
Conductive Education and NDT – Bobath: Experts discussion on History, Development and Current Practice

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Abstract

Conductive Education (CE) and NDT Bobath are two approaches that have been applied to persons with motor disabilities. Both were introduced in the 1940s, and pioneered an approach to these disorders that recognizes clients with neurological impairment to have the potential for functional recovery.

Both approaches are widely accepted in Israel for the management of individuals with cerebral palsy and have been utilized by physical, occupational and speech therapists.

In celebrating the twentieth anniversary of 'Tsad Kadima' ('A Step Forward'), the Association for Conductive Education in Israel, invited three internationally known professionals and scholars to discuss six key questions regarding Conductive Education and the Bobath-NDT approaches to childhood disability. The discussions revolved around topics such as the commonalities and differences in the historical influences that led to their development, other factors that influenced their development, as well as their uniqueness, contribution to the profession and achievements. These discussions also included

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a description of the most credible scientific evidence supporting these methodologies, and an attempt to place their basic concepts within the framework of the International Classification of Functioning, Disability and Health (ICF) (World Health Organization [WHO], 2001).

Though representing different paradigms, CE and NDT-Bobath can be used in tandem and, indeed, complement each other. They both should be recognized for their contributions to client-based neurorehabilitation and their use should be encouraged. A shift towards the utilization of these approaches is in accord with current thinking supporting the need for an integrated approach to neurorehabilitation.

Introduction

Health professionals are familiar with NDT-Bobath and Conductive Education, as two approaches to the management of children and adults with cerebral palsy. Literature comparing these approaches is limited and has failed to capture the context in which they were developed, their evolution and their current practice in the conceptual framework of the ICF.

In celebration of the 20th anniversary of Tsad Kadima ('A Step Forward'), the Association for Conductive Education in Israel held an international conference, entitled: *Throughout Life with Cerebral Palsy: Partnership, Environment and Participation*. As part of this conference, three internationally recognized professionals and scholars were invited to discuss six key questions related to CE and NDT-Bobath in a one-hour educational session. The session was moderated by Professor Peter Rosenbaum, Professor of Pediatrics at McMaster University, Ontario, with the participation of Dr. Sarah Capelovitch, former president of the European Bobath Tutors' Association (EBTA-Israel), and Dr. Andrew Sutton, former director of the Foundation for Conductive Education, Birmingham, UK.

CE and Bobath-NDT were introduced in the 1940s and, though separated by political and language barriers, have been widely adopted by conductors and therapists as major approaches for the management of persons with motor disabilities. CE was developed in Budapest, Hungary by Andras Peto and his successors, and is considered to be an educationally-based system for children and adults with motor disabilities. The Bobath method was developed by Berta and Karel Bobath in London, England, as an essentially neuro-developmental treatment approach (Tatlow, 1997). Both approaches share the perspective that clients with neurological impairment have the potential for functional recovery (Mayston, 2002).

Early history

Berta and Karel Bobath

Berta Bobath (1908-1991) and Karel Bobath (1907-1991) were born in Germany to Jewish families, and were active in Jewish youth groups. Berta took ballet lessons and trained as a remedial gymnast teacher, and was especially gifted in relaxation techniques and in the analysis of normal movement. Karel studied medicine in Prague and qualified in 1936, but the rise of Hitler and Nazism, made it impossible for him to practice in Germany, so he went settled in Czechoslovakia. Berti (as she was called) and Karel, lost touch, met again in 1939 in London and married in 1941. As Jewish refugees from Germany, neither could practice their professions.

The Bobath's pioneering work began in 1944. Berta's work included children in an institution with severe cerebral palsy, while Karel was requested "to find her a theory" based on the existing knowledge-base on movement control. They started a private clinic in 1951, as the joint founders of the Bobath concept (Capelovitch, 2008). Berta and Karel Bobath died in 1991.

