient was balanced; they felt it was too vague a term to be used in clinical practice.

They agreed that as occupational therapists, they looked at the psychological, sociological, cognitive, sensory, and motor functions first, and used NDT as an adjunct in terms of the handling skills and techniques. However, they did not agree that the patient must be balanced in these areas in order to interact functionally with the other levels of the environment.

The Continuum of Function-Dysfunction

Question: *Does the continuum accurately describe what you observe in the clinic, as far as the behaviors that it explains, and, is it feasible for use in assisting with treatment planning?*

In terms of the accuracy of the description of behaviors on the continuum, the participants commented that it was necessary to consider the patient's grieving process. For example, low personal causation and decreased interests may be expected or normal in a patient who is a few weeks post CVA. Thus, what the continuum determined as "dysfunctional," may actually be functional depending upon the patient's psychological stage of recovery.

The participants also stated that sometimes it was difficult to know where the origin of the problem actually was on the continuum. For example, under "personal causation," one dysfunctional behavior was described as "Refusal to participate in

therapy." However, this may have been a result of factors other than low personal causation. It may have been that the person's level of arousal was so poor he or she could not attend to the task, or, the left side of his or her world was not there, making the person fearful about participating. These are components of CPM function that should be considered before classifying the problem as being decreased personal causation.

The participants agreed that the level 2 components of CPM function were those that are assessed initially and throughout treatment. The level 1 components of competent occupational behavior, on the other hand, were based more on the patients' previous history; their premorbid state, versus their performance in treatment. In general, they concluded that the level 2 components applied more directly to treatment, while the level 1 components were important to assess and be aware of, as they would influence how the patient performs. Level 1 information was important to know in order to plan specific activities and make goals. But until the patient's level of performance in CPM function was known, it was difficult to apply the occupational behavior components to treatment.

Throughout the discussion of the continuum, the therapists returned several times to the idea that the levels were interrelated; that it was important to look at the whole person. Level 1, the higher level choices, were contingent on level 2, the more specific components related to CVA. However, level 2 aspects were under the influence of level 1.

For treatment planning purposes, the participants agreed that level 1 should be level 2 and vice versa. The level 1 components should be the information the therapist needs to gather initially, that being the patient's level of CPM function, in order to determine what needs to be treated. Then, in level 2, the therapist can discover the patients' level of occupational behavior, that being their previous habits and roles, interests, values, and personal causation. This information is usually gathered after working with the patient several times, and can then be applied to the treatment plan.

The therapists agreed that they followed this continuum automatically in their treatment, in that they addressed the problems described on level 2, CPM function, in as individualized a way as possible, via knowledge of the factors on level 1, occupational behavior.

Postulates Regarding Intervention

Question: *How accurately do the postulates relate to your experiences in providing treatment to CVA patients, and how applicable are they? Do you find that you do these things in treatment?*

In general, the participants stated that after reading through them quickly, yes, the postulates were accurate. However, there were specific changes they suggested for individual postulates. The following section lists each postulate, followed by comments or suggestions that were given by the participants. If no comments are

listed, the postulate was accepted by the participants as being accurate.

* Integration and balance in all subsystems are enhanced by providing the opportunity to engage in occupations which the patient has designated as interesting and meaningful and which are within the patient's capacity to perform.

* The patient's engagement in therapeutic occupations is enhanced by structuring the environment, including the type and intensity of stimuli, to enable participation in occupations which the patient values and experiences as meaningful.

The participants indicated that in treatment, the environment is not always structured in such a way as described in this postulate. Often, treatment happens spontaneously. For example, if the patient asks for a drink of water before the treatment session begins, this can be incorporated into the treatment. His or her need at the time is a drink of water, so it is important to utilize the moment; it is not always a conscious effort to structure the situation for the patient. It is better to use real life situations in treatment, and real life is not predictably structured at all times.

On the other hand, the participants agreed that there are patients who need structure, for example, those at a low level of functioning with severe cognitive impairment.

* Engagement with the environment of objects, tasks, social groups, and culture is enabled by providing interventions which enable the patient to balance the person environment.

The participants had difficulty with this postulate in that they have seen patients engage functionally with the environment of objects, tasks, social groups and culture despite having a "scattered" person environment.

* Balance in the person environment may be facilitated by the therapist's handling and other therapeutic use of self within the context of tasks which are familiar and meaningful to the patient.

The participants suggested that this postulate would be more applicable if the term "Balance in the person environment" was replaced with "Balance in the areas of the performance subsystem."

* The patient's commitment to therapy is increased by honoring the patient's choice of goals.

The participants had difficulty with the phrase "commitment to therapy," and likened it to the term "motivation" as discussed earlier. In actuality, honoring the patients' goals may not have anything to do with their commitment to therapy. Giving the patient choices in treatment is important, and should be included as a postulate, however, not necessarily to increase their commitment to therapy. Rather, it was suggested that patients be given choices as a way to give them some control, something they have lost as a result of their

CVA. This can be as simple as allowing them to decide what color pants they want to wear.

Postulates regarding subsystems of occupational behavior

* Personal causation is enhanced by giving permission to explore capabilities in a safe environment and by providing supports for emerging capabilities--for example, NDT facilitation/inhibition, guiding, and careful grading of therapeutic tasks.

The participants suggested that this postulate would be more accurate if the phrase "giving permission" was changed to "providing opportunities." The participants did not see themselves giving permission to their patients, but they did provide opportunities in treatment.

* Development of appropriate interests is facilitated by exposure to a variety of potentially enjoyable activities in an environment which encourages exploration and which provides appropriate supports for deficient performance skills.

The participants had difficulty with the term "appropriate interests," and suggested that the postulate would be more applicable if the word "appropriate" were removed. As therapists, they did not believe that they were able to judge whether the patient's interests were appropriate.

- * Perceived incumbency in valued roles is enhanced by providing the opportunity to explore avenues for reorganization of habit patterns which support roles.

The participants suggested that this postulate would be more applicable to treatment if the phrase "perceived incumbency" was changed, this term being too "academic" for clinical use.

- * Development of efficient habit patterns for self-care and other activities of daily living is facilitated by application of NDT facilitation, inhibition, and guiding procedures in the context of daily living task performance.

- * Retrieval of performance skills is enhanced by providing the opportunity to produce skills in the context of familiar tasks and habit patterns, with appropriate facilitation, guidance, and environmental modifications.

Postulates regarding CPM function

- * Retrieval and integration of cognitive-perceptual-motor rules is facilitated by providing repeated encounters with objects and tasks the patient recognizes as meaningful, in an environment geared to the patient's ability to attend, and with supports provided according to NDT principles to normalize feedback from somatosensory systems.

The participants suggested that this postulate would be more accurately stated if the first part was changed to: "Retrieval and integration of normal cognitive-perceptual-motor abilities is facilitated by providing regular encounters . . ." The word "normal" was added because this is important in the concepts of NDT. The word "rules" was changed to "abilities" in order to be perceived as more clinically oriented. Finally, the word "repeated" was changed to "regular" to cancel the implication that the encounters should be in the same order or setting every time. Rote learning, using the same sequences and settings, should not be used in treatment.

* Integration of normalized tone, postural adjustments, and volitional movement is enhanced through immediate use of the pattern in an occupation which is meaningful to the patient.

It was suggested that the word "pattern" be changed to "available movement" because "pattern" often implies a type of movement that is not desired, such as flexor or extensor patterns.

* Attention is engaged by tasks which occur at the patient's performance ceiling, presented in an environment controlled for complexity and arousal level, with guidance by the therapist as needed.

It was stated that this postulate is an Affolter concept. While the therapists agreed that it was applicable in treatment, they believed it was important to delineate it from the other postulates in

terms of this frame of reference, as it is separate from the NDT concepts.

- * Unimodal sensory processing may be enhanced by structuring the task environment to fit the patient's capacity for intake in an affected modality.

The participants understood this postulate to mean that it is important to grade tasks in treatment. As the term "grading" is commonly used in practice, it would be helpful to use the term in this postulate in order to make it more applicable in treatment.

- * Intermodality integration is enhanced by providing the sensation of normal movement and normal encounter with objects in the environment, through NDT facilitation/inhibition procedures and guiding in the context of a task which provides sensory information through more than one modality or from both sides of the body.

- * Accurate perception is facilitated by providing the experience of normal movement in interaction with the environment, and simple and familiar tasks which provide inherent feedback about the results of one's interaction with objects.

The participants agreed that this postulate was accurate, and they have used it, for example, by letting the patient spill the cup rather than jumping in to catch it. Spilling the cup gives the patient

accurate feedback about the results of his or her movements in the environment.

- * Flexibility in planning and selection of motor behavior is promoted by providing optimal variability in therapeutic occupation; the tasks in which the patient is engaged should be familiar, but never performed in exactly the same way.

- * Motor behavior is evoked by tasks and routines which are familiar to the patient as components of valued roles; a smooth and effortless quality of movement is facilitated by application of NDT principles to movement in the context of those tasks and routines.

