

Conductive Education

Occasional Papers

Number 12 (2005)

Publications of that special issue (CEOP 2005, Number 12) are based on the lectures held at the 5th World Congress on Conductive Education, 20-22 June, 2004

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CONDUCTIVE EDUCATION OCCASIONAL PAPERS

First published in 1997 by Trentham Books Limited

International Pető Institute
Kútvölgyi út 6.
BUDAPEST
1125 Hungary

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ISSN: 1418 5881

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Modifiability, Neuroplasticity and Environmental Stimulation: Columbus' Egg or False Hopes?

*by Joseph Lebeer**

In recent years the picture of the brain as a static, predetermined, hard-wired structure has tumbled down thanks to a myriad of studies in neuroplasticity. The capacity of the brain to constantly modify its structure and function, as a reaction to learning and to damage, is now scientifically well accepted.

In public perception, however, the brain is not generally thought of as an organ with a healing capacity. The general “paradigm”, found in scientific as well as popular literature, is that the brain works as a complex mechanical communication network, something like a telephone or a computer. Using this analogy it follows that damage to the brain is not self-regulating. If the wire of a telephone is cut, the message cannot get through. It has long been taken for granted that brain cells do not grow or multiply after birth, i.e. that we only loose cells (Curtis et al., 1972).

Since Broca showed in the 19th century that the function of speech is directed from a zone in the brain situated in the lateral side of the frontal lobe, just above the 'great sulcus or cleft', the brain has been mapped into detail. Most of the functions are now located precisely and this knowledge is still

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increasing resolution of the modern scanners, ever more defects are located. This rather static representation of brain function is still a dominant concept, on which tests, diagnostics, prognostics and therapy are based. Modern findings from neurosciences, however, as well as from clinical research, require a different model of the brain, a more dynamic, interactive and “plastic” brain. Plasticity can be looked at on various, higher levels: neurochemistry and microanatomy, organisation of brain pathways and the individual in interaction with his environment.

This article will discuss some findings on neuroplasticity in relation to the “ecology” of the child and its relevance in children with non-progressive brain or spinal damage for rehabilitation and educational practice.

Plasticity on a micro-anatomic and chemical level

Thousand of studies have been performed during the recent decades in animals to study plasticity on a micro-anatomical level. The brain reacts to damage by loss as well as gain. On the one hand there is a *loss of neurones* at a distance from the site of damage, and the cortex becomes thinner (Rosenzweig, 1984). On the other hand nerve axons can grow out to make connections at a distance too. This phenomenon is called *axonal sprouting*. It has long been believed that the number of neurones does not increase after damage, but some studies have shown that in adult rodents and primates *new neurones* are formed after damage (Kaplan, 1988; Rakic, 2002). The number of *dendrites* - i.e. the branches of neurones that make synaptic connections - also increases, as does the number of synapses (Klintsova & Greenough, 1999). The cortex of the undamaged half becomes thicker (Kolb, 1989). In human beings there is also evidence of synaptic reformation through dendrites: hemiplegic children were discovered to have compensatory pathways on the affected side that came from the brain half of the paralytic side (Farmer et al., 1991).

These micro-anatomical changes are accompanied by corresponding neurochemical change. An example is denervation hypersensitivity, i.e. the post-synaptic plate becomes more sensitive to the stimuli of the neurotransmitters. There is increased synthesis of neurotransmitters (Marshall, 1985). There are also neurochemical changes in memory phenomena. The synapses of the

hippocampus react to learning situations with an increased long-term potentiating (LTP) effect: the synaptic plate, which receives the message, becomes more sensitive to chemical substances (Teyler & Fountain, 1987; Morris & Squire, 1988). Trophins are now known to regulate synaptic plasticity. *Activity-driven experience* activates specific gene promoters (BDNF – brain derived neurotrophic factor), leading to enhanced transcription, elevated trophin levels, postsynaptic receptor activation and increased synaptic transmission (Black, 1999).

Plasticity on the level of brain organisation

In the early 20th century Karl Lashley observed in numerous experiments that in the rat's brain there is little absolute functional localisation (Lashley, 1950). Whatever part of the brain was taken away, there was always a trace of memory. The brain acts as a unit; he called this the mass action effect. The recovery capacity of mammals is sometimes spectacular. For example, when the motor cortex of new-born rats is surgically removed, there is no loss of function, and a regeneration of neuronal pathways can be observed (Hicks & d'Amato, 1984). There is always a capacity to learn, whatever the extent of the ablation of the cortex (Meyer, 1984).

Neurological plasticity depends on the location, the time and the extent of the lesion, and the kind of tasks that animals are confronted with after the lesion. What are some factors which can influence plasticity?

Effect of age on brain plasticity

Damage to a young brain cortex recovers more easily than in grown-ups (Hicks & d'Amato, 1984; Villablanca, 1984; Kolb, 1989; Steward, 1984). Neurones that are not yet differentiated have a higher capacity to readjust to changes of structure and rebuild a new structure. There is a “*window*” where plasticity is at its best: when a hemispherectomy is performed later than the second day, rats did not recover as well (Kolb, 1989).

This effect has also been observed in human beings: e.g. Hécaen's team showed that young children in whom the visual or acoustic areas of the brain are damaged recover quite well in most cases (Hécaen, 1984). In newborn infants, residual foetal neurones, which disappear around the 6th month, have

been shown to be responsible for the greater plasticity of the newborn brain and thus its capacity to repair early damage (Kostovicz et al., 1989). However, cellular plasticity and nerve cell regeneration have been shown to exist in adult animals as well. This criticizes the often generally held concept that the older brain is less plastic, less capable of learning. In spite of several studies reporting a reduction in cell number with age, the evidence for nerve cell reduction with age is far from convincing (Kaplan, 1988).

It is far from certain how long the “critical period” for recovery of brain damage extends. Vargha-Kadem et al. (1997) published the case of a boy with tuberous sclerosis (Sturge-Weber disease), who was aphasic, intellectually retarded (no reading or writing) and behaviourally disturbed, and who was operated for hemispherectomy at the age of 9 years for intractable epileptic fits. He started to talk a few months after the operation, which is beyond what was considered as the maximum critical period for language acquisition. Rashmi Sharma (2002) has started to work with this boy when he was 14 and still analphabetic, and through intensive mediated learning, he manage to learn to read, write and do maths, up to a secondary school level. The “critical period” is a rather relative concept and learning and plasticity occur much later.

Plasticity and the extent of brain lesion

In rats one can go as far as 70% cortex removal before the animals shows signs of dysfunction. The sensorial and motor cortex of the rat is able to perform all functions when only 30% is left of one side (Finger, 1978).

In human beings, it looks like the larger lesion, the larger the subsequent functional loss is (Irlle, 1987). But it is not such a linear relation. Correlation between CT features and clinical (particularly cognitive) findings in congenital hemiplegia is inconsistent (Molteni et al., 1987). In the visual cortex, the sensorial system, spinal section and lesions of the hypothalamus, small lesions of the same area have consequences that are worse than large lesions. In the limbic system, a similar paradoxical phenomenon was found: more loss of memory occurred when two zones were damaged than with one zone; but damage to three or more zones of the limbic system restored memory and behaviour again (Irlle, 1987).

The relationship between extent of damage and functional loss is not linear but follows a U-shaped curve (Chugani et al., 1996). In the beginning, when the lesion is very small, the effects are big enough to cause a big disturbance. A bigger lesion could cause a greater disturbance. But after a certain point, the growing damage causes a strong decreasing functional loss. One of the possible explanations for this greater recovery is the existence of an *inhibitory effect*: some brain zones inhibit others, and when the zone is neutralised, function of the other zones are re-established

Children who have been removed an entire hemisphere (e.g. in the case of intractable epilepsy or Sturge-Weber disease) recover almost completely. It is better to take away a full hemisphere in children than just a part. Prudent surgeons, who only took away the disturbing part, saw more problems than the more daring ones who took away the whole hemisphere (Boon et al., 1996).

Children with hydrocephaly who survived their condition with or without a shunt sometimes show a massive compression and deletion of their cortex, without any or little functional problems. Lorber found a mathematician with 95% of his brain cortex lost (Lorber, 1965). We found a man with hydrocephaly, with a 75% cortex loss, with only slight cognitive functional problems (Lebeer, 1998). Also large porencephalic cysts sometimes recover quite well, as do other extensive cerebellar losses such as in Dandy Walker syndrome.

Changing places: a critique on the localisation theory

There is now an increasingly detailed map of the brain functioning. The localisation theory, attributes specific functions to specific brain regions, e.g. the rear, occipital part is supposed to “encode” for visual perception; the left frontal part is the “motor cortex”; below it the “motor speech centre” (area of Broca) is situated, and so on.

Knowledge of this detailed localisation has been inferred from clinical observations in patients who lack certain functions and appear to have defects in certain parts of the brain. Nowadays it is possible to highlight brain function with PET scans or functional magnetic resonance imaging (fMRI).

It has become the dominant paradigm to “predict” function on the basis of localised defects in the brain. Neuropsychology generally tries to explain

learning dysfunctions in terms of visible lesions. The search for brain defects associated with developmental impairments and behaviour disturbances is booming.

However, the localisation paradigm is tumbling down in view of the findings of plasticity of the map. For example, people with the occipital part lacking can learn to “see” with their parietal parts.. Early –blind children learn to “read” Braille with their “visual” occipital cortex (Chen et al., 2002). Children are not yet specialized and can “easily” change places.

The *speech centre*, which is usually on the left side, can go to the right side, but does so *only after training*, as is shown by PET scans of aphasic patients (Musso et al., 1999)

Brain maps and receptive fields are not confined to one sensory modality but can be replaced to other sensory modalities through learning (Edeline, 1999). Cells of the temporal cortex, which normally “code” for auditory processing, can be trained to behave like visual cortical cells in recognizing patterns of orientation, when the visual cortex is damaged. In this experiment the brain had been rewired from the visual pathway to the auditory cortex, which led to specialisation of auditory cortex cells to recognize visual stimuli (Roe et al., 1991; Merzenich, 2000). If it is possible to rewire the brain in experimental conditions, it can be imagined that similar mechanisms happen in natural situations.

The brain grows by use: effect of environmental enrichment and learning

The brain is not fixed at birth, but experiences continuously shape its construction and connections. The hypothesis was already launched in the forties by Donald Hebb (1949), who hypothesized that every learning involving memory should have a structural effect on the nerve connection, i.e. the synapses. It was not until the sixties that Rosenzweig and his colleagues were able to demonstrate these daring hypotheses in a series of ingenious experiments. They examined the difference in learning behaviour in brain damaged rats that were raised in standard conditions - an isolated position in a cage with just giving subsistence care - and others that were raised in an “enriched” environment - a few animals together in a large cage where they had ample opportunity to exercise with various devices. It appeared that the

thickness of the cortex diminished in early lesions with an expected neuronal degeneration at a distance. However, this negative effect was partly compensated by environmental enrichment. Rats educated in *environmental enrichment* were better learners than rats educated in isolation. It also effected the microstructure of their brain connections: in brain-damaged new-borns, environmental enrichment increased survival time of neurones, cortical thickness, the size of the neurones, the size of the synaptic contact areas, neuronal metabolism, the number of synapses and the number of dendritic spines (Rosenzweig & Bennet, 1996). The beneficial effect of environmental enrichment also occurred in adult animals, although it was higher in new-borns. Since Rosenzweig launched the principle of *environmental enrichment*, nothing really new has been discovered during the following 40 years, only a lot of additional evidence that refined the basic knowledge that *exercise changes brain circuitry* (Villablanca, 1984; Van Praag et al., 2000).

In order to maximise recovery of function, one must minimise compensation. Because the brain has a tendency to shift activity to regions that are not disrupted, it tends to neglect chances of recovery by the lessoned system itself (LeVere, 1980). When animals are subjected to exercise, especially to “force” them to use their injured limb, they display significant alterations in their brain function and neurochemistry (Tillerson & Miller, 2002). This idea has been applied in the rehabilitation of hemiplegic adults after stroke, with significant success and has been termed “forced use therapy”. The name “forced” is harsher than reality. People, in particular children, however, tend to neglect their paretic arm. This worsens the problem and it seems to prevent recovery. In conductive education there is no “forced use” of the paretic arm, but the use of two arms and hands is continuously solicited – which is much less in a system of physiotherapy sessions, where during most part of the day the child is left free.

Visual experience has been shown to have a profound effect on the maturation of the visual system in mammals, including humans (Kaplan 1988). Deprivation of sensory and motor stimuli has a negative effect on neurological development. Nobel Prize winners Hubel & Wiesel (1963) found that cats fix the visual patterns that they had been exposed to when they were young, in their visual cortex. When they grow up with one eye covered, the occipital visual cortex that receives the information from the uncovered eye grows

thicker to compensate. This phenomenon is similar to the effect of compensatory muscle growth in paralysis: unused potential atrophies (atrophy by lack of use). Deprivation of environmental stimulation occurs when young animals are separated from their mother. Children with cerebral palsy often have central visual disturbances: restriction of the visual field, nystagmus, slow vision, lack of discrimination. Moreover, they often lack visual experience and environmental stimulation, because their restricted mobility. To develop the visual system, one should actively explore together with the child and activate the child to distinguish objects in the world, learn about distance, compare contrasts, etc. Also conductive education works on these aspects, but it could be done more intensively.

It has been shown that the prefrontal cortex – that which in man is comparably higher developed than in animals – is needed in learning skills, cognitive analysis, working memory, and once these are automatized becomes less involved (Raichle et al., 1994). In other words: *the brain grows by use, and it atrophies by deprivation*. The brain needs stimulation in order to create the function. *Use it or lose it*.

The final network structure of the neuronal connections is established after birth, not in the first place as an unfolding of a genetically determined structure, but it seems to be strongly influenced by early experience (Aoki & Siekevitz, 1988).

It is not clear what kind of experience is needed to trigger brain development. Activity certainly is necessary, but is it any activity, we don't know. In any case, the daily activity and continuous activation, which are characteristic of conductive education, seem to respond to this idea of “environmental enrichment” – as compared to the ordinary life of a child with cerebral palsy who is confined to passivity. Emotional and social interactions are also key, as is described in the following paragraph.

Emotional interaction triggers brain development

Early *handling* of newborn animals – stroking, caressing, and caring - has been shown to have marked neurobiological effects. It increases nerve growth factor, it triggers formation of dendritic spines, long-term potentiation of the hippocampus; cortical and hippocampal thickness and it has effect on

dopamine-release and a number of neurotransmitters (Meaney et al., 1988, 1991; Fernandez-Teruel et al., 2002). The result being that caressed laboratory rodents learn better than those left in an isolated cage. The mechanism probably has to do with anxiety reduction, which has various neurotransmitter effects.

Walsh introduced the concept of *ecological brain plasticity* to designate the environmental effects of stimulation (Walsh, 1981). He did experiments which showed that even the attitude of the people dealing with the animals in the research had an effect on the plasticity: for example it mattered whether the caretaker of the animals was kind to the animals, and gave extra stimulation besides just giving food. It also mattered what the expectancies of the researcher were.

Colwyn Trevarthen found that a positive emotional relationship is primary in development of brain function. By filming at the same time newborns and their mothers, interacting in a playful way, he found that the baby is fully responsive, in contact and takes initiative. Babies can get depressed when they are not responded to. This “primary intersubjectivity” is a condition for adequate neural development, since it triggers neuronal development and connections (Trevarthen, 1990). Behaviour is not due to “hard-wired innate control mechanisms”, according to Fleming et al. (1999), but is dependent on neuronal plasticity and learning, which needs a maternal-infant emotional and care giving interaction. Without this emotional bond between parents and child, brain development is hampered. In other words, *it is parent-child mediation which triggers brain functioning towards a development of higher cognitive functions.*

Possible mechanisms of reorganisation

There are several hypotheses possible to explain plasticity of the brain on the level of organisation. A first mechanism is compensation by other systems, analogous to the blind man who learns to use his sense of touch better (Burnstine & Greenough, 1984).

A second theoretical mechanism would be redundancy, signifying that every function is represented by an excess of neurones (Marshall, 1985). Linked to this is the *neural group selection theory* (NGST). It has been found that

movement patterns *grow by experience* and “select” different groups of neurones during the course of development. It is likely that in the case of Cerebral Palsy, *precisely because of lack of experience of activity the neural selection process is disturbed* (Forssberg, 1999)

A third possibility, related to this, is the recourse to unused circuits, called relearning of vicarious functioning. Examples are the reactivation of not-crossing pyramidal pathways that conduct motor activity to the muscles after hemispherectomy (Villablanca, 1984) or in hemiplegic children (Carr, 1996) and the dentate nucleus who takes over the function of the small brain after removal of the small brain (Gramsbergen, 1984).

A fourth possible mechanism is re-allocation or substitution. In this case functions which are normally coded by certain zones, would be taken over by other zones after damage. Next to the visual-auditory reallocation experiment mentioned above, Sasaki & Gemba (1986) demonstrated that apes who had undergone surgical removal of the small brain and a paralysis of the motor cortex by undercooling, relearned hand function with their sensory cortex.

In any case, recovery of function seems to imply a *re-coordination of a network of areas* (Weiller & Rijntjes, 1999)

How does the brain stock information?

These four mechanisms of plasticity may all partly offer an answer. Nevertheless, the question remains where is all the information stored when 95% of brain substance is missing? If memory is chemically stored as current hypotheses suggest, the analogy with a hard-disk is easily made, but clearly a hard-disk which has lost 95% of its storing capacity is not going to function well. Is 95% of our brain redundant? Such an explanation is unlikely. Why has evolution then spent so much time and trouble to increase the volume and complexity of the brain, which marks the difference between human beings and the rest of the animal world?