Andras Peto

Andras Peto was born in 1893, in the Austro-Hungarian Empire, to a lower-middle-class Jewish family, and commenced medical studies at age 18 in Vienna. In 1938 Peto had moved to Budapest, then a Fascist state where anti-Semitic laws barred Jews from practicing medicine. At age 52, with meager resources except for the help of volunteers, Dr. Peto practiced with children and adults with a variety of conditions. During this time his work became an official 'State Institute' under the Ministry of Health. Eleven years after he began developing his approach, Peto declared 'Conductive motor therapy as a special pedagogy' (Sutton, 2007; Schenker, 2008). In 1962 the Institute was transferred to the Ministry of Education. Andras Peto died in 1967 and his work was secured and developed as a formal system of education and professional training, largely for children, under his follower Maria Hari (died 2002).

NDT-Bobath

The Bobath concept is primarily a method of observing, analyzing and interpreting task performance. It is a problem solving approach to the assessment and treatment of individuals with disturbances of function, movement, and tone due to a lesion of the central nervous system (Raine, 2006) and is based on the systems approach to motor control. In their words:

Rony Schenker, Sarah Capelovitch, Andrew Sutton, Peter Rosenbaum

"We all learn and change our ways of treatment according to our growing knowledge and experience...Such changes are good and necessary and will continue, but the concept from which they have evolved should remain intact" (Bobath, 1990).

Since Berta and Karel Bobath pioneered their approach in the UK and Europe over 60 years ago, the Bobath concept has subsequently become an international approach. In the United Kingdom, their work became considered essential to the development of services for cerebral palsy and stroke patients (Parliamentary Debate, 1965 in: Mayston, 2008). The Bobath concept was developed as a living concept, in which therapists are expected to learn from, adapt to, and consider each child as having his/her own complex set of unique problems, seen differently over time. It involves the understanding that as the therapists' knowledge base grows, their view of treatment broadens (European Bobath Tutors Association Executive Committee, 2008; Raine, 2006). The Bobath concept requires that therapists consider the whole person, including sensory, perceptual and adaptive behaviors, in addition to the motor problems. The therapy is to be directed towards improving function in activities of daily life. These ideas can only be applied if a thorough analysis of the child/client's skills is carried out (Mayston, 2008).

The Bobath-NDT approach is a transdisciplinary approach, based on an evaluation of the child by health professionals, emphasizing the client's abilities, activity limitations and participation restrictions in the context of his/her environment and culture. Realistic, measurable and relevant goals are then set, based on an analysis of the findings, and shared with the client and his/her family. More than a technique, NDT-Bobath is a working hypothesis based on reassessments, and intervention strategies are changed, aimed at enhancing abilities, and maximizing potential in all domains. Quality of movement is important, aimed at minimizing sheering effects and contractures, however the client's functions or activities are never compromised. Handling and facilitation are active strategies aimed at allowing the client to initiate efficient motor acts to carry out goals towards the achievement of meaningful tasks.

Conductive Education (CE)

Professionals trained in CE regard it as a new paradigm in the treatment and well-being of people with disabilities. It is an educational approach for children and adults with cerebral palsy and other motor disorders, aimed to help them learn to overcome problems of coordination and control, in order to participate and function within the various environments of their lives. CE addresses the

totality of a client's development and personality (Kozma, 1995) and aims to achieve 'orthofunction'. Orthofunction refers to a state in which self-reliance, initiative and the ability to problem solve in all areas of life is maximized (Wright, Boschen & Jutai, 2005). The novelty of CE is in the recognition that the disability results in systemic learning difficulties, and offers education and teaching to enable clients to overcome these difficulties in different environments. It is based upon a belief that individuals can learn, and that if they learn, they can change. The philosophy of CE holds that learning is not dependent upon inherent abilities, but that new abilities are created as a result of learning. Thus, the goal is to mediate between the environment and the learner, thereby creating new abilities and potentials (Schenker, 2008).

The popularity of CE is growing world wide, although conclusive evidence of its effectiveness has not been established yet (Darrah, Watkins, Chen & Bonin, 2004; Ludwig, Legget & Harstall, 2000; Parkes, Donnelly, Dolk & Hill, 2002; Pederson, 2000; Sutton, 2002). Some professionals have expressed the opinion that the concept of orthofunction resonates within the International Classification of Functioning, Disability and Health (ICF) framework (WHO, 2001), because it advocates a variety of ways to achieve functional goals, dependent on the abilities of the child and the environmental context (Darrah et al., 2004).

