

Basic Therapy – A Basic Development Programme for Reorganising Psychomotor Abilities Through Individually Planned Complex Exercises

Márton Szerdahelyi¹, Dr Éva Marton-Dévényi¹, Dr Gábor Tóth^{1,2}

¹ Alapozó Terápiák Alapítvány, Budapest, Hungary

² Department of Education and Child Studies, Sagami Women's University

「ATA 財団法人の精神運動機能発達プログラムについて」 － 感覚運動統合支援の個別計画プログラム －

マールトン・セルダヘイ¹、イーバ・マルトン・デーベニー¹、トート・ガーボル^{1,2}

¹ ATA ベーシックセラピー財団法人、ブダペスト、ハンガリー

² 相模女子大学学芸学部子ども教育学科

1. The foundation of Basic Therapy programme

The history of Basic Therapy programme originated from the aim of the foundation to help children who are struggling with problems related to their native language and necessary abilities.

During the 1980s - the director of the Alapozó Terápiák Foundation (ATA) - Dr Éva Marton-Dévényi started to treat children with developmental reading disorder (dyslexia). As a neurologist, Dr Marton-Dévényi realised that in order to improve the efficiency of the therapy, it is important to apply *motor-coordination therapy*, which more profoundly affects the development of the nervous system. Later result showed that even though they achieved slow progress in improving speech and reading, this improvement often did not last. The weakness was in making the improvement automatic; the children were able to move past their original level, but the new skills did not reach the level of becoming *automated*.

Dr Marton-Dévényi was not satisfied with the results, thus she sought out new methods that would allow “reaching into the brain” and delving into the formation of language through developmental science. In the professional literature numerous authors have shown that later intellectual development - including language development - is built upon the sensory and motor development of the child (Tobis-Lowenthal, Ball, In. Bakonyi 1981; Katona 1979; Hottiger 1980; Schilling 1985).

During her search for scientific evidence and therapeutic results, Dr Marton Dévényi learned about the developmental neurology oriented school of the *Rehabilitation Center of Philadelphia* (later the Institute for the Achievement of Human Potential: IHAP) founded in the 1950s. The theory of IHAP proceeds from the most prominent steps in motor development with sensory stimulation (movement without mobility, rolling, crawling, creeping, walking) and considers the culmination of this process to be speech, which is built upon these basic developmental movement stages. Researchers of that period supposed that ontogenesis is basically the repetition of the phylogenesis. Dr Marton-Dévényi set off the program in 1987. She adopted some of the principles and practices of the IHAP. Although she had some results, she was not satisfied with those. The IHAP's original theoretical work has become obsolete by now; therefore the ATA foundation does not consider their theory the origin of the Basic Therapy Programme.

Ferenc Katona (1979) Hungarian pediatric neurologist upon his neurohabilitation research implied that crawling, creeping, sitting up (hovering sitting) and walking can already

be triggered on the 20-29th weeks of gestational age (from mid second trimester to early third trimester). *Katona* and his team found that these motor patterns are not reflex-like, but appear in continuing movement series in different stimulating situations. These basic developmental movement patterns are human specific and cannot be activated in new born or young animals, not even in mammals. Therefore, *Katona* (1979) named these motor patterns as *elemental motor patterns*.

Utilising current scientific language the ATA Foundation would formulate its *therapeutic theory* in the following manner: if the linguistic module develops insufficiently, it is worthwhile to examine the motor-coordination and motor control from several aspects, because speech and language (with related reading-writing ability) later develops based on these areas. According to the scientific literature, 70% of children with speech-language development problems and/or reading/writing disorder have difficulty or delayed development in certain areas of motor development (Shapiro 1993; Rousselle & Wolff 1991; Chiarenza 1990; Marosits 1992).

The Basic Therapy programme is a precisely planned enhancing development programme with a strong viewpoint of problem-oriented approach. Its theoretical and practical importance is that Basic Therapy programme never starts the treatment on the level of symptoms, but goes below the symptoms and go through the developmental stages once more to make the developmentally lower levels work properly.