Why does *microcephaly* not always lead to mental retardation (Martin, 1970)? Neither atrophy of the brain nor focal lesion volume after traumatic brain injury are statistically related to post-injury IQ (Bigler, 1995).

If it is not the size of the brain which makes our intelligence, then what is it?

An interesting explanation can be found in the theory of holography. According to Pribram (1971), the brain could work in a similar way as information is stocked in a hologram. A hologram has a remarkable feature that, when only part of the holographic plate is illuminated, the whole of the picture reappears, although with diminished resolution. This means that the information of the whole is contained in every part of the holographic plate. This is called *point-to-whole correspondence*. Photographs, which do not operate with laser light, but with sunlight, also contain information – the image – but they have a point-to-point correspondence: indeed, in a photographic reproduction, such as projection of a slide, every point on the screen is 'caused' by a corresponding point in the photographic plate, or slide. When you cut the slide in two and you illuminate only one of the halves, you get half a picture. Not so in a hologram, where every point of the plate contains the information for the whole of the picture.

Pribram suggested that in the brain the information coding for a certain function (which always requires the co-operation of large units) is contained in every unit. This means that when parts are damaged, the information would not be totally lost. A hologram is a form of memory, which is not lost when parts are removed:

As for movements, the Russian neurophysiologist Bernstein had already in the thirties mentioned a problem that it is impossible to explain movement in a simple mechanical way, as if the motor cortex of the brain commands the muscles via a keyboard (Bernstein, 1967). Bernstein wondered how it can be explained that there are thousands of possibilities for activation of the muscles that are involved in one simple action, e.g. drinking from a cup: depending on the position of the body, the weight of the cup, etc., and that the brain automatically adapts muscle lengths and required forces, type and number of muscles. If the information for all these possible variations would have to be stored as separate information in the motor cortex for every single action that can possibly be performed, there is not enough space. The variations are endless, yet we do not perceive muscle movements, but the same action of drinking from a cup. It was Pribram who solved Bernstein's paradox by offering the holographic hypothesis. We can look at a hologram

from different positions yet perceive the same object, while all this information is contained in the same mathematical storage pattern on the holographic plate. Analogously the information for movement is not contained for each muscle, but in the form of action patterns. The pyramidal tract of the brain would serve as a controlling, feed-forward mechanism, more of a sensory nature, than as a keyboard operating mechanism.

The brain as a living city

Plasticity is undoubtedly happening all the time. The *brain is a living organ*. Development of motor patterns is experience-dependent. The idea that the brain is all prewired and determined by genetic programmes and that movement patterns are only “evolution” in a certain order of in-born mechanisms, is not correct, or at least incomplete. This idea is called the “maturational model”. It still influences a lot the basic beliefs of doctors, therapists, teachers and parents: “it will all mature, and when there is damage, it does not mature, or we have to wait and see”. This maturation model of the brain can now be called “obsolete”.

However, one has to be careful in order to avoid creating myths about plasticity. Plasticity mechanisms are far from accurate and operate more like a not too attentive electrician. Man's capacity of restoring brain function seems to be *less perfect than in animals*. It seems that slow compression is better tolerated than sudden necrosis of brain parts. This is the same as in a coronary infarction: in a sudden infarction, there is no time for construction of collateral pathways and the damage is greater than in a slowly progressing narrowing of the vessels. In our own clinical research as well as throughout the referred literature we found people with large brain holes, although a majority is perfectly normal, there are others who had a severe handicap. There are many low functioning children with small or invisible lesions, as is the case in subcortical damage. There is still a lot to be found out.

It is probable, however, that there is not a blind disorder, that activation plays a role, that a positive emotional environment and challenging activities make a considerable difference. The actual process shows similarities with the concept of “order through fluctuation”, introduced by Prigogine to describe processes in open systems: after a period of struggle (“fluctuations”) suddenly a new ability (“order”) is acquired (Prigogine & Stengers, 1984).

In this sense the image of the brain as an orderly programmed computer is incorrect. Much better would the image fit of the *brain as a living city*: a highly complex, partly self-organising system, in open contact with its environment, with numerous influences, communication possibilities and functions, and also with numerous restoration possibilities.

Brain plasticity and its ecological context

One cannot understand a child's development by looking only at the child and its physical condition, without looking at the child's context and processes. It is clear from plasticity studies that activity plays a major role in activating and directing new pathways and functions. But it is not clear what kind of activity is being meant.

What is the role of therapy?

Therapy effect studies, on the whole, have been rather disappointing in showing statistically significant effects. In the eighties, review studies by Ottenbacher (1986) and Parette & Hourcade (1984) on the effect of neurodevelopmental therapies, were not able to make any difference between therapies.

It is questioned whether "classic therapy" makes any difference at all. In 1962 Sir Richmond Paine published a follow up study of 177 children with cerebral palsy, of which 74 had not been treated. The ones who were untreated sometimes did better in autonomy skills. These situations could hardly be met nowadays, because all children are treated. But it is interesting to know who got better without. Paine hypothesized that the children without therapy had been stimulated to gain greater independence, whereas the ones with therapy had been "strapped" in a restricted environment with apparatuses.

A large follow-up study of Nelson & Ellenberg (1982) of 40000 newborns found that 80% of hemiplegic and mild spastic diplegic children walk before 7 years of age, regardless what therapy they do. Palmer et al. (1988) compared the effect of early NDT therapy with "just normal" activities like singing and playing with young diplegic children and also were not able to trace significant differences in outcome. More recently, Bower et al. (2001) found

that more intense or less intense NDT therapy did not show differences in outcome in 56 children with cerebral palsy, but what did matter was the goals and content of activation. The comparison was between NDT sessions once a week, twice a week or 1 every two weeks. That did not make any difference. However, when goals were set collaboratively with child and family, then the outcome was better. Paradoxically, these studies would “undermine” the degree of evidence of conductive education, if it claims high results on orthofunction, because there are various other ways, which have similar results. On the other hand, they reinforce conductive education, because what are key are activity, goal orientation and motivation. These are essential aspects of conductive education.

Bairstow & Cochrane (1993) e.g. found that children, who were treated with conductive education in a UK project, even under supervision of the well-experienced supervisors, did not show significantly more movement skills than children who had undergone “classical” NDT therapies. One can criticise these studies because of methodological weaknesses (e.g. the inability to make good control groups, the short time span, the lack of a consistent implementation of conductive education as it was “prescribed” by the its inventors in Hungary), but the fact remains that the results are not spectacularly better nor worse.

In summary, it seems that not the specificity of the method is the most important contributor to motor development and development of autonomy. Also, “copying” a method from the original, like in the UK Pető experiment, is no guarantee of involving the essential ingredients.

Favourizing an active developmental ecology

There are apparently other factors, which are essential. It is important to know what happens outside therapy hours: what do parents do or not do, how much activity does a child have, how much opportunity, how much learning? How intense is the activation process? In what way is the personality of the child involved? But it is also important to know something about what is really happening between the child and its surrounding world, on a immanent level. On other words: the painter is more important than the painting.

CONDUCTIVE EDUCATION OCCASIONAL PAPERS

From a study of children who had developed “better” than had been expected on the grounds of tests or severity of diagnosis a few hypotheses emerged (Lebeer & Rijke, 2003)

First, development in children with brain impairment does not seem to happen spontaneously or as a natural process of maturation, but seems to be the result of complex interactions between the child and a stimulating “ecology”. By this, we mean:

1. Providing adequate *learning opportunities* of sufficient intensity and frequency, e.g. if there is insufficient experience of active sitting, standing or walking, there can be no learning of these functions.
2. *Creating needs* in the child to develop new functions (rather than filling in all needs): daily life needs (mobility, nutrition, dressing, hygiene, etc.), communication, literacy, etc.
3. *Actively stimulating* and *mediating* necessary steps leading to these new functions by facilitating learning processes, when the child does not do things alone spontaneously. It is better to use active, transient support materials (callipers, bars, ropes e.g.), rather than final replacement systems (e.g. passive standing frames). This also has to do with the construction of cognitive functions, which are dependent on mediated learning experience (Feuerstein, 1981).
4. Taking the child *out of its equilibrium* (and passivity) by providing regularly new challenges, is not keeping to the status quo.
5. Acting in a *goal-directed* way, e.g. throwing a ball towards somebody, walking towards an ice cream, etc.

These are necessary but not sufficient general conditions for learning. Our results were more or less identifiable in biographies of people with cerebral palsy (Carlson, 1952; Killilea, 1952)

These ideas have been operationalized in Feuerstein’s model of “the Active Modifying Environment” (Feuerstein, 1988). People *mediate* concepts and relationships to the younger generation, so that the child is able to acquire sufficient mediated learning experience, which is a fundamental condition to develop higher cognitive functions. In analogy, an active modifying envi-

ronment and a lot of mediated learning experience are needed to develop movement functions (Lebeer, 1995).

The common denominator in many developmental stimulation programs is the increased opportunity and mediation. This may explain why it has been difficult to find statistically significant differences in effect of various methods of rehabilitation. Indeed, many significant things happen outside the hours rehabilitation therapy, which are often not taken into consideration when comparing methods. In accordance with modern plasticity studies, it is important to offer children with movement disorders as ample opportunities as possible to develop functional and successful motor patterns. This may help the neural selection process (Hadders-Algra, 2001). NDT, which is usually offered in a “therapeutic mode”, once or a few times a week, is clearly not enough. Intense parent involvement is needed. The system of conductive education is one of the few systems, which offer a full time daily programme with functional goals, in a coordinated way (Hári & Tillemans, 1984). But even this system does not work in a deterministic way. In order to understand this better, we have to look, beyond plain exercise and hard work, at a more experiential level.

Development of an inner will process

The complex interactive dynamic between child and people in its environment, which influences the developmental process to a great extent, primarily happens on an inner level of - mostly unconscious - experiences. New abilities emerge in interaction. A child’s intention may be impossible because of a motor disturbance. The environment may stimulate the child to overcome frustration, to continue trying. In this way they help the child to obtain results from its intention. The environment may also reinforce a child’s helplessness. Success reinforces motivation. A child’s will or intention may be blocked after too many frustrations or when the environment fulfils all its needs without requiring a corresponding effort. A similar process happens with learning skills of a more cognitive nature. Time is an important element: “patience” is essential, but in a child with CP, patience sometimes means years of practice. Therefore, studies should be long enough. A year is nothing for a child with cerebral palsy.

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A child's will processes involves motivation, needs, projection of goals, direction, energy leading to perseverance and determination, letting go, starting again, flexibility, etc.

Several conditions may stimulate or hamper will processes, first of all the child needs meaningful goals. Enforced exercise has no effect, but when the child can do the same thing in a meaningful context, it does. E.g. a girl with spastic hemiplegia, who was not able to lift her paretic arm 90° at shoulder height during therapy sessions, was able to lift her arm upright at 180° during ballet lessons.

A peer group may be a strong motivator. Motivation enhanced by peer group learning is one of the essential characteristics of Conductive Education (Hari & Tillemans, 1984).

In Conductive education there is a lot of children's songs. Not only does music, especially songs the child sings itself accompanied with movements, elicit purposeful movements – exactly as it does with normal children in every culture - it may also be a stimulator of cognitive concepts (counting, body parts, concepts of space and time), communication, language and brings a child (and therapist) in the good mood necessary to overcome difficulties. Unfortunately, in modern versions of conductive education, recordings are replacing the singing. It is not the same.

Humour and paradox can also be powerful triggers of will: children who are not able to do something with their parents, even after exercising and trying for a long time, can do so with another committed adult who uses humour. This points to the role of a coach, much in the same way as an athlete's, circus or music coach. It may sound evident, but the underlying force which triggers all the above, is a meeting between two "souls", the child and an educator (parent or other). When one is open to this "energy of the heart", one can look beyond the child's state, beyond beliefs, and look at the child's real needs.

Activating will processes in children is not at all the same as enforcing strenuous continuous exercise to a child. Conductive education is sometimes misunderstood as such. Children with brain impairment may spend similar

amounts of time and practice to attain just normal skills, as musicians may spend to attain the skill of playing an instrument well. However, without a soul, this becomes empty and problematic. Therapists need to understand this. A good model is the character depicted by Nicholas Evans in his book "The horse whisperer".

The child's will processes (or intentionalities), might be hampered by a number of circumstances. Some children slide down in a vicious circle of "learned helplessness". Ákos Károly (Ákos & Haug, 1991) gives a clear description how children with cerebral palsy develop a disturbed pattern with their patterns, which sometimes leads to helpless behaviour. This is countered in the system of conductive education. Of course, even conductive education does not help when the child received counter-messages at home. Like all people, children with brain impairments have opposing tendencies: a will to develop and a will to stay in a cocoon. Adults have a tendency to justify that it is all right for them to stay in a cocoon. This could be called "love without will". On the other hand, parents who are overparenting, overstimulating or overdemanding may also block the development of the child; they have a lot of will, without love.

Children as well as parents may be caught in belief systems, positive or negative. What one believes the child will be able to do will influence decisions. This is an aspect of the concept of the definition of the situation, described by the Chicago school of sociology in explaining social adaptation to novelty (Thomas & Znaniecki, 1984). Also belief systems may be in the way of developing the child's will processes.

The vicious circle of physical impairment leading to more and more frustration and more physical impairment and psychosocial handicap, is illustrated in figure 1. This is the drama of the child with Cerebral Palsy. It is a complex interaction process. This vicious circle can be interrupted in order to allow a more positive development. Conductive Education, when it is well performed, aims at interrupting this vicious circle on every stage: it tries to work on the child's impairments, on frustration and motivation, it offers opportunities for activation and experience. This is not at all incompatible with other forms of therapy or treatment.

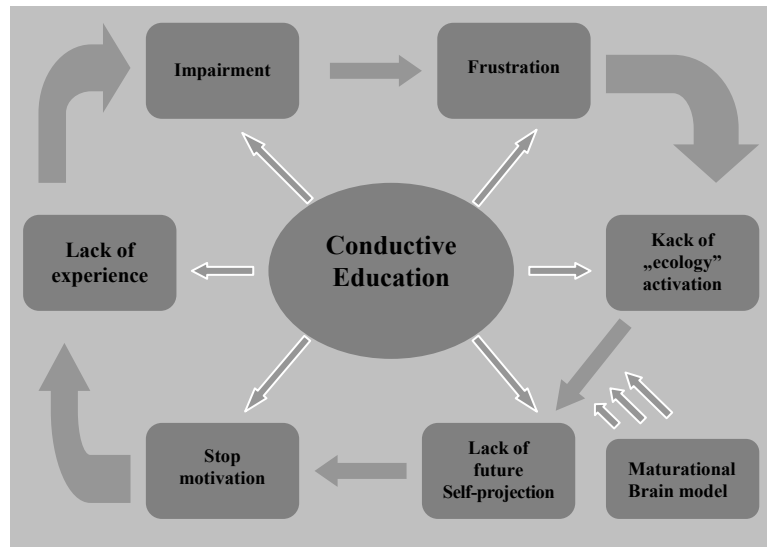


Figure 1: Vicious circle of child with cerebral palsy of physical impairment leading to motor and social handicap, which happens in interaction with the good-willing environment (parents, teachers, therapists). It also shows that conductive education tries to interrupt this vicious circle at every stage.

Development is not a linear, but an unpredictable process

There is not any variable on which a reliable prognosis could be based: neither the length of birth anoxia, type of chromosome damage, extent of brain tissue loss, degree of spasticity, justified a *prediction* of the degree of functional deficits. In the same way, *coping capacity* of parents cannot be predicted. Several parents in our study affirmed that they gained strength along the way and that they never would have considered themselves capable of coping.

Tests carry a risk of a *self-fulfilling prophecy*. This has become known as the *Pygmalion effect*: the way children are labelled influences their school results. Rosenthal and colleagues found that children with learning disabilities performed better with teachers who had been given flawed positive test results and thought they were dealing with normally gifted children (Rosenthal & Jacobson, 1968). As an alternative to deterministic standard-

ized testing procedures, we need other ways of evaluation, which are more open to signs of a child's potential and to environmental considerations. Feuerstein proposes *interactive forms of assessment*, which aim to assess a child's modifiability and learning *propensity*, which give more information for planning educational intervention (Feuerstein et al., 1981).

Accepting the assumption that the child had reached a developmental ceiling may be a reason to stop creating conditions to elicit potential. The limit to development of abstract reasoning is a priori unknown.

In Conclusion

A better knowledge about the plasticity of the brain, positively influenced by experience-driven activity and a close "mediating" relationship with significant adults in the environment, will have to redirect rehabilitation procedures and practices. Adequate learning opportunities, together with intentioned mediating interventions of adults, in a meaningful daily activity programme, not only stimulate the child's active motor learning, but also shape its brain connections. Piecemeal physiotherapies only make sense, when they are embedded in a comprehensive system of "ecological" care, including family and community coaching.

There are many things still to learn, e.g. can plasticity be induced by electromagnetic stimulations? Can it be reinforced by pharmacological intervention? These are promising research lines for the future. On the other hand, one has to be careful to look at plasticity not in a deterministic way. One of the difficulties seems to be that development does not occur in a linear way, but proceeds in a *process* of ups and downs, frustration and success. Long periods of hard work often precede the sudden acquisition of skills and cognitive abilities. It seems important to continue activating for a long time even if the child's shows little response.

