

# Foetal Life and the Cerebral Palsied Child

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**Abstract:** A preliminary study of five couples of non-identical twins, observed monthly during their prenatal life starting from the twelfth week, and weekly after birth up to their second year of age, has allowed the author to individuate a specific “foetal personality”. In particular the importance of the foetus’ motor and sensory functions as central elements of “foetal personality” is demonstrated. “Foetal personality” is expressed by a behavioural pattern which characterizes each foetus and it is clearly recognizable, especially after the 17<sup>th</sup> or 18<sup>th</sup> week of pregnancy. The images of echographic recordings of intrauterine life and the remarks from postnatal observation sessions allow to understand how a child’s specific modality of relating himself to space and to the habitat after birth, continues the model he has experienced prenatally. This specific and particular acquisition of habits, which is different for each child, seems to show “foetal memory”. Together with foetal personality, foetal memory allows to understand the trauma experienced by cerebral palsied children. Cerebral palsy, in fact, concerns a pathology which is closely connected to birth, often a seriously premature one. In this situation the newborn loses the patterns and movements experienced during foetal life. What is the value of “foetal memory” for a cerebral palsied child? Can he remember? What is the meaning of his foetal life? Thus, it is not sufficient for a physiotherapist to consider the entity of the neurological damage but it is also important to consider the trauma coming from the sudden loss of the great variability of movements and perceptions experienced during prenatal life. The author gives some suggestions to help the child reconnect to emotional and motor-sensory experiences which were previous to trauma.

**Zusammenfassung:** *Das fötale Leben und das Kind mit cerebral bedingten Lähmungen.* Eine vorbereitende Untersuchung von fünf Paaren von nicht identischen Zwillingen, die monatlich während ihrer vorgeburtlichen Entwicklung ab der 12. Woche und wöchentlich nach der Geburt bis zu ihrem zweiten Lebensjahr beobachtet wurden, hat der Autorin erlaubt, eine spezifische „fötale Persönlichkeit“ zu beschreiben. Insbesondere die Wichtigkeit der motorischen und sensorischen Funktionen des Fötus als zentrale Elemente der „fötalen Persönlichkeit“ werden gezeigt. „Fötale Persönlichkeit“ drückt sich in Verhaltensmustern aus, die jeden Fötus charakterisieren, und die klar erkennbar ist, besonders nach der 17. oder 18. Woche der Schwangerschaft. Die Bilder der Ultraschallaufnahmen des intrauterinen Lebens und die Aufzeichnungen von nachgeburtlichen Sitzungsbeobachtungen erlauben zu verstehen, wie die spezifische Art eines Kindes in einem Verhalten zum

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Raum und zur Umgebung nach der Geburt das Modell fortsetzt, das es vorgeburtlich erlebte. Dieser spezifische und besondere Erwerb von Gewohnheiten, der für jedes Kind unterschiedlich ist, scheint „fötale Erinnerung“ zu zeigen. Zusammen mit der fötalen Persönlichkeit erlaubt die fötale Erinnerung, das Trauma zu verstehen, das Kinder mit hirnbedingten Lähmungen erlebten. Hirnbedingte Lähmungen betreffen eine Pathologie, die eng mit der Geburt verbunden ist, oft auch mit ersten vorgeburtlichen Einwirkungen. In diesen Fällen verlieren die Neugeborenen die Muster und Bewegungen, die sie während des fötalen Lebens erlebten. Was ist die Bedeutung „fötaler Erinnerung“ für ein Kind mit hirnbekindeter Lähmung? Kann es sich erinnern? Was ist die Bedeutung seines fötalen Lebens? So reicht es für den Physiotherapeuten nicht aus, nur den neurologischen Schaden in Betracht zu ziehen, sondern es ist ebenso bedeutsam, das Trauma zu berücksichtigen, das aus dem plötzlichen Verlust einer großen Vielfalt von Bewegungen und Wahrnehmungen, wie sie während des vorgeburtlichen Lebens erfahren wurden, resultiert. Die Autorin gibt einige Hinweise, wie man dem Kind dabei helfen kann, sich wieder mit den gefühlsmäßigen und motorisch-sensorischen Erfahrungen vor dem Trauma in Verbindung zu setzen.