Israel was one of the first countries to explore the potential benefit of CE for children with CP and their families. 'Tsad Kadima' is an organization founded by parents and professionals, with the support of the Ministries of Education, Health, and Welfare, that has developed an array of conductive services nationwide utilizing qualified Israeli conductors. Israeli CE retains its overall holistic character and basic principles, while retaining a trans-disciplinary staff to provide a variety of accepted educational and rehabilitative approaches and methods.

Early contact and knowledge exchange between Peto and the Bobaths

Contact and knowledge exchange between Peto and the Bobath's is documented from the 1960s. Personal notes and letters exchanged between Berta Bobath and Andras Peto testify to their curiosity and mutual interest in each other's professional activity. In 1961 Peto asked for and received literature from Karel Bobath. Karel Bobath wrote: "I was very pleased indeed to receive your letter of April 29th and to know that you are interested in the work we are

doing for cerebral palsied patients" (Hari, 1997). In 1965, Esther Cotton, who then worked with the Bobaths', visited Peto at his Institute on Berta Bobath advice (Cotton, 1965), followed by a visit by the Bobaths' themselves in 1966. In response to their intended visit, Peto wrote that he felt honored by it. The Bobaths' visit to the State Institute was followed by written (but unpublished) reports of their impressions and critical comments. Berta Bobath remarked: "...It's the only other approach which makes sense to me other than my own" (Bobath, 1966). Soon after, in 1967, during the 2nd International Symposium of Cerebral Palsy in Prague, Karel Bobath, in his seminar on Modern Concepts of Treatment of Children with Cerebral Palsy, said: "...It is felt that this approach [conductive education] may make a valuable contribution to this field [of neurological treatment] and that the methods used by Dr. Peto would make further investigation worthwhile" (Bobath, 1967).

At the time of the Bobaths' visit, Andras Peto was ill, but friendly correspondence continued until his death in 1967.

The Bobaths' activities and writings reflected their impressions of Conductive Education: "...Over the years we have been influenced by and have learned from other workers in the field... We have learned most, however, from Peto... who like us, saw that the problems for these children was in co-ordination of function, and this helped us better to prepare athetoid children for everyday life" (Bobath & Bobath, 1984, p. 8).

After Peto's death, professional opportunities for sharing knowledge continued with his successor, Dr. Maria Hari. "It is not a shame to learn from one another. I think the greatness of somebody, of Peto and Bobath begins in the openness, understanding, acceptance of new ideas. This is good for the welfare of children" (Hari, 1997).

Questions and answers based on the round table session

Question 1:

Every system of treatment or therapy is grounded in a particular set of historical forces. Please give us a brief 'context' of the approach with which you are connected, how it emerged, and what you think were the most important influences on its development and adoption by practitioners at the time that it was being developed?

Dr. Sarah Capelovitch:

The context, or "Zeitgeist", as it was referred to since the 1930s, was a neurophysiologic hierarchical model, based on lesioned brains whose complexities were lost. The accepted approach regarding brain lesions was that of corticalization; lower structures influenced by higher centers, reflex dominated, where control was based on inhibition.

Berta Bobath's first patient was a famous right hemiplegic portrait painter who wanted his arm back at the paintbrush. Her approach was that of reducing tone, relaxation, and activation. The artist regained the use of his arm and word to that effect got around.

In many ways, the Bobath's were ahead of their time: understanding the lack of feed forward before that concept even had a name. They described it as: "movement [that] goes wrong before it gets started" (Bobath, 1979). They realized that reflex and posture inhibition does not translate into function, and published their views in the 1970s (Bobath & Bobath, 1972). They said that they made mistakes thinking that training balance reactions while not engaged in function, will improve stability. The Bobaths also advocated not following milestones in the treatment of children, but to observe and analyze movement in a horizontal way, as to which components or modalities best enhance the activity, or function (Bobath & Bobath, 1984). Knowledge on balance and equilibrium is incorporated by therapists during intervention, based on today's theories (Massion & Woollacott, 2004).

The Bobaths did not believe that a 'substantially dysfunctional system' (words used then) can produce normal movement. When Bobath therapists talk about normalization, they are not referring to normal movement, rather to make it possible for the client to maximize his/her potential (Bobath, 1979). The Bobaths disagreed with "taking away" movement patterns that enables a client to function successfully when it is not possible to promote activity in better, more efficient movement patterns (Bobath, 1979).