One cannot "apply" methods or attitudes in a deterministic way, because in essence the system child-environment, like any living system, behaves in an indeterministic way. In other words, the child is a unique individual, in a unique environment, of all different people, who have their own way of be-

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ing in it. One can become more conscious of one's own and the child's inner processes and this may help in understanding, one can try to coordinate as much as possible, instruct good-willing adults, and built a consistent system like in conductive education, but even then, results are no guarantee.

As Columbus tried to make clear in showing an egg that he would sail out West and arrive in the East, he did so because he thought it a logical consequence of the upcoming paradigm that the earth was round. However, when he departed on his voyage, he met with many dangers on his travel and he did not exactly arrive where he thought he would. This is the case with plasticity as well.

As the paradigm of neuroplasticity is probably going to radically change our concepts in rehabilitation and learning, we have to remain cautious and acknowledge we still know very little about the brain, and what we know goes against our strongly internalised prejudice.

Acknowledgements

We wish to thank Dr Rudy Rijke MD PhD of the Foundation for Ecological Health Care (Capelle a/d IJssel, NL) who was key to conveying the ecological view on development, and for realizing a grant for this research project.

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Co-ordination and Intention in Neurophysiology and in CE: Alike or Different?

(Based on the plenary talk held at the 5th World Congress
on Conductive Education, Budapest, 2004)

by Erzsébet Balogh

The topic is about the **relationship and the simultaneous presence of intention and of co-ordination** surfing alongside in the literature from various sources (educational, biological, research and other studies).

„...Pető suggested that it is essential the child's is *activity*, which means that the child is preparing herself for the motor act and he/she is *intending* instead of waiting for someone to do something to her.” (Lee, Cotton et al. 1997)

“...*intention* is a powerful initiative, a decision to act.” (Hári & Tillemans, 1984)

“Purposeful activity is the only road leading to active learning. “...we have only used the function in order that small pieces of *co-ordination* included in the function would be formed.” (Hári, 1991)

Pető, Hári and today's conductive educational professionals often use the terms:

- co-ordination and
- intention and
- rhythmic intention, of course,

which can probably be considered the most powerful facilitation method in conductive education (CE).

In Pető's times (1893-1967) it was totally inconceivable (Pető, 1965) and hardly expectable in Hári's times (1923-2001) that the neuro-diagnostics and imaging techniques would show such a development that we become able to monitor the events related phenomena of intention and co-ordination.

The most modern imaging techniques

CT	=	computerised axial tomography
SPECT	=	single photon emission tomography,
fMRI	=	functional magnetic resonance imaging for scanning the local increases in blood flow and microvascular oxygenation to show, which part of the brain are activated by any events and sensation or activity by injected short half-life radioisotope will be scanned
BOLD	=	blood oxygenation level-dependent signal in the brain areas)

Different types of examinations were carried out in various small groups of children but there are some, which have not been performed on humans, yet. The available examination alternatives require anaesthesia for stillness, and because that, the time is still far when all these can be applied with every children at risk or with the atypical signs of cerebral palsy (Balogh et al. 1993, Balogh & Kozma, 2000).

Medical biology – especially: neurology and paediatric neurology should be **obliged to CE**. CE was “born” and established as a method & system and spread out before introducing of the effective prenatal counselling, before introducing of the most important items of the perinatal and premature intensive medical care.

Short and long-term effective medical intervention for the brain damage, appeared intrauterine or perinatal, came into the practice later on as CE started applied. (Prevention of brain lesion in the first hours of life: electrolyte therapy, treating and

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preventing of hypothermia, lung and kidney disorders, ventilation, Usher infusion, what means sodium bicarbonate solution with glucose and insulin etc.)

The development of the knowledge about the causes and the time of origin of hypoxic ischemic encephalopathy (HIE is the pathogenetical name for cerebral palsy) (Hagberg, 1972, Stanley, 1994) became clear, that the majority of hypoxic injuries were acquired during pregnancy (Nelson & Ellenberg, 1986, Paneth, 1993, Volpe, 1994). It falls within medical competence.

Meanwhile CE became a well-developed educational approach changing the lives of thousands of people (Loring, 1978, Lee & Cotton, 1997) CE has changed the former character of traditional professions (e.g. physiotherapy according to Martin Bax) and which has become internationally and scientifically accepted during the early 80s, although its neurobiological basis has not been clarified in full extent (Hámori, 1997, 2002). Nowadays it is not possible to publish in rehabilitation for ICP children without mentioning CE.

One of the first trials to explain, how CE operates, was done by Eugen Bleck with a drawing in his orthopaedic book (Bleck, 1987), we think, that according to his opinion, CE might be on the right place in the mind of other professionals (parietal cortical area). (Figure 1)

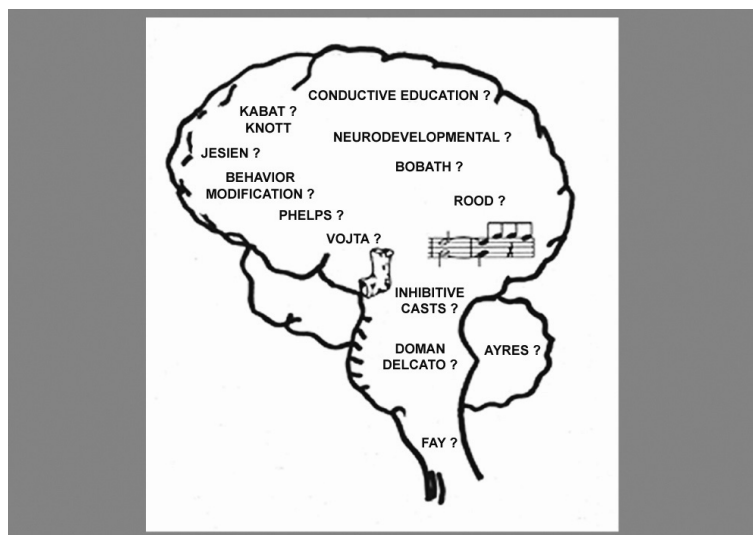


Figure 1

Accepted, that CE might be acting at the mental i.e. cortical level, not the motor only, but the sensory functions are more important – knowing that all sensory information will be pooled at the parietal lobe, it is – perhaps a good start to bring in an appropriate connection of CE to the brain.

The role of the parietal lobe in primary sensory impulses (pain, touch, vibration, temperature etc.) is clear, as well as the importance of the primary sensory cortical area. In fact, more recently we have experienced the renaissance of our understanding of the importance of touch. Fingers are very sensible and sensation (Figure 2) from here runs – through the spinal cord and through the thalamus – not only to the parietal lobe but straight to small brain, to the cerebellum, too. Simple tapping starts first by a movement command.

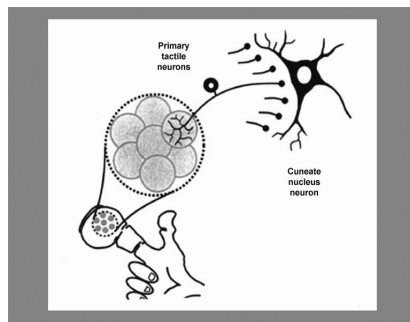


Figure 2

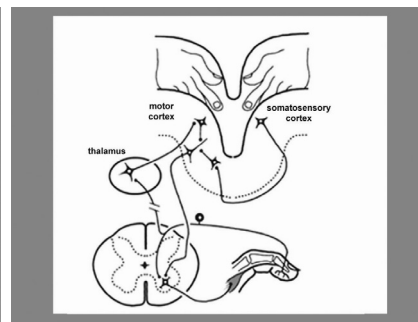


Figure 3

It is generally understood that somatic sensation can only be experienced once the movement has been executed. Others said that somatic sensation of finger movement could be internally simulated - before the movement gets started. It is suggested that sensory experiences – that are expected to emerge when movements are actually executed – can be internally simulated in the network of motor areas during motor imaginary (Naito & Sadato, 2003).

Anyway: finger movement and sequential movement (tapping) sensation will be referred by the changing contraction in the muscles (1) and by the touch from the skin (2) (Figure 3).

These impulses are going not only to the sensory but to the motor cortical area of the hemispheres and to the cerebellum, as well. Primary sensation will be processed and associated with others (temperature, vibration etc.) and passed from the primary sensory cortex to the secondary ones. The primary motor and primary sensory areas are surrounded by the secondary and beside that by the tertiary motor and sensory regions (Figure 4).

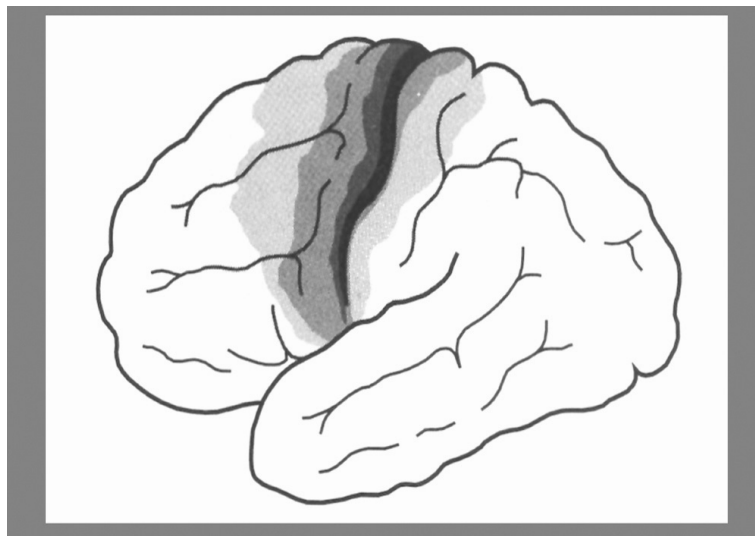


Figure 4

Tapping is much more than simple touch.

Tapping, rhythmic,

- **external paced** (with speech, song, counting, drum or metronome, etc. and later on
- rhythmic, but **internal paced** tapping (by silent counting or without),
- tapping with **preferred hand** and
- with the **non-preferred hand** etc. is the most popular experiment model for assessing sensory-motor involvement and the start of the movement and intention.

The place with the most active glucose metabolism and perfusion of the brain during;

- simple tapping (Figure 5A),
- during rhythmic, alternating tapping (Figure 5B) and
- during thinking on it without any movement (Figure 5C)

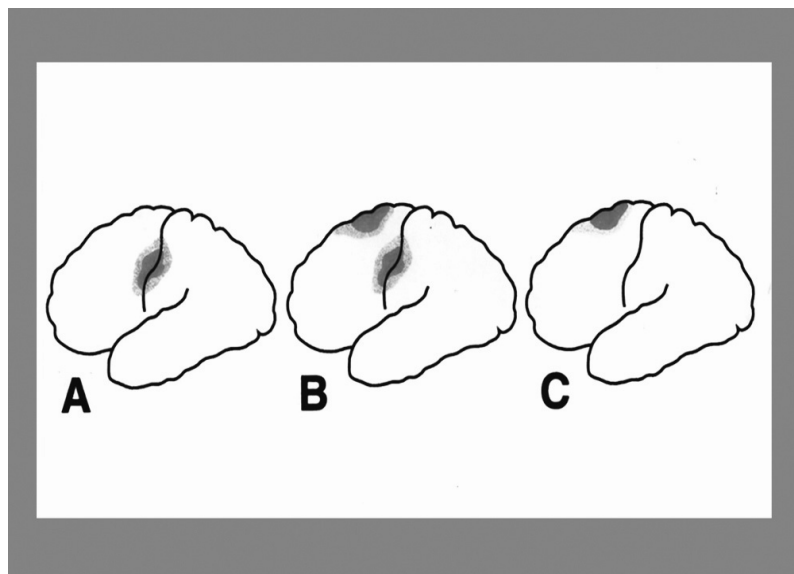


Figure 5

From that experience researchers declared *the prefrontal region as a place of intention*. More than one place was found in these expanded regions, which indicates increased glucose utilisation before the execution of the movement.

Bloom and Lazereson were the “fathers” of the little man, Mr Homunculus (Figure 6), with which they illustrated the disproportionate areas of the somatic motor and sensory cortex devoted to different parts of the body. One can take the most usual pictures for the motor and for the sensory cortex (Figure 7, 8, 9).

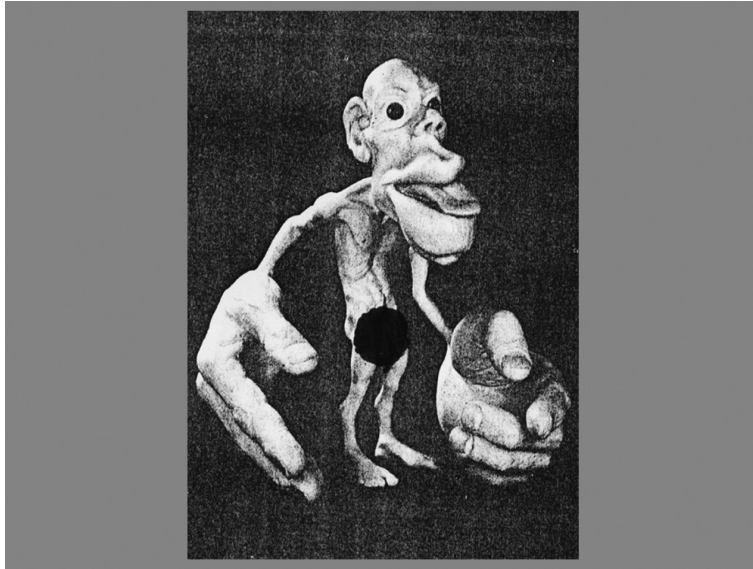


Figure 6

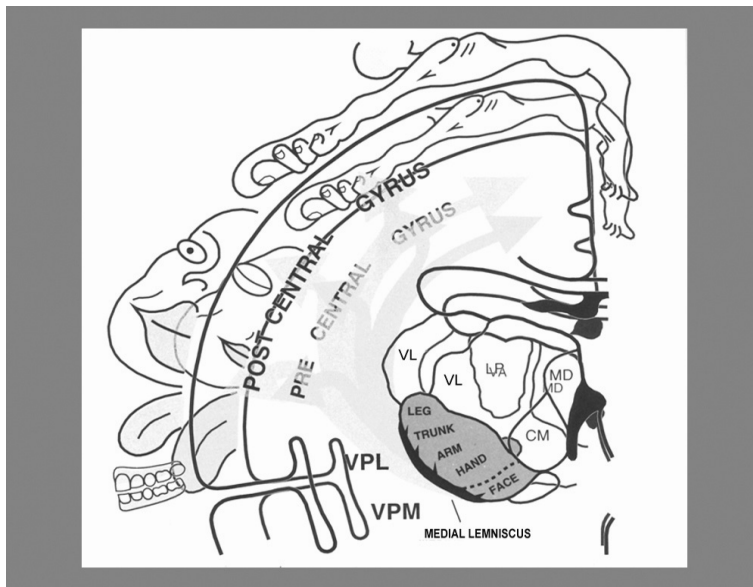


Figure 7

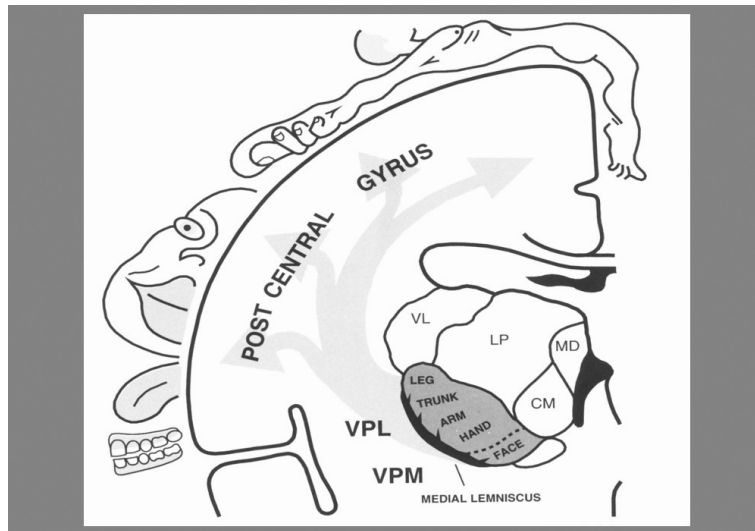


Figure 8

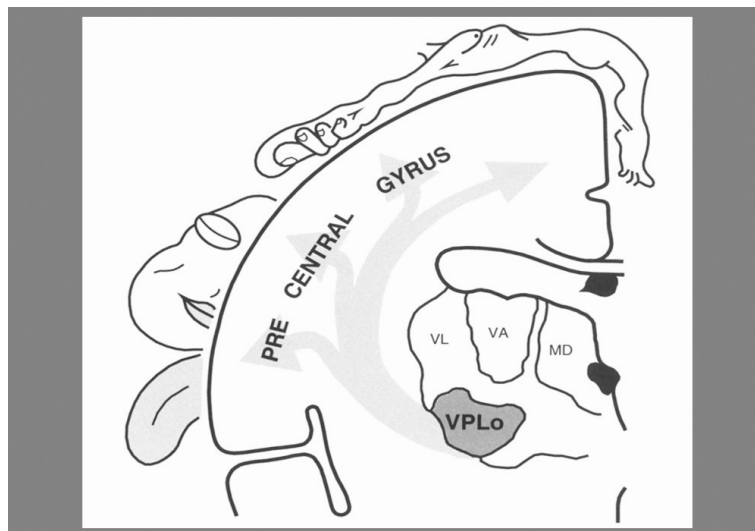


Figure 9

According to that representation the trans-cranial electromagnetic impulses can be delivered for assessing of the facilitating effect of thinking about movement, measured by electromyography.

That refers to **muscular evoked potentials** (MEP), which can be made:

- in rest,
- in thinking on the contracting muscle but without any contraction and
- during a very weak voluntary contraction (10% of the maximum power).