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Child cerebral palsy concerns a pathology which appears in the very first years of life and is closely connected to an often seriously premature birth (foetuses can survive after 24–25 weeks' pregnancy).

This cerebral damage above all appears in the very first period of a child's life and, as Dr. Bobath and his wife realized more than 20 years ago, it heavily interferes not only with a child's motricity but also with the child as a whole, a totality, and this totality must be considered in the treatment. The Bobaths, in fact, starting from the assumption that the "brain" co-ordinates all our activities, stress that the child as a "whole" is compromised by this damage and, as all the child's problems are linked together, they must be evaluated in relation to this fact. Furthermore, their affirmation that a child's cerebral palsy "is not only a motor problem but also a motor-sensory one" is really significant. "A child can only use what he knows, what he has felt and experienced, so he can remember". Berta Bobath does not only consider the meaning of sensoriality in movement but, referring to Thomas, she adds: "The movements of the newborn infant are, to a large extent, a continuation of those of intra-uterine life. The new elements are simply due to the interaction of pre-existing aptitudes with the environment, which is proposed as adequate to development. This means that no movement the child learns is new for him, but it is only a modification of pre-existing patterns. When a healthy child comes to birth he owns a great variety of movements which he has experienced and felt and, therefore, he can remember and use them. A cerebral palsied child does not have or, better, loses many of these early aptitudes and movements at birth. Furthermore he is often subdued, often quite precociously by an affected tone and by pathological patterns. Thus he can only rely on these possessions for his development, for his future learning."

What does intra-uterine life and the motor-sensory activity experienced before the trauma of the cerebral damage mean to a cerebral palsied child? Can he remember? What does this mean for his parents and therapist?

## **Foetal Life**

Foetal life has stimulated great interest since ancient times, causing remarks which nowadays seem absolutely surprising if we think how, in those late epochs scientists were not supported by technical instruments.

In the 13<sup>th</sup> century, the concept of universe was reflected in embryogenesis: a foetus was to the uterus what a man was to the universe; the uterus as well as the universe were considered to be influenced by the stars. (Babies born before the 7<sup>th</sup> month of pregnancy were not assumed to be able to survive because not all the planets had exercised their influence. Birth at the 8<sup>th</sup> month was not considered favourable because that month marked the return of Saturn, a cold and dry planet. The most favourable period for birth was the 9<sup>th</sup> month, which stood under the influence of Jupiter.)

The uterus was imagined to be an autonomous creature, like a wild and obscure animal, hidden in the dark hole of the womb (pregnancy was considered to be a distressing phenomenon which finds the woman fragile and the child vulnerable). The mother was given credit of a direct influence on the foetus' physical condition. This influence could be exercised by dreams, fantasy, emotions, wishes, but also sensory perceptions like sight and touch in particular. Thus the mother's body had a double role in regard to the foetus: it was a screen, a filter that protected it from cold or from excessive heat and at the same time it was able to transmit sensations that could deeply condition the child.

In medieval manuscripts the foetus is illustrated as a full-grown child: theologians strongly opposed embryogenesis in those times. The scientific debate focused on the moment when the foetus was infused with the divine spirit and thereby was given a soul – 40 days from conception for baby boys and 80 to 90 days for baby girls.

The first movements and foetal activity were considered significant as to vitality even if it was believed that a foetus passed most of his time sleeping.

In the 19<sup>th</sup> century the studies on foetal motility by Preyer and Ahlfeld are particularly significant.

It is well known how numerous the psychoanalysts have been – even since Freud's times – who attribute an important meaning to foetal life for the individual's mental functions.

At present the abundance and precision of the images conveyed by echography together with an increasing number of neurophysiological studies allow more accurate research into the characteristics of foetal life and owing to this, even easier connections between intrauterine life and the development after birth are possible.

