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Introduction

In the recent three decades, advancement in technology and in understanding of the motor control has brought about a revolutionary change in the habilitation of the brain-damaged patients such as cerebral palsies. Traditional treatment for cerebral palsy (CP) has highly focused on the restoration of physical deficits through the inhibition of 'positive' symptoms and the facilitation of 'negative' symptoms without considering how these separate symptoms combine and affect the whole person in real world functioning.

Obviously, people with CP can display a vast range of physical deficits. But more important, their concurrent cognitive deficits further limited their ability to overcome their physical disabilities. Cognitive deficits such as disorders of memory, attention and perception may eventually lead to the loss of motivation and generalization abilities rendering cerebral palsied persons difficult to establish and maintain acitve participation in therapy. Little attention has previously been paid to the restoration of motivation and generalization abilities.

When treating adolescents or adults who have brain lesion before the age of two, it is important to remember that the lesion has dramatically altered the developing central nervous system. As a result, the integration and development of the self has not been completed and thereby their personality development is jeopardized (Ellis et al, 1980). In addition, people with CP are deprived of the usual opportunities that are appropriate for their age. They spend most of their time in the therapy rooms, and all the while becoming more and more out of step with the rest of the community.

In the Spastics Association of Hong Kong (SAHK), we provide our cerebral palsied clients a holistic system in which a consistent 'learning' atmosphere is established thoughout the whole day of the clients. Our ultimate goal is to integrate them into the community (Fung and Su, 1995). Integration is possible only when our clients have developed the ability to interact effectively with the environment, both physically and cognitively. This habilitation model is based on the 'Peto's Concept' founded by Prof. Andras Peto in Hungary.

From a Multi-disciplinary to a Transpdisciplinary Team

On the road of habilitation, a person with CP has received frequent treatments provided by a number of specialists in their respective treatment rooms. These specialists often secretly believe that their discipline has the most offer. Therefore the members of the multi-disciplinary team may all be doing what they think is appropriate for the client's, but it may not be coordinated in a common goal. Thus, fragmentation of patient is resulted.

Communication among specialists can be enhanced by interdisciplinary case meeting in which common goals are established for individual clients Due to the differences in the individual philosophies of the specialists, the estabishment of the common goals is not easy. After the case

meeting, the specialists will provide their treatment on their own in their respective treatment rooms. Fragmentation of clients still exists.

In our association, we adopt 'Peto's Concept' as the common philosophy. The 'Peto's Concept' is used because it is highly compatible with the recent knowledge in motor control and motor learning. It gives our staff members from many different fields a common perspective from which to approach their treatment techniques to CP.

Under the 'Peto's Concept', each cerebral palsied client is viewed as a 'whole person' instead of the 'fragmented parts'. A 'whole person' consists parallel developments in physical, cognitive, psychological and social aspects. In designing a training program, staff members should consider the abilities of their clients in these four aspects disregards their own professional backgrounds. After the establishment of the common goals, different disciplines of staff are required to sit together again to plan for the training programs. When a training program has been planned, it can be implemented by any one of the disciplines who has involved in the planning process. (Fung and Su, 1995). This is known as a transdisciplinary approach. The essence of the transdisciplinary approach is a consistent attitude and approach to treatment by all members of staff.

Undoubtedly, the attempt to foster the transdisciplinary nature of treatment may carry with it the risk of blurring professional boundaries. A group identity instead individual professional identities. One of the best ways to develop a group identity is to establish a common philosophy and to ensure good communication between all team members. In-service training is an important method for supporting staff, alleviating feelings of stress and ensuring communication. This sharing of backgrounds will enable staff members to coordinate their treatment effectively. It will also encourage staff to respect each other's unique contributions to the treatment program instead of competing over the patients.

From a 'Treatment' Model to a 'Learning' Model

In traditional approach, a cerebral palsied client is viewed as a passive recipient of treatment in which there is only active physical participation without much active cognitive involvement. In this 'treatment' model, the client learns to react to the environmental stimuli rather than utilizing the environmental stimuli to carry out a response. This may be the explanation of the common phenomenon that a patient performs satisfactory in front of the therapist and remains dysfunction at home.

Kielhofner (1980) regards human as an open system which develops through interaction with the environment. Human receives demands and feedbacks (inputs) from the environment and in turn carries out actions (outputs) to the environment. The required action is more than just a movement. The action should be an interaction in which an individual is simultaneously organizing his or her internalized concepts of self into a unity while at the same time forming a systematic relationship with the surrounding things and people (Lichtenberg and Norton, 1970).

Thus a 'learning' model which stressed on the cognitive participation in motor performance is advocated. In this model, clients are learned to solve problems through their motor activities. Therapeutic activities are aimed at the development of a strategy for problem-solving rather than at merely reaching a goal or producing a product. The problem solving activity is the essense of the training.

