CONDUCTIVE EDUCATION FOR ADULT HEMIPLEGIA

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Churchill Livingstone

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Preface

This book has been written in response to the many enquiries about our recent work in the field of Conductive Education with adult hemiplegia. It is based on Ester Cotton's observations at the Institute for the Motor Disabled in Budapest; our experiences over several years with groups at Queen Mary's Hospital, Roehampton, the Whittington Hospital, Highgate and Barnet General Hospital; last but not least, on lecture notes and task-series given by Professor Petö to Ester Cotton. The Institute for Conductive Education of the Motor Disabled and Conductor's College was founded in Budapest by Professor Petö in 1945. Since his death in 1967, it has been under the leadership of his pupil and co-operator, Dr Maria Hari. The Institute is a rehabilitation centre primarily for children, the majority of whom are residential; it is neither a hospital nor a school but is regarded as a pre-school training centre from which children move into suitable schools as soon as possible. There is a large out-patient department for babies and adult neurological conditions, who may also be treated as in-patients.

London, 1983 E.C. R.K.

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Explanatory Note

Ester Cotton

Over a decade ago I visited Professor Petö's Institute for the Motor Disabled and Conductor's College in Budapest. I never imagined on that sunny morning that I would become so interested in Conductive Education and spend so much of my time proclaiming this system.

As for hemiplegia, all I saw that morning were large groups of patients working for very long hours. At that time I was so prejudiced against group work—in favour of individual therapy—that I could hardly concentrate on the outcome of the session. But it did strike me suddenly and forcibly that after prolonged effort these patients actually lifted up their hemiplegic arms with extended elbows. I listened to the rhythmical sound of their speech but did not understand why they spoke and what influence this had on their performance. In fact, their speech had a soporific influence on me in the warm room.

I had on that day a conversation with Professor Petö. When I enquired about the speech, he only said they used the second signalling system. Later he mentioned Luria and his book. *The Role of Speech in the Regulation of Normal and Abnormal Behaviour.* When I left Budapest, after my second visit to the Institute, I was still very confused and not yet particularly interested in the work of the Institute. However, what had impressed me most were the girls who worked with the hemiplegic patients. They were so insistent and so seriously encouraging, creating a very special atmosphere in the group. This was very different from the jolly group work that I knew from England, which although pleasant, did not create the right atmosphere for learning—as for individual treatment, I was aware that patients often become too attached to their therapists. Both these factors were foreign to Conductive Education.

I intended to return again to Budapest, and therefore made enquiries in varying quarters as to the function of the patients' speech. Speech therapists I consulted had never heard of the second signalling system, and the neurologists I spoke to were not familiar with Luria's work. This was the first time in my life that I had experienced the lack of communication caused by the Iron Curtain between the East and West. In continuing my search for information, I found there were many other 'curtains', most notably those dividing the professions. It was not until I met neuropsychologists that I was able to obtain answers to my questions.

The problem of integration of the professions has shown itself as more and more difficult and the solution in the West has been to introduce the multi-disciplinary team. When I tried to introduce Conductive Education, as applied to children with cerebral palsy, I discovered how insecure the professionals were and how frightened they became if the citadels they built around themselves were threatened. Professor Petö knew this well and solved the problem by creating a new professional—the Conductor. Young girls train for four years and learn to deal with all problems facing a patient with a neurological deficit. In this way, Petö gives the patients a chance to function as a whole instead of in fragments. As fragmentation and confusion are the patient's worst enemies, the results of Conductive Education are immediate, because the patient feels secure.

Until a few years ago I was only involved in developing Conductive Education amongst children with cerebral palsy. In this I have had excellent support from the Spastics Society, especially its late Director, Mr James Loring, now Chairman of the International Cerebral Palsy Society. The Petö Unit at Ingfield Manor School, for young children suffering from cerebral palsy, is the outcome of this work.