Echographic images have shown how, after the 8<sup>th</sup> week of pregnancy, the foetus expresses an intense motor-sensory activity which is facilitated by the support of the amniotic fluid which sets the foetus free from the force of gravity. The foetus stands up, rolls on its vertical and horizontal axes, stretches its arms, brings its hands to its face, sucks its thumb and so on. But in addition, the foetus is also extraordinarily stimulated by a strong sensorial interest. We can observe, in fact, how it tries to touch the uterine wall, the umbilical cord and the placenta with its hands. In the meantime the gradual and progressive functioning of its sensory systems enables it to perceive, starting in the 8<sup>th</sup> week, afferent kinaes-

thetic, tactile, vestibular, gustatory, olfactory, auditory and, according to some, even visual stimulations. (Gottlieb's study on embryogenesis is very important in this respect.<sup>1</sup>)

But foetal life is not only sensorial. The maturation of the centres of emotivity and affectivity, like hippocampus, and the function of sleep, which is recognizable from the 29<sup>th</sup> week of pregnancy, make us understand the great complexity of the foetus' psychophysical structure.

In 1989, Tajani and Ianniruberto ascribed the foetus an individuality from the motory or, more generally, from the behavioural point of view. They maintain that each foetus has its own personality, its own way of behaving, though restricted to common models.

### A Preliminary Study on Twins

My interest in the study of foetal life was mainly stimulated by two ideas: first, I thought it could be useful to investigate the foetus' behaviour and living conditions as accurately as possible in its intra-uterine life, in order to offer a pre-term newborn – or more generally a cerebral palsied newborn – in the incubator environmental conditions as near as possible to the physiological situation they have abruptly abandoned. Secondly, I wanted to verify if there could be any correlations between intra- and extra-uterine personalities, that is, if we could speak of a foetal mental life.

Thus I decided to start a preliminary study observing couples of non-identical twins during their intrauterine life in monthly echographic recordings, starting from the twelfth week. After birth, the same children have been observed weekly up to their second year of age. The technique of observing a newborn in his family life was described by E. Bick about fifty years ago and proposes weekly sessions of about an hour.

Up to now, I have examined five couples of non-identical twins. In this paper I will refer to the behaviour and the remarks concerning the first three couples observed.

#### *"Foetal Personality"*

According to my experience, pattern of foetal behaviour is clearly recognizable from the 17<sup>th</sup> or 18<sup>th</sup> week of pregnancy. I first noticed this in 1985, when I was observing the first couple of twins. I think this is to be attributed not only to a more advanced maturity process of the foetus' neuronal structures, but also to a more substantial and organized presence of the placenta from the 14<sup>th</sup> or 15<sup>th</sup> week onwards. This observation is relevant if we think of the frequent and particular interest that many foetuses have in this organ; this seems to be due to the many sensorial qualities that the placenta offers: warmth, consistency, vascularity. It is therefore important, considering foetal life, to take into consideration the emerging of the foetus' sensory functions.

Furthermore, the examination of the observation sessions of foetal life and of life after birth of one of the children emphasizes the problem of the correlation existing between motricity and emotivity. On the other hand, the maturation of the mental centres regulating emotivity and affectivity, like the hippocampus,

takes place during foetal life. All the elements above allow to speak of a “foetal personality”.

### **Echographic Observations – Methodological Considerations**

It was no mean task to clarify the conceptual frame of this work, to understand what kind of observations can be made on the basis of the echographic recordings obtained, and what kind of connection can be drawn to the observation of the child after birth. During the echographic phase of the observation I thought it advisable to abstain from any kind of interpretation, since one easily draws erroneous, hasty or schematic conclusions that can completely pollute the subsequent observation. It is just retrospectively, after having observed the same phenomenon several times after birth in the relational context, that one can consider the event to be evident, understandable, and explainable.

In spite of the fact that one might stick to the terminology proposed by Precht and his school (1984), the interpretation of the images are connected to the author’s own experience of foetal life.

In order to maintain the transparency of this research, I thought it appropriate not to take part in the sessions of echographic observation during intrauterine life in person; only after observing the children up to their second year of age I examined the recordings and I compared the prenatal behaviour of the children with the remarks I collected after their birth.

### **Evaluation of the Observation of the First Three Twin Couples**

To save space, I am presenting a synthesis of the observations of three couples of bi-corial, bi-amniotic twins with two placentae in separate bags.