It should be measured: the stimulus intensities, the median amplitudes of MEP and the area of MEP. They were significantly larger during thinking paradigm compared with rest. This effect was greater at the lower stimulus intensity.

Conclusion: **thinking on a movement** (without muscular activity) **has a facilitatory effect on magnetic MEPs** (Kiers et al.). The enhancement of activity when participants attend to their intentions could be followed by “fMRI study and with BOLD (blood oxygenation level-dependent) signal in the brain areas that represent intention) (Hakwan et al., 2004).

Recent findings reveal that attention and intention can be separated **hardly from each other**. Former examination techniques did not let us prove it, but the recently publishing authors say:

“...participants attend to intention, there is enhanced activity in the pre-SMA (SMA = pre-supplementary motor area.) It has been suggested that the effective editing and *evaluation of intentions are only possible when we are conscious of the intentions*. Within the context of voluntary actions, it has been reported, that awareness of the production of spontaneous movements is associated with an enhancement of the premovement slow potentials recorded over the medial frontal region.”(Hakwan et al., 2004) The intensity of activity in the pre-SMA correlates with the awareness of intention, and the results suggest that “*attention to intention may be one mechanism by which effective conscious control of actions becomes possible*” (Hakwan et al., 2004).

In addition, with the various imaging techniques it is now possible to make the changes in the brain visible: the solely movement, the spontaneous or provoked motion, the repetitive movements or thinking on it, the understanding of sound and written an/or generated word and speech, the convul-

sive attack, the fear, positive or negative emotion, religious devotion or some complex processes of reflection (e.g. playing chess).

How the terms “intention” and “co-ordination” are defined in CE? (See the newest publication of Kozma, 2004, the same issue of CEOP)

Motivation, the *intention* to act, planning of implementation of an action and the spatial realisation of an action. (It is very similar to Luria’s thought: “Voluntary movements are controlled by a combination of goals and *intention*.”)

Intending and representing the goal become an internal language. Pronouncing the symbol loud is not any more necessary, conceiving the action will do. Learned *intention* evolves automatically and can be used in any situation during the daily routine without becoming conscious of it. With the assistance of conduction *the perception of the intention* – an inner image or micro Gestalt – is thus changed (Hári, 1997).

Co-ordination in CE is (most briefly)

“Purposeful activity is the only road leading to active learning. ...we have only used the function in order that small pieces of *coordination* included in the function would be formed.”

“So that small pieces of *coordination* are formed the functions must contain the short-term, ‘microscopic’ aims, which can only be achieved by internal reorganisation.”

“While the child achieves the goal set for him/her the *new co-ordination* evolves and, by knowing it the child will apply this *newly emerging co-ordination*.” (Hári et al. 1991)

“Reorganisation can be achieved via the activity of the mind. The small aims will give feedback to select *coordination*.”

The nervous system organises the process of purposeful action. This discovering and forming organisation will establish something new compared to the constant dysfunctional operation when the microscopic aim is achieved: *a new coordination*.” (Hári, 1984, 1991, 1997)

The two terms (intention and co-ordination) in the neurology.

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The two terms (intention and co-ordination) in the neurology.

Intention (in neurology)

- the initiating a movement,
- sustaining a movement or posture,
- inhibiting extraneous off-task movement while engaged in and
- shifting from one movement to another, which involves inhibiting the previous movement.

Co-ordination (in the neurology)

- fast and precise start,
- correct and precise end of movement (getting to the aim and stopping);
- evenness of exertion,
- acceleration and
- slowing down appropriate for achieving the goal,
- ensuring suitable intervals and
- changes in sequence and alternating motions,
- ensuring suitable muscle tone for movements and
- rest positions (fixing during standing and sitting); thus body posture is also correct.

Short vocabulary

Co-ordinate = equal in importance, bring or put into proper relation, the act of co-ordinating

Intent = purpose, giving attention, determined

Intend = to have as a plan or purpose

Intention = an aim, a purpose, intending, that you want and plan to do

Intent on doing something

= with the desires or attention directed towards

Intentional = done with purpose, intended

Rhythm = regular succession of weak or strong stresses, accents, sounds or movements, (in speech, music, dancing, etc) processes, regular recurrence of events

Rhythmic, rhythmical

= marked by rhythm, having rhythm

Reading either educational or neurological definitions carefully, it becomes apparent that the two topics show many similarities. In neurophysiology not only

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similarity is present, but the term intention and the term co-ordination mean almost the same, although they are quite different in everyday parlance.

The similarities of intention and coordination are based on the anatomical and functional (metabolic) connection of the prefrontal and frontal motor area to the contralateral cerebellar region (Figure 10, 11, 12).

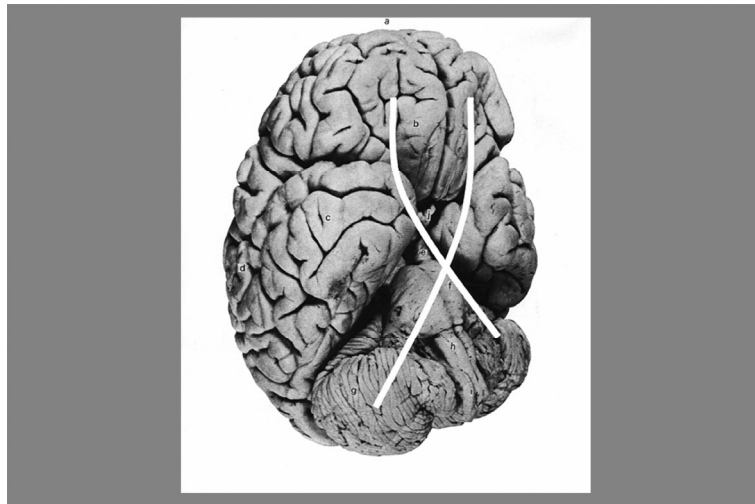


Figure 10

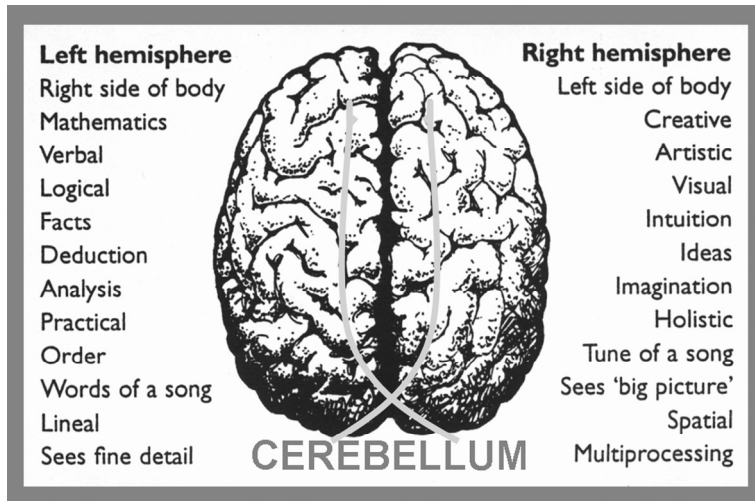


Figure 11

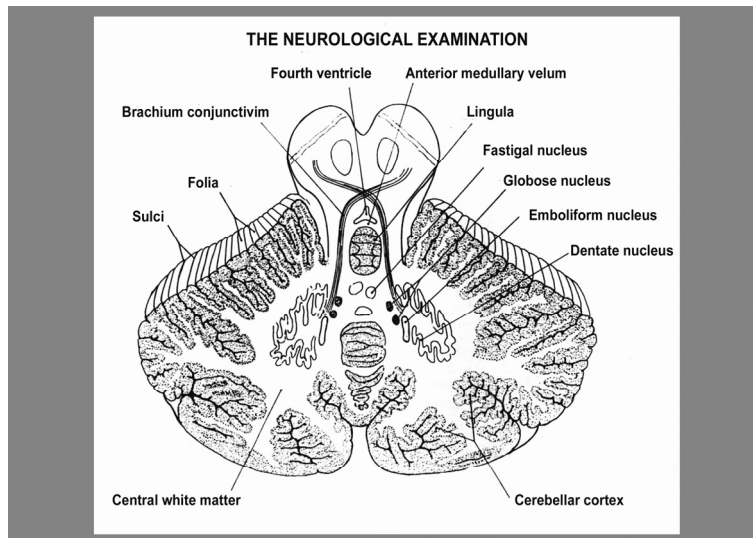


Figure 12

The cerebellum is the centre of the co-ordination and proprioceptivity of neurological sense (Figure 13, 14).

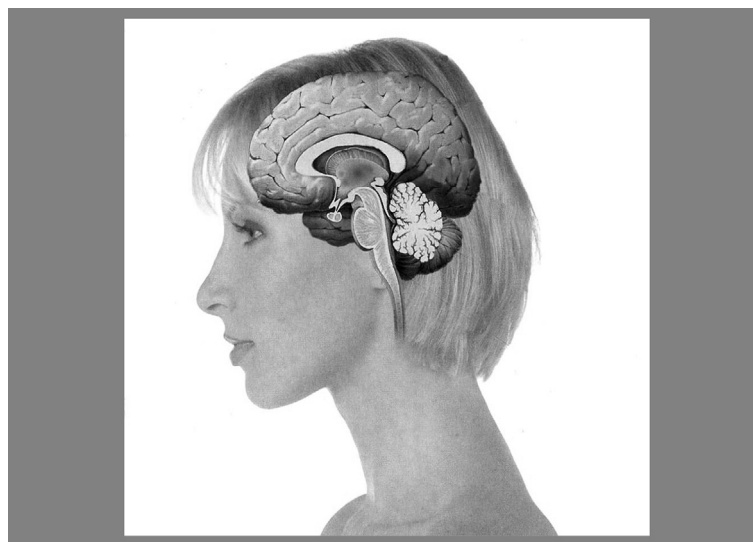


Figure 13

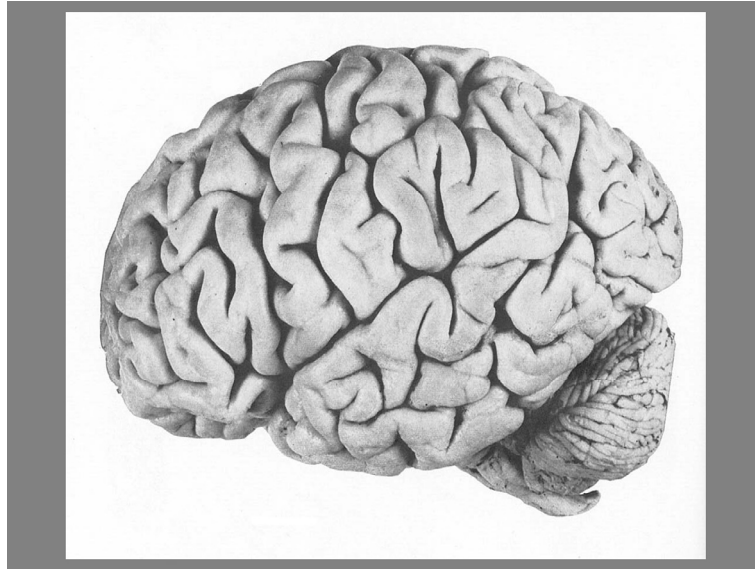


Figure 14

The small brain (cerebellum) is involved

- in ensuring the accuracy of the specific movements
- in binding a number of individual movements into a complex coordinated movement
- in learning
- in timing

Most authors suggest that movements or co-ordinated sequences of movements may be adequately produced by non-cerebellar structures, such as the motor cortex, the cerebellum must take with an additional contribution.

How can the cerebellum process all that?

With not only the nature of the negative pattern computing cerebellar functions, but with the important (tactile, proprioceptive, vestibular, reticular, olivar, corti

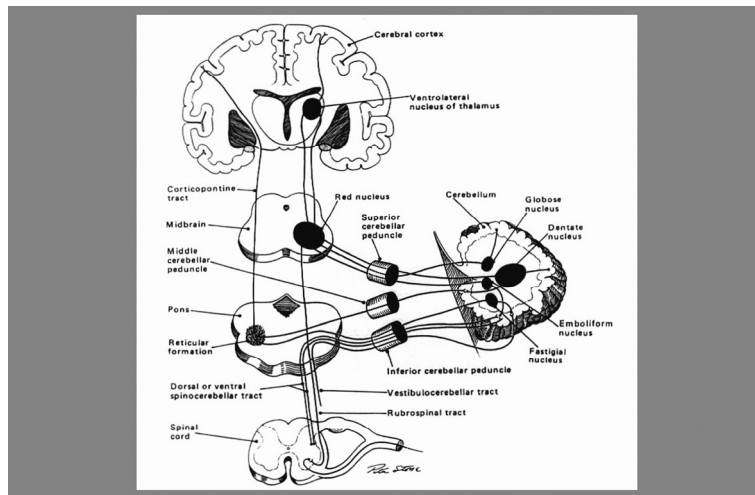


Figure 15

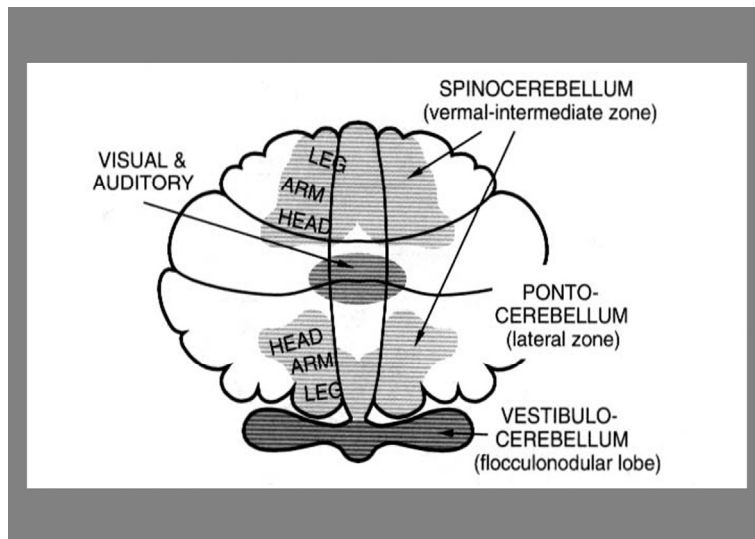


Figure 16

cal, visual, acoustical) proportionated input and output connections (the spinal cord via red nucleus = reticulospinal tract, via vestibular kerns = vestibulospinal tract, via reticular formatio = reticulospinal tract; to the thalamus, cortex) from and to other parts of the body and brain (Figure 15, 16).

The lesion of the cerebellum or which is much more frequent: the lesion of the connections of the cerebellum to the spinal cord, to the brainstem and the hemispherical structures will stop the in- and outgoing routes, it will stop or diminish the afferent stimuli and without them no processing in the small brain will be present and the output is absent too.

Functions and body parts are represented in the small brain, these double representations might be important to control the body posture in gravity (Figure 17).

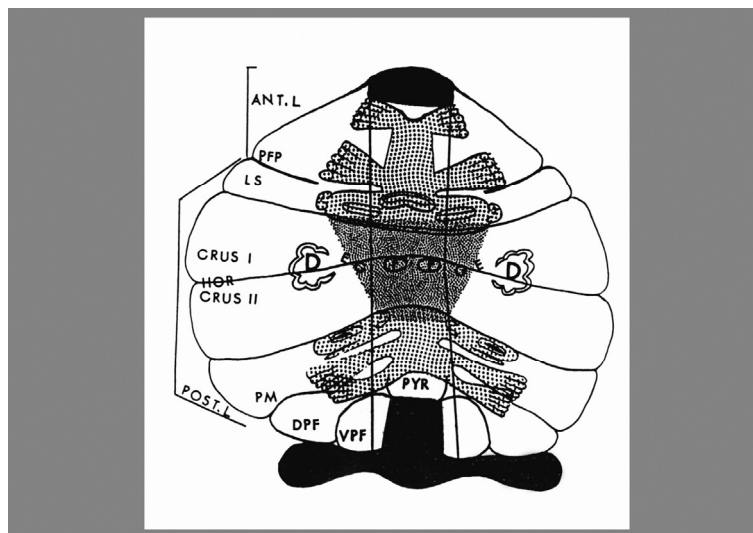


Figure 17

Neuroimaging procedures, which can be repeated during the life, and functional imaging tests confirmed the fact that the important cooperation between the cerebellum and the contra-lateral brain is being formed in activity (Scott et al. 2001). In the intellectual profile of children suffering from cerebellar tumour (Levisohn, 2000) it has been found that ipsilateral motor deficit symptoms and contralaterally steered behaviour disorders (aggression,

concretisation, lack of empathy), cognitive and speech disorders were manifested (Lalonde and Botez-Marquard, 2000; Riva and Giorgi, 2000). It is not a one-time, finished discrepancy but, due to the functional disorder of a gradual and progressive character because the reduced metabolic activity (progressive degenerations) of the cortico-cerebellar and the cerebello-cortical tracts. Affected right cerebellar hemisphere will damage verbal and written skills and the left cerebellar hemisphere will harm spatial skills.