- * Recognition and processing of feedback are facilitated by repeated exposure to an environment of tasks and objects structured so that the patient's actions upon it will produce feedback in a form which the system is able to process.

The participants commented that it is important to allow some of the feedback to be successful feedback. It is important not to make the patients feel as though they are failing. Also, it is necessary in treatment to consider the patient's tolerance for frustration, and for the therapist to assist as needed to reduce the amount of frustration and negative feedback.

This concludes the presentation of the responses to the interview questions asked during the focus group. Each question was addressed in the order that it was asked, with examples and quotes given. In the following section, these results will be reported in terms of the research questions.

Research Questions

Question 1: To what degree is the Integrated Frame of Reference connected with the actual process of treatment of patients with CPM dysfunction following a stroke?

All of the participants agreed that in many ways, they were using the concepts of this frame of reference in practice. One participant who had practiced occupational therapy many years before the Model of Human Occupation was introduced, stated "when this came out I thought, gosh, I already do all this anyway, now they're just putting labels to it!"

This research question essentially asks the relevance of the Integrated Frame of Reference to the treatment of stroke patients. The data show that the idea of integrating the use of NDT with the occupational therapy theory base of the Model of Human Occupation is very relevant for the therapists interviewed.

Question 2: How valid is the Integrated Frame of Reference in serving as a guide for therapists in day-to-day treatment?

This question will be answered in terms of each of the three parts of the frame of reference: the theoretical components, the continuum of function-dysfunction, and the postulates for intervention. It will be discussed further and addressed in terms of the whole picture in the following chapter.

Theoretical Components

The participants agreed that the Model of Human Occupation (Kielhofner, 1985), NDT (Bobath, 1981; Davies, 1991), and the Motor Behavior Concept (DiJoseph, 1982) apply to their experiences with treatment of patients who have had a stroke. However, the sensory-motor-sensory loop (Pelland, 1986) and the Person Environment Concept (Llorens, 1984a) were deemed less applicable to treatment. The Affolter concepts (Affolter & Stricker, 1980) were believed to be important to be included in the theoretical base, as well as aspects of Motor Learning Theory (Marmer, 1992; Sabari, 1991) as an expansion of the Motor Behavior Concept.

Thus, it was felt by the participants that the theoretical base should include the following components: a) the Model of Human Occupation; b) NDT; c) Affolter concepts; d) Motor Learning Theory, including the Motor Behavior Concept.

The Continuum of Function-Dysfunction

The behaviors described on the continuum were deemed accurate as they are observed in the clinic, however, it should be presented with level 1 as describing CPM function and level 2 describing occupational behavior. The first level is then assessed initially in treatment, and the second level comprises information that is gathered in further assessments.

Postulates Regarding Intervention

Below is a list of the postulates with suggested changes that make them more applicable to treatment, according to the participants.

Postulates regarding overall integration/balance

- * Integration and balance in all subsystems are enhanced by providing the opportunity to engage in occupations which the patient has designated as interesting and meaningful and which are within the patient's capacity to perform.

- * The patient's engagement in therapeutic occupations is enhanced by incorporating real life situations in treatment, rather than structuring the environment at all times.

- * Balance in the areas of the performance subsystem may be facilitated by the therapist's handling and other therapeutic use of self within the context of tasks which are familiar and meaningful to the patient.

* The patients are given a sense of control in therapy by presenting them with choices and honoring their goals.

Postulates regarding subsystems of occupational behavior

* Personal causation is enhanced by providing opportunities to explore capabilities in a safe environment and by providing supports for emerging capabilities--for example, NDT facilitation/inhibition, guiding, and careful grading of therapeutic tasks.

* Development of interests is facilitated by exposure to a variety of potentially enjoyable activities in an environment which encourages exploration and which provides appropriate supports for deficient performance skills.

* Perceived occupancy in valued roles is enhanced by providing the opportunity to explore avenues for reorganization of habit patterns which support roles.

* Development of efficient habit patterns for self-care and other activities of daily living is facilitated by application of NDT facilitation, inhibition, and guiding procedures in the context of daily living task performance.

* Retrieval of performance skills is enhanced by providing the opportunity to produce skills in the context of familiar tasks and habit patterns, with appropriate facilitation, guidance, and environmental modifications.

Postulates regarding CPM function

* Retrieval and integration of normal cognitive-perceptual-motor abilities is facilitated by providing regular encounters with

objects and tasks the patient recognizes as meaningful, in an environment geared to the patient's ability to attend, and with supports provided according to NDT principles to normalize feedback from somatosensory systems.

- * Integration of normalized tone, postural adjustments, and volitional movement is enhanced through immediate use of the available movement in an occupation which is meaningful to the patient.

- * Attention is engaged by tasks which occur at the patient's performance ceiling, presented in an environment controlled for complexity and arousal level, with guidance by the therapist as needed.

- * The patient's ability to register specific information about the body and environment may be enhanced by grading the task environment to fit the patient's capacity for intake in an affected modality.

- * The patient's ability to integrate input from several sensory modalities is enhanced by providing the sensation of normal movement and normal encounter with objects in the environment, through NDT facilitation/inhibition procedures and by guiding in the context of a task which provides sensory information through more than one modality or from both sides of the body.

- * Accurate perception is facilitated by providing the experience of normal movement in interaction with the environment,

and simple and familiar tasks which provide inherent feedback about the results of one's interaction with objects.

- * Flexibility in planning and selection of motor behavior is promoted by providing optimal variability in therapeutic occupation; the tasks in which the patient is engaged may be familiar, but never performed in exactly the same way.

- * Motor behavior is evoked by tasks and routines which are familiar to the patient as components of valued roles; a smooth and effortless quality of movement is facilitated by application of NDT principles to movement in the context of those tasks and routines.

- * Recognition and processing of feedback are facilitated by repeated exposure to an environment of tasks and objects structured so that the patient's actions upon it will produce feedback in a form which the system is able to process; successful feedback should be allowed as well.

CHAPTER 5

CONCLUSIONS, PROFESSIONAL IMPLICATIONS, RECOMMENDATIONS FOR FURTHER RESEARCH, AND SUMMARY

This chapter discusses the research questions in relation to the answers summarized in the previous chapter. Following the discussion of the research questions, professional implications and recommendations for further research are made. Finally, a summary and review of the entire study is given.

Research Questions

Question 1: To what degree is the Integrated Frame of Reference connected with the actual process of treatment of patients with CPM dysfunction following a stroke?

The participants agreed that in using this frame of reference, the therapist is encouraged to look at how NDT can be utilized in everyday activities. This is very relevant to practice, as it enables the therapist to maintain the philosophy of occupational therapy while using treatment techniques appropriate for today's society. The participants discussed this idea, stating that with technological advances, the whole issue of "quality" came to the forefront. Improved quality of life became connected with improved quality of movement, the core of NDT. Thus, while occupational therapists still focus their treatment on a person's functional activities of daily living, using NDT within this paradigm can further increase the

patient's quality of life. As a result, the idea of integrating the Model of Human Occupation with the use of NDT is very relevant to the process of treatment of patients with CPM dysfunction following a stroke.

Question 2: How valid is the Integrated Frame of Reference in serving as a guide for therapists in day-to-day treatment?

This question will first be discussed in terms of each of the three parts of the frame of reference: the theoretical components, the continuum of function-dysfunction, and the postulates for intervention. Then, the question will be addressed in terms of the whole picture.

Theoretical Components

As determined in the previous chapter, the participants agreed that the Model of Human Occupation, NDT, and the Motor Behavior Concept apply to their experiences with treatment of stroke patients. However, the sensory-motor-sensory loop and the Person Environment Concept were deemed less applicable to their treatment. The following section discusses each component in detail regarding why this conclusion was made by the participants.

The Model of Human Occupation

Overall, the participants felt that they identify concepts of the Model of Human Occupation in their work to different degrees, depending upon such factors as the individual patient's level of function and the specific treatment session. While none of the participants actually think about specifics of the Model of Human Occupation while they are treating patients, they agreed that learning it helps to develop thinking skills that can be used inherently in treatment.

The following will summarize conclusions in terms of each subsystem of the Model of Human Occupation.

The performance subsystem. All participants agreed that this area is focused upon a great deal in the treatment of stroke patients. Usually the first assessments of the patients are related to this subsystem, and sometimes goals related to this subsystem are a priority in treatment, despite dysfunction in the other subsystems.

The habituation subsystem. All participants agreed that they teach patients new habits, especially in self-care, in order to achieve greater independence in their conditions. They respect the patient's premorbid habits and routines, incorporating them into therapy as appropriate. Additionally, they attempt to facilitate the patient's performance in previously occupied roles.

The volition subsystem. Personal causation is enhanced by giving the patient opportunities of success, choice, and independence. Interests and values are incorporated into treatment when

appropriate, considering the possibility of negative consequences, as discussed in Chapter 4.