First, there were Daniele and Elisa. The girl’s characteristic liveliness of motory and prehensile activity, her eye-motility can be noticed from the 18<sup>th</sup> week of pregnancy. Situated slightly askew over her brother, she is continually looking for him, she tries to touch his head with her hands and the placenta with her feet. Daniele, who is crouched under his sister in breech presentation, keeps this position up to birth. Characteristically, he slightly moves his limbs towards his body. After birth, Elisa looks more extrovert, more sociable and more open to learn and to relate with others than her brother. She is very helpful with him, she looks for him and she treats him as if he were a baby. Daniele then behaves like a “good child”, obedient and easily accepting compromise. His eating looks very meticulous and in playtime he prefers games and activities where precision is required. At the nursery and at home he prefers narrow spaces.

The second couple are Silvia and Stefano. From the 18<sup>th</sup> week of intra-uterine life, Stefano characteristically keeps in close contact with the placenta: he lies against it with the whole body and touches it continuously. His sister Silvia, instead, keeps stretching her body both when she is face down and face upwards. She doesn’t keep contact with the placenta, though it is also at her disposal. During the echographic sessions the twins are not in contact with each other. After birth, Stefano immediately shows a tender and passionate relationship with his mother. He accepts to be sent to the nursery, getting on particularly well with one of the

assistants. He settles well into nursery school becoming integrated in the group and showing great learning ability; even here he gets on particularly well with a little girl older than him. When being nursed in the first months of her life, Silvia seems to concentrate more on sucking than on building a relationship with her mother. At the nursery, she is not able to leave her father's hand and she rather stays at home with her brother. At nursery school, she prefers to stay alone and does not take part in other children's games. She frequently tosses legs and arms.

After birth, these two children do not establish frequent contacts to each other; just as they did during their intra-uterine life, they tend to lead their own lives by themselves. Generally, Stefano shows a better ability to learn and to relate to others than his sister Silvia.

In the third couple, Sandro and Ilde, the boy shows intense contact with the placenta and with the body of his sister from the 18<sup>th</sup> week of pregnancy. Particularly in the 22<sup>nd</sup> week, the movement of his hand touching his sister's body is quite evident. From the 18<sup>th</sup> week on, Ilde approaches the pelvis and remains almost immovable during all the echographic sessions up to birth. Her motor activity is limited to the legs, which point upwards and are often used to contact her brother and the membrane that divides them. After birth, Ilde remains practically isolated from the environment for more than a month: she refuses her mother's breast, she sleeps a lot and when she wakes up she avoids others' eyes. After leaving her isolation, she often seems overcome by her own emotivity. Particularly at the beginning her fear of moving is quite evident. Ilde also shows a lower ability to learn and socialize than her brother.

### Comments

The observation sessions during pregnancy were only held once a month, owing to ethical reasons. The impossibility to individuate specific characteristic sleeping and waking conditions before the 28<sup>th</sup> week of pregnancy emphasizes the importance of the foetus' motor and sensory functions as prerequisite of "foetal personality".

In echographic images of a 17<sup>th</sup>-week foetus, its attachment to the placenta as to an object was clearly perceivable: the child was continually interested in touching this organ, in approaching it with its lips, in playing with it. In the same way I observed how Elisa, at 18 weeks of conceptional age, went on touching the placenta with her feet and then, at 31 weeks, she got interested in her brother as in an object: she touched the membrane, she touched her brother lightly, she looked for him repeatedly. After birth, when she was at the nursery, I observed her continually looking for him and dealing with him as if he were a baby in need of protection.

In the same way Stefano of the second twin couple showed an attraction for the placenta; he touched it repeatedly, stretching out his mouth and keeping in close contact with it. Sandro too, of the third twin couple, sets up a close contact with the placenta. He lies on it as if it were a cradle and he also frequently seeks to contact his little sister.

As for the other components of the twin couples, Daniele was in breech presentation in his intra-uterine life, he needed less space and his movements were

oriented to himself. Silvia, instead, moved a lot, she stretched her legs and arms and seemed ready to check and mark her space. Ilde, the girl of the third couple, stayed motionless in the pelvic region with her head downwards during the whole pregnancy.