These data suggest that whatever lesion takes place in the cerebellum (in childhood) could later cause a problem in behaviour and intelligence, and which may affect verbal/written and spatial skills, ended or really pseudo-progressive clinical cases or on the whole for the developing brain in childhood. Rehabilitation tasks must be carefully planned and implemented (Kozma & Balogh, 2004). It is obvious that cerebellar plasticity is different from that of the cerebrum, i.e. we have different and much more intensive duties in childhood, especially in early childhood, than later. The interesting

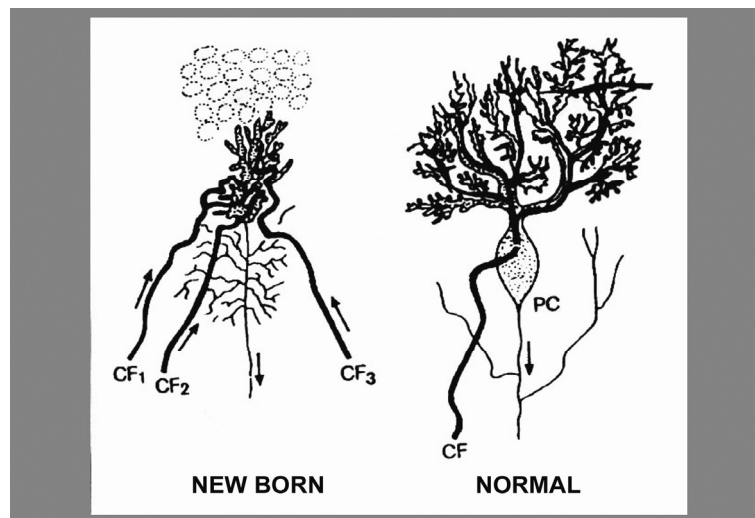


Figure 18

plasticity distortion of the developing but affected infantile brain gives us an important caring responsibility (Kozma & Balogh, 2004). Neuroplasticity means that ingoing tracts, ending and contact with climbing fibres, compete with each other for survival during the functional and anatomic change and

adaptation acquired by the functioning of the nervous system, and only a single fibre will remain connected to the Purkinje cell. Fibre, which had the most adequate impulse quantity go through it can be victorious and survive (Hámori, 1997, Figure 18).

The situation in the cases of connatal hemiplegias are very similar (Shin-ichiro et al. 1993). There is a real risk that the contra-lateral cerebellum participates in the pseudoprogression and a coherent form of rehabilitation would be really important in the first 6 years of life at least (Balogh & Horváth 1990, Horváth & Balogh 1990, Balogh & Hári 1992).

Harmonic and well-organised movements, rhythmic movements, outer and inner paced tapping and co-ordination generally will be organised by the whole brain including the cerebellum. Readiness for alternating tapping (intention) will be accompanied by increased glucose consumption at the prefrontal region of the brain. Rhythmic tapping itself causes a simultaneous activation of both the cerebellum and prefrontal area (fMRI) (Figure 19).

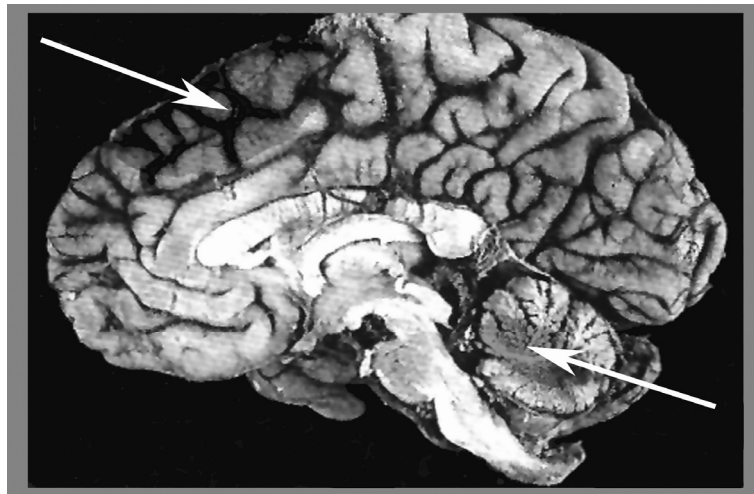


Figure 19

If we put together the data of various publications, which were made with PET, SPECT, near-infrared and fMRI, BLOD techniques, than we can conclude the following (see table):

Neuroimaging techniques show

Attention and intention cannot be separate; during both of them is an increased brain activity to see in the prefrontal cortical area.

Two regions of pre-motor cortex can be distinguished on the basis of the relative involvement in attention

- rostral (anterior) region – close to the prefrontal cortex
- caudal region – close to the motor cortex.

Intention and co-ordination during rhythmic movements increase the brain metabolism at the prefrontal and cerebellar (axial) area simultaneously

„Attention and motor preparation are two intimately linked processes...neurons that discharge in relation with attention or with motor preparation (or intention) exist in a variety of brain region, especially the prefrontal premotor cortices...”

(Boussaoud, 2003)

Brain and small brain connections, evidences for the importance of cerebellum (i.e. co-ordination!) for the development of higher cognitive functions (Schmahman, 1991) obtained findings only through the latest high-tech techniques will help us understand that what education could carry out, as rehabilitation is effective and good. These cerebral characteristics of the non-dissociable neurophysiologic events gave the rational for the former genius ideas written by Luria, Bernstein, Pető, and Hári.

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The State of Conductive Education in the USA: Past, Present, Future

by V. James Garofalo

Introduction

Through much of the written history of western formal education, there has been a thread of advocates calling for the education of the whole child. They called for the celebration of the individual child's gifts, the respect for facilitating that child's learning through the child's interests and concerns, the construction of meaning, learning, communicating the focal point of education, then to blend these fundamental concepts with current popular practices of the day. In the manner of Plato, Rousseau, Froebel, Steiner, Dewey, Montessori and Freire, Andreas Pető and his colleagues see their students as capable human beings. They searched for ways to facilitate their students reaching their maximum potentials, with dignity and with a joy in learning about themselves and the world.

At the same time parents living in the Reggio Emilia area of northern Italy were formulating their approaches to the education of their children to resist fascist thinking and world domination, Mary Richards in California in the United States of America was conceiving strategies of teaching young people that will become known as Education Through Music (ETM), and Andreas Pető was laying the foundations of his conductive education philosophy for mobile disabled children in Budapest.

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Emerging in the last half of the 20th Century were numerous approaches to teaching children; almost all fall under an umbrella that on-lookers to these events would come to call “Constructivist” Theory.

This morning I want to briefly share my understandings of the past, present and possible future of conductive education practices in North America. Bear in mind this is a work in progress, so what is spoken today is from an on-going study of conductive education. I want to thank Ms. Judit Roth-Familant and Mr. Pat Riley, of IACEA for their contributions to my research efforts. This paper is more accurate because of their assistance.

Past

The earliest USA contacts with Dr. Andreas Pető’s ideas are found in the **1950s**. **Stella Shelby** of New York is cited as having contact with Pető in 1950. Correspondence dated to this decade between Pető and USA doctors, leaders of professional organizations and a family therapist are found. Journal articles and research were shared back and forth. Some visited the Institute for Movement Therapy (IMT), later renamed Pető Institute in honour of Dr. Andreas Pető’s work. There is only one USA family mentioned in this time period that visited the institute. By the end of the 1950s a Florida doctor was making films in Budapest of the Conductive Education practices to be shown at the Third International Congress of Physical Medicine in Chicago in 1960.

Three professional organizations held informational sessions and/or published information about conductive education in the 1950s. They were The National Society for Crippled Children and Adults, The International Society for Rehabilitation of the Disabled, and the Journal of Florida Medical Association.

USA people who Pető identified as informed on conductive education are **Ilna Rostas**, family therapist working in Chicago, Illinois and who had worked at some time in the past with Pető; **Earl C. Graham**, Librarian and Editor of National Society for Cripple Children and Adults, who exchanged professional materials (articles, research) with Pető; **Dr. Farkas**, a professor at a New York City medical school, corresponded with Pető; **Sarah Semans**,

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instructor at Stanford University, whose research was of some interest to Pető, and they exchanged research and corresponded; **Brewster Miller**, Secretary of International Society for Rehabilitation of The Disabled, organized a trip to the IMT in Budapest; and **Dr. Irwin Leinbach**, Director of a Rehabilitation Center in St. Petersburg, Florida, visited the IMT, wrote a favorable article about Conductive Education in The Journal of Florida Medical Association and began making films at the IMT of Conductive Education practices to be shown at the Third International Congress of Physical Medicine in Chicago in 1960.

The **Preisach family** is the only USA family known to visit the IMT in the 1950s.

The **1960s** had similar interactions. By 1969 the Wisconsin State College at Eau Claire's professor **Dr. James B. House** had received a two year federal grant to study the impact of conductive education principles on ten cerebral palsy children between the ages of 5-13 compared to a control group of fifteen similar cerebral palsy children. The study was organized by House, Professor and Director of Speech and Hearing Clinic at WSC: Eau Claire. He had studied Conductive Education in both England and at the IMT for a summer. He sent his wife, **Margo V.**, also a Professor at WSC: EC, and two other colleagues to the IMT to study for ten months in preparation for carrying out the study. Dr. House wrote his observations of this work in an article entitled "Evaluating an Integrated Approach to the Management of Cerebral Palsy" (5) from Texas in 1971, where he had relocated with his second wife. The federal final report (3) was written by **Dr. Laird W. Heal**, Research Director of The National Association for Retarded Children.

The Wisconsin study concluded, of the twenty-five tasks and three "subtotal" scores compared, that children receiving conductive education were significantly superior to the control group in communication. The control group was significantly superior to the conductive education children in eating, drinking and the subtotal score for self care. All other comparisons were considered not significantly different.

During this decade **Mrs. Bobath** represented Conductive Education Concepts at the American Academy of Cerebral Palsy Congress convened in

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New Orleans, Louisiana in 1961. She corresponded with Pető and people at the IMT throughout the decade. Sidney Licht, President of American Congress of Rehabilitation Medicine, had lengthy correspondence with Pető and shared research and articles. Dr. Irwin Leinbach and Mr. Brewster Miller continued their communication into the 1960s.

The 1970s finds the Wisconsin study completed with Dr. Laird Heal writing a six-volume report. Volume One described the WSC: EC study (3). Volume Four described the results of conductive education practices on eight hundred and sixty-six Hungarian children treated and discharged in CE programs in Hungary between 1950 and 1965 (4). Six hundred and twenty six of these children had cerebral palsy.

During this decade Ernst Jokl, Professor and Director of Rehabilitation Center at the University of Kentucky corresponds with Pető. Teachers of cerebral palsy children attending The Sunbeam School at Einstein College in Cincinnati, Ohio visit IMT. The International Rehabilitation Association Secretary, Norman Action, visits the IMT as well.

From 1950 to 1979, thirty years of contacts with Pető, there appears to be no widespread discussion of conductive education, and with the exception of one very small inconclusive research study, no effort to explore the benefits of conductive education compared to on-going practice.

The decades of the 1980s finds educators and parents in the greater New York metropolitan areas discovering conductive education principles. In 1981 Stephen Parish, Professor of Special Education at Columbia University, and three women from the Rehabilitation Medicine Research Department in New York City in 1983 visit IMT. Dr. Alexander Russell, paediatrician working in London and Israel, brings conductive education materials written by Ester Cotton of the Spastic Society of England to the International College of Paediatrics (ICP) in New York City. In 1985, two years later, the ICP holds its annual meeting in Budapest, Hungary, allowing members to visit the Pető Institute. Dr. Frieda Spivak, Psychologist and Director of the Hospital clinic Center at Kingsbrook Jewish Medical Center of Brooklyn attends the meeting and invites Dr. Mária Hári, Director of the Pető Institute, to come to New York City to talk about conductive education.

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In 1986 the first conductive education instruction is offered in the United States of America by a Petó Institute certified conductor teacher. This conductor teacher was from Hungary and now relocates to New York City and develops a program. The following year the New York City Board of Education introduces “principles of conductive education” to some Brooklyn classes for multi-handicapped school age children. The teachers delivering conductive education instruction had brief abstract training, but were not certified conductor teachers.

The World Rehabilitation Fund in 1988 provides moneys to two United Cerebral Palsy of New York City teachers to observe conductive education programs in Australia and Hong Kong. The next year a pilot program of conductive education principles is started in a United Cerebral Palsy pre-school room staffed by non Conductive Education trained staff.

1990s open with the ideas of conductive education having a foothold in New York City public school special education classrooms, delivered by non-conductive education certified people. Rhona Hanshaft, Director of Operations for the Children’s Programs of United Cerebral Palsy of New York City, facilitates the creation of one conductive education classroom in each of the UCP programs in Manhattan, Brooklyn and Staten Island. In 1991 UCP of NY City funds conductors for the summer to develop conductive education programs and train their staff. October of that year Ester Cotton leads a five day workshop on conductive education at the Matheny School and Hospital in Peapack, New Jersey.

1992 Dr. Frieda Spivak leads in the formation of the Inter American Conductive Education Association. It has six goals at inception. First was to inform North American audiences of the conductive education principles via training, workshops, conferences and speaking engagements. Second, was involved facilitating the development of conductive education programs with parents, conductors, therapists, teachers and health professionals. Third, was to qualify trained conductor-teachers as professionals eligible for payment of services in health care by Medicare, Medicaid and private insurance companies. Fourth, including the training and certifying qualified conductive educators working in North America. The fifth goal was to link with conductive

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education centers in Canada, Europe, Asia and Israel. Lastly the IACEA was to serve as a conductive education information and resource center for North America. This now created a “Professional” organization of educators, medical people and parents devoted directly to the promotion of the concepts of conductive education. **Mr. Pat Riley** became the Director of IACEA and continues to serve in that capacity today.

1993 two summer programs are lead by Pető Institute (**PI**) trained conductor-teachers. UCP of New York City and NY City Board of Education offer a one week summer program to ten children using four conductor teachers from the PI. In the same year the **Ontario March of Dimes** presents an informational conference about conductive education in Toronto. Canadian parents of motor impaired children organize a summer program using Hungarian conductor teachers, some living in North American, some from Hungary. **Mercer Country Special Services School District** hosts a summer pre-school using conductive education principles. The program is lead by **Vicky Tsang**, an occupational therapist from Hong Kong where she learned many of the conductive education principles.

IACEA hosts a world conference on conductive education in 1994 bringing to the United States of America leaders in conductive education, including Dr. Mária Hári, Dr. Alexander Russell, **Dr. Andrew Sutton**, **Anita Tallow** and Ester Cotton. In the same year, New York City Board of Education added one conductive education classroom to two schools located in Manhattan and Queens. Parents living outside New York City on Long Island forge an agreement that will take effect in 1996 with the PI Directors to have the Pető provide services to their pre-school children. This results in the creation of the Conductive Education Center of Long Island. The parent group calls itself **PACE, Parents for the Advancement of Conductive Education**.

1995 is the year that a year around conductive education program opens in Picton, Ontario, Canada. It is the first year around conductive education program in North America. Summer programs, organized by parents, open in New York, Connecticut, Spokane (Washington), Virginia and California. Each hires one or two conductor teachers trained and certified by the PI.

Between 1996 and 2000, the PI enters into formal agreements with five conductive education programs in the United States to supervise and/or provide

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conductor teachers. The PACE program, already mentioned, had a supervisor for four summers of their summer programs; two Arlington Virginia summer programs, in 1999 Capitol Association for Conductive Education and in 2000 Cerebral Palsy Ability Center received conductor teachers from the PI; and in 1999 in Cleveland, Ohio United Cerebral Palsy Association's summer program received conductor teachers. The fifth agreement was with **Aquinas College in Grand Rapids, Michigan** to provide conductor teachers for a year around program, a supervisor for that program and to jointly create a training program for conductor teachers to be offered at Aquinas College in **Grand Rapids Michigan**.

In this same last half of the 1990s parent initiated programs lead by individual and/or sets of conductor teachers, most trained at the PI, were created. My involvement began during this period when I was approached by **Chuck Saur**, parent of Dan Saur, who had very positive experiences in conductive education programs. Chuck organized and led a parent group with his wife, **Sue**, that hosted three summer conductive education programs (1996-8). By the end of the third summer program, the President of Aquinas College, **Dr. Harry Knopke**, had approved the creation of a conductor teacher training program and a supporting conductive education lab school. Aquinas College supported the laboratory school for the next three years, as the parents, local advocates and Aquinas people created the school's own board and making the lab school a separate private school, **The Michigan Conductive Education Center**, with close ties to Aquinas College's School of Education.

Meanwhile in Minnesota, the conductive education program people were able to secure state foundation grant money to support children receiving conductive education through a state waiver program. The Center for Independence through Conductive Education in Western Springs, Illinois was able to work with eighteen school districts to provide conductive education like principles by pairing a physical therapist with a Pető Institute trained conductor teacher. This arrangement was recognized by the state of Illinois as appropriately qualified to provide the services. Throughout this time period IACEA reports between 25 and 50 conductive education programs in existence in North America in any one year. In 1997 in North America there

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were sixteen year around programs, seventeen summer programs, ten programs jointly supported by UCP and NY City Board of Education and a pre-school program offering conductive education principles in Mercer County New Jersey.

Present

The Twenty-First Century begins in 2001 with thirty-five conductive education centers in USA and eight in the Provinces of Canada. Most of the centers are organized, run and funded by local parent groups. What each program offers in the name of Conductive Education is very different from Conductive Education as it performed at the Pető Institute. The teachers in these programs have varying familiarity with Conductive Education principles and practices. Judit Roth-Familant will report later today about the characteristics of conductive education programs in North America from data collected in 1999. The life of most parent lead programs is less than four years. The sheer volume of work in addition to securing funding for their individual operation leads to leadership burn out. However, the number of programs continues to remain in a range of 25-50 in any one year. With the exception of the March of Dimes program in Ontario, programs are focused on pre-school and school age children.

In February of this year, Sixty-Minutes II offered a twenty minute segment about conductive education, focusing almost entirely on information filmed in Budapest at the Pető Institute. Although informative, it did not give much of a sense of what was happening in North America with Conductive Education. It certainly did not have the impact that BBC report on "Standing Up for Joe" in 1987 had on the British public.