Environment. The importance of feedback from every layer of the environment about the patient's performance is observed in treatment. Often, this feedback affects what the patient values as goals. The effects of culture, the outermost layer of the environment, is frequently observed and affects the therapist's treatment planning and goals.

The importance of the environment relative to the patient's function is often evident when he or she leaves the hospital. Despite efforts to simulate the actual environment to which the patient will be returning, the hospital setting facilitates function that is not always carried through when the patient goes home.

The open system. The concept of the person being an open system was noted to be applicable to practice, as the patient's performance is affected by the feedback he receives from previous function. It was noted; however, that the phrase "open system" is not a clinical term, thus making it difficult to conceptualize in practice.

Neurodevelopmental Treatment

The concepts of NDT as described in the Integrated Frame of Reference are valid after the considerations and changes are made that were discussed in Data and Results. It is important to consider; however, the fact that the concepts of NDT are always changing, it is

a relatively new theory for treatment. Therefore, to be included in a frame of reference, it must be updated regularly to remain valid.

In summary, changes and ideas to be added to the description of the NDT principles include the following:

1. The term "spasticity" should not be used, but should be replaced with "abnormal tone."
2. Random situations and change are important to incorporate into treatment, rather than using repetitions.
3. Bony alignment, symmetry throughout the whole skeletal system, and quality of muscle tissue are evaluated and treated, versus just evaluation of muscle tone.
4. Symmetrical, bilateral movement is not necessarily desired; rather, normal movement in bi-manual tasks should be encouraged.
5. Weight bearing on the hemiplegic arm is an important technique used for regaining movement and sensation.
6. Concepts directly related to Affolter need to be differentiated from NDT concepts.

In regards to the Affolter concepts, the participants agreed that Affolter and NDT compliment each other well, and it would be appropriate for Affolter concepts to be included in the Integrated Frame of Reference. The Affolter technique was developed by Dr. Felicie Affolter, a speech pathologist from Switzerland. She first introduced her technique in 1978. In occupational therapy, it is used for treatment of people with perceptual-motor problems (Affolter & Stricker, 1980).

Dr. Affolter believes that adequate perceptual skills are needed in order for cognitive and motor skills to be learned. She describes perception as a mental image of an experience, and the best way to produce a mental image of an experience is through interaction between the environment and the individual. The most common ways that individuals interact with their environment are through touch, or the tactile-kinesthetic system, vision, and hearing. Dr. Affolter believes that only through the tactile-kinesthetic system can a person accurately produce a mental image of what he is perceiving. This is because the tactile-kinesthetic system is the only sensory system that relates directly to reality. For example, looking at the world does not alter it, nor does listening, but touching the world will cause change. Also, the patient's tactile-kinesthetic system is the only sensory modality which can be activated directly by the therapist, and some input can be assured (Affolter & Stricker, 1980). Thus, the tactile-kinesthetic system needs to be stimulated in order to improve the patient's perceptual skills, which will enable him to learn cognitive and motor skills.

The therapist uses the concept of "guiding" to stimulate the patient's tactile-kinesthetic system. By guiding, the therapist supplies the patient with as much stimulation to his tactile-kinesthetic system as is possible and appropriate. The resistance the patient feels from the environment provides information about the properties of the object, the location of his body relative to the object, the location of objects relative to each other, and the effect of

his body's movement upon objects (Affolter & Stricker, 1980). With this information, the patient acquires a set of rules about what works and doesn't work in his environment. From these rules, the patient can develop cognitive and motor skills that can be applied to situations encountered in daily life.

Some principles of treatment that are used while guiding are as follows:

1. As perception is not hemisphere dominant, movement should be bilateral in order to integrate what is learned into both hemispheres.
2. Little or no verbalizations are made during treatment in order to minimize the sensory overload.
3. The therapist uses familiar and functional activities to allow the patient to experience cause and effects and to enable the building up of essential tactile-kinesthetic rules.
4. When the therapist senses that the patient perceives the resistance and recognizes how to move to produce the desired effect on the environment, guidance should be reduced.
5. The patient must be working at his "performance ceiling" or limit in order for learning to occur; thus, attention and input will be maximal (Affolter & Stricker, 1980).

The above principles should be included, along with the description of the Affolter concept, in the Integrated Frame of Reference to make it more valid for practical use in stroke treatment.

The Motor Behavior Concept

This concept, stating that a person acts purposefully within and upon the environment, was agreed upon as being valid to practice in treatment of stroke patients. It was noted, however, that the term "motivation" should be replaced with "intrinsic gratification"; as motivation implies intent by the patient that can not always be determined or identified by the therapist. In summary, this concept stresses the importance of providing a purpose for the patient in treatment, and all participants agreed that this is valid.

Providing a purpose in treatment is an important concept in Motor Learning Theory, a relatively new theory that is developing about treatment of central nervous system dysfunction (Marmer, 1992; Sabari, 1991). The participants agreed that the ideas of this theory could be included in the Integrated Frame of Reference as an expansion of the Motor Behavior Concept. As Motor Learning Theory is not based in occupational therapy theory, integrating it into this frame of reference would provide the necessary connection to occupational therapy.

Motor Learning Theory (Marmer, 1992; Sabari, 1991) is a systems approach to treatment that takes a holistic, task-oriented focus to managing central nervous system disorders. It suggests that motor behavior is heterarchically organized. Thus, a specific motor behavior is the result of the interaction of a person with a specific task in his environment, where neither is subservient to the other. This suggests that task-oriented behavior is the result

of interaction among many of the body's systems, including the sensorimotor, psychosocial, and cognitive systems (Marmer, 1992). It also theorizes that normal development varies and takes into consideration personal characteristics and environmental factors, as opposed to following a predictable sequence, i.e., cephalo-caudal to proximal-distal to ulnar-radial, etc.

Motor Learning Theory (Marmer, 1992; Sabari, 1991) questions the assumption that sensory stimulation alone can be used to inhibit abnormal movement patterns, muscle tone and reflexes, thus facilitating normal movement. Rather, it states that functional tasks and environmental contexts organize behavior.

It also theorizes that people recall movement most efficiently when they have had the opportunity to actively control all aspects of initial movement. This includes preliminary planning and initiation of movement, its execution and its termination. Additionally, it states that all movement is action oriented; without an action or task associated with the movement, the person will not learn the movement (Sabari, 1991).

In terms of applying these concepts to practice, several suggestions were given:

1. Teach the patients to be effective problem solvers by making them active participants in their treatment.
2. Allow the patients to experiment with movement until they find what works best.

3. Random practice of several tasks is more beneficial than repetition of the same task, and performance of tasks in different environments is emphasized.

4. Practice the whole task, from start to finish, in a sequence, rather than practicing the task in smaller parts and eventually putting all parts together. Perform the task with its natural complexity, if possible.

5. Do not provide frequent, immediate feedback to the patients; rather, provide 50% feedback. Faded feedback is more effective than increasing feedback. This enables the patient to learn how to evaluate his own performance rather than becoming dependent upon the therapist.

6. Over time, the therapist should attempt to diminish her or his role in helping the patient in order to facilitate the patient's gaining more independence in performing a task (Marmer, 1992).

Presently, this theory is being discussed as to its cohesiveness with the techniques and concepts of NDT. Several of the ideas discussed above have already been discussed in the section about NDT, thus the participants have already integrated some of the Motor Learning concepts into their use of NDT. With Motor Learning Theory's emphasis on action and task-oriented treatment with a systems theory base, it blends nicely with the Model of Human Occupation's emphasis upon treating all aspects of the person. The uniqueness of the occupational therapy philosophy is maintained while the therapist uses NDT techniques in task-oriented treatments.

CPM Dysfunction Categorized in Terms of the Sensory-motor-sensory Loop

This theoretical component described CPM dysfunctions in terms of an open system. The symptoms caused by a stroke were categorized into one of seven steps in the sensory-motor-sensory loop, that form an open system of input, throughput, output, and feedback. It served as a system within the performance subsystem of the larger open system described in the Model of Human Occupation.

In general, the participants reported that this theoretical concept was not valid in their everyday treatment of stroke patients. It was stated that people who are NDT oriented are getting more into just describing what is observed instead of trying to identify it and put a label on it. The sensory-motor-sensory loop, with its divisions and labels, contradicts this.

Additionally, the idea of the central nervous system being conceptualized as an open system was not agreed upon as something that was observed in treatment. The categories of input, throughput, output, and feedback as described in the sensory-motor-sensory loop were conceptualized by the therapists as being output, as these are behaviors they observed in treatment.

In summary, the therapists in this study indicated that the Integrated Frame of Reference would be more applicable to treatment without this theoretical concept.

The Person Environment Concept

This concept served to strengthen the connection between the use of NDT and the Model of Human Occupation, as it emphasized using direct, hands-on therapeutic intervention for treatment of the person environment components of sensory, motor, psychological, sociological, and cognitive functions. It emphasized such an approach because it stressed the importance of balancing the individual as the first level environment, in order to enable interaction with the second and third level environments of family and community.