The differences I have noted between the foetuses – for instance Elisa, Stefano and Sandro seeking objects, Daniele playing the object for others, Silvia staying by herself and checking spaces and situations, Ilde with her head downwards being withdrawn to herself – all these characteristics found their correspondence in life after birth. The use of space and the use of motility was quite different with different twin couples. Are the children's different qualities linked to constitutional and genetically determined aspects? Or do we have to think of the uterus as of a habitat and try to understand which factors have an impact on the child's mental development? Do the factors we already know – prenatal position of the foetus, situation of the placenta, the foetus' reciprocal position (concerning also the greater or smaller possibility to receive sensory stimulations – auditory, olfactory, visual, kinaesthetic, etc.) – have an influence in determining the children's development after birth? Is it possible, then, to state that the contrasting features of character in a twin couple are connected to factors of experience?

In other recordings I have seen how a foetus between the 12<sup>th</sup> and 20<sup>th</sup> week of pregnancy had much space at its disposal and how, in certain cases it was possible to perceive a sort of excitement in the foetus concerning the space around it and its wish to occupy this space; I have seen the foetus kick, stretch, rotate, play with the placenta for a long time etc. What is the relation between this foetal experience and the child's future life? This research, considering the child's observation during his foetal life, gives the possibility to shift the focus in the study of mental processes, but it does not give a solution.

The uterus is the habitat where the unborn child can make experiences which bear a certain significance for his extra-uterine mental development. Thus, he is conditioned by many maternal factors of endocrine and metabolic kind, in relation to particular physical and emotional conditions. But is the way also significant in which a mother chooses to bear the foetus during her pregnancy – whether she pushes the abdomen forward, towards the top, outwards or presses it inwards, towards the lumbar part of the column? In the first case I described, for example, how important were the mother's fantasies in urging Elisa's interest in Daniele, while they were still unborn? As a matter of fact, after their birth, the mother chose to take care of and breastfeed Daniele, while the father took care of Elisa. To what extent can Ilde's isolation have been influenced by her identification with her mother's psychotic part? Ilde's mother, in fact, showed a strong schizoid personality. Or is it the foetus itself that, being closely linked to the anatomical and physiological programme of its genes, expresses a particular way of relating itself to the intra-uterine habitat? The fact that in many cases, from the 17<sup>th</sup> or 18<sup>th</sup> week, the foetus "chooses" a particular position in the uterus by adopting specific patterns and neglecting other possibilities makes me favour this second hypothesis. Even the observation of seriously pre-term newborn children starting from the 26<sup>th</sup> or 27<sup>th</sup> week would confirm this hypothesis.

## Conclusions

### *“The Forerunner Object of the Relational One”*

The observation of the twin couples I have described, of several seriously pre-term newborns and of others whose study is still in progress, gives the possibility to hypothesize that a particular availability of rudimentary introjective processes – and then at projective ones – which allows a better learning and socialising ability in a child, is present in those subjects who seem to possess a “good object” innately, starting from very early phases of foetal life. I might then suppose that the presence of an inner object, to which the foetus can make a reference, seems to be a hereditarily transmitted attribute. It is necessary to clarify the meaning of “good object” at this level of development. It can be considered a certain “something” that includes all three meanings ascribed to an object in psychoanalysis. Going back to my reference concerning the sensory systems, I think that this “something” consists of a tendency to look for an instinctual object. This tendency is developed with the help of the foetus’ sensory attributes even so precociously. But as I have observed in three of the foetuses studied, they do not stop at instinctual objects. Their search at foetal level implies something more; they do not seem to feel satisfied by a self-sensory activity but also seek contact with the habitat and in particular with elements that can be considered an object because of their specific sensory qualities concerning form, consistency and temperature. This explains that the foetus itself makes a first evident differentiation between its subjectivity as a foetus and the object. In these cases, then, the instinctual object seems to be a forerunner of the relational object.

The examination of the observation sessions of foetal life and of life after birth of a child from the third twin couple emphasizes the problem of the correlation existing between motricity and emotivity.