Facilitation Tools

The processing of the inputs and outputs from and to the environment requires three underlying abilities. They are: (1) motivation; (2) generalization; and (3) skills (Leung and Su, 1995). Despite differences in the theories of motor learning, they are generally agreed that motor learning is highly influenced by the motivational, practice and feedback variables. Obviously, motivational variable related to motivation, while practice variable related to generalization and feedback variable related to the acquisition of skills. In the 'Peto's Concepts' strategies are developed to facilitate these variables in order to enhance the underlying abilities required for interacting with the environment.

Our training programs can broadly be divided into two categories: (1) daily routine training and (2) group training (Fung and Su, 1995). Generally speaking, group training aims at skills acquisition where daily routine training aims at skills generalization.

Facilitation of Motivation

Among the three underlying abilities, motivation is the most important one. In our model, training in natural environment is highly emphasized. Habilitation activities must be relevant not only to the clients' impairments but also to the client's personality and to the environment in which the client exists (or will exist). Since need is fundamental to motivation, the skills trained must be relevant to the client's needs and be sufficiently useful to him or her so as to warrant the effort needed to acquire it. Thus, the tasks selected for training must possess functional goals.

Instead of focusing on the disabilites, training programs should be designed to demonstrate the clients' abilities. In doing so, task analysis is performed in order to break down the selected task into a sequence of discernible task parts. This sequence of task parts will serve as landmarks which permit the staff and the client to follow the progress that is being made. With each success in accomplishing a task part, no matter how small it is, can lead to an increase in the clients' sense of self-value and hence the motivation.

The use of reinforcement can further assist learning especially for brain-damaged people (Ellis, 1970; Lashley and Drabman, 1974; Dolan and Norton, 1977). This behavioural techniques, while not solving the problem, can help staff members to manipulate the environment, and hence overcoming motivational problems.

Working in groups also provide a greater level of motivation than individual work. It allows the staff members to reinforce appropriate cooperation and behaviour with greater effect. The group can create a cohesive, secure atmosphere which is contructive to learning. To achieve this atomsphere, groups must remain stable for a considerable period of time.

Facilitation of generalization

Generalization means the ability to transfer a skill learned in one situation to other novel situations. In the traditional 'treatment' model, it is assumed that a patient can automatically integrate the newly learnt skills from the treatment room into the context of daily life. This assumption may be valid for the medical or orthopaedic patients, but it does not stand by well to the clinical experience with the brain-damaged. Recent studies revealed that the brain-damaged people have great difficulty in generalizing skills (Bjonetry and Reinuany, 1885; goldstein and Oakley, 1985).

In our model, a daily time schedule should be carefully planned for each individual so that whatever skills a person acquires in the group training sessions, he or she should be given every opportunities to practise those skills functionally in the daily routine training. The daily routine training should have the capacity to provide opportunities and supports for the cerebral palsied

clients to engage in as much self-care as possible, as well as structured work experience and structured recreational activities. To facilitate generalization, it is important to help the clients to learn some of the regularities of their environment. The daily time schedule enables them to understand where they are and what they should be doing, thus relieving anxieties. This helps to induce the individuals with CP a sense of security which encourages them to use the learnt skills to materials in everyday life.

Various studies revealed that increased variability of practice at a task will increase transfer of skill to a similar task (Carson and Wiegand, 1979; Lee et al, 1985). Practice of a task in a slightly different ways may result in the subjects having a greater ability to generalize the skill to novel situations. Shea and Morgan (1979) found that when practice was grouped together (blocked practice), skill acquisition was facilitated but with a poor retention. However, by randomly ordering of different tasks (random practice), retention was facilitated but acquisition performance was hampered. In our model, we use block practice in the group training sessions and random practice in the daily routine training.

Facilitation of skill acquisition

In the traditional 'treatment' model, 'hand-on' facilitation is emphasized. In the 'learning' model, 'feedback' is used as the facilitation tool (VanSant, 1991). Winstein (1987) found that fading of feedback enhanced learning. While the idea of withdrawing 'hand-on' factilitation to promote increased 'volitional' participation is a traditional practice, the idea of withdrawing feedback to enhance learning is the practice of the 'learning' model (VanSant, 1991).

The open-loop theories of motor control as proposed by Schmidt (1980, 1982) stressed that the sequencing and timing aspects of skills are governed by central motor prgrams. Practice on a skill results in the acquisition, by the higher centres of the central nervous system, of a motor program that contain all the information necessary for movement patterning (Schmidt, 1988). Summers (1981) pointed out that feedback is important for the development of such motor programs.