Within the United States of America classroom, much is asked of the special educator. National and state laws govern preparation of these teachers, as well as procedures related to student eligibility, curriculum components, assessment, funding allocation and more. It is the merging of these laws with the principles and structures of conductive education that are resulting in a new, highly valued, desired and endorsed method of dealing with students with motor impairments. With the leadership of Kathy Barker and Andrea

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Benyovszky a marriage of Michigan Department of Education standards, the Pető Institutes' program of training and the Aquinas College School of Education constructivist expectations for pre-service teachers has occurred. Dr. Erzsébet Balogh and Dr. Ildikó Kozma have been invaluable in assisting in the creation of the program and fleshing out of the individual courses. Like any marriage, it is a dynamic process with adjustments, refinements and additions occurring as compatibility become more in focus at different junctures.

At the present time a conductor teacher graduate of the Pető Institute-Aquinas College training program will have a Bachelor of Art's degree and a regular education teaching elementary certificate indicating she is qualified to work with children in kindergarten to fifth grade in all subjects. Additionally she will have endorsements certifying her as specially qualified to work with children who are Physically and Otherwise Health Impairments, pre-school to seven years old children (called Early Childhood), and pre-school children with special educational needs (called Preprimary Impaired). They will have earned a Pető Institute conductor teacher certificate for 0-18 year olds.

The conductor teacher program at Aquinas College currently can work with four to six candidates a year, until the lab school serves more children. The first set of conductors will graduate in spring 2005. At the current training rate the Aquinas College program can not meet the North American demand for conductors. The Michigan Center for Conductive Education, the lab school, has to grow its enrolments, before the college program can prepare larger numbers of conductor-teachers. David Dvorak will be sharing more detailed information on the school in the afternoon session.

The conductor teacher program, as it now exists, may be implemented with other North American Colleges who are willing to work with the Pető Institute and Aquinas College to assure the integrity of training is maintained, yet make appropriate adjustments to meet the standards of the particular region and college.

Future

The challenges that face the current conductive education movement in North America are many. Leading the list is informing a much wider audience of the medical, educational and general public about the conductive education principles. It is imperative to continue to communicate with international conductive education communities, sharing ideas, research and articles. Supporting IACEA efforts in North America to carry out their goals, including securing more financial resources to accomplish their missions is critical to all work for North America Conductive Education. Attaining a niche in appropriate national and international professional organizations is important and on-going. Conceptualize, support, carry out and publish research that has the robustness to represent a true contrast of the benefits of CE programs, without dismissing its shortcomings needs to be constantly pursued.

Programs that called themselves conductive education and teachers who call themselves conductor teachers need to be monitored to assure that they are what they say. The first step needs to be an international understanding of what elements need to be present in a program to be considered a “conductive education” program, and what elements need to be part of the teacher’s training that insure she is a conductor teacher. Each national or regional conductive education group may monitor, certify and recertify the programs and teachers, but without a consensus agreement of definitions, monitoring becomes arbitrary as best. In my opinion this is the most serious threat to the effective use and understanding of conductive education, world wide. Anyone who can make a sign or print a business card can list conductive education as a specialty to benefit themselves. We must have a way to counter this threat.

The driving force in establishing footholds of conductive education in North America is from parents. The professional community has not developed as a broad advocacy base to support the parents, or to secure conductive education as one of an array of services offered to families in North America, or to gain tax and insurance dollars to fund these programs. How professionals get involved and how the acceptance is attained is part of the challenge before us.

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The need for more highly qualified conductor teachers is a world wide need. The rate of Pető Institute-Aquinas College conductive teacher training needs to be increased and more Canadian and United States of America colleges need to join in this effort.

Usually an advocate emerges who drives a philosophy, a program, a concept. Sometime it is individual, or a non-profit group, or business or industry. Occasionally a government department will lead the charge. None of these have occurred to date for conductive education. However, individual parents at the local level in communities across North America have found information about conductive education, secured conductive education services in some manner to serve their children and have pressed the rest of us to help. But they emerge and disappear within four years.

I return to history to help at predicting the future. One scenario is the Rudolf Steiner schools that were initially funded by a wealthy individual, Waldorf, which made the first school possible. Maria Montessori and the Reggio Emilia schools began their schools though interested local groups organizing local schools and supporting the training of local teachers. Montessori being the charismatic leader of Montessori schools, and the concepts of Reggio Emilia teaching became the powerful leader of the Reggio school movement. The March of Dimes started to fund research to eradicate polio was initiated and lead by a President of the United States of America. The Green Bay Packers, a legendary professional sports team in the United States, began with money from a business that allowed them to purchase uniforms and rent facilitates upon which to practice and play. The sport of golf was started by bored fishermen in Scotland hitting rocks with sticks on their way to and from their boats. The distraction has become attractive to other bored segment of the public. Today golf is a way of life for a niche of people, with a body of rules, national oversight groups and a group of people who make living playing the game and/or providing support services to those who do play and watch the play.

We also have the model of a polio treatment. A very dedicated nun created a very effective and labour intensive approach that allowed children and adults to reach their maximum potential once they survived the initial attack of the polio virus. This procedure was opposed by the “establishment” for much of

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its existence, but it eventually became the premiere approach to restoring polio victims to a life of dignity and hope. Over time scientific understandings via science research lead to the creation of medication to prevent polio and has virtually eliminated the virus from the face of the earth. So the need for the effective, labour intensive approach has disappeared.

Possibly with scientific research on repairing and avoiding nerve and brain damage, conductive education will not be service needed at some point in the future

While science searches for answers and solutions, conductive education remains a dynamic approach to minimizing the impact of mobile impairment caused by damage to the brain and/or nervous system. We are gathered here today, because we all, in some way, have been charged with the responsibility of moving conductive education principles to a higher level of visibility and use in the world.

Pető and those that have followed have taken the age old practices, currently called “constructivist”, and applied this set of practices effectively to special needs children. History will tell us whether we are a monument of practice on the timeline road of educational history or an example of an application of principles articulated over the ages.

Those of us in this room are the doers, not the observers of educational practice. So we must continue to “do” conductive education and let the watchers draw their judgments over the course of time. Let us accept that charge with renewed dedication, enthusiasm and wisdom. Let us all rejoin hands in this effort!

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Summary of Elements of Contacts with Conductive Education in USA (1950-2004)

Features	1950s	1960s	1970s	1980s	1990s	2000s
I. Communication/Sharing						
Professionals:						
Dr., educators, specialist	x	x	x	x	x	x
Parents	x	x	x	x	x	x
II. Visiting IMT (Pető Institute)	x			x	x	x
II. Informing USA						
professional organizations	x	x	x	x	x	x
practitioners		x	x	x	x	x
parents				x	x	x
Pető Institute			x	x	x	x
come to USA		x	x	x	x	x
write to USA						
III. Research USA						
professional organization						x
medical						
educational		x	x		x	x
parent						
IV. Practice of CE in USA						
Pető style						x
Some other style						x
Pető trained people						x
Pető exposed		x		x	x	x
Non-CE trained						
Unknown				x	x	x
Group setting				x	x	x
individual setting				x	x	x
supervised only					x	

Countries where Conductive Education has Gained Ground: USA

by V. James Garofalo

The North American Conductive Education efforts began in 1950 with contact by Stella Shelby with Dr. Andreas Pető. Several indicators of conductive education principles gaining ground in the North America are the activities related to

- 1) communication between conductive education programs;
- 2) informing the medical/education/parent/general public;
- 3) study of conductive education and the treatment of central nervous system damage;
- 4) levels of acceptance of conductive education by the medical and educational “establishments”; and
- 5) oversight and coordination of all aspects of conductive education in North America.

Communication between conductive education programs

Most conductive education programs in North America are registered with the IACEA. They usually have websites and newsletters, which may be accessed by all who are interested. Conductive Education programs outside of North America can be accessed via the IACEA website. On these websites can be found current information about CE programs, indication of articles

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and research related to conductive education and the general state of CE in their area.

Although conductive education programs' lives in North America are less than four years for eighty percent of the programs, new programs emerge as others close. Information on each is generally recorded by the IACEA people. Communication of conductive education is accessible, fairly current and is in place for those who choose to access it.

Informing the medical/educational/parent/general public about the principles of conductive education

Earliest contacts were doctors and educators who sought information, but they did not move to implement or in almost all cases carry out research. Parents of children with cerebral palsy who are also physically impaired are the most motivated to seek out information. The current professional community generally has interest only if one of their clients is involved or seeking to be involved in some form of conductive education program, or they are protecting their niche of the work world from rival ideas being accepted.

In North America parents continue to explore CE as an option. Professionals are slowly informed as they watch their mutual client's progress, and/or visit CE programs and/or speak with CE trained professionals. Information about conductive education is steadily, but slowly, gaining a wider body of "establishment" professionals. Each conductive education program carries on their informational activities locally.

In Michigan the Board of Directors for the Michigan Conductive Learning Center has medical doctors and specialists, as well as educators sitting on its boards. Their presence and voices have opened the ears of their colleagues to conductive education. Each program in North American has opportunities, successes and frustrations in their geographic area.

The broadcasting of the Sixty Minutes II segment on Conductive Education helped to inform all audiences, but most likely had the largest impact on the general public and parents. The important fact is that information is being shared across the continent.

Study of Conductive Education Practices and causes and cures of central nervous system damage

In February 2003, the American Academy for Cerebral Palsy and Developmental Medicine published a study entitled “Effects of Conductive Education Intervention for Children with a Diagnosis of Cerebral Palsy: An AACPDM Evidence Report”.

The purpose of the study was “to provide the biomedical research and clinical practice communities with the current state of evidence about various interventions for the management of developmental disabilities.” The report was not to conclude proof of effective or ineffective practice or to provide guidelines for practice. Its focus was to “reflect areas in which more meaningful research is needed.”

The group searched data bases of research from 1966-2001. They found eighty-eight citations to examine. Of that group fifteen articles fit their criteria for review and study. Their bibliography includes thirty-two citations for research mentioned in the narrative of the report. The criteria they used to select studies, their conclusions and insights provide an excellent base for formulating research, models of research to replicate and general guidelines for evaluating research, programs and teaching credentials of conductor teachers. This study is a major step in stimulating more careful research.

There is a need to research using traditional procedures and instruments to compare the effects of conductive education on clients to control groups of similar children. However, we should be bold in our exploration of new more “robust” ways of assessing effects and conducting research that will most accurately reveal the impact of all services to special needs children. We desperately need trained and motivated professionals to work in this area and adequate funds to support their efforts.

We also must keep abreast of new medical interventions, such as oxygen therapy and laser research, in strategies to repair neural and brain damage and in methods of reducing the risks of initial damage to occur. Our ultimate goal should be the prevention of brain and nervous system damage and one hundred percent restoration of damaged tissue and body function.

Acceptance by medical and educational establishments

Progress has been made in receiving recognition of Conductive Education as a legitimate service in an array of special services to children. It comes in the form of funding conductive education services to special needs children with state and insurance moneys; of recognition of conductor teachers as “certified” teachers and of the conductive education programs as appropriate for special needs children.

The Michigan Department of Education recognizes conductive education as an appropriate strategy to be used with special needs children. They allow pre and in-service teachers to be trained in this technique and attain endorsements that allow the practice to be used in Michigan public schools. Aquinas college faculty and Board of Trustees have approved the preparation of conductor teachers as part of the course of study leading to a bachelor of arts degree.

- Minnesota allows students to receive state education tax dollars toward their costs to receiving conductive education services through an education waiver system.
- In Illinois, eighteen school districts are working with a conductive education program that delivers its instruction through a physical therapist paired with a conductor teacher.
- I was informed at this conference that a school district in the Pittsburgh, Pennsylvania area and one in the New York City area have gained local school funds to pay for conductive education

These are major steps toward gaining wider “establishment” recognition of conductive education as a valued service.

Oversight and Coordination of Conductive Education in North America

The best group to provide this function is the IACEA. That is not to say another group may eventually take on this task. However, IACEA serves as an information base; a communication link to international CE centers facilitates development of CE programs in North America, and makes an effort to ex-

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pand the knowledge of CE in North America. It is seriously under funded, which is a characteristic of all CE efforts in North America.

IACEA has made efforts in all the following areas, some have been in the consideration stage, some in drafting of a plan stage, and some in the initiation of action stage.

1. Certifying and recertifying conductor-teachers and conductive education programs is desperately needed. Right now there is no way to verify any person or program has met a standard of conductive education, other than a diploma from the Pető Institute. The international CE community must address this issue in a way that there is a consensus on the definitions and the manner of certifying and recertifying. Without this, Conductive Education is doomed to pretenders and charlatans capitalizing on the desperation of parents, and professional silo builders exploiting and/or distorting the good work of Pető and all of us.
2. IACEA must have a fund raising arm to support programs, research and maintaining a facilitator function. This service should be provided to local programs to help share the burden of delivering CE services.
3. They need to have lobbying expertise to gain accreditation from the various establishment groups, such as national and state level government officials and the leaders in professional medical and educational organizations.
4. Linking to and keeping updated on what is occurring throughout the world in conductive education is very important. We can be inspired and learn from each others' efforts nationally, regionally and world wide.

But, left unaddressed are questions. How can we support the spread of the conductive education ideas to other African nations and support the efforts in South Africa? To support the efforts in Mexico and Brazil? and the spread of conductive education to other areas of Central and South America? IACEA should be a part of those efforts, certainly a leader in finding partners to further the work of conductive education.

Using these five indicators, give some sense of a wider acceptance of Conductive Education in North America and also bring into focus some the major challenges ahead.

Characteristics of Conductive Education Programs in North America

by Judit Roth-Familant

Background

After the second Inter-American Conductive Education Association (IACEA) 1998 international conference at Aquinas College in Grand Rapids, Michigan USA, a survey was developed to investigate the characteristics of conductive education (CE) programs in North America.

Objective of the Study

The purpose of the study was to gather baseline information about the programs offering CE services in the United States and Canada. The available published research studies about CE from around the world mostly focused on the effectiveness of the program and the differences between traditional treatment and CE. However, this original research intended to show these programs from a different aspect, such as organizational and program structure and administrative issues. Professionals and treatment seeking families should know about the available CE services and the quality of these CE programs. The findings of this research drew a picture of how the CE programs look in America, and how much they differ from the original Hungarian version. Furthermore, the research indicated that there are programs identified as CE programs, but lack essential 'ingredients' to call themselves CE service provider.

Research Method

A descriptive survey was developed and used in the cross-sectional study. The approximately 250 questions were grouped into five different categories:

- 'Basic Information' about the accessibility of the program and the date of establishment.
- 'Staff' about conductors, aides, administrators, and other professionals working with the program.
- 'Program' about the program model, record keeping, and academic curriculum offered by the program.
- 'Work Environment' about the location and the furniture and supplies of the program.
- 'Organization' on the organizational attributes of the program.

The survey asked specific questions regarding the past, the present and the future. The goal was to find out how the programs started, how fast they grew or shrank, and what their future plans looked like.

Participants

Surveys were sent out to all fifty-six CE programs listed on the IACEA database. Twenty-one programs (37.5 percent) participated in the study. Of the twenty-one programs, nineteen programs were located in the United States and two programs were located in Canada. The Aquinas College CE program was excluded from the study to eliminate data collector bias.

Results

Based on the most notable results and descriptors of CE programs in North America we can state that most conductive education programs in North America are:

- Available mostly on the eastern and western coasts of the United States (Figure 1.).
- More likely to be located in highly populated cities.

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- Young organizations (mostly one to two years old).
- Legally established and listed as non-profit organizations. There are no CE charter schools in North America (Figure 2.).
- Shifting from summer programs to year around CE programs (Figure 3.).