Contents

PART ONE
The System

Introduction: background to Conductive Education

HISTORICAL BACKGROUND

Prior to the Second World War, the hemiplegic patient was often the 'Cinderella' of the Physiotherapy Department. The physiotherapist used her traditional tools of the trade—massage, passive movements, active movements, heat, cold, electrotherapy, slings, bandages, calipers. Any combination of these became recognized as 'conventional' physiotherapy. The patient was encouraged to compensate with the unaffected side; the efforts and associated reactions often increasing spasticity and leading to contractures —ultimately to the 'one-sided' individual.

As long ago as 1860 the neurologist John Hughling-Jackson hypothesized that areas of the motor cortex represented muscles on the opposite side of the body. Nearly fifty years went by before other neurologists and physiologists began to map out areas of the brain, propose channels of communication (Sir Charles Sherrington, 1934 to 1942) and the analysis of function of movement (Bernstein 1935). As theories became more widely known it was not surprising that pioneers in the field of physiotherapy began to acquaint themselves with these advances and develop neurophysiological approaches to the treatment of hemiplegia. 'Conventional' physiotherapy may still be used, but most physiotherapists are now aware of more specific approaches to the treatment of adult hemiplegia. Most notable in this field are Dr and Mrs Bobath, Dr Kabat, Miss Rood, Dr Twitchell, Miss Brunstrom and Dr Temple Fay. Each of these pioneers used neurophysiological approaches to enable the therapist to tackle the problems of the neurological deficits. While differing in emphasis, techniques and facilitations, there are some features common to them all:

1. The theoretical background is western neuro-physiology
2. Treatment is directed towards the affected side to:
   - reduce spasticity (hypertonia)
   - improve sensory input and propricoceptive feedback
   - reduce reflex activity or use reflex activity
   - break up stereotyped motor patterns
   - facilitate normal movement
3. Treatment is divided between physiotherapy, occupational therapy and speech therapy
4. Treatment sessions are by appointment and have little connection with the rhythm of the day-to-day routine
5. The outcome of treatment is in the hands of the therapists, who use a variety of techniques—for example, handling, positioning, pressure, manual facilitations, icing, brushing, tapping
6. Treatment of the patient is often isolated from the management of the patient, with areas of overlap not developed to full potential, allowing for poor reinforcement and a lack of continuity

THE DEVELOPMENT OF PROFESSOR PETO'S SYSTEM—CONDUCTIVE EDUCATION

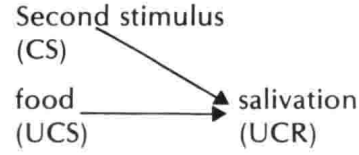
Professor Petö, in common with the others in this field, wanted to break up motor patterns, reduce spasticity and develop more selective movements. However, unlike his contemporaries, Professor Petö chose to rely on *the patient's own active participation and initiative* rather than on the handling and skill of the therapist. With this aim he moved into the educational and neuropsychological field where he was inspired by the works of Pavlov, Luria, Vygotsky, Bernstein and others. This step into the world of *education* enabled Professor Petö to develop his new and original approach to the rehabilitation of neurological conditions.

Therapists who wish to interest themselves in Conductive Education will not only have to acquire the techniques of this system but must also widen their theoretical knowledge to include learning theories and information about voluntary movements (the motor act), and study how skills are acquired.

The Russian physiologist Pavlov, in his famous experiments, showed that dogs could be conditioned to associate stimuli with reward. This represented a simple form of learning, which became known as *classical conditioning*, or *learning by association*. Normally dogs salivate when presented with food. This involuntary response Pavlov called the *unconditional response* (UCR) and the stimulus he called the *unconditioned stimulus* (UCS).

Food ⟶ salivation
(UCS) (UCR)

He noted that if some other stimulus (e.g. sound or light) accompanied or preceded the food, it evoked the same response. This stimulus he called the *conditioned stimulus* (CS). This second stimulus on its own did not evoke a response, but in association with the unconditioned stimulus, i.e. food, it did.