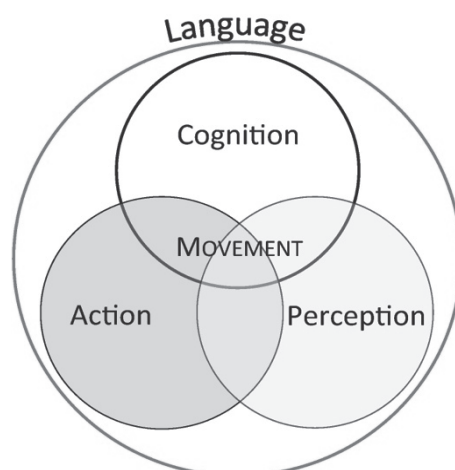


Figure 1 Perception, (inter)action and cognition relations to movement and language development (Based on Felicie Affolter's theory on perception interaction and language; Affolter 2011)

1.1 Expansion and further development

In 1990's, members of the ATA Foundation provided further development and expansion to the therapy programme.

- Added all those movements that play an important role in a child's development;
- Expanded the programme with additional knowledge from developmental education theories and programmes in Hungary;
- Expanded the programme with new areas of development;
- Incorporated elements of other development oriented therapies;
- Experience from therapists has also enriched the therapy itself.

At present the Basic Therapy programme divides its basic tasks into 22 areas and still develops new modules to its open system. This way, the programme is more than a motor- or moto-sensory development programme; it includes orientation in space and time, body image,

left-right directionality, developing memory, etc. This programme proved to be effective for not only in the case of problems with mother tongue skills, but other children groups as well (e.g. learning disability, mild intellectual disability, attention deficit hyperactivity disorder: ADHD). The fundamentals of the Basic Therapy programme were laid down by Dr Marton-Dévényi, Dr Gábor Tóth, and Márton Szerdahelyi. The last 20 years the ATA foundation published four books about the programme and therapeutic experience (Alapozó Terápiák Tanulmány 1994, 1999, 2002, 2013; Tapasztalataink és tanulságaink az Alapozó Terápiában 2000; Gondolatok a diszlexia végső okairól 2007; Minden gyermek kincs 2012).

2. Medical examination and developmental assessment

Prior to therapeutic intervention there are two major types of assessments in use:

- a. Complete medical examination and assessment (presently it is conducted by Dr Marton-Dévényi);
- b. Orientational assessment by a trained therapist.

The first is a whole day examination of several areas of neural functioning, neurological examination, speech and hearing assessment, perception and comprehension evaluation. Including the confidential medical developmental and institutional (kindergarten or school history) report. For those in primary school a reading and writing test precedes the examination. The analysis of assessment data shows that the *neurological status* of the children is very significant: more than 90% of the subjects showed some sorts of disorders (hypotonia, disarthria, asymmetric strength, diplopia etc.). These are only partly examined in routine neurological examinations.

The second orientational assessment by a trained therapist includes the evaluation of the *anamnesis sheet* and the *assessment of the motor areas*. The evaluation results are assessed both in narrative and in numerical forms.

There are follow up assessments in every six months during a therapy course.

2.1. Assessment of motor areas

This is an examination of the general movement development of a child. The evaluation of motor areas uses a *six-point scale* according to pre-determined considerations, but also includes a *written explanation* of motor behaviour during the assessment.

Important areas of general motor-development are as follows:

- Developmental gross motor skills;
- Motor skills modelled on the infant development;
- Muscle tone of the trunk and balance reactions;
- Forms of locomotion in infancy: types of walking and movements imitating animals;
- Skipping examination;
- Balance (static balance, transitional balance, dynamic balance);
- Transverse motor skills (starting with easier exercises and proceeding with more difficult ones);
- Rhythm test (clapping rhythm, movement rhythm, speech and movement rhythm together);
- Exercises to develop independent lower and upper limb movements;
- Test of fine motor skills (hand related, mouth and tongue muscles related, eyes related);

- Test of spatial motion along the three spatial axes;
- Lateral dominance (An example that shows how important lateral dominance is from the data analysis of a 60 case study, that points out the followings: well established lateral dominance is *missing* at 56% of children, more directly 35% had *no established dominance* and 21% had *crossed lateral dominance*).