The participants indicated that the Integrated Frame of Reference would be more applicable to practice without this concept, because they were uncomfortable with the idea of being able to assess whether the patient is "balanced." Additionally, they have found in their experiences that frequently, patients interact well with their family and community despite having dysfunctional motor, sensory, psychological, sociological, or cognitive components.

The Continuum of Function-Dysfunction

This continuum, derived from the theoretical base, describes the degree of function from total inability to engage in a particular function to complete mastery of that function (Mosey, 1981). Additionally, behaviors are described in order to facilitate treatment planning.

The continuum was presented at two levels, one describing competent occupational behavior, and the second describing CPM

function. The participants agreed that in treatment, behaviors described at both levels are considered, and that they interrelate. However, to assist with treatment planning, it would be more practical to have the first level describe CPM function and the second level describe competent occupational behavior. In treating stroke patients, the behaviors described on the CPM function level are evaluated and treated initially, and information about the patient's occupational behavior is gathered on a less formal basis and over a longer period of time. While it is important information, realistically, it is much more difficult to determine competent occupational behavior. Additionally, behaviors relating to CPM function can present as dysfunctions of occupational behavior. By determining the patient's level of CPM function first, this mistake will be more difficult to make. Conceptually, it made more sense to the therapists to have the first level be that which is assessed initially in treatment.

The levels of CPM function are delineated in terms of the steps of the sensory-motor-sensory loop. If this theoretical component was removed, as was suggested earlier, it would not be appropriate to use these steps. Thus, the levels of CPM function could be described in terms of the divisions of cognitive, perceptual, and motor functions, as they were explained in the beginning of the literature review.

In summary, the continuum assists the therapist in taking a holistic approach to treatment. The behaviors described were deemed accurate as what is observed in the clinic, and the therapists

agreed that in treatment, they do attempt to consider all levels described.

Postulates Regarding Intervention

The postulates describe specific principles by which the therapist treats the patient. In Chapter 4, specific changes suggested by the participants were described that make the postulates more applicable to treatment. With the changes, the postulates are believed to be valid as descriptive principles by which the therapists in this study treat patients who have had a CVA.

The Whole Picture

All participants agreed that integrating the use of NDT with an occupational therapy theory base warrants an organizing frame of reference. Such a frame of reference would serve to increase the ability of occupational therapists to articulate their practice with NDT and to rationally present occupational therapists' use of NDT in treatment.

With the suggested alterations, the Integrated Frame of Reference may provide an accurate description of treatment of patients who have had a stroke, according to the participants in this study. However, one participant noted that she personally does not find her clinical reasoning directly guided on a day-to-day basis by a specific frame of reference. The others agreed, but stated that reading about the Integrated Frame of Reference enabled them to

reflect upon their treatment techniques and experiences and conclude that they are practicing within the guidelines of an occupational therapy frame of reference. In addition, it served as a reinforcement of the concrete ideas that underlie the philosophy of occupational therapy.

It is the conclusion of the researcher that the Integrated Frame of Reference would be valuable for providing such reinforcement for experienced therapists, as well as being an excellent teaching tool for students and new therapists. Learning about the frame of reference can help to form a new therapist's clinical reasoning skills. While the therapist may not actually refer to it on a day-to-day basis for treatment, knowledge about the ideas and concepts of the frame of reference can lead to its inherent presence in his or her treatment techniques.

Professional Implications and Recommendations for Further Research

The Integrated Frame of Reference may need to be rewritten to include the changes determined by the participants and described in this study. If the assumption is made that the participant sample from this study accurately represents occupational therapists who treat stroke patients using NDT techniques, then the Integrated Frame of Reference can have professional implications. It can be used as a teaching tool in occupational therapy schools, and as a guide or reinforcement for therapists at facilities where NDT is

utilized in the treatment of stroke patients. Additionally, occupational therapists' use of NDT will be theoretically differentiated from its use by other professions. Ultimately, this would increase the credibility of occupational therapists' use of NDT for stroke treatment.

Further research should entail determination of the efficacy of the revised Integrated Frame of Reference for use as a teaching tool for students and a guide for experienced therapists. Trial use of the frame of reference in occupational therapy schools and facilities that use NDT for stroke patients should be followed by gathering qualitative data from those who have learned it. Such data would include information about how it impacted the students' clinical reasoning when they began practicing, and how it influenced already practicing therapists. Then, further revisions could be made, with a long term goal being wide spread use of the Integrated Frame of Reference for greater impact on the profession.

Summary

This study provided data to answer questions regarding the perceived relevance and validity of Bruhns' (1988) frame of reference for occupational therapy to be used with adults who have had a CVA. The frame of reference was a synthesis of the Model of Human Occupation and Neurodevelopmental Treatment, and was referred to in this study as the Integrated Frame of Reference. It offered a specific treatment approach for occupational therapy with

stroke patients that had a broad theory base specific to occupational therapy.

Literature was reviewed about CPM dysfunction caused by stroke, documented approaches to stroke treatment, and the need to integrate occupational therapy theory with clinical practice. Then, a detailed description of the Integrated Frame of Reference by Bruhns (1988) was provided.

The data were collected at a focus group session with four registered occupational therapists who worked at Los Gatos Community Hospital. The focus group was three hours long, during which the researcher asked the participants questions about the Integrated Frame of Reference, in terms of its relevance and validity in practice.

Each question was summarized and discussed as to how it addressed the following research questions: a) To what degree is the Integrated Frame of Reference connected with the actual process of treatment of patients with CPM dysfunction following a stroke? b) How valid is the Integrated Frame of Reference in serving as a guide for therapists in day-to-day treatment?

For the therapists interviewed, it was determined that in answer to the first research question, the concepts and ideas described by the Integrated Frame of Reference are very much connected with the actual process of stroke treatment; in fact, many of the ideas were "taken for granted" by the participants, as they use them automatically in treatment.

In answer to the second research question, specific suggestions for change were described that may increase the efficacy of the Integrated Frame of Reference in terms of its practical use and applicability, as perceived by the participants. It was determined that the theoretical base may benefit from inclusion of the Model of Human Occupation, Neurodevelopmental Treatment, Affolter Concepts, and aspects of the Motor Learning Theory as an expansion of the Motor Behavior Concept. The continuum of function-dysfunction should be written with Level 1 describing CPM function and Level 2 describing competent occupational behavior. Finally, the postulates regarding intervention may be re-written with the changes described earlier.

In terms of its use in serving as a guide for therapists in day-to-day treatment, it was concluded that the Integrated Frame of Reference may be most useful in the following ways: 1) increase the ability of occupational therapists to articulate their practice in the use of NDT for stroke treatment; 2) serve to reinforce the philosophy of occupational therapy which underlies experienced therapists' use of NDT techniques; 3) serve as a teaching tool for students and new therapists to assist in the formation of their clinical reasoning skills in such a way that the ideas and concepts of the Integrated Frame of Reference become inherent in their therapy techniques.

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Appendix A
Consent to Use the Name
of the Department of Occupational Therapy
at Los Gatos Community Rehabilitation Center

March 1, 1994

TO WHOM IT MAY CONCERN

Elizabeth Deuel is hereby granted permission to refer to the Occupational Therapy Department at Los Gatos Community Hospital and Rehabilitation Center in her thesis in partial fulfillment of the Masters in Occupational Therapy Degree at San Jose State University. However, should this thesis be published in a professional journal, additional permission must be obtained from Community Hospital and Rehabilitation Center's Legal Department at Phone (408) 378-6131.

I have reviewed Ms. Deuel's writing regarding our department and concur with her description.

René Padilla, MS, OTR

René Padilla, MS, OTR

Director

Department of Occupational and Recreation Therapy

Appendix B
Informed Consent

College of Applied Sciences and Arts • Department of Occupational Therapy
 One Washington Square • San José, California 95192-0059
 Main Office: 408/924-3070 • Fieldwork Office: 408/924-3078 • FAX: 408/924-3088

Dear Participant:

I am a graduate student at San Jose State University in the Occupational Therapy Department. I am currently working on completion of my Master's Degree by completing my thesis.

I am studying the applicability to treatment of a frame of reference described by Bruhns in 1988. Generally, this frame of reference integrates the Model of Human Occupation and Neurodevelopmental Treatment, and is meant to guide treatment of patients with cognitive-perceptual-motor dysfunction following a stroke. In order to determine its relevance and validity in the clinic, I would like to conduct a group interview with several occupational therapists from Los Gatos Community Hospital. Participation would entail reading information I give to you about the frame of reference, prior to a scheduled interview time. The group interview will consist of four therapists, myself, and two assistants, and will last approximately three hours. Questions will be asked and discussion encouraged about your perceptions of the frame of reference and its applicability in practice. The session will be audiotape recorded, so that I can analyze the discussion in terms of the questions I am seeking to answer. Upon completion of my research, the tapes will be destroyed, thus there are no foreseeable risks involved by participating in the study.