Dr. Andrew Sutton:

Everything has a history (Haldane, 1951). However, in examining the history of the development of CE and at what is written regarding the life Peto and his writings (Hari, 2001) - very little verifiable, concrete information exists. Peto hailed from a world long-passed during the first four decades of the twentieth century in Middle Europe. This world was predominantly 'German', which refers to German culture, which, at the time was German-liberal-Jewish. He

lived from young adulthood and on into middle age in Vienna, where he received a belated medical degree from the University of Vienna in 1923. His few publications (he was much given to pseudonyms) (Barnklau, 1965; Barnklau, undated) suggest that he favored a set of beliefs that did not distinguish between the mind and the body in determining the task of the 'healer'. The goal for his medicine was the *heilung* (healing) of the *seele* (the soul), the latter comprising the individual personal characteristics of the human being, in their entirety.

From 1945 onwards, Conductive Education developed and flourished in what was soon to become Communist Hungary. Andras Peto's personal practice developed into a state institute, and eventually was transferred from the Ministry of Health to the Ministry of Education. Andras Peto died in 1967.

His disciple and successor Maria Hari, further embedded Conductive Education into the education system, incorporating curricular programs for kindergarten and general elementary schools, and creating a formal, college-level training program for the people who worked at the state institute (i.e., the 'conductors') (Hari, 2001).

The 'communist' state would be most concerned with how educators thought about their task, (Bauer, 1952; Bronfenbrenner, 1970; Shimoniak, 1970).

From 1986 onwards, however, even before the fall of the Iron Curtain, Conductive Education exploded into the Western world at the behest of parents of children with cerebral palsy, it fell inevitably under a wholly new range of influences. Parents who struggled to establish and maintain conductive programs outside Hungary were interested in determining and controlling their own goals for their children, through programs that would achieve their personal and social aspirations within the societies in which they lived.

Question 2:

How did the system evolve, and what factors were central to its evolution?

Dr. Sarah Capelovitch:

The Bobaths did not view CP as an immutable condition. They believed in plasticity before it had a name, and practiced it, trying to improve involved body parts rather than strengthen the part which is not involved, and in doing so they used the concept of Constraint Induced Therapy before it became common practice (Capelovitch, 1981).

Bobath therapists are accused of being open to whatever approaches are evidence-based and being applied; but the Bobaths maintained that their approach

is a way of thinking, a working hypothesis, and not a prescriptive specifically defined treatment (Mayston, 2001, 2002). They believed in relying on the therapist's skills to evaluate and analyze, which is hard to quantify and measure.

How the approach is practiced depends on where and when their courses were taken. The Bobaths agreed with the then accepted theories of Sherrington and Magnus, based on adult neurology, in which all the complexities of a developing brain were not taken into consideration. Karel Bobath, an analytical thinker, did not have access to today's imaging technology; he tried to incorporate new ideas, and with Berta, tried to use them. They were influenced by Bernstein's "functional coalitions" connecting biomechanics to neurophysiology (Bernstein, 1967), and that is when the concept of "alignment" originated. Berta talked about "patterns of movement" and not of single muscles that support the body up against gravity; Thelen talked about "coordinate structures" (Thelen, 1986), and Edelman referred to "neuronal maps" (Edelman, 1987). One wonders, if the differences in terminology is purely semantic or if the core ideas underlying them are actually different.

The Bobaths always suggested that environment is a major factor, but did not always state this explicitly. They emphasized the influence of the family to carry over the practitioner's strategies into the child's living environment, outside the therapeutic encounter. The Bobaths had their own version of the ICF, and before "participation" became our middle name, they advocated the team approach, incorporating physical therapists, occupational therapists, speech-language therapists, social workers, and psychologists, to evaluate all possible treatment domains for the child.

Dr. Andrew Sutton:

The story of Conductive Education is one of development through a succession of qualitatively different stages, rather than of an 'evolution', which implies quantitative change. The leading forces under which Conductive Education has developed were threefold:

- at its early stage, the philosophy, the interests and personality of Andras Peto;
- in its middle stage, the social, intellectual and political structures that both supported and constrained its development during most of Maria Hari's watch, under the Ministry of Education of the Hungarian People's Republic; and
- in its present stage, the need to adapt to the modern world outside Hungary.