Recommended other supplementary assessments are:

- Eye examination and vision testing by ophthalmologist or optometrist;
- Assessment of phoneme hearing, speech perception and comprehension.

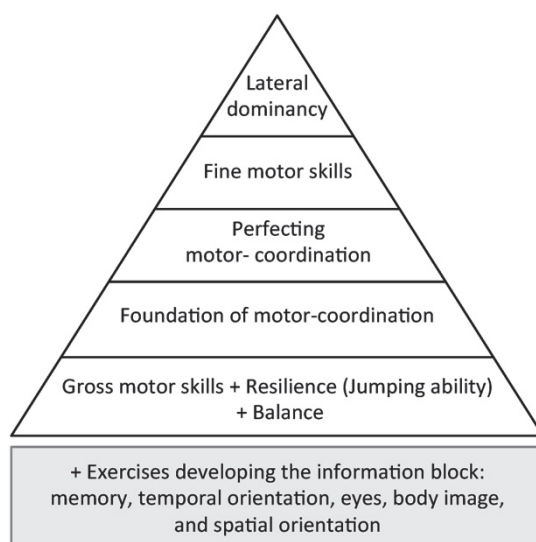


Figure 2 The structure of Basic Therapy programme

3. The characteristics of the Basic Therapy programme

3. 1. Who is the Basic Therapy programme for?

The Basic Therapy programme is designed to work with children from the age of 5 years old and is in the *last year* in pre-school/kindergarten. Nowadays, almost half of the children brought for testing and evaluation are between 5 to 7 years old. This may suggests, that both educators and parents are more aware of children at-risk for deleyed development or already identified learning difficulties and they look for prevention rather than facing the problems at the elementary school. The most common problems found in this population are:

- Problems and identified lack of school readiness;
- Poor motor dexterity and gross/fine motor problems;
- Not yet established lateral dominance (most problems with hand dominance);
- Already diagnosed as at-risk for reading/writing difficulties;
- Moderate to severe speech-language impairment, delayed speech-language development (Affolter 2011);
- Special cases of ADHD (Parush et al. 1997);
- Boarderline to mild intellectual disability (Eichstaedt and Lavay 1992).

The second major target group for therapeutic intervention is children from elemementary school to 16 years old. These children are at-risk or have already diagnosed developmetal problems like:

- Developmental dyslexia;

- Dysarthria and dysphasia (dysarthria is a disorder of speech, whilst dysphasia is a disorder of language);
- Dysgraphia (the Basic Therapy programme shows its therapeutic effect mostly on the improvement of *formal aspect of writing*);
- Special cases of ADHD (for children whose ADHD has a psycho-organic origin with developmental coordination disorder and/or sensory processing disorder) (Parush et al. 1997);
- The Basic Therapy programme has documented effectiveness in the cases of borderline-children and children with mild intellectual disability.
- The programme is effective in cases of so-called “pseudo-mental retardation” (in whom sensory or motor deficits produce some of the symptoms of intellectual disability, but true intellectual deficiency, per se, is not present and that the impairment in measured intelligence is more a function of the inadequacies of the psychological tests than of the impairment in the child’s cognitive functions) (WHO 2005).

It is important to state that the Basic Therapy development programme and its exercises do not help for problems with spelling (improved speech perception would help spelling). The development programme of the Basic Therapy is proved to be effective in cases of children with speech-language acquisition problems (speech production in the cases of children in kindergarten and schoolchildren who suffer from dyslexia).