The association between a conditioned stimulus and a *conditioned response* is learned through the pairing of these two stimuli followed by the unconditioned response. After repeated presentation of the conditioned stimulus it would itself become enough to elicit salivation. In other words salivation occurred independently of the unconditioned stimulus.

conditioned stimulus ⟶ conditioned response

However, it was found necessary to re-introduce the unconditioned stimulus to strengthen the link between the UCS and CS. This Pavlov called *reinforcement*. If the conditioned stimulus is repeatedly presented without the accompaniment of the UCS then the conditioned response ceases to occur. This is known as *extinction*.

Once a conditioned response is linked to a conditioned stimulus, other similar stimuli will evoke the same response. This is known as *generalization* and accounts for our being able

to react to new situations in so far as they resemble familiar ones.

As Pavlov extended his experiments he developed elaborate chains of conditioned stimuli. He noted that with dogs the more complex the chain the less the success rate was; this was not so with human beings. He argued that this was because language used as conditioned stimuli is a strong reinforcer. He called this conditioned stimulus, i.e. language, 'the second signalling system, peculiarly ours, the signal of signals which has made us human'.

All hemiplegic patients have to relearn voluntary movements. The origins of voluntary movement (the motor act) have been studied as far back as Descartes and still remains largely a mystery. Two schools of thought dominate—the *idealistic* and the *mechanistic*. The former suggests that a voluntary movement arises from an act of will which evokes a movement. The latter rests on the idea that voluntary movements are only responses to external stimuli (Setchenov), an approach that proved applicable only to very simple programmes.

Bernstein maintained that the human motor act is so varied that the mechanistic approach was insufficient. Vygotsky took this argument further by suggesting that the basis of voluntary movement in childhood is social in origin and arises in communication between adult and child. In early years a child's behaviour is regulated by adult speech, i.e. 'give me, take it' etc. Later, when he has learned to speak and can give himself spoken instructions, he will begin to influence his own development and behaviour. Acquisition of skills is sequential, varying with age and ability. In the early stages of maturation a child learns by trial and error; his efforts are assisted by his mother, who will guide and improve his performance both manually and verbally. During this period the child depends on the progress of his physical development to make the skill possible; for instance, a child of 6 months can pull off his sock because he can stabilize his trunk, bend his hips and grasp his foot, while also co-ordinating hand and eye for the task. As already mentioned, this skill is achieved through trial and error. At later stages of learning the mother will use a great deal of language which will also help the child's cognitive learning—e.g. in the task of putting on a vest, where the mother gives step-by-step instruction. The more complicated the task the more precise will be the language. A useful analogy in adult life is the experience of learning to drive a car, where the instructor guides the learner solely through verbal instruction and gradually 'internal speech' becomes the regulator of the skill.

In his book *The Role of Speech in the Regulation of Normal and Abnormal Behaviour*, Luria explored the reinforcing influence of speech on motor behaviour. As movements are learnt they can be carried out without accompanied speech or by repeating words silently (internal speech). The intention is constant and represents a future need, the goal also being constant. The road to the goal moves through many stages (referred to by Connolly as *sub-goals, task-parts* or *sub-routes*). An active movement starts with an intention and finishes with a goal, and it is not the movement but the goal which is represented in the motor cortex. Luria further hypothesized that brain-damaged people whose selection process is impaired could be retained to select required information, essential for being able to tackle everyday tasks. It has to be remembered that any motor act involves constant monitoring between the action or actions performed and the original intention. For the original intention to be performed successfully this analysis and comparison is absolutely vital.

In Conductive Education the patient learns a task which will lead to the acquisition of skills. Initially he attempts the whole task observed by the Conductor. The task is then broken up into appropriate task-parts. As the task parts are mastered, these intermediate steps are assimilated and new task-parts are introduced. In this way the patient develops a wider repertoire of movement. Unless the various combinations are learnt, the patient will fail in his attempts to perform the task in a controlled way. The patient is taught how to guide his movements towards each task-part of the task by using his own speech (*Rhythmical Intention*).