Rony Schenker, Sarah Capelovitch, Andrew Sutton, Peter Rosenbaum

The shaping forces over the last twenty years have been contemporary and international, the goals and aspirations of parents, the rights of disabled people and the inclinations of children themselves. The third stage is therefore, a long way removed from the worlds of Andras Peto or Maria Hari that preceded it and laid its foundations.

What effects have research and scientific development had upon the development of Conductive Education? Conductive Education has lived its own life, in a fairly autistic way. Developmental psychology, transactionalism and reciprocity exemplify this theoretical separateness. From the early nineteen-seventies, Conductive Education parent-and-child work has routinely demonstrated the principle of babies' leading parents as much as parents' leading babies (Sutton, 2008). Just as Conductive Education has not adopted this articulation, so developmental psychology has failed to notice this practical manifestation in its midst. There may have been historical periods in which Conductive Education's autistic behaviour has served as essential protection, a force for survival. In our present world, however, such a mind set makes for terrible vulnerability.

Question 3:

What are the major contributions and the most meaningful achievements of the approach?

Dr. Sarah Capelovitch:

The Bobaths main contribution was the belief and practice that cerebral palsy is changeable, that it is not immutable. No less important was the provision of a venue for all professions to come together, in an era in which hardly any dialogue existed between them, via courses that were guided by a core curriculum. (Schleichkern, 1992).

Looking forward means not at the here and now, but trying to foresee signs of secondary structural changes, such as dislocations and contractures. There may not be longitudinal studies of groups of cerebral palsy during a life-span, to research evolving restrictions, but the orthopedic literature is full of them (Barnes & Johnson, 2001). Bobath therapists are not "guardian angels" against contractures; a core issue in intervention planning, however, is to minimize the effects of sheering and fatigue over time.

Quality is another misunderstood word. Bobath therapists do not work for normal movement - we know 'normal' is not possible. We are accused of being too slow to allow ambulation; we advocate for early mobility but against

walking at all costs - to minimize deformations and sheering. We do not push a child to walk, even though that is what parents want; we safeguard as much as possible against secondary limitation - looking forward, taking advantage of mobility aids, to serve independence.

There is no paradigm shift as the underlying tenants, the core of the concept, was and still is an approach based on multi-disciplinary observation, analysis, hypothesizing and coming up with an intervention that is tailored to the individual child, though strategies and tactics have changed based on today's emphasis on participation as the main goal.

The complexity of each child's needs is as varied as the population of cerebral palsy. It took 150 years to define this heterogeneous population; and a consensus has not been reached yet. Since the Bobath concept is open, rather than structured, and is operationally defined, it allows many entry points based on new scientific findings not known at the time when the Bobaths started and re-defined their ideas. Bobath therapists have the expertise to use evidence as a basis for finding "the best fit" for their clients.

Dr. Andrew Sutton:

Conductive Education's major contribution is that it demonstrates a paradigm shift in understanding what constitutes the very nature of disability and how society should best respond. Conductive Education offers a model of disability, integrating the medical and the social 'models of disability', within a developmental/pedagogical model. Conductors interact psycho-socially with learners (note, not 'patients'), using psychological skills and tools to achieve psychological outcomes, new emotional adjustments, realizable intentions, new motivations, new determination, control of movement etc. Change a child and the effects ripple systemically out from the specific individual involved, into the social world, then back again.

In Conductive Education one looks forward to the day when this understanding of cerebral palsy, indeed of multiple sclerosis or any other motor disorder, whenever its onset, is as commonplace, matter-of-fact and acceptable as the already long-established recognition that blindness and deafness lead to developmental disorders in just that way. Equally, the obvious effects of motor disorder upon human development and well-being, upon living and upon life, need to be responded to with appropriate, learning-enhancing, psycho-social interventions, and above all, through 'education'.

Question 4:

Today, the ICF is a central framework, which should guide our work and thinking, both for clinical and research activities in childhood disability. Please try to 'place' the ideas of the approach you represent into the 'modern' conceptual framework of the ICF.