With your participation, I will be able to contribute to the effort of reinforcing occupation theory in treatment of persons with cognitive-perceptual-motor dysfunction. This will help to increase the visibility of the unique perspective in treatment taken by occupational therapists, as described by our theoretical basis. Questions you may have about my research may be addressed to myself at (408) 243-1923. Concerns about the procedures of my study may be presented to Dr. Lela Llorens, PhD., OTR at (408) 924-3070. Questions about your rights as a research participant can be addressed to Serena Stanford, Ph. D. at 924-2480. Your help is greatly appreciated.

Sincerely,

Elizabeth Deuel

INFORMED CONSENT

I have read the explanation of this research project and understand that my participation in it will be entirely voluntary and that I may withdraw from the study at any time without prejudice to my relations with San Jose State University. It is understood that the audiotapes will be held in strict confidence, and that my name will never be publicly associated with the study. I have received a copy of this consent form for my file.

 Participant's signature

 Date

 Investigator's signature

 Date

Appendix C
Packet Given to Participants
Prior to the Focus Group

Enclosed in this packet is a description of a frame of reference formulated by Larissa Bruhns in 1988. Referred to in this paper as the Integrated Frame of Reference, it is designed specifically for the treatment of stroke patients. It synthesizes concepts of occupational therapy theory with a specific treatment approach, that of NDT. At this time, such a frame of reference does not exist in practice.

The Integrated Frame of Reference has three structural parts: (a) the theoretical base, which identifies the concepts, definitions, and postulates necessary to describe and rationalize the type of intervention suggested in the frame of reference; (b) the function-dysfunction continuum, which describes the range of function seen in patients with whom the frame of reference is to be used. Behaviors indicative of function-dysfunction are described, enabling assessment and measurement of function relative to the stated continuum; and finally, (c) postulates regarding intervention, which describe specific principles by which the therapist treats the patient.

This paper is organized in terms of the above three parts. In the group interview, each part of the frame of reference will be discussed as to its applicability in practice.

THE THEORETICAL BASE OF THE INTEGRATED FRAME OF REFERENCE

The following elements are included in the theoretical base of the Integrated Frame of Reference: the Model of Human Occupation; Neurodevelopmental Treatment theory; cognitive-perceptual-motor (CPM) function and dysfunction, categorized in terms of the sensory-motor-sensory loop described by Pelland (1986); the concept of motor behavior; and the concept of the person environment (Bruhns, 1988). Each element will be discussed in the following section.

The Model of Human Occupation

The Model of Human Occupation is a frame of reference that organizes key concepts from the paradigm of occupational therapy. This paradigm, occupation, preserves the early themes of occupational therapy by addressing the occupational nature of human beings and the use of occupations as therapy (Kielhofner, 1985, Ed.).

The model organizes concepts of occupation into a framework based on general systems theory. This theory describes an open system as interacting with the environment by way of a process of input, output, throughput, and feedback (Kielhofner & Burke, 1980). Input is the information that comes into the system from the environment. Throughput is the internal organizational process of the flow of information from the input. Output consists of mental, physical, and social aspects of occupation, and feedback informs the

system about the results of its output. Both input and feedback are the means by which the system can organize itself to adapt to the environment, and throughput links the processes of input, output, and feedback to complete the cycle (Kielhofner & Burke, 1980, see Figure 1).

The Model of Human Occupation describes humans as open systems. Individuals constantly produce action and information (output); they constantly receive information from the environment (input), including information about the results of their own behavior (feedback). The internal process of organizing and adapting to this information is the throughput, which results in a changed capacity for output. New behaviors generate new feedback, which lead to further changes in output (Cubie & Kaplan, 1982). Since the throughput process is the critical link of the person to the environment, it must be examined in clinical practice. The Model of Human Occupation conceptualizes throughput as three hierarchically arranged subsystems: performance, habituation, and volition (Kielhofner & Burke, 1980).

The performance subsystem functions to produce skilled action. Perceptual-motor skills, process skills, and communication/interaction skills are components of this subsystem. Perceptual-motor skills enable interpretation of sensory information and manipulation of self and objects. Process skills are abilities directed at managing events in the environment. These include

Figure 1. The open system. Adapted from "The Model of Human Occupation, Part I. Conceptual Framework and Content," by G. Kielhofner and J. Burke, 1980, American Journal of Occupational Therapy, 34, p. 575. © (1980) by the American Occupational Therapy Association, Inc. Reprinted with permission.

problem solving and planning skills. Communication/ interaction skills are used with other people and enable sharing and receiving of information. Constituents of these skills include the nervous system, the muscular and skeletal systems underlying human movement, and symbolic rules or images which one acquires through experience (Padilla, 1992). This subsystem occupies the lowest level, as it is governed by both the habituation and the volition subsystems. Thus, it functions to produce behavior that is called upon by the higher level systems (Kielhofner & Burke, 1980).

The habituation subsystem consists of images which trigger and guide performance of routine patterns of behavior. It is composed of internalized roles and habits. Roles are images one holds of oneself as occupying certain positions in social groups and the expectations that accompany being in these roles. These images are influenced by the persons perceived incumbency, internalized expectations, and role balance. Habits guide the typical ways in which a person performs behaviors within a role. Habits are influenced by the person's degree of organization, social appropriateness, and flexibility (Padilla, 1992). The formation of habits and roles is governed by the components of the volition subsystem.

Volition, the highest level subsystem, produces conscious choice for behavior. There are three components of this subsystem: personal causation, values, and interests. Personal causation refers to beliefs and expectations about one's effectiveness in the

environment, and determines whether persons will expect success or failure from their actions. Values reflect a person's images of what is good, right, and important. Meaningfulness of activities, occupational goals, and personal standards are affected by a person's values. The third component, interests, determines occupations that one finds pleasurable (Kielhofner & Burke, 1980).

To summarize, the subsystems are conceptualized as working together in the following way: the volition subsystem responds to the human being's innate urge to master and explore the environment by choosing actions; the habituation subsystem organizes these actions into patterns of behavior for everyday life; the performance subsystem provides the skills necessary to build routines of behavior and to explore the environment (Kielhofner & Burke, 1980). Thus, the interaction of the three subsystems is critical in ultimately producing one's output (see Figure 2).

The Model of Human Occupation also describes aspects of the person's environment that influence the open system process. The environment is conceptualized as having four concentric circles or layers: objects, tasks, social groups and organizations, and culture. Objects form the core layer, as the materials and artifacts of daily life. The next layer, tasks, refers to the activities that comprise play, work, and self-care, thus determining one's use of objects. Social groups and organizations delineate roles and their relationships with tasks necessary to the group's functioning. The final layer, culture,

Figure 2. The human open system. Adapted from *A model of human occupation: Theory and application* (p. 35) by G. Kielhofner (Ed.), 1985, Baltimore : Williams & Wilkins. © 1985 by Williams & Wilkins. Reprinted with permission.

consists of the beliefs that govern the actions of groups of people. These layers influence the decisions made when encountering one's surroundings (Barris, Kielhofner, Levine & Neville, 1985, ch. 4). Because interaction with the environment affects the human open system, the therapist must understand the way in which this interaction influences the patient's intake, throughput, output, and feedback (see Figure 3). An understanding of the patient's environment will enable the therapist to manipulate it as necessary to facilitate occupational behavior (Barris, et al., 1985).

In summary, the Integrated Frame of Reference is concerned with the human open system with its three subsystems (performance, habituation, and volition), the layers of the environment, and the dynamic relationship between them as defined in the Model of Human Occupation (Bruhns, 1988).

Neurodevelopmental Treatment

Neurodevelopmental Treatment (NDT) was developed by Karel and Berta Bobath, a neurologist and physical therapist, respectively. In the context of the Integrated Frame of Reference, NDT prescribes intervention for dysfunction of perceptual-motor skills, one level of the performance subsystem as described in the Model of Human Occupation (Bruhns, 1988).

A primary goal of NDT is for the patient to relearn the sensations of normal movements, through normalization of tone, posture, and function. Spasticity, sensory impairment, and the

Figure 3. Layers of environment that affect the human open system. Adapted from Back to basics: Can theory help integrate occupational therapy practice? by R. Padilla, 1992. Paper presented at the Occupational Therapy Association of California State Conference, Los Angeles, CA. Reprinted with permission.

release of primitive reflexes from cortical control result in the patient having a distorted body scheme and distorted perceptions of the body's relation to the physical world. It is assumed that an accurate body scheme is necessary in order to have a correct perception of and interaction with objects in extrapersonal space. To assist the patient in gaining an accurate body scheme, the therapist provides the patient with sensory experiences of normal movement and interactions with objects in the environment. This will lead to normalization of perceptual processing and a higher level of discrimination skills (Bobath, 1981; Bruhns, 1988; Zoltan, Siev, & Freishtat, 1986). In the Integrated Frame of Reference, the concepts of NDT just described are conceptualized as an open system, as is the Model of Human Occupation. Figure 4 diagrams this open system.