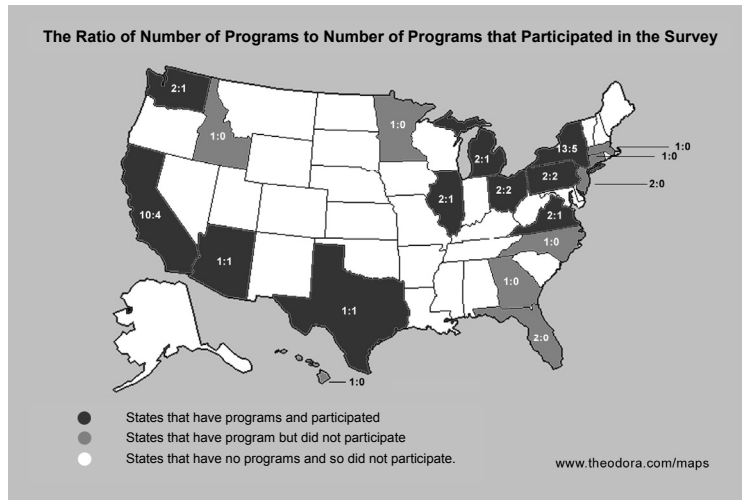


Figure 1

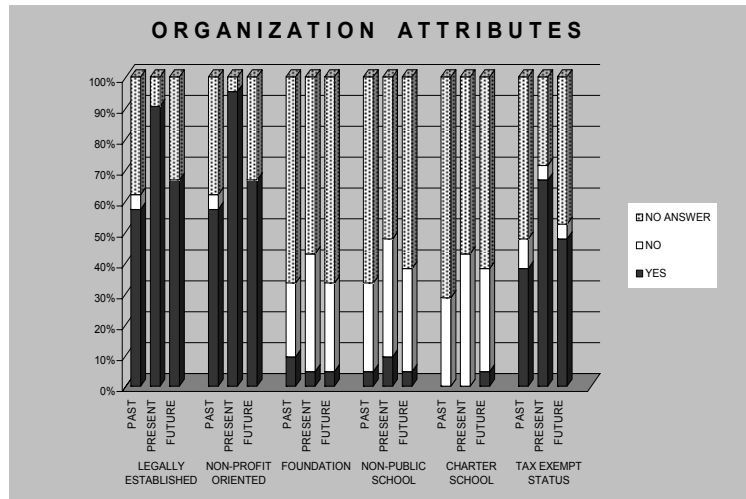


Figure 2

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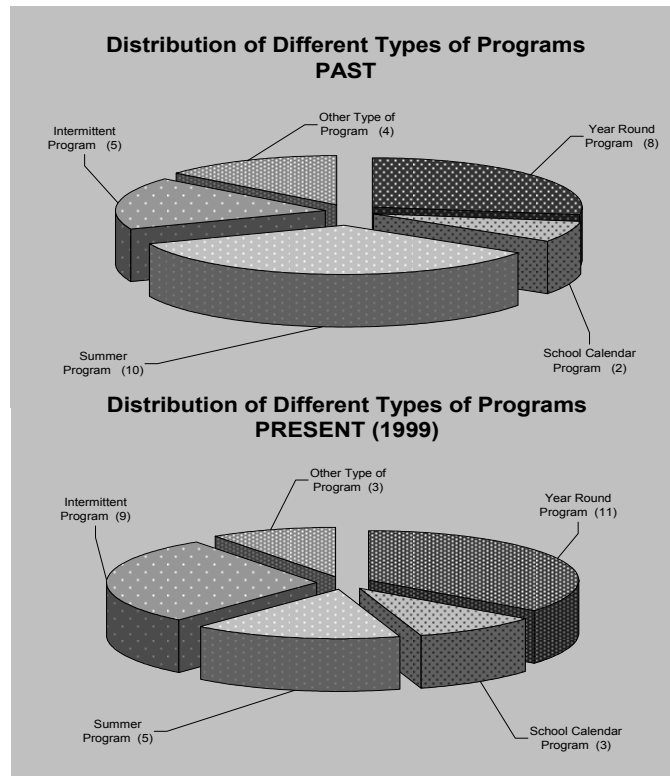


Figure 3

- Providing 80 to 1300 hours of CE services per year for children.
- Small, employing one or two conductors at a time. This fact also limits the number of children in the program.
- Operating without Conductor's supervision.
- More likely to hire Conductors with Hungarian training background.
- Employing Conductors in North America who do not pursue further education or local state teacher certification.
- Conductors are hired both short and long-term, which suggests that Conductors are willing to relocate to North America.
- Most programs hire conductors with less than five years of post-graduate work experience.

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- Serving children between the ages of 0 to 17 years old. There are no reported conductive education programs serving adults with motor disorders in the United States.
- Providing Conductor to child ratio of 1 to 3.
- Serving children with Cerebral Palsy. Some programs do work with children with other disabilities (Figure 4).
- Relying on the Hungarian academic curriculum. There appears to be a tendency to include the local state curriculum into the conductive education program (Figure 5.).

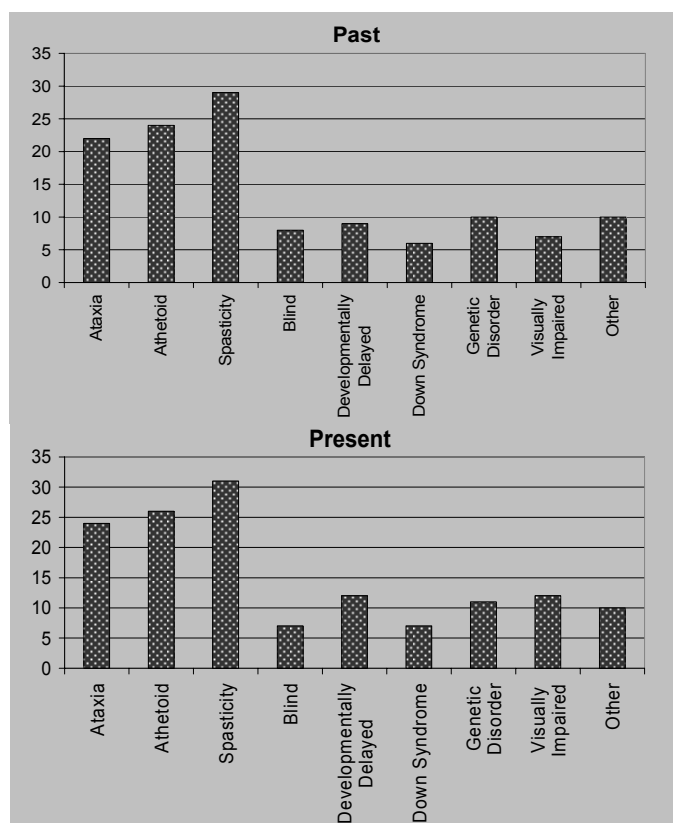


Figure 4: Diagnosis Distribution

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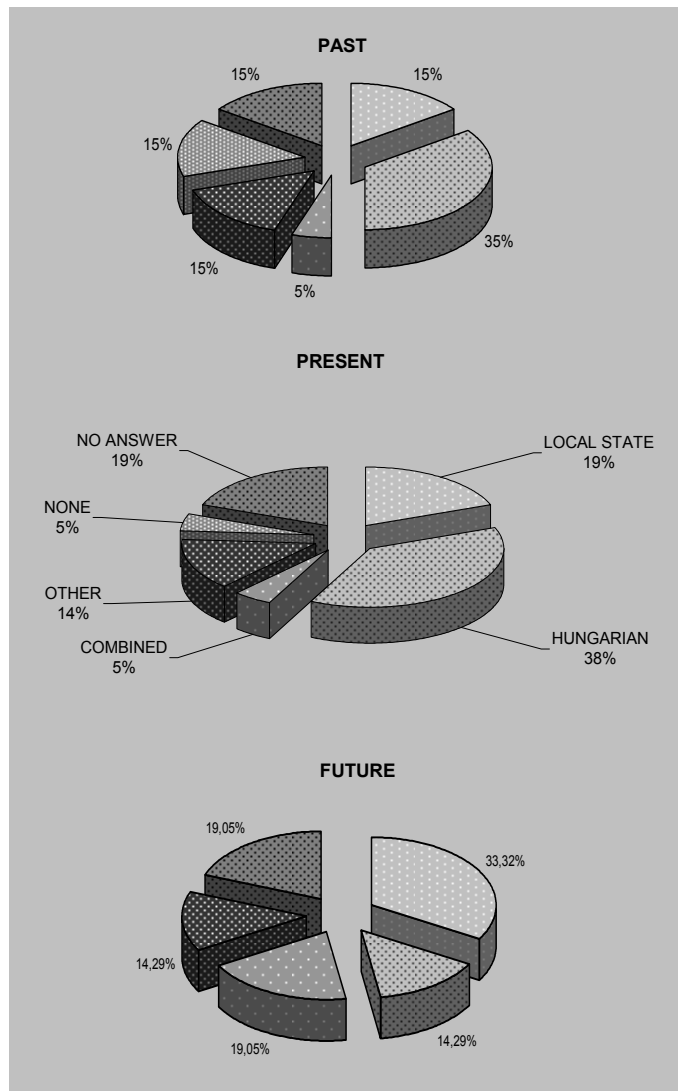


Figure 5: Applied Curriculum

Conclusions and Reflections

Would CE programs in North America meet the accreditation standards as defined by the guidelines of the Petó Institute? Most definitely not.

1. Why do programs look like and work like as they do?
2. Who oversees the programs that call themselves CE?

Most programs (the ones where the conductor(s) delivers the CE services) in North America are under two-levels of management: administrator and an oversight Board. The board members are usually prominent members of the community in the business, finance and legal areas. Some of them might have family member with CP and/or direct experienced with CE. Some of them, after the introduction, see the benefits of the program and willingly support it. The board members are responsible to develop short and long term goals for the organization. They are also responsible to guarantee the financial stability for the program. It means that they have to raise money in different ways, like holding fundraiser events to get support from friends, families, and members of the community; writing grant proposals to receive city, state and private grants. A key factor for long-term success is that the members of the board have a comprehensive knowledge about the CE program. They must know the differences between the traditional therapies and CE. One way to gain this level of understanding is to see the program in action so they are able to represent the CE program properly and effectively to others.

The person who is the link between the Board and the program is usually the administrator, sometimes called director or executive director of the program. By knowing the backgrounds of most of the CE programs in North America, it is clear that the people currently serving as program administrators are mostly parents with a child involved in the CE program. In some rare cases the administrator is a leader with some sorts of educational background, or a certified conductor. However, most programs do not let the conductor take charge of areas other than the delivery of the CE program to children. Over 75 % of the participating programs in this study have parents in charge of the Conductive Education service provider organization.

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According to Barker (2001) the greatest strengths of conductive education in the United States is that it is parent driven. It can be stated that there are no other people who are as persistent as the parents about getting this type of service for their child. We all know that persistence is crucial when the task is to crack the traditional system and get acceptance for something new. The parents are willing to fight the system and get the most appropriate services for their child. The downside of parent leadership is that the lifetime of most programs are only two to three years. Why? Most administrators/parents decide to open their own CE program after experiencing the benefits of CE on their own child somewhere else. The parents are excited about the progress that their child has made and strongly believe that they found the program that will benefit their child and others with motor disabilities in their own community.

They hire a conductor, establish the organization, advertise the program, make furniture, etc. If the parents have good business skills, and their child is thriving on the program there is a chance that the program will last. However, in most programs the administrator/parents do not have the necessarily business skills to keep the program running. They might have poorly controlled budget, weak PR, unsuccessful fundraising, difficulty with securing conductors, difficulty with solving employer-employee conflicts, or their family life is shaken (their child is not making the expected progress, siblings need more attention, etc.). These are the issues that might lead to program closings, leaving others involved in the program feeling upset and disappointed.

The other key person in the success or failure of the program is the conductor. European-trained Conductor-teachers arrive to North America feeling confident about their knowledge on Cerebral Palsy and the practice on conductive education. Most of them are also resourceful, creative, and eager to please families with children with Cerebral Palsy. However, most of them have to deal with language barriers, cultural differences, personality conflicts and isolation from other conductors in their work, and frustration about their partial acceptance. Most are financially dependent on the program, and do not have access to sufficient professional and personal support. These factors result in to two types of programs:

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1. successful programs with open-minded conductors who are also willing to learn about the American system, and
2. Compromised, isolated programs with conductors working quietly, 'under the table'.
3. What could improve the CE quality of programs in North America?
4. How could Conductors be trained about the American educational and medical system?

Any answer would have to consider two issues: (1) most conductors arrive to America as individuals, not formally connected to a CE program; (2) and they work geographically apart from other conductors in North America.

If the conductors' arrivals, work locations and related issues would be handled by an agency or organization based on contracts between the CE program and the agency, the Conductor and the agency, and another contract between the Conductor and the CE program, an intense (maybe a week-long) training course upon arrival to America in a central location would be feasible. However, this type of agency or organization is not currently in place in North America, or elsewhere in the world.

Conductors working abroad have the possibility to access the Pető Institute's library, or the collections of CE related articles and information in other programs via the Internet. It can be stated that the continuing education of Conductors working in America is undoubtedly one of the greatest task for the future to insure the acceptance of CE in North America. It is hoped that the Aquinas/Pető trained USA Conductors will be viewed as knowledgeable professionals in the field of Cerebral Palsy treatment and begin the long acceptance process.

Sutton (2001) asked in one of his paper: How many conductors does a country need? To continue this, how many conductors does a country produce? In 2005 four USA conductors will graduate from the Aquinas College CE/POHI program. This makes it obvious that for another ten to fifteen years North America still must work with conductors trained in Hungary, England, Israel, or Spain.

Presently, the available, official CE support system in North America includes one organization: the Inter-American-Conductive-Education-Asso-

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ciation (IACEA), based in New Jersey. It serves programs that are about to open, pairs up conductors with organizations, and educates the medical and educational fields about conductive education. The Pető Institute has granted personal and financial resources to choose to collaborate with a college supported CE program. The Aquinas College's CE program is the only Pető Institute-College supported CE program in North America.

Obviously, the CE support system in North America is incomplete.

When we rethink the same questions: 'How to improve quality of CE services in North America? How to educate European trained conductors about the US system?' another question emerges: 'Would a professional organization help the situation?'

During the 1998 IACEA/Aquinas conference there were some discussions about the possible establishment of the Conductors' Association, specifically for conductors working in North America. In the past five and a half years nothing significant happened regarding this issue.

In Europe, there is one Conductors' Association in Hungary, and one in Germany. The latter one is in the process to officially become the European Conductors' Organization.

What purpose could a similar organization serve in North America? This type of professional body could assist conductors working in North America with continuing education, with conductor-to-conductor consultation, and with legal matters. The organization could take part in assisting in research projects, reviews, updates in the field of orthopaedics, rehabilitation, conductive education, and special education.

It is hoped that the people involved in the promotion, research, practice, and training in Conductive Education in North America will be able to work together and succeed with the same goals in mind: to help people with motor disabilities reach their maximum level of independence and to help them to become an active member of the society by using high quality Conductive Education programs as an attaining vehicle

Future Work

Based on the research results, the following recommendations were made:

1. Follow-up studies should be conducted every 3 to 5 years to monitor changes in programs in North America.
2. The 'Characteristics of Conductive Education Programs in North America Survey' can be easily adapted and transformed for application in other countries.
3. Based on the study results, guidelines could be developed to help establish new CE programs, and help to reach higher quality of CE in the existing programs in North America.

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The Conductive Education of Nursery-age Children with Ataxia

by Ákos Szilágyi

My last actual contact with ataxia was eight years ago; nevertheless I am pleased to have been able to work with this problem again because when I completed my previous assignment I felt that something was missing, there was more work I had to do in this area. Though I know that others are better qualified in this area both in theory and particularly in practice, I would like to make up this deficit by attempting, by means of some statistical procedures, a survey of the nursery-age children who received conductive education for extended periods in our institute at that time and since then.

First, I would like to summarise briefly the symptoms of ataxia, which most of you already know: children with ataxia are those in whom a particular group of cerebellar symptoms are found. They have deficiencies, difficulties and problems the solution of which is regarded primarily as the task of the cerebellum.

The cerebellum is the place which must constantly receive information on the state of movement at any given time and on the intention to move. It must continuously integrate any corrections and adjustments it makes and build these into the movement impulses.

The following is a short and not exhaustive list of the symptoms:

- dyssynergia
- dysmetria

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- intention tremor
- abnormal recoil
- dysdiadochokinesis
- hypotonia
- wide based gait
- nystagmus
- speech disorder

Historically, ataxia has always been separated out as an independent group or differentiated as a subgroup of what we generally call a mixed diagnosis group.

The conductive education programme as adapted for ataxics is drawn from three large sources:

- the increasingly marked differentiation of tasks for such children attending mixed group programmes, resulting in increasingly uniform task sequences for them
- conductors have discovered similarities in symptoms and aims with the tasks performed by patients with symptoms of parkinsonism attending adult conductive education programmes
- previously existing tasks for children with ataxia, mainly individual development tasks

Ataxia was treated as a completely separate entity only for a very short period. For most of the last 10-11 years it has generally been separated within the daily routine, and it is mainly the task sequences which are independent.

In 1993, I observed eight functions in seven children who formed the nucleus of the ataxia group at that time. Standing and walking were so closely linked that I think it better to treat them in combination here.

1. Sitting
2. Standing and walking
3. Coordination
4. Motor function

5. Speech
6. Socialisation
7. Self-care

I tried to compare the children's condition on arrival and on discharge, or at the time of observation for those children who were still there.

Sitting On arrival, most of the children were able to sit at a table or slatted bed, or even without any support, but most of them overbalanced, with large arm movements, when the support was removed. On discharge all were able to sit unsupported on a low chair or on the floor; this does not mean that they did not occasionally lose their balance, but their sitting was reliable enough to serve as a basis for further activities.

Standing and walking This is the combined category. The better cases were able to walk independently with some form of aid, but most needed an adult's help. On discharge, they moved around the room independently and could walk 20-30 steps unaided, but only one was able to walk in the street.

Coordination This is determined largely by the uncertainty of hand-eye coordination; this is where children achieved possibly the greatest development.

Motor function I observed the children mainly when they were drawing. On arrival most scribbled with oscillating movements; some could not draw at all. On discharge all were able to draw and several were able to draw people (of course in this area the age factor influenced development significantly).

Self-care On arrival, the children had problems even with continence. However, by discharge they had not only improved in this area but could also feed and dress themselves independently.

Speech On arrival the children did not speak and used only a few words. On discharge, they usually spoke in sentences and were able to speak at greater length, though in all cases scanning was a marked feature of their speech.

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Socialising On arrival the children were generally more withdrawn than the average. By discharge they had become much more open and cooperative, though some exhibited a certain degree of aggression. In my experience at the time, this characteristic was confined fairly specifically to members of this group.

Results of conductive education in the group of children observed at that time

	ARRIVAL	DISCHARGE
SITTING	variable	reliable
STANDING/WALKING	with help	independent
COORDINATION	uncertain	more reliable
MOTOR FUNCTION (DRAWING)	none, or only oscillating scribbles	recognisable drawing
SPEECH	no speech, scanning	able to speak
SOCIALISING	withdrawn	cooperates well (sometimes aggressive)
SELF-CARE	variable	independent

We have information on the progress of several of the children since then: essentially all are attending mainstream schools within the local education system, one is at college. Several of the children are taught in integrated units within educational institutions, so we cannot speak of complete integration in the traditional sense.