Dr. Sarah Capelovitch:

As mentioned, the ICF was always there, when working within a team, looking into the home, and considering the individual's personality. The change that has occurred is in considering the individual's environment in the planning of intervention. We have always considered the environment, however, now it is one of the considerations that we look at first (EBTA, 2004; WHO, 2001). It is easy to adapt the environment, however, it is harder to change the health policies, which, as a result of the ICF, became a major focus.

The bio-psycho-social model - and one should add the educational model - always existed as well. The difference is in the terminology used.

The Bobaths advocated looking at the child's needs in everyday life, noting:

- What is possible: what can the child do first of all?
- What is not possible - and why?
- Where does it become possible and under what circumstances?
- Why does it go wrong, and why?
- What is missing to make it possible?

All these questions are asked by the therapists during an intervention session. The therapists analyze what they see, and poses questions to the parents, since not everything is related to the child's body alone. The environment is always addressed, and adaptive, low- and high-technological equipment were used to increase independence and participation. The treatments that reduce spasticity, like Botox and Baclofen, were not known in the days of the Bobaths (Barnes, 2001). Normalizing meant not making it 'normal', but making it efficient.

I can say this clearly since I have been taught by the Bobaths themselves to think that way.

Dr. Andrew Sutton:

Conductive Education has remained largely untouched by the ICF, Internally at least, Conductive Education has not needed it, as it has already implicitly moved on to the next stage, which involves mechanisms for change not just classification.

Conductive Education represents a systemic view of all human mental development - be that normal or disordered. From such a viewpoint, when a biological mechanism is affected, in order to establish and maintain effective, reciprocal transactions with a child's material and especially social worlds, it is vital to consider what Vygotskii (1924) called the 'social dislocation' (English reference translation: Vygotskii, 1993, pp. 76-84). If social interaction is out of joint then the reciprocal processes of learning may proceed in a dysfunctional manner (note the word 'dysfunctional'). This in turn affects formation of the child's psychological qualities, and the quality of the parents' upbringing of their child, establishing a vicious circle of non-productive learning and development.

When development is derailed or dislocated by motor disorder, the task of Conductive Education is to ensure that all parties involved seek actively to find ways to correct the chain of consequences that leads from the biological through the social to the psychological, and replace it with a self-reinforcing, benign cycle of learning and development (in the language or Conductive Education, to replace dysfunction with orthofunction).

If the ICF makes it respectable to mention such levels of effect, then so much the better for the plausibility of Conductive Education, and perhaps Conductive Education has missed out by not speaking more according to the language of the ICF. But the practice of Conductive Education is already based upon a rather more dynamic understanding of transactions between levels.

Question 5:

What do you believe is unique about the system of therapy/treatment with which you are associated? What does it not do?

Dr. Sarah Capelovitch:

The Bobath-NDT approach is a working hypothesis developed for each client, based on analyzing the daily manifestations of typical and non-typical nervous systems, musculoskeletal systems, and how they influence the dynamics of motor-sensory-perceptual activities of the child within a continually changing

Rony Schenker, Sarah Capelovitch, Andrew Sutton, Peter Rosenbaum

environment. An intervention plan is generated by a multidisciplinary team, based upon the strategies used by the child while being observed in as natural an environment as possible. Handling is used where a question arises as to how much help a child requires when limitations to perform a function/activity-are observed. The Bobaths believed in plasticity of the nervous system, long before it was proven by imaging techniques and said that "what the child can do with a little bit of help- is his potential". It was up to the team to decide what specific preparation (today called "control parameter" in motor-learning literature) was needed for a specific function or task in the domains of communication, play, ADL, ensuring safety and comfort in eating, sleeping as well as mobility. It was up to the team's clinical reasoning, to arrive at an intervention "that works best for the child" and can be carried over in the home and school. "Handling is important, but if you have not taught the child something he himself can do better or in another way- you have done nothing at all" (Capelovitch, 1981).

In an era, in which technology was minimal, Bobath therapists were trained to adapt daily-used utensils, furniture, mobility aids and toys, to minimize decompensation and the sheering effects produced by exclusive repetition of pathological movements. This did not, and does not mean, that the child should not be allowed to use movements that serve his purpose. Function was NEVER sacrificed because the movement or execution of a task was done in abnormal patterns. This is a very misunderstood issue.