Assessment using the NDT approach focuses on the quality of the patient's movement rather than quantitative measures (Bruhns, 1988). Tonus, sensation, postural reactions, balance and protective reactions are typically assessed. However, in NDT, assessment and treatment are not mutually exclusive. The therapist observes changes in the patient's quality of movement during each treatment session, and adjusts treatment accordingly.

Davies (1991) stated that NDT is not a prescription for treatment. Rather, it is a concept that advocates anything which results in a new ability for the patient, or enables movement in a more normal way. There are, however, principles of treatment

Figure 4. Bobath Neurodevelopmental Treatment as an open system. Adapted from Synthesis of the model of human occupation and Bobath neurodevelopmental treatment: A frame of reference and its clinical application (p. 129) by L.R. Bruhns, 1988. Unpublished master's project, San Jose State University, San Jose, CA. Reprinted with permission.

consistent among all sources that serve as guidelines for treatment using NDT (Bruhns, 1988). They are as follows:

1. Many repetitions are necessary for the patient to learn to move again with an unfamiliar body. Ideally, the patient will learn to inhibit spasticity independently and produce normal movement patterns automatically (Bruhns, 1988).

2. Abnormal movement patterns will be reinforced if the patient experiences them. Thus, the therapist should provide the patient with experiences of normal movement, specifically, the sensation of normal righting and equilibrium reactions, normal postural adjustments, and volitional movement patterns (Bruhns, 1988).

3. Bilateral activities should be used in order to include the whole body in treatment. Compensatory methods which rely on the sound side should be avoided; rather, symmetrical movement patterns for daily living activities should be learned by the patient. This will help to normalize the patient's body scheme and retain recovery potential (Bruhns, 1988).

4. Treatment must be implemented twenty-four hours a day. If the patient moves in abnormal patterns that worsen spasticity throughout the day, gains made in therapy will be lost (Bruhns, 1988).

5. Too much effort and stress leads to increased spasticity and abnormal movement patterns (Bruhns, 1988).

6. The environment can be structured in order to elicit an automatic response from the patient. In addition, the therapist uses direct contact with the patient through tactile-kinesthetic channels to communicate the expected response. Verbal directions are kept to a minimum (Affolter & Stricker, 1980; Bruhns, 1988).

The principles described above help alleviate cognitive-perceptual-motor dysfunctions typically seen among stroke patients. While the motor dysfunctions are the most visible to the therapist and patient, the cognitive and perceptual problems must be recognized and addressed in treatment as well. Relearning cognitive and perceptual skills takes place through repeated experience with the environment via the tactile kinesthetic sensory system (Affolter & Stricker, 1980; Davies, 1991). By guiding the patient through activities while applying the appropriate techniques and principles described above, the patient's perceptual skills will improve, leading to enhanced performance of functional activities.

Cognitive-Perceptual-Motor (CPM) Dysfunction Categorized in Terms of the Sensory-motor-sensory Loop

In relation to the Integrated Frame of Reference, the deficits resulting from stroke are described using the term cognitive-perceptual-motor (CPM) dysfunction, and are categorized using the sensory-motor-sensory loop described by Pelland (1986). The sensory-motor-sensory loop utilizes the concept of the central nervous system as, again, an open system. Thus, the central nervous

system can be thought of as having input, throughput, output, and feedback, all of which are affected by CPM dysfunctions.

As in the Model of Human Occupation, throughput is broken down into several levels. These include (a) unimodal sensory processing, (b) intermodality integration, (c) perception, and (d) planning and/or selection of a motor response. Output is described as motor execution, and feedback becomes new input and continues the loop. In the following description of the sensory-motor-sensory loop, examples of CPM dysfunctions seen in patients who have had a stroke are described according to the part of the open system to which it most corresponds. It is important to remember that the loop represents a continuum, and that the divisions are somewhat arbitrary. Therefore, some of the dysfunctions may span over several levels of processing, not just the one in which it is described.

Input is the level of sensory and perceptual processing that enables the person to receive and respond to sensory stimuli. Impairments in a person's ability to attend or sustain attention to a task or the environment are defined as disturbances at this level.

Unimodal sensory processing refers to the ability to register specific information about the body and the environment. For example, sensation of pain, touch, temperature, and kinesthesia may be affected. Additionally, visual skills deficits such as hemianopsia are defined as unimodal sensory processing impairments.

Intermodality integration refers to integration of input from several sensory modalities. This enables the person to perceive objects in the environment and their relationships to each other and to oneself. Body image and body scheme disorders such as somatognosia, unilateral neglect, and right-left discrimination apply here.

Perception occurs when integrated sensation takes on meaning in relation to the person's previously developed view of the environment. Difficulties with spatial relations such as figure ground impairments, inability to attend to subtle variations in form (ie: confusing the water pitcher and urinal since they have similar shapes), inability to interpret concepts of spatial positioning of objects, and recognizing depth and distance are at this level of processing. Agnosias, when the patient lacks recognition of familiar objects perceived by the various senses, are also described as difficulties at the level of perception.

At the level of *planning and selection of motor responses*, disturbances in the ability to conceptualize a task and determine the steps necessary to carry it out are observed. Apraxias, decreased mental flexibility or ability to abstract, perseveration, impulsivity, decreased initiation of movement, and decreased ability to problem-solve are all disorders occurring at this level.

Difficulties at the level of *motor execution* include hemiparesis, hypo-/hypertonicity, ataxia, disturbances in normal postural reflex

mechanisms, and loss of selective, discriminative, and isolated movement.

Feedback is information about the self interacting with the environment. As the person executes a movement, new sensory input is created for processing. Disruption at any step in the sensory-motor-sensory loop may result in faulty feedback, leading to a cycle of maladaptive motor behavior. The therapist must structure the patient's environment and activities so that feedback will be adaptive and able to be processed by the patient.

Many of the symptoms of CVA involve several of the steps; the divisions are somewhat arbitrary. It is most important to recognize that the loop represents a continuum, and dysfunction anywhere in the cycle may affect other areas (see Figure 5). The open system of the sensory-motor-sensory loop serves as a system within the larger open system described in the Model of Human Occupation. The loop is part of the performance subsystem, including perceptual-motor skills and process skills related to interaction with the environment of objects and tasks.

The Concept of Motor Behavior

DiJoseph (1982) discussed the concept of motor behavior as being that a person acts purposefully within and upon the environment. Any volitional motor act, or intentional lack thereof, is an expression of a complex set of events involving the mind, body, and environment. Similarly, Marmer (1992) stated that a specific

Figure 5. Cognitive-perceptual-motor dysfunction, categorized according to Pelland's (1986) sensory-motor-sensory loop and open system. Adapted from Synthesis of the model of human occupation and Bobath neurodevelopmental treatment: A frame of reference and its clinical application (p. 130) by L.R. Bruhns, 1988. Unpublished master's project, San Jose State University, San Jose, CA. Reprinted with permission.

motor behavior is the result of a person's interaction with a specific factor in the environment. Neither is subservient to the other.

Therefore, factors such as motivation, arousal, attention, role dysfunction, or temporal adaptation must be considered as to their influence on motor behavior when using techniques such as NDT (DiJoseph, 1982; Marmer, 1992). For example, one does not move without motivation, and motivation is best achieved through the presentation of understandable and meaningful tasks for the patient. Thus, in order to achieve the goals of NDT, the therapist must consider other factors about the patient; factors that apply to the habituation and volition subsystems of the Model of Human Occupation. In the Integrated Frame of Reference, Bruhns (1988) used this concept to provide the necessary link between NDT's emphasis on motor control and the primacy of volition in the Model of Human Occupation.

The Concept of the Person Environment

Llorens (1984) discussed the importance of the dynamic interaction between the individual and the environment upon prevention of dysfunction. However, she stated that the individual is the first level environment. This first level must be balanced in order to enable interaction with the other levels of the environment. Such balance is achieved by direct interaction between the therapist and patient, during which factors relating to the individual as an environment must be considered. For example, biological,

psychological, and intrapersonal environment components of sensory, motor, psychological, sociological, and cognitive functions need to be viewed (Llorens, 1984).

This concept supports the use of NDT in treatment of the person environment, as a way to help the patient maintain balance in the whole environment system, or the layers described in the Model of Human Occupation (Bruhns, 1988). Direct therapeutic handling and other neurofacilitation and inhibition techniques, used in the context of meaningful occupation, will allow the person to willfully interact with the objects, tasks, social groups, and culture of the external environment (Bruhns, 1988). This emphasis on direct, hands-on therapeutic intervention is missing from the Model of Human Occupation, and serves to strengthen the connection of NDT and the Model of Human Occupation for the Integrated Frame of Reference.

Summary of the Theoretical Base

Figure 6 is a schematic representation of how the theoretical components described above synthesize to form the Integrated Frame of Reference. The concepts of motor behavior and the person environment strengthen the connections between the interrelated set of feedback loops formed by the Model of Human Occupation, NDT, and the sensory-motor-sensory loop (Bruhns, 1988). The output of the sensory-motor-sensory loop is motor behavior, and is under the influence of the volition and habituation subsystems.