Further to fully understanding Professor

Petö's approach to treatment compared with his contemporaries, it is essential to understand his concept of dysfunction versus orthofunction. He rejected the narrow view of dysfunction as mere motor disability (i.e. handicap) and maintained that dysfunctions are partial manifestations of a neurological disorder which arise from a breakdown of general adaptive development and affect the entire personality.

Function is bound up with the successful performance of tasks that arise from the biological and social system of demands appropriate to a particular stage of life. It should be remembered that with increasing age there is less hope of spontaneous adaptation. Therefore to achieve recovery there is need for expert guidance (*Conduction*). It is by considering the relationship between the individual and his environment that a full understanding of dysfunction is possible. Cerebral dysfunction results in changes of the personality and ability to adapt, which govern the patient's learning ability. The word 'learning' should be taken in its widest sense and includes every aspect of the patient's personality. Education and adaptation are concerned with the problems of *learning*, therefore the rehabilitation of patients with dysfunction is an *educational task*.

In conclusion, the system of Conductive Education is concerned with teaching 'dysfunctional' persons to become functional by developing their adaptive and learning abilities. Conductive Education is a totally integrated system, and the operator of the system is the *Conductor*.

The role of the Conductor

Professor Petö, by his definition of dysfunction, created a need for a new professional, namely, the Conductor. The Conductor* is the person who co-ordinates the patient's day so that he may perform to his best ability intellectually, emotionally and physically.

The Institute in Budapest, besides being a treatment centre, is a training college for Conductors; the training takes four years. Conductors are mainly female and are accepted on A-level equivalent qualifications. They must also show an aptitude for the work. The Hungarian Ministry of Education recognises the professional qualification awarded to Conductors graduating from the Institute.

The syllabus is demanding and includes anatomy, physiology, neurology, pathology, paediatrics, psychology, nursery skills, nursery teacher and infant teacher subjects, movement theories, group dynamics, treatment methods and techniques, splint making and workshop routines. The student Conductor is expected to work in the Institute for six hours a day, as well as to attend lectures and complete homework. The theory taught in the lectures is put into practice at once, thereby providing immediate reinforcement.

As with others involved in caring and rehabilitation, it is important that the Conductor develops a singular personality — positive and dynamic and, wherever possible, musical.

The following are the Conductor's responsibilities:

1. a) To assess each patient
   b) To observe each patient in normal life situations
   c) To observe the patient in a group situation

*Throughout this book the Conductor is referred to as 'she' and the patient as 'he'. This is purely for the authors' convenience.

These observations and assessment form the basis on which the Conductor decides which group the patient will be allocated to.

2. *To organise and direct the timetable and day routine*

The Conductor must have contact with the patients in the broadest sense of the word, to ensure that what the patient learns in one situation is used correctly during the day, for example, when eating, drinking, washing, toileting and walking. She also plays an active part in assisting the patients to arrange their leisure time (pp. 6 & 20).

3. *To initiate the patients into the group*

All activities are programmed for the same time every day so that a work rhythm is established which helps the patient to adjust to the new way of life. The Conductor makes sure that each patient is fully aware of the timetable and that the patient becomes conditioned to this rhythm and feels secure. Activities which previously might have caused apprehension are now accepted and confusion is eliminated.

4. *To direct the group*

The Conductor can be compared with the conductor of an orchestra. She assures the smooth flow of the timetable and the repetition of harmonious movements. The patients are brought together 'in tune' through the Conductor's pleasant manner and ability to facilitate the group.

5. *To make up the task-series*

The task-series consist of many combinations of task-parts which together lead to the performance of more complicated tasks. They are not exercises.

The Conductor not only works out the task-series but is also responsible for the discarding of task-parts when they become superfluous.

6. *To create a pleasant working atmosphere*

The Conductor is responsible for arranging the room and the furniture for the patients, so that patients know they are expected and welcome.

THE ROLE OF THE FIRST AND SECOND CONDUCTORS

Two Conductors work with each group (three if the group is very large). All Conductors have the same training and are equally knowledgeable about the patients, the timetable and the task-series.