Normalization in the Bobath concept and in the therapeutic encounter, means - providing different, more efficient options, by preserving the length of muscles, alignment and range of movement. This was done by facilitating, which means making easier or making it necessary to produce patterns of movement that were less automatically known to the child, via the use of key points, that allowed the child to feel and chose a different more efficient strategy. This had to be done while the child was engaged in an activity and repeated over and over under different environmental conditions in different functions. The Bobaths said that learning to control movement and posture cannot happen when practiced outside function (Bobath, 1984). Manual restraint of the less effected parts, was often applied and withdrawn as required, to support and encourage the use of the more effected parts (today referred to as constraint or restraint induced therapy).

Dr. Andrew Sutton:

The Conductive Education approach considers motor disorders primarily as learning difficulties, and approaches them by means of teaching and learning.

This is not a direct quotation from any single source but countless slight variations of this have been spoken of and written for years, summing up the distinctive nature of Conductive Education. One might add 'upbringing and development' to 'teaching and learning' but the basic distinctions emerging from this remain:

- Conductive Education is not a treatment or therapy,
- it is not delivered through training or exercises,
- it offers a primarily psychosocial intervention, to problems of primarily psychosocial development;
- outcomes are primarily psychosocial, and
- should be evaluated at an appropriate level and with appropriate methodologies,
- its fundamental tools are pedagogical,
- it offers no cure.

This position should be read through the understanding of Andras Peto's most fundamental position of all, the oneness, the unity of our being, the bodily and the 'soul' (Barnklau, 1965), the vital factor for all healing, of which Conductive Education for the motor disorders was but a part. The primacy of the 'education' in Conductive Education should not therefore be taken as a further reductionism, to oppose or replace the medical reductionism through which disability is so often perceived. A properly 'holistic' understanding of cerebral palsy and the appropriate societal response to the challenges that it poses integrates both the educational and the medical.

Question 6:

What would you say is the most scientifically credible evidence that the approach 'actually' works. How should future research about your approach look, and what should it focus on?

Dr. Sarah Capelovitch:

There is no scientifically credible evidence that the approach works. In fact there is no evidence for any package of care for children with cerebral palsy. There are pockets of evidence found in research that are applicable to some GMFCS levels and types of cerebral palsy, however, these are not explicit enough to be generalized.

Research in NDT therapy suffers from small samples, no ability for power calculations and a strong possibility of type II errors. One has to wonder whether NDT and Bobath are the same; to quote Mrs. Bobath "... there are now a few people who have sidestepped and don't really do the Bobath approach as well as I thought they should and then perhaps that is better not to be (called) Bobath" (in Schleichkorn, 1992, p.100). Therefore for the future, Bobath therapists have to come to universal conclusions as to:

- What is considered the core of the Bobath approach?
- What are the adjuncts or strategies and tactics used that do not conflict with the concept?
- What of that which was being used in NDT treatment is NOT Bobath and is based on theory that they objected to? That does not mean that effective strategies should not be used by Bobath therapists. It does mean that credit should be given to the source, rather than incorporated in NDT-Bobath as Bobath.
- What can be defined operationally, in an intervention, as Bobath strategies, for specific groups of children, that in itself could present difficulties in view of the heterogeneity existing in the GMFCS levels.
- What and how to quantify therapists' skills and the degree of carry over.
- How to come to a consensus in what domains, using the ICF as a framework, the approach has the most positive effects, and test this via large numbers of well documented single-case studies.
- What specific types of questions should researchers be asked to investigate.
- How to promote interest in researchers to find ways to be more familiar with the therapy they are investigating.
- How to promote and advocate for longitudinal studies that would last at least long enough, past growth-spurts and ages at which current research shows a plateau.

Last but not least, leading researchers and therapists have to rise above the feuding and vying for control that exist, and advocate for ways and means to close the gap between research and practice, for the benefit of children and their families.

Dr. Andrew Sutton:

There is no 'scientifically credible evidence' that Conductive Education actually works and further research of the same kind will likely continue to say the same (Sutton, 2007). Further such studies are under way, and other studies are projected. 'More research is needed', such studies often conclude. More research is certainly needed, but not more of the same kind of research. Meanwhile, opponents remain blind to the simple logical principle that an 'absence of evidence is not necessarily evidence of absence'.