3.2. The basic structure of the therapeutic intervention

Therapists work with children both individually and in small groups. This development programme is not recommended for more than six children in one group. A criterion for the therapy is that the therapist must see through the supervision of each child individually. Maintaining communication with the parents is also important, and if possible with the kindergarten and school staff as well. All therapists must participate in continuing in-service programmes, special courses and meetings to maintain quality control, up-to-date information exchange and cooperative programme development to further expand the therapy.

The required development programme time of Basic Therapy is twice or three times a week for two ours or five times a week for an hour. The therapy lasts for six months up to two years, depending on the necessary therapeutical intervention needs of each child. The average time of the therapy is 12 to 18 months.

A. Rectify the basis of motor skills

A.1. Gross motor exercises

The gross motor movements include movements from infant development stages, movements from kindergarden age imitating nature-based animal movements and walking exercises. These are human specific primary motor patterns and variations, which appear during the continuous development stages.

A.2. Resilience:

Resilience exercises include various jumping tasks (push oneself off a surface and into the air by using the muscles in one’s legs and feet). We think that development of physical resilience has a countereffect on spiritual resilience. The only tool that is necessary is a trampoline.

A.3. Balance exercises

According to some publications (Fodorné 1993, Ayres 1979), a child’s balancing ability is an indicator of the maturity of the central nervous system processes. The system of

brainstem-cerebellum-vestibulum with its connections is primarily reliable for the coordination of the proprioceptive and motor systems, where the integration of perception and movement takes place (Fuentes and Bastian 2007). The stimulation of the vestibular system enhances the maturing processes of the central nervous system. The main role should be given to dynamic balance, when fluid in the labyrinth happens to move due to the frequent changing of position, the change of direction during movement, turning, spinning, ball exercises etc. Figure 3 shows the summary of related key points in physical/motor skills development. It is important to improve movement coordination (developmental gross motor skills), balance, and resilience (jumping ability) through activity and engagement for a healthy psychosocial development and provide a solid basis for the development of pre-academic skills: to improve small muscle coordination (fine motor movement, eye-hand coordination etc.), to learn basic concepts, and to acquire skills necessary for literacy (reading, writing and arithmetic) (Guralnick 2005).

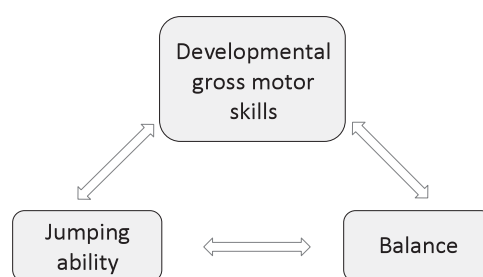


Figure 3 Summary of key points in motor development skills

B. Special gymnastics elements

Special gymnastics elements are based on the three key motor development skills (see in Figure 3) followed by the exercises aimed to develop movement coordination in two stages (foundation and perfection) with so-called ‘closed’ and ‘open’ motor skill development exercises (e.g. body-midline passing and crossing, limb separation, independent limb movements, rhythmic movements and serial movements).

Thus, there are two major types of these exercise groups:

B.1. Special exercise groups for the development of ‘closed’ motor skills

- B.1.1. This includes the so-called **Pinokkio exercises** (motor coordinational exercises of the limbs first on the same side and then on the opposite sides), in which we ask children to raise and lower their arms and legs simultaneously, first lying down then standing up.
- B.1.2. **Body-midline passing exercises**, where the point of the exercise is to cross the body-midline in different postures.
- B.1.3. **Crossing exercises** include simultaneous crossing of hands and later the hands and legs.
- B.1.4. **Limb separation exercises** are tasks to raise the limbs consecutively.

B.2 Special exercise groups for the development of ‘closed and open’ motor skills (perfecting motor coordination)

- B.2.1. **The exercises to make lower and upper limbs independent** are build up the separate functioning of the hands and feet. These are a series of exercises, which

are difficult, where the independent control of hands and legs is combined with jumps, and hand/foot motions move in spatial directions and are perpendicular.