The first Conductor leads the group and initiates Rhythmical Intention (ri). She decides if a task-part has to be repeated or changed.

The second Conductor is there to assist the patients, which she does by moving from patient to patient anticipating their needs. She also helps in Rhythmical Intention and, if further repetition is needed, signals to the first Conductor accordingly. When necessary, she may use facilitations.

The Conductors may change roles during the day.

Although we recognise that in Britain there are at present no training courses for Conductors, it has been found that through staff meetings, case conferences, daily group discussions and combined efforts in making up programmes, certain individuals take up the role of 'conductor'. The authors believe that, provided the multi-disciplinary team is prepared to adopt the Conductor principle, it is possible to train any members of the team to become Conductors. This demands a dedicated staff who are versatile, willing to work shift hours and prepared to share their professional expertise.

The structure of groups

In Conductive Education, group work is the accepted format of work sessions. Patients work together in homogeneous groups which stimulate, motivate and develop their initiative. The groups are led by a Conductor who has previously planned the sessions and subsequent functional tasks. In the group setting she observes the general attitude and bearing of each patient in addition to his performance and disposition.

Besides obtaining a total view, each patient is observed individually (p. 8). Using this information, the Conductor is able to select the right group for each patient. The advantages of group work are many and varied — patients often have feelings of isolation, rejection and loneliness culminating in difficulties in forming personal relationships.

In the group the patients work together and identify with each other, sharing individual problems during rest and free periods. They find that their feelings are accepted, trust begins to develop and through this interaction confidence and their own personalities develop.

With the aid of Rhythmical Intention, and through the Conductor, the patient learns tasks (or task-parts) and how to carry these over into the rest of the day. The patients' arousal level is maintained without fatigue by working in rhythmical sequence and at a slow tempo for long periods of time.

The patient is free to choose whether he works or not. This choice allows him to develop his own self-esteem and his social awareness. The patient may also learn by watching the performance of others (vicarious learning).

Group work may take place

— at the table
— in supine lying
— in free sitting
— in standing
— in walking

It is important that at all times each patient has sufficient space so that movement is not hampered. For example, in *Task-series sitting at a table* (p. 28) patients should face each other across the table with enough space for them to extend the arms freely in all directions.

In summary, the advantages of group work are

1. motivation
2. development of initiative
3. learning of motor skills
4. vicarious learning
5. stimulation
6. social interaction

In addition to these above-mentioned advantages, the Conductor alone has continual interaction with each person, which gives her a unique opportunity of enhancing the habilitation of each patient.

SELECTION OF PATIENTS FOR GROUPS

Initially, the Conductor uses a task-series to observe the patient's ability within the group and completes an assessment of each individual patient. Using this information the patient is allocated to the most suitable group. However, it is not always possible to place a patient in the right group, so the following comments may serve as a guide line.

1. Beginners group

This group includes patients who are not ambulant and those unable to initiate voluntary movements with their affected arm. There may also be other associated problems: hemianopia, proprioceptive loss, aphasia and severe spasticity or flaccidity. The beginners group carries out task-series in lying (sometimes also in sitting). The goal of this group is to learn to raise the affected arm from the shoulder, with an extended elbow, and to place the fingers above their head. The task-series will always include grosser and finer hand movements.

In this group patients will develop body-image and spatial awareness so that without help and without Rhythmical Intention they will be

able to find their own starting positions — head in the middle, arms at the side and legs straight. They also learn how to break up the total motor pattern. Patients remain in this group until such time as they can raise the affected arm from the shoulder with their elbow extended and are able to place their fingers above their head.

2. Intermediate group

Patients in this group should be able to place their clasped hands on the table whilst sitting. Patients do many task-series at the table both sitting and standing, developing hand function with extension of the elbows. Initially, they learn how to work with both hands together, moving on to positions in which one hand supports whilst the other hand moves. The patients are continually encouraged to reinforce their actions through visual feedback.