Figure 6. Schematic representation of the Integrated Frame of Reference. Adapted from Synthesis of the model of human occupation and Bobath neurodevelopmental treatment: A frame of reference and its clinical application (p. 132) by L.R. Bruhns, 1988. Unpublished master's project, San Jose State University, San Jose, CA. Reprinted with permission.

NDT influences the sensory-motor-sensory feedback loop by balancing the person environment to enable interaction with the outside environment. The context in which the feedback loop will be influenced is determined by the occupational history of the person, or the past experience of the open system through time and its environment (Bruhns, 1988, see Figure 6).

This concludes the description of the theoretical components of the Integrated Frame of Reference. The next section is important in facilitating treatment planning consistent with the theoretical base described above.

CONTINUUM OF FUNCTION-DYSFUNCTION AND BEHAVIORS INDICATIVE OF FUNCTION-DYSFUNCTION

The continuum of function-dysfunction and behaviors seen on the continuum is organized on two levels. Level 1 relates to the components of the human open system, as described in the Model of Human Occupation, and level 2 relates to the concrete steps of the sensory-motor-sensory loop. Level 2 is needed in order to describe aspects of the performance subsystem in greater detail, as the Integrated Frame of Reference focuses on the needs of persons who have had CVAs with resultant CPM dysfunction.

The two levels of the continuum are described by defining the end points of function (+) and dysfunction (-), with a global description of function described for both levels. Listings of

behaviors indicative of function (+) and dysfunction (-) follow each continuum and are meant to provide examples of behaviors, not an exhaustive list.

Level 1: Competent Occupational Behavior

Globally, function at this level implies volitional traits, roles, habits, and skills which are in balance with one another and with the demands of the environment. This balance allows satisfaction of the intrinsic urge to explore and master the environment. Continuum of function-dysfunction for the components of occupational behavior include the following:

Personal Causation

(+) Realistic sense of internal control; realistic sense of one's assets and limitations.

(-) Hopelessness and lack of recognition of what one can control, or denial with unrealistic belief in skill.

Examples of behaviors indicative of function and dysfunction in this area include:

(+) Willingness to explore new possibilities for function with altered capacities.

(+) Verbal expressions of determination to overcome disabilities.

(-) Refusal to participate in therapy.

(-) Verbal or nonverbal expressions of hopelessness and helplessness.

(-) Expression of belief that problems will disappear once specific physical problems clear up--for instance, when the person can walk, or when the arm gets better.

(-) Denial that anything is wrong; insistence that skills are intact despite evidence to the contrary.

Values

(+) A developed set of values congruent with personal assets and limitations and with necessary changes in roles and habits.

(-) Undefined values, or values incongruent with one's capabilities and environment.

Behaviors indicative of function or dysfunction in this area include:

(+) Ability to describe values and valued goals, either spontaneously or in response to the therapist's inquiry.

(+) Ability to recognize a variety of activities and occupations as meaningful.

(-) Refusal to consider alternative ways of performing tasks or structuring habit patterns.

(-) Insistence on return to premorbid status as the only acceptable goal of rehabilitation.

(-) Refusal to alter personal standards to accommodate permanent limitations in personal capacity.

Interests

(+) Interests sufficient in number and potency to structure time and to provide feelings of pleasure and accomplishment.

(-) Paucity of interests, or interests incongruent with personal capacities or with social and financial limitations.

Behaviors indicative of function and dysfunction in this area include:

(+) Ability to discriminate tasks as more or less interesting.

(+) Ability to indicate interests, either spontaneously or in response to inquiry from the therapist.

(+) Willingness to explore new interests, or to modify former interests to allow participation within present limitations.

(-) Failure to participate in interests premorbidly; inability to derive pleasure from interests.

(-) Interests which are exclusively work-related or achievement-related.

Roles

(+) Roles sufficient in number and variety to structure time and to provide a sense of social usefulness.

(-) Absence of roles, or limitation to roles which are not valued.

Behaviors indicative of function and dysfunction in this area include:

(+) Ability to identify incumbency in several distinct roles, either spontaneously or with appropriate cueing from the therapist.

(+) Willingness to explore modification of role expectations, or alternate ways to fulfill them.

(-) Expected role behaviors incongruent with current personal capacities.

- (-) Statements that all valued roles are lost.
- (-) Identification with patient role exclusively.

Habits

(+) Habit patterns adequate to maintain valued roles and sufficiently congruent with personal capacities to preserve a balance between work, self-care, and leisure pursuits.

(-) Disorganization of habit patterns due to diminished personal capacity or environmental constraints; habit patterns which lead to imbalance in energy available for work, self-care, and leisure.

Behaviors indicative of function and dysfunction in this area include:

- (+) History of organized and balanced use of time.
- (+) Flexibility, or willingness to explore alternative habit patterns.
- (-) Use of time which is under exclusive external control; inability to manage unscheduled time.
- (-) Complaints of insufficient time for valued activities.
- (-) Excessively rigid habit patterns; unwillingness to modify habits in response to changes in personal capacity and environmental constraints.

Performance

(+) Perceptual-motor, process, and communication-interaction skills adequate to support interests, habits, and valued roles within the person's accustomed or anticipated environment.

(-) Inability to communicate, to plan, or to interact with the environment of objects and tasks which prevents or inhibits production of those behaviors necessary to support interests, habits, and valued roles.

Examples of behaviors will not be given here, as this area is further examined in level 2.

Level 2: CPM Function

Globally, CPM function may be defined as the ability to move within and manipulate the environment of objects and tasks, sufficient to produce the motor behavior which supports occupational role performance and adaptive habit patterns. This implies balance within the person environment and the sensory-motor-sensory loop, as well as congruence between the performance of the CPM system and the demands of the external environment. Continua of function-dysfunction for the steps of the sensory-motor-sensory loop are described; behaviors indicative of function and dysfunction at each of the levels were described in the earlier section explaining the sensory-motor-sensory loop, and will not be repeated here.

Input

(+) Ability to maintain an appropriate level of arousal, alert to stimuli, select relevant stimuli, and sustain attention to a task within a variety of environments.

(-) Inability to control level of arousal, deficiencies in alerting, selective attention, and concentration, rendering one unable to function within accustomed environments.

Unimodal Processing

(+) Recognition of and ability to compensate for primary sensory deficits.

(-) Unrecognized sensory deficits or inability to compensate.

Intermodality Integration

(+) Ability to integrate information about the internal and external environment from more than one sensory modality, sufficient to form the basis for movement and for perception; ability to process and integrate information from both sides of the body simultaneously.

(-) Inability to process and integrate information from more than one sensory modality, leading to disturbed postural and movement patterns and distorted perception; inability to process more than one task or element of motor behavior simultaneously.

Perception

(+) Ability to assign meaning to sensory information in relation to one's previously developed view of the environment.

(-) Distortion in the interpretation of sensory information which prevents or interferes with the performance of valued occupational role behaviors.

Planning and Selection of Motor Response

(+) Ability to select and sequence motor behaviors on the basis of perceptions, sufficient for competent manipulation of the environment; ability to perform tasks at the production level.

(-) Inability to select and sequence motor behaviors which prevents manipulation of the environment for competent occupational behavior.

Motor Execution

(+) Reflex inhibition, postural control, and selective motor control adequate for production of valued occupational role behaviors.

(-) Primitive reflexes, postural instability, and absent or abnormally patterned movement which prevents or interferes with production of valued occupational role behaviors.

(+) Initiative and intrinsic motivation sufficient to enact the motor behavior required by accustomed or expected occupational roles and habits.

(-) Difficulty with task initiation; motivation inadequate to enact expected role behaviors.

Feedback

(+) Ability to recognize and to process information regarding the effect of one's behavior on the internal and external environment, and to modify one's behavior in response to that information.

(-) Inability to recognize feedback as information about the consequences of one's behavior, with resultant inability to modify behavior in response to it.

In the focus group, you will be asked to reflect upon how accurate these descriptions are in accordance with what you observe in the clinic, and how feasible the continuum is to assist in treatment planning.

POSTULATES REGARDING INTERVENTION

This section focuses on specific principles by which the therapist can treat the patient in accordance with the Integrated Frame of Reference. The postulates described here suggest new ways of applying modalities which already exist. They have been deduced from the theoretical base, and range from the global to the specific. In the group interview, you will be asked to reflect upon how applicable these postulates are in practice, and how accurately they relate to your experiences in providing treatment to CVA patients.

Postulates regarding overall integration/balance

- * Integration and balance in all subsystems are enhanced by providing the opportunity to engage in occupations which the patient has designated as interesting and meaningful and which are within the patient's capacity to perform.

- * The patient's engagement in therapeutic occupations is enhanced by structuring the environment, including the type and intensity of stimuli, to enable participation in occupations which the patient values and experiences as meaningful.