A credible programmatic investigation into Conductive Education requires 'multidisciplinary' investigation, involving a scientific methodologist and an educational researcher:

- a formal, academic review of all relevant literature to date (with implications almost certainly wider than Conductive Education).
- a methodological enquiry into issues arising from the paradigm demonstrated through Conductive Education (identifying what this paradigm is would require empirical work to identify what is actually going on in Conductive Education).
- a proposal of an alternative, credible research paradigm.

Perhaps this might be like what Luriya (1981) called 'Romantic Science', a term best illustrated by the work of Oliver Sachs. This is ideographic as much as nomothetic, subjective as well as objective, and humane, holistic and dismissive of reductionism.

Finally, what do we mean by 'this approach actually works'? Have we been investigating the right thing? The priority subject of research should be proper experience of conductive upbringing. The possible benefits of briefer exposures, (a 'camp', 'blocks' etc.), or to 'conductive' services shaped and perhaps diluted by demands of existing ways of doing things, or in provisions that are nothing more than *simulacra* from the start, are of secondary interest. 'But why do parents (and adults) persistently express themselves so pleased if, as you say, there are no demonstrable advantages?' Thus, research should focus on investigating systemic processes and experiential outcomes amongst all involved, not unquestioningly applied existing static measurements and research methodologies from the existing paradigm.

Perhaps some of these proposals could be profitably applied to other approaches too.

Rony Schenker, Sarah Capelovitch, Andrew Sutton, Peter Rosenbaum

Professor Peter Rosenbaum:

You have just had a feast of ideas from two people, who really understand, value, teach and articulate these two approaches to childhood disability. I would like to sum up a little bit and make couple of personal comments. This has been extremely enlightening for me, and I hope for you, in recognizing that ideas come from somewhere... that they have a particular history in politics, as we have heard, and in various other aspects of people's lives. I think what we've also heard is that ideas change, and they sometime change not because the people who developed them changed them, but because the rest of us do, and we then may be misinterpreting certain things. Certainly some of the things I've heard today have helped me to understand much more clearly what the Bobath- NDT and the Conductive Education approaches are about.

Every good idea contains within it the 'seeds of perversity', which means that people can use a certain idea such that they go off with it in a different direction as they see fit. I think that both of these approaches to childhood and adult disability have been changed and interpreted and misinterpreted and reinterpreted in various ways. I hope that what people have recognized in this session, is that it is important to understand where the ideas come from, and what the people who promote them really mean, and not to misinterpret them for our own benefit.

Summary and future directions

Bobath-NDT and Conductive Education are considered to be well established approaches relevant to neurorehabilitation. Bobath-NDT is an approach that is primarily based on an analysis of a child's abilities and activity limitations, looking specifically at capacity and performance. Neurophysiological and biomechanical aspects, as well as the manner in which they interact in specific environments as the child or baby are engaged in occupations of daily life, are taken into consideration. Existing limitations are addressed by a transdisciplinary team in a "forward looking" way. In contrast, Conductive Education is derived from an educational and psychological body of knowledge. It is viewed as a learning process rather than an intervention, and uses pedagogical tools rather than treatment techniques. Although originated from different paradigms, Bobath-NDT and Conductive Education can be used in tandem and complement each other well. Both approaches are dynamic and systemic in their conceptualization of developmental disorder, call for flexible and humane implementation in people's lives, and run the risk of being

improperly practiced with respect to their core underlying principles, by professionals who invoke their names.

Current thinking supports the need for an integrated approach to neurorehabilitation that is client-based, theory-based, and whenever possible, evidence-based (Mayston, 2008). This requires a shift in focus to recognize Bobath-NDT and Conductive Education as contributors to client-based neurorehabilitation, rather than as two independent approaches. The application of such modalities and others should be encouraged in order to facilitate the use of a client- and a family-centered approach. However, it should be recognized that at certain times and for certain individuals, other interventions may be useful, necessary and preferable. Therefore, empirical strategies that seem to work should not be discarded. Rather, the challenge is to provide the evidence for their efficacy.

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