Standing up and sitting down at the table using both hands for weight-bearing through extended elbows, as well as weight transfers, are tasks included in this group in preparation for walking.

3. Advanced group

The ultimate aim for the members of the advanced group is to achieve functional independence, including free walking as well as fine movements of the affected hand.

Patients in this group may be at many different levels and therefore for some tasks may be divided into sub-groups.

It should be emphasised that this is the most difficult group to conduct because of the many different levels of individual achievement and personal expectations. Both Conductor and patient must be aware of the individual aim for the patient, and the patient should learn to identify his needs within the task-series. There is a continual interaction between the Conductor and the patient — the dynamic expectancy of the Conductor motivating the patient to achieve optimal function.

The aphasic group

It is a misconception to believe that the aphasic patient cannot be helped through Conductive Education, above all through Rhythmical Intention. It is often thought that learning a motor act through language would be an impossibility for aphasic patients: they need, in particular, specialised help to deal with the language problems. However, there are many factors other than language in Conductive Education that may facilitate comprehending and learning functional tasks for the patient — the group, observation of other patients, auditory input combined with the motor act, and the intention of the action.

All these factors, together with repetition and reinforcement, help the patient to achieve function. These patients, as in other groups, must be free to choose to work or not. They may often join in with the counting or in the dynamic commands of the task-parts when they do participate in the group.

Observation of the patient

It is worth recalling that during normal movement the central nervous system is fed precise information regarding muscle activity. Immediately any altered demand is detected, compensatory adjustments are made to result in a smooth movement. The body is programming an effective performance. This programming is part of a finely-balanced system. The hemiplegic patient with abnormal muscle behaviour is unable to programme his performance in this way.

Meticulous observation of each patient will indicate where abnormalities are and also build up a comprehensive understanding of the patient's attitude toward commands, his sense of effort and how he is able to integrate information. Observation must begin at once and continue throughout the patient's course of treatment.

In Conductive Education observation is concerned with the execution of movement that can be used for functional tasks. How each task is performed shows the Conductor where the difficulties are so that the patient can be taught how to programme his performance.

Observation of movement is divided into seven parts. These parts are not chosen arbitrarily but show how a patient performs a movement, whether he

— understands the task
— has correct body-image
— has spatial awareness

Flat hands on the stomach is chosen because it illustrates particularly well how the patient deals with his loss of ability, and encompasses the three areas mentioned above. Each therefore gives an indication of the patient's functional level. Movements are observed in supine lying, in sitting and in standing.

It is also important to be aware of the patient's attitude; for example, does he

— become angry when trying to exert himself?
— perform unnecessary movements?
— try to use the affected arm?
— prefer the unaffected arm or give up altogether?

Observation of movement	Supine Lying		Sitting		Standing	
	Yes	No	Yes	No	Yes	No
1. *Flat hands on the stomach.* Starting position: hands at the side. Can the patient						
— place affected hand on stomach?						
and then, can the patient						
— make a fist?						
— release fist?						
— slide hand on to chest?						
— take hand to neck?						
— take hand to back of neck?						
— take hand to opposite shoulder?						
— take hand to opposite elbow?						

Comments

2. *Clasping of the hands.* Starting position: hands at the side Can the patient						
— clasp hands together?						
— raise clasped hands with straight elbows?						
— raise arms to 180°?						
— turn hands 'inside out'?						
— place hands (clasped) behind neck?						
— with clasped hands, touch alternate ears?						

Comments

	Supine Lying		Sitting		Standing	
	Yes	No	Yes	No	Yes	No
3. *Movement of the affected arm.* Starting position: hands by sides. Can the patient						
— lift his arm with straight elbow?						
— hold the extended position?						
— bend his elbow?						
— place the heel of his hand upon his forehead?						
— place his hand on surface and push down?						
— approximate finger pads of both hands ('make a basket')?						
— move his thumbs individually?						
— move his index finger individually?						
— move his other fingers individually?						
If not, can he move affected arm when above his head?						

Comments