In analysing the intervening period, I used data from the Records Department, which generally include information on the discharge or most recent examination. My aim was to consider a number of characteristics and compare them in children with ataxia and with other forms of cerebral palsy. In order to be selected for the study, a child needed to have spent at least one year in the Petõ Institute's residential nursery group. I selected 346 children for the study, of whom less than a quarter (72) was diagnosed as ataxic. The numbers (as opposed to percentages) which appear in the tables vary because for any child if there was no clear reference to or information on the particular characteristic I wanted to compare, that child was not included in the table for that characteristic.

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Tendency to spasm

	NO TENDENCY TO SPASM	EPILEPTIC	TOTAL
OTHER FORMS OF CEREBRAL PALSY	202 86,30%	32 13,70%	234 100%
ATAXIA	55 84,6%	10 15,4%	65 100%
TOTAL	257 86%	42 14%	299 100%

As far as tendency to spasm is concerned, ataxics are virtually identical to those with other forms of cerebral palsy.

Changing position and place

	ABLE TO WALK	WALKS WITH HELP	UNABLE TO WALK	TOTAL
OTHER FORMS OF CEREBRAL PALSY	44 16,7%	66 25,1%	153 58,2%	263 100%
ATAXIA	38 50%	22 28,2%	16 21,1%	65 100%
TOTAL	82 24,2%	88 26%	169 49,9%	339 100%

For changes of position and place, I included in the study mainly those characteristics which relate to walking. The proportion of children able to walk independently is much larger in those with ataxia than in those with other forms of cerebral palsy; the reverse is true for those unable to walk. The proportion of those able to walk with assistance is similar in both groups.

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Speech

	SPEAKS WELL	DELAYED FROM THE AGE	DOES NOT SPEAK	TOTAL
OTHER CP	150 60,7%	27 10,9%	70 28,3%	247 100%
ATAXIA	29 40,3%	11 15,3%	32 44,4%	72 100%
TOTAL	179 56,1%	38 11,9%	102 32%	319 100%

Intellectual development

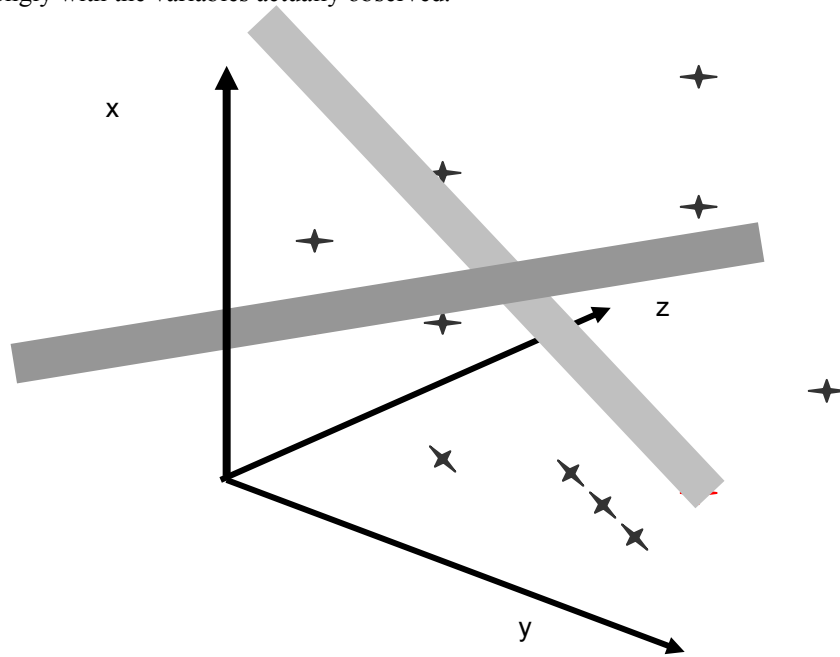
	AGE APPROPRIATE DEVELOPMENT	DELAYED FROM THE AGE	NO OR MINIMAL DEVELOPMENT	TOTAL
OTHER CP	104 42,4	112 45,7	29 11,8	245 100%
ATAXIA	32 44,4	24 33,3	16 22,2	72 100%
TOTAL	136 42,9	136 42,9	45 14,2	317 100%

Manipulation

	MANIPULATES WELL	DELAYED FROM THE AGE	DOES NOT MANIPULATE	TOTAL
OTHER CP	121 43,5%	120 43,5%	36 13%	277 100%
ATAXIA	46 63,8%	23 31,9%	3 4,3%	72 100%
TOTAL	167 47,8%	143 41%	39 11,2%	349 100%

Manipulation skills are radically different in the two groups. The proportion of children able to manipulate well is significantly larger among ataxics; conversely, the proportion of ataxics is much smaller among those unable to manipulate.

Following these analyses involving just two variables, I went on to perform multi-variable analysis, and used factor analysis to try and find relationships between the characteristics of the children I had observed. Factor analysis would in itself be useful here in enabling us to discover a pattern within a larger system of variables and to create artificial dimensions which correlate strongly with the variables actually observed.



Through factor analysis I found three components which explain an acceptable number of elements or characteristics, so I examined how far the given and measured characteristics correlate with these.

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Factor analysis

COMPO- NENT	INITIAL OWN VALUES			EXTRACTION SUMS OF SQUARED LOADINGS		
	TOTAL	% OF VARIANCE	CUMULATIVE %	TOTAL	% of VARIANCE	CUMULATIVE %
1	2,608	23,708	23,70	2,608	23,708	23,708
2	1,271	11,559	35,266	1,271	11,559	35,266
3	1,171	10,649	45,915	1,171	10,649	45,915
4	,990	9,000	54,916			
5	,947	8,613	63,529			
6	905	8,224	71,753			
7	,795	7,229	78,982			
8	,751	6,823	85,805			
9	687	6,246	92,051			
10	,518	4,710	96,760			
11	,356	3,240	100,000			

Extraction Method: Principal Component Analysis

Through factor analysis I found three components which explain an acceptable number of elements or characteristics, so I examined how far the given and measured characteristics correlate with these.

Component matrix

	COMPONENT		
	1	2	3
CAUSE OF INJURY	-,292	,438	,492
TENDENCY TO SPASM	411	,168	0,07367
CHANGING PLACE AND POSITION	,676	-,279	0,01144
MANIPULATION	667	0,04635	0,03331
SPEECH	,771	,226	0,07308
INTELLECT	,701	,249	-0,01764
MASTICATION	,491	,114	-,146
HEARING	0,02019	0,04720	,700
SIGHT	,256	-,185	,587
CURRENT AGE	-,240	,654	0,01393
LENGTH OF STAY	-0,02389	-,618	,247

Extraction Method: Principal Component Analysis

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We can identify two components which can be interpreted empirically, one of which correlates mainly with speech and intellect, and also has an acceptable level of correlation with change of place and position and manipulation. If we create and attempt to interpret a new artificial but empirically valid variable, this variable could perhaps best be termed level of cognitive development. (The second component does not correlate with any of the variables and so does not contain any new information, but the third shows a strong correlation with sight and hearing which distinguishes those with severe injuries in these areas. However, the number of children in this separate group is not significant enough to analyse for our purposes.)

	LEVEL OF COGNITIVE DEVELOPMENT		
	DIAGNOSIS		
	OTHER FORMS OF CEREBRAL PALSY	ATAXIA	
1	19,2	28,6	49
2	19,2	17,1	46
3	21,7	11,4	48
4	19,2	25,7	48
5	20,1	17,1	47
TOTAL	100	100	238
Extraction Method: Principal Component Analysis			

When we examine the level of cognitive development, we find that the proportion of ataxics is larger in the top twenty percent; on the other hand, they also constitute a larger proportion of those whose development is severely delayed but only a smaller proportion of those whose development is slightly delayed. We may conclude, with caution and in relation to this group only, that the cognitive development of ataxics is more polarised than that of children with other forms of cerebral palsy, that is to say there is a larger proportion of ataxics in the groups showing the highest and lowest levels of development.

Conclusion

This analysis naturally poses a number of new questions and problems which could be the subject of a new and possibly more comprehensive research project. The Pető Institute can provide ample opportunity for such a project based on its accumulated observations, since the number of children attending for conductive education, even those who have specific clinical features, is sufficient to bear analysis.

Interview Questions from an Imagined 6-year-Old Child with Cerebral Palsy

by Melissa Kelly

Answer: Melissa Kelly Trainee conductor in the IV. Year at Aquinas College, Grand Rapids, Michigan

What is wrong with me?

There is nothing wrong with you. Everyone looks different and everyone was supposed to look different. It wouldn't be much fun if everyone looked just like everyone else. Some people have glasses, some people have to wear braces on their teeth, and some people walk with canes. We all have something that makes us stand apart and be a special individual.

Why do I look different?

Everyone on this planet looks different. Even though you and your brother are twins, there are still things about you that make you and him look like two special people. Both of you are fun guys and are super smart so you had to look different from each other so that everyone can see that there are two special brothers.

Why me?

Why you what? Why are you a special person who is a really good singer and who loves to play with dogs?

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I think that why you are because the world is really happy to have a smilely young lady in the world. A girl who always tells me a funny joke and a girl who loves to make cards when people are sad. Having cerebral palsy may make you work a little harder to accomplish certain things, but it is not a bad thing. There are things in every person's life that are hard for him/her and they have to work hard to accomplish them.

Can other people get this from me?

No. Cerebral palsy is something you born with and other people cannot catch it. CP makes you work a little harder to accomplish things, but it also lets you have your own unique way to complete lots of tasks.

Can I play basketball with my friends?

You may not be able to run as fast as your friends, but with a little imagination you can play all types of sports with your friends. You can use your walker or wheelchair to move up and down the court and then you can pass to a friend to shoot. Or you can shoot the hoop and have your friends pass it to you, however you want to. There are always ways for you to play sports with your friends and have fun.

Will I be able to drive a car?

Having CP creates special challenges for your body. Sometimes these are good challenges and sometimes they are not as good. Driving a car requires lots of practice and even more challenges. When you are older we will be able to discuss ways you could learn to drive a car, as well as special types of cars you may be able to drive. You may not be able to drive on your 16th birthday, but you will always have a way to get around and go where you need to go.

Can I get married /be a mom?

Being a mom takes a lot of hard work and you have to have lots of love to give. I know that you have lots of love inside of you that you want to share with someone else, whether it is your husband or your wife. There are also

lots of mommies who become mommies because they love and take care of a baby who doesn't have a mommy.

Why do I go to 2 different schools?

There are all types of schools in the world, and different schools are better at teaching certain things. Some schools are better at teaching math and others are better at teaching things like art, it just depends on the school. Kids go to all different schools for different specialties. Going to a school to work on your walking or standing is another "specialty school." This school has lots of time and lots of special teachers who are good at teaching you things like, walking and crawling and standing.

Why do I have to have surgeries?

People of all types have surgeries for a variety of reasons. Some have surgeries to fix something after an accident, some have them to fix a problem they were born with or some have surgeries to prevent something worse from happening. Whatever the reason for having the surgery, you have to understand that you only have a surgery because the doctor, your parents and teachers know that the surgery will make you better. It may make you more independent of it may help you walk better or keep you from getting sick. Whatever the reason, it is only done to make you better!

Why do people stare at me in my walker/wheelchair/stroller?

Some people have not seen many people who don't look like them. They are not trying to be mean; rather they are trying to learn something. These people may not have the opportunity to play with or work with people who are different from them. Unfortunately, they don't always know that you are still a loving person and that you don't like to be known as different. Usually if they get to know you or talk to you, they will get a chance to see that you are still a great child.

Possible Questions Asked by a 6-year Old with CP

by Clare Avery

Introduction

The editors asked that imagined questions/answers from the author for publication. Clare Avery is one of the first students, close to the diploma at the Aquinas College (Michigan, USA) taking part in the Pető College & Aquinas College common training (E. Balogh).

Why me?

All people are very different and have been given different difficulties to live with. You are a very special person with talents and qualities all your own. Having CP is part of you and the amazing way you live life and conquer challenges is a huge piece of what makes you outstanding.

Why do I have to go to therapy and other kids don't?

Many children have needs that others do not. Some need to go to an eye doctor to help them with their vision, some need to stick to a special diet, some need to go to a doctor to help them with their hearing. Your body has its own special needs and going to therapy (Conductive Education, PT, OT, etc.) is the way that you can help your body develop and help it to learn to do many things (walking, cutting with scissors, etc).

Why do I have to go to a special school / classroom and other kids don't?

All children have a different way of learning. It is called a learning style. Your teachers and parents have decided together that the best way for you to learn is by going to a special school/classroom.

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You may feel like this makes you different from the other kids - and in a way, you are right. Everyone is very different and you are learning in the environment that will help you to be the best you can be. However, even though you are in a different room, you are like the other kids because you smile, laugh, play, etc. just like them. You are just as smart and just as special (maybe even a little more!)

What is wrong with me?

Nothing is “wrong” with you. You are a special person whose body has some special needs. When you were born (in mommy’s stomach, etc.) you did not get enough air to breathe and your tiny brain was injured. Now your brain has trouble getting its messages to your muscles, which makes it hard to do some things. With a little hard work, you have the ability to learn to do many of these things.

Why do I hurt so much?

You are a special person whose body has some special needs. When you were born (in mommy’s stomach, etc.) you did not get enough air to breathe and your tiny brain was injured. Now your brain has trouble getting its messages to your muscles, which makes it painful to do some things. You are an extremely brave person and very strong. All of the therapies, schools, doctors, etc. that we go to are to help your body relax so that we can make the hurt go away.

Why do I have to have operations?

Even though our bodies are wonderful creations, they are not always perfect. Doctors are here for us to help “fix” the imperfect parts of our bodies. The doctors, your teachers, and your parents have talked a lot about what is the best way to help your body be the best it can be. The operations may seem scary and they may not be fun, but they will help to ease your pain and allow you to do many things.

When will I learn to walk? (Ride a bike, or run etc.),

Learning to walk will take a lot of hard work on both of our parts. Let us make some smaller goals first and work at reaching those. Learning to put your feet flat on the floor, standing up, shifting weight, etc. will be steps toward learning to walk. You may learn to walk differently than other kids,

as by using a walker or canes or your walking may look different. We will work together to learn the best and most independent way for you to get around.

Why do I look different?

If you look around, you will see that everyone looks a little different. You may notice some things about you that are very different from your classmates. CP can make people appear different which may confuse people about who you are on the inside. The important thing to remember is that you are a beautiful person with qualities no one else has. Every single part of you is special and completely gorgeous.

Why wasn't I invited to her birthday party?

Sometimes children are only allowed to invite a small number of classmates to their birthday parties. When you have your birthday party, you will not be able to invite everyone from school either! There will be plenty of opportunities to go to birthday parties and you will have lots of them, too! Why don't you and I invite some friends to the beach and have a Happy Friday party?

Why can't I play soccer? Will I ever?

Your body has special challenges that limit how much you are able to do. While you are learning to do so many amazing things there are still some things we need to work on. Playing soccer like your brothers and sisters requires a lot of fast running and kicking. Perhaps we can invite some friends / cousins over to play a special soccer game in the backyard or down at the soccer field. It is also important to remember that you do a lot of things that your brothers and sisters do not, like swimming and horseback riding.

When can I drive a car?

Your body has special challenges that limit how much you are able to do. While you are learning to do so many amazing things there are still some things we need to work on. You may not be able to drive a car when you turn 16 and you may not be able to drive a car like I do, but when the time comes we will talk together about different ways you can accomplish this goal (or different ways you will be able to get around on your own).

Can I be a mommy, too?

Being a mommy requires an immense amount of love and dedication. You are a warm and caring person who would make a wonderful mommy. Sometimes people become mommies by taking care of babies who do not have mommies. This is called adoption. When you are old enough to be a mommy, we will talk again about what it means to take care of your own baby and how you will be able to do this.

Why did she say that mean thing to me?

Many people speak without thinking first about what they are saying and how their words may hurt someone else. Sometimes when a person does not understand something, she may say something cruel. It may help you to try to understand her – maybe she was having a bad day or maybe she does not know what CP is and did not know how to respond to you. The most important thing to remember is that no matter what anyone says you are an amazing person and someone who makes me proud everyday.

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CONDUCTIVE EDUCATION OCCASIONAL PAPERS

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Notes for Contributors

The aim of this series of Conductive Education Occasional Papers is to promote greater awareness, understanding and development of conductive education in an international context. The series takes a broad view of the range of activities and interests which are embraced by conductive education and as such includes:

- i) articles on research, research methodology and developments in conductive education and related fields such as medicine, education and social services and related disciplines such as psychology, child development and special education needs;
- ii) the critical evaluation of theory and practice;
- iii) accounts of current practice and reports of developments;
- iv) brief reports on professional development and on-going research.

Articles are welcome from a variety of individuals working in the field of conductive education for the motor disabled. Readership is international and consists, for example, of researchers, trainers and students in the disciplines of medicine and health, education and psychology; conductors, conductor trainee teachers, physicians and paediatricians, other health service professionals, special education teachers and associated professionals.

Authors are requested to submit their manuscripts for consideration as follows:

1. One paper copy and a copy on floppy disc or sent in by e-mail in a Windows Word file to; Pulay.Eva@peto.hu
2. Articles must be in English and should normally be between 3,000 and 5,000 words in length. Shorter report describing recent developments and work in progress may also be accepted.

CONDUCTIVE EDUCATION OCCASIONAL PAPERS

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