Two types of feedback have been identified. Internal feedback includes information coming from vision and specialized receptors in muscle, joint, tendon (Gibson, 1966). In CP, internal feedback (except vision) is usually impaired. External feedback refers to feedback which does not necessarily arise as a result of movement. External feedback can be provided in two forms: (1) knowledge of results (KR) and knowledge of performance (KP). KR is defined as information about the consequences of an action or series of action (Salomoni et al, 1984) while KP is information about the means to the end, that is, the movement pattern used. Usually external feedback is provided by an external source, however, it can also be provided by the individual's own speech.

In normal development, humans often use language to self-regulate their behaviour. Learning of motor skills is demonstrated not only by increased competency but also by a reduction in the attentional demands of the tasks. Fitts (1964) and Fitts and Posner (1967) described this transition as one from cognitive control, through the association stage and ending in the autonomous stage. Cognitive control requires total active attention in which individual tend to verbalize each step of the task. In the autonomous stage, only limited attentional demands required, the individual abandons the need to verbalise the task (Fitts, 1964). The generation of a motor program is the underlying mechanism which allows a change to take place from cognitive control to automatic processing. Various researchers therefore proposed the use of auditory and verbal stimuli to 'by pass' the damaged area of the brain.

Tigard (1959) suggested that the brain is a system with high redundancy and its functional capacity is suplus to requirement. BachyRita (1981) suggested that the brain can relearn a lost function in an undamaged area of brain by unmasking 'hidden' connections. Luria (1966) pointed out that an impaired functional system can be transferred to the higher level of cortical processes through the use of speech. In other words, a person with CP may learn to rely on an alternative functional system to compensate for the impaired one. This is known as intersystemic reorganization. Adams (1971, 1976) concluded that language is clearly implicated in motor learning and retention. Verbal regulation aids motor organisation and planning, and may act to inhibit unwanted motor activities (Luria, 1961). Undoubtedly, using a verbal prompt can speed the learning of new skills. A major practical question is how speech can best be used in order to speed learning and maximise retention of what is learned.

In our model, we utilize the therapist's verbral instructions and comments together with the client's own speech as the external feedbacks which facilitate motor learning. This is known as 'Rhythmical Intention' (RI), a unique facilitation tool used in the 'Peto's Concept'.

RI is composed of two components: (1) intention and (2) rhythm. In RI, the therapist states the movement, usually in term of a goal (intention), the clients repeat it (intention) and then perform the appropriate action whilst counting (rhythm) or using dynamic speech (rhythm). RI is used whenever the client attempting a task. A task starts with an intention and ends with a functional goal. By verbalizing an intention, it assists an individual to acquire full active attention. With the use of RI, a cerebral palsied client frequently instructs himself or herself in words, thereby increasing his or her ability to complete a task or to learn a skill.

From the perspective of the motor learning theory, RI facilitates the development of motor programs. A motor program consists variant and invariant parameters (Schmidt, 1988). In attempting a particular task, the movement sequence is invariable while the spatial, temporal and force parameters are variable. The 'intention' component of RI provides a 'feedforward' message which enhances mental practice. Various studies reported that mental practice facilitates the acquisition of movement sequence and the spatial aspect of the movement (Start and Richardson, 1964; Richandson, 1967; Shea, 1977; Johnson, 1982; Johnson, 1984). On the other hand, the 'rhythm' component provides feedback in the form of KP. Rhythmical counting facilitates the acquisition of the temporal aspect of the movement while dynamic speech gives information about the force required by the movement. RI usually use together with the verbal feedback from the staff member in the form of KR. Therapists should make every efforts to establish an atmosphere which encourages cerebral palsied clients to use RI as an alternate signalling system to compensate for their impaired internal feedback systems. Both RI and KR are powerful tools for facilitating the brain-damaged clients to acquire new skills.

Conclusion

The ‘Peto’s Concept’ provides a common perspective for different disciplines of specialists to deliver their training to the cerebral palsied clients. In this ‘learning’ model, facilitations are directed at the motivational, practice and feedback variables so as to enhance motor learning. The habilitation activities involve the establishment of numerous opportunities thoughout the whole day of the clients. Embedded in each opportunity are a number of demands that must be met. Without opportunities, there is no demand, and without demand, there is no motivation. Ideally, the staff members should not propose a particular solution for the clients, but instead encourage them to tackle the motor problems at hand with whatever abilities are available to them. Then by presenting appropriate demands and feedbacks, the staff members can help the clients to refine their approach to solve the problems. Alternatively, the clients can use their own speech, in form

of RI, to assist themselves in solving the problems. This is the essense of our habilitation. Lastly, but not least, the involvement of the rehabilitation team should not cease until the brain-damaged client become fully integrated into the community.

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