- B.2.2. **Rhythm exercises** are rhythmic movements: the coordination of rhythmic movement and speech (nursery rhymes for children). By practicing the rhythmic jumps the development reaches the premotor cortex of the brain. *Freund* (1990) writes that the premotor cortex has a role in the temporal organisation of the movements, also in the organisation of skills, such as speech and writing.
- B.2.3. **Short-long series exercises** are combinations of shorter (3-4 elements) and longer (32 element) series from automated movements (modularity of feed-forward motor programmes that are kinematically well characterised by smooth speed and acceleration curves).
- B.2.4. **Prefrontal cortex related exercises**, in which movements are connected to cognitive processes: the development of essential apprehension of motor skills, movement serialisation, delayed reactions and concentration. The unexpected exchange and alteration of one or more factors constitutes the theoretical basis of this exercise group. These so-called *prefrontal cortex exercises* influence the system of connections between the prefrontal cortex-basal ganglia-limbic system-cerebellum.
- B.2.5. **Exercises with balls**: these are planned and well organised activities that can be a challenging way to add variety and fun to the programme. The proprioceptors communicate everything from the position of a joint to the tension on a muscle

C. Fine motor skills

Developmentally, following the above exercises the programme begins intently improving fine motor skills.

C.1. Manual dexterity

- C.1.1. **Preparatory exercises for establishing fine motor skills** are keeping the developmental direction: start with head exercises then work towards the body and the hands, from the proximal (shoulder) towards the distal (fingers).

- C.1.2. **Fine motor exercises** include many exercises both building on one another and of equal rank that develop dexterity.

C.2. Oral and lingual dexterity exercises

- C.3. *Exercises for controlling eye muscles* help to the development of vision control (Vision Therapy exercises).

D. Lateral dominance

Following the fine motoric development, if needed, the next step is the dominance development. The IHAP research group stated that the acquisition of dominance is the crown of the movement development (Delecatto 1963). In the case of problems with lateral dominance, after working with the central axis the brain is better disposed for stable one-sided dominance to emerge in fortunate instances after a half year of work, since the exercises traverse the path of human motor development.

For the above series of exercises therapists include **discipline** and **breathing exercises** on the one hand and **limbering**, **strengthening** and **stretching exercises** on the other. If it is necessary supplement this with areas of developmental education (**memory**, **temporal orientation**, **Gestalt**, **body image**, etc.), but these methods probably vary according to the country. In all the exercises of the therapy the *movements* and the *spatial location* of the child

appear equally important: in the beginning when the child lies on the mat and raises his/her head, and later in reflecting complex spatial situations.

In the examination all children had one common factor: *they all had problems in motor execution*. Commonly observed indications of developmental delay or impairment in motor skills:

- Muscle tone disorders: hypotonia extending most often to the limbs and pelvic area.
- Compulsory poses: for example the lower limb is in a particular pose, the upper limbs and possibly the trunk assume the characteristics of this pose.
- Compulsory movements: for example if the limbs move, particularly with difficulty to perform or newly learned movements, the mouth and tongue performs the same movement together with them.
- Transverse movements are very weakly developed.
- Skills of independence are still weakly developed (separate control of the upper limbs - lower limbs - head/neck - body and their coordination).
- The simultaneous and combined exertion of the two sides of the body.
- Weakness in fine motor skills
 - Manual dexterity;
 - Dysarthria (the motor weakness of speech performance due to innervation disorders or limpness in the muscles of the mouth, pharynx and soft palate);
 - The performance of eye movements.
- Dysdiadochokinesia (inability to perform rapid, alternating movements) is very common.
- These children usually have sequential problems, therefore it is difficult for them to organise and remember the sequence of movements in series.

These symptoms are specifically targeted and in most cases corrected during therapy as they are caused by developmental delay (Kranowitz 1998).

The analysis of the effects of the Basic Therapy programme revealed that even six months of treatment significantly improved the following areas:

- Reduce the associated movements and synkinesis;
- Gross-motor movements were automatised with 45% of the children;
- The motor coordination became problem free with 25% of the children.