- * Engagement with the environment of objects, tasks, social groups, and culture is enabled by providing interventions which enable the patient to balance the person environment.

- * Balance in the person environment may be facilitated by the therapist's handling and other therapeutic use of self within the context of tasks which are familiar and meaningful to the patient.

- * The patient's commitment to therapy is increased by honoring the patient's choice of goals.

Postulates regarding subsystems of occupational behavior

- * Personal causation is enhanced by giving permission to explore capabilities in a safe environment and by providing supports for emerging capabilities--for example, NDT facilitation/inhibition, guiding, and careful grading of therapeutic tasks.

- * Development of appropriate interests is facilitated by exposure to a variety of potentially enjoyable activities in an environment which encourages exploration and which provides appropriate supports for deficient performance skills.

- * Perceived incumbency in valued roles is enhanced by providing the opportunity to explore avenues for reorganization of habit patterns which support roles.

- * Development of efficient habit patterns for self-care and other activities of daily living is facilitated by application of NDT facilitation, inhibition, and guiding procedures in the context of daily living task performance.

- * Retrieval of performance skills is enhanced by providing the opportunity to produce skills in the context of familiar tasks and habit patterns, with appropriate facilitation, guidance, and environmental modifications.

Postulates regarding CPM function

- * Retrieval and integration of cognitive-perceptual-motor rules is facilitated by providing repeated encounters with objects and tasks the patient recognizes as meaningful, in an environment geared to the patient's ability to attend, and with supports provided according to NDT principles to normalize feedback from somatosensory systems.

- * Integration of normalized tone, postural adjustments, and volitional movement is enhanced through immediate use of the pattern in an occupation which is meaningful to the patient.

- * Attention is engaged by tasks which occur at the patient's performance ceiling, presented in an environment controlled for complexity and arousal level, with guidance by the therapist as needed.

- * Unimodal sensory processing may be enhanced by structuring the task environment to fit the patient's capacity for intake in an affected modality.

- * Intermodality integration is enhanced by providing the sensation of normal movement and normal encounter with objects in the environment, through NDT facilitation/inhibition procedures and

guiding in the context of a task which provides sensory information through more than one modality or from both sides of the body.

- * Accurate perception is facilitated by providing the experience of normal movement in interaction with the environment, and simple and familiar tasks which provide inherent feedback about the results of one's interaction with objects.

- * Flexibility in planning and selection of motor behavior is promoted by providing optimal variability in therapeutic occupation; the tasks in which the patient is engaged should be familiar, but never performed in exactly the same way.

- * Motor behavior is evoked by tasks and routines which are familiar to the patient as components of valued roles; a smooth and effortless quality of movement is facilitated by application of NDT principles to movement in the context of those tasks and routines.

- * Recognition and processing of feedback are facilitated by repeated exposure to an environment of tasks and objects structured so that the patient's actions upon it will produce feedback in a form which the system is able to process.

This concludes the description of the Integrated Frame of Reference. The theoretical components, continuum of function-dysfunction, and postulates of intervention were explained in detail, and each section will be discussed in the group interview as to your perceptions about the applicability of this frame of reference in practice.

Appendix D
Agenda of Focus Group and
Guideline for Interview Questions

I. Review of Pertinent Information

A. Packet given to participants was reviewed; questions they had about the Integrated Frame of Reference were answered to ensure that everyone had a congruent understanding of all parts of the Integrated Frame of Reference.

II. Interview Questions

A. Are the four subsystems (volition, habituation, performance, and environment) of the Model of Human Occupation addressed in practice?

1. If so, which ones are addressed most frequently?

B. Are the six principles of NDT as described in the Integrated Frame of Reference utilized in practice?

C. Is the sensory-motor-sensory loop an accurate way to conceptualize the CPM dysfunctions observed among patients served in your clinic?

D. Does the concept of motor behavior seem accurate, judging from your experiences using NDT with stroke patients?

E. In your perception, how relevant is the concept of the person environment to treatment of patients with CPM dysfunction?

F. Does the continuum of function-dysfunction and the examples of behaviors on the continuum accurately describe what is observed in your clinic?

1. Is the continuum feasible for use to assist in treatment planning?

G. In your perception, how applicable are the 19 postulates regarding intervention that are described in the Integrated Frame of Reference?

1. If applicable, do they accurately relate to your experiences in providing treatment to CVA patients?

H. As a whole, in your perception, how relevant is the Integrated Frame of Reference to treatment of patients with CPM dysfunction following a stroke? In other words, to what degree is the Integrated Frame of Reference connected with the actual process of occupational therapy with stroke patients?

J. In your perception, how valid is the Integrated Frame of Reference in serving as a guide for therapists in day-to-day treatment? In other words, what is its efficacy and degree of soundness in relation to its practical use and applicability?

K. Is there anything else you'd like to tell me about the Integrated Frame of Reference that I haven't thought to ask you?

Appendix E
Handout Given to Participants
Defining Key Terms

DEFINITIONS OF KEY TERMS

I. The Theoretical Base of the Frame of Reference

The first structural component of the frame of reference: identifies concepts and definitions necessary to describe and rationalize the type of intervention suggested in the frame of reference.

A. The Model of Human Occupation

1. General Systems Theory - describes an open system as interacting with the environment by way of a process of input, throughput, output, and feedback.
2. Volition Subsystem - Highest level subsystem of the Model of Human Occupation. Involves conscious choice for occupational behavior, as affected by personal causation, values, and interests.
3. Habituation Subsystem - middle level subsystem of the Model of Human Occupation. Involves roles and habits which trigger and guide performance of routine patterns of behavior.
4. Performance Subsystem - lowest level subsystem of the Model of Human Occupation. Produces skilled action and purposeful behavior via perceptual-motor skills, process skills, and communication/interaction skills. It is governed by both the habituation and the volition subsystems.
5. Environment - aspects of the person's environment that influence the open system process. Conceptualized as having four concentric layers:

objects, tasks, social groups and organizations, and culture.

B. Neurodevelopmental Treatment

1. Six principles - refer to pgs. 11-12 of packet.

C. CPM Dysfunction Categorized in Terms of the Sensory-motor-sensory Loop

1. Sensory-motor-sensory loop - utilizes the concept of the central nervous system being an open system. Categorizes CPM dysfunctions resulting from stroke in terms of where they fall in the open system.

See pg. 16 in packet.

D. The Concept of Motor Behavior

States that a person does not move without a reason or motivation. Therefore, in order to achieve the goals of NDT, the therapist needs to structure the task so that it provides motivation which is understandable to the patient (ie: has meaning to him or her.) This concept provides a link between NDT's emphasis on motor control and the Model of Human Occupation's emphasis on volitional behavior.

E. The Concept of the Person Environment

States the individual is the first level environment, which must be balanced prior to functional interaction with the other levels of environments. Direct therapeutic handling and neurofacilitation and inhibition techniques, used in the context

of meaningful occupations, can be conceptualized as a way to facilitate balance in the person environment.

II. Continuum of Function-Dysfunction

The second structural component of the frame of reference: describes the range of function seen in patients who have had a stroke, enabling assessment and measurement of function.

Refer to pgs. 21-28 of the packet.

III. Postulates Regarding Intervention

The third structural component of the frame of reference: describes specific principles by which the therapist treats the patient when utilizing the frame of reference.

Refer to pgs. 29-32 of the packet.

Appendix F
Demographic Information

DEMOGRAPHIC INFORMATION

Please take a moment to answer the following questions:

O.T. History

1. How many years have you been a practicing O.T.?

2. How many years have you worked at Los Gatos Community Rehabilitation Center?

3. Please circle the populations below with which you are presently working at Los Gatos Community Rehabilitation Center:

CVA	Orthopedic	Hand Injuries
Head Injury	Spinal Cord Injury	Psychiatric
Peripheral Nerve Disorders (MS, Guillain-Barré, etc.)	Cardiac	Alzheimer's Disease
	Parkinson's Disease	
OTHER: _____		

4. Please circle the populations below with which you have worked prior to working at Los Gatos Community Rehabilitation Center, and state the number of years you worked with that population:

CVA	Orthopedic	Hand Injuries
Head Injury	Spinal Cord Injury	Psychiatric
Peripheral Nerve Disorders (MS, Guillain-Barré, etc.)	Cardiac	Alzheimer's Disease
	Parkinson's Disease	
OTHER: _____		

Educational and Professional History

5. Please list your educational degrees and the schools from which you received them:

6. Have you ever worked in another profession besides O.T.?

If so, what profession?

NDT and Continuing Education History

7. Did you use NDT in treatment prior to working at Los Gatos Community Rehabilitation Center?

If so, for how many years?

8. Are you certified in NDT?

9. Please list continuing education courses you have taken in NDT:

10. Have you attended any conferences or courses in Kielhofner's Model of Human Occupation?

If so, please list them:

THANK YOU FOR YOUR TIME! YOUR PARTICIPATION IN THIS STUDY IS VERY APPRECIATED!