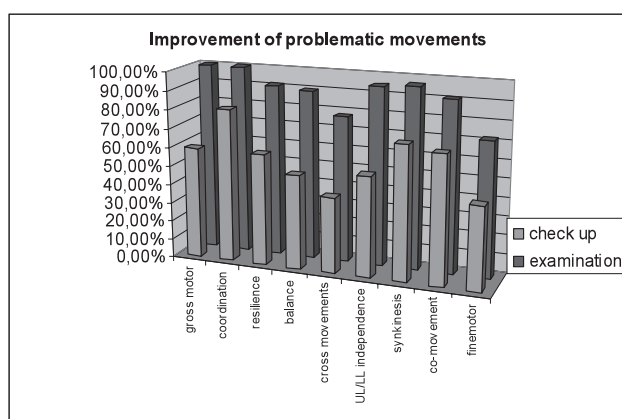


Figure 4. Chart on the improvement of problematic movements

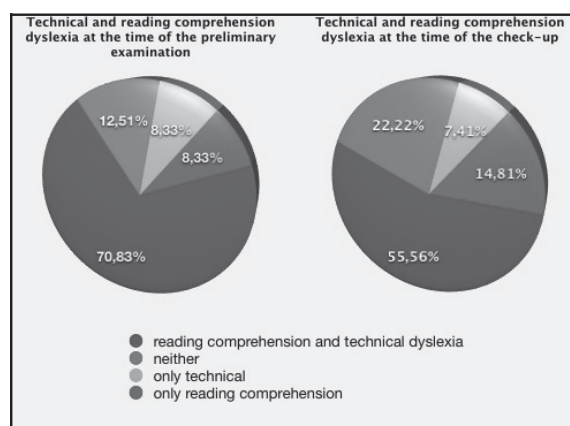


Figure 5. Chart on the reading difficulties

Figure 4 shows that the development is about the same at the other factors as well. All children's movements improved, but did not reach automatisisation in six months.

Figure 5 shows the distribution of dyslexia (reading difficulties) among the schoolchildren at the time of the examination and at the time of check-up.

4. Gymnastics of Basic Therapy programme

The special gymnastics elements of the Basic Therapy programme excessively develop posture, control over muscles, dexterity, stamina, and sense of rhythm and provide considerable coordination skills.

Motor perception exercises influence and regulate movement, while more accurate movements regulate perception (proprioceptivity). This process develops the integration of organisational skills. The gymnastics exercises, through their conscious, exact performance, develop concentration and self-control.

- The child's motoric space, time, and dynamic sense also develop together;
- The course of the movements determines the spatial relations of the movements, the rhythm of the movements, its time relations, and dynamics determine the necessary strength portions and the state of muscle tone;
- Improve the learning and regulation of motor skills and systems regulating the visual field: frontal lobe, parietal and parieto-occipital areas, as well as the sense of time for movements, because every one of these gymnastic movements are composed in rhythm and space.

The Basic Therapy programme follows the directions of spontaneous development in the ontogenetical viewpoint. The therapy goes a) from the movements of the head towards the movements of the limbs, b) from the gross motor movements of the trunk towards the fine motor movements of the limbs, and c) from simultaneously moving limbs on the same side to the contralateral movements.

5. Thoughts on the mechanism of action and effects on basic development

5. 1. Anatomical system

The research group of Basic Therapy Foundation has been trying to refer to anatomical systems that are induced into functioning:

- The development is moto-sensory in character, so it sets into motion every area of the brain related to motor function and every area of perception related to this.
- Gymnastics elements of the Basic Therapy programme powerfully engage the corpus callosum for the harmonisation of the movements of the two sides of the body and coordinating separate transverse lateral functioning.
- The therapy develops along the skill-ability-automatisation line, since children with difficulties in ability have problems in making their actions automatic in both the motor-sensory and cognitive areas.
- The therapy powerfully engage the systems affected by the cerebellum and the basal ganglia, which are the main areas controlling automatic actions. The basal ganglia are one of the initial objectives of the therapy, which are to be developed. Through this the therapy develops implicit procedural memory and implicit learning.
- The goal of every one of these gymnastic movements is to powerfully engage the basal ganglia, since the primary objective is to make these gymnastic movements automatic, and through these new learning possibilities for the cerebral cortex. The

automatisation of movement and speech is also carried out through the basal ganglia (Damasio 1992)

Csaba Pléh (2003) head of the Department of Cognitive Science at Budapest University of Technology and Economics wrote: *“The entire development facilitates the central integrating processes, because this central control is insufficient in children with ability problems. It is difficult to define what this central control process is. Perhaps it can be described as follows: the precise identification of stimuli and the comparison of the stored objective with the one, which is determined and with the response mechanism. On the basis of the data in the literature the underachievement of the children does not arise from slowness in either the sensory or motor phases, but instead from the slow nature of complex central processes.”* Pléh also says *“The frontal lobe–basal ganglia system has a strong connection with the commencement of forming a sentence, improved accuracy in sentence formation and the motivation to construct a sentence.”* (Pléh, Kovács, Gulyás 2003, p.443)

- The ATA develops every area of the brain and spinal cord that takes part in motor skills and necessitates large-scale integration from both the vertical and horizontal systems of pathways.
- Therapists often experience this during the course of Basic Therapy programme, and it can also be supported by data from the literature, making it one of the pivotal factors of this programme in the realm of language.
- Therapists also experience the commencement of a disposition towards and skill at drawing, because perhaps this is dependent upon exercising the parietal lobe and not the development of fine motor skills.
- Considering the neuro-biological functioning of the brain, therapists begin with the “vertical axis” (brain stem vestibule cerebellar system-basal ganglia-cerebral cortex motor areas).
- During the Basic Therapy programme the development reaches the axis from the so-called “front to back line” (prefrontal-basal ganglia-limbic system-cerebellum).
- The therapy affects the embracing ark of the lateral brain areas less (temporal, parieto-temporal and occipito-temporal areas). Nevertheless, linguistic ability requires the functioning of these areas. However, the developments of these areas are under the competence of the speech therapy and the corrective education/special education, but the Basic Therapy programme is able to underpin their work, provide work-share and assistance to help them.

5.2 The plasticity of the brain

The Basic Therapy programme is made possible because the brain has plasticity. The brain works in functions and allows the possibility of solving new problems by the re-arrangement and/or the enhancement of the synaptic network. Looking from a neurological/histological point of view, the Basic Therapy programme works on the reformation, reinforcement and repair of defects in the synaptic network, which is why it is important to have a large number of movements performed in a proper manner.

Oliver Sacks (2010) said: *“The brain is more than an assemblage of autonomous modules, each crucial for a specific mental function. Every one of these functionally specialized areas must interact with dozens or hundreds of others, their total integration creating something like a vastly complicated orchestra with thousands of instruments, an orchestra that conducts itself, with an ever-changing score and repertoire”.*

5.3 Therapeutical regression

One of the greatest strengths of Basic Therapy programme - and also one of the greatest challenges - is that it works with therapeutical regression. It comes from its developmental aspect: it presumes a stuck development and tries to lead back on this development on the original physiological path. In so doing, it uses the regression and leads the child below the level where s/he was stucked.

The Basic Therapy programme leads the child into therapeutical regression by the movements of infancy and early childhood. Movement is such an elemental factor in development that it leads the whole personality to regression. The child is lead to that psychic fixation point where his/her somatic (motor and speech) development - and probably the psychic development, too - stopped and went on a forced ride.

Finally some words from one of our greatest master *Glenn Doman* (1974): “*So demanding is the program today that I know of only one thing in all the world that is more difficult - that is to have a child whom you love who can't do what other kids do.*”

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