I think that the study of the twin couples cannot offer an exhaustive reply to all the questions I have asked but it leaves space for suggestive considerations and in particular it urges to consider more closely what was affirmed in psychoanalysis. The most significant authors ascribe a great significance to physical, motor-sensory attributes at the beginning of life. M. Klein says that at birth the self-nucleus is sensory. Freud himself ascribes an enormous importance to the body-self. Bion defines the sensory attributes of the foetus and of the newborn as “embryonary thought”. Tustin qualifies the initial step of a child’s development as self-sensory and Corominas, with extraordinary intuition, says that this “self-sensoriality” has co-existed with the object-relations since the beginning of life, even if in a partial and a little rudimentary way. We must not forget that the newborn, recognizes his mother using his sensory attributes, telling her clearly from the others taking care of him. The newborn’s personality seems to be, then, a *continuum* of the foetal personality I have previously tried to describe, which is made up of sensory attributes and of very intense and sometimes even violent emotional components. A child can, then, move towards development by integrating motor-sensory attributes with emotional ones, and all authors agree on this (Let me just mention Bion, Corominas, Meltzer, Stern and Tustin). It is necessary for the person who takes care of the child, usually the mother, that she can live the anxiety and wishes in the place of the child, that the newborn feels but is not able to recognize. The



mother gives him back these experiences enriched with meaning and so they are introjected and “digested” by him (this is the maternal function that Bion calls “reverie”). This is the only way for the child to move from sensation to the situation experimented with any kind of emotion, and subsequently the way towards thought, integration and development opens up.

“By giving a meaning to feelings and sensations emotions become thought, thought which is a way to give order to this meaning” (Harris 1982 in Negri 1989). Sensation without emotion, though, does not acquire any meaning. It is not ready to represent anything and to be integrated in order to form thought. The result of this is a persisting sensoriality and a weakened development which turns into pathology.

I think that the push towards integration does not only depend on the mother’s ability of “reverie” but also on a specific quality of the child’s personality. In particular, I am referring to that foetal personality I have previously described, that pushes a foetus to establish and show a strong interest in any contact with something different from itself during its intra-uterine life – with an object. In this context,

Corominas talks about a rudimentary component of the sensory-self, forerunner of the object relation, which is evidently present in each newborn at a greater or lower extent.

### “Foetal Memory”

If I recall to my mind the images and interviews of pre- and postnatal life, I cannot but recognise how a child’s specific modality of relating to space and to his habitat after birth, continues what he has experienced during foetal life. This specific and particular acquisition, which is different for each child, seems to show a “foetal memory”.

Even if Freud doesn’t recognize the presence of “intra-uterine objects”, he supported a view very close to the concept of “foetal memory” since 1925. With great intuition, he stated: “There is much more continuity between intra-uterine life and the earliest infancy than the impressive Caesura of the act of birth would have us believe.” More recently, still from a psychoanalytical point of view, the work of Ludwig Janus (1997) confirms and deepens this concept.

### The Cerebral Palsied Child

Berta Bobath said: “The newborn’s movements are a *continuum* of the movements existing in intra-uterine life” and then “a child can only use what he knows, what he has felt, experienced and then can remember . . .”

At this point it seems possible to answer the questions I have asked at the beginning of this essay: What is the value a cerebral palsied child gives to intra-uterine life, to the motor-sensory activity he has lived and experienced before the trauma of the cerebral damage? Is there a recollection? What is the meaning of this recollection? – What I have tried to describe concerning “foetal personality” gives an idea of the drama a cerebral palsied child lives when he feels that all the motor-sensory habits he has developed during foetal life go into pieces, leaving

him crushed by painful and split sensations, as he is isolated from his object of reference, the mother.

In such situations the motherly duty is very hard; she has to cope with facing, understanding and living for the child such a disordered sensoriality, mixed with so violent emotional connotations and also with her personal emotions, which are a further obstacle to perform the function of "reverie". (The serious sense of anxiety the parents of this kind of children live is, then, absolutely understandable.)

All this causes a particular difficulty for the therapist of rehabilitation because, if he really wants to promote the child's development he must not only do his best to facilitate movements but together with the mother, he must help the child achieve a gradual integration of movement, of sensoriality with the emotional component. According to what Corominas says, it is important that the therapist first reports to the child what he does or what is done to him. Secondly, it is advisable that the therapist suggests to the child the sensation which he is supposed to feel at that moment (e.g. "Can you feel how hot my hand is!") and then he will help the child to connect the sensory experience with feelings (e.g. "Do you like, don't you like this biscuit? Do you want another one? No?"). The therapist can also stimulate the child to recognize his mother in her good or not so good components, facilitating the splitting (e.g. "Is your mother good when she cuddles you?" or "What a bad mother this is . . . ! She doesn't clasp you in her arms when you want her to!"). In the end it is very important that the therapist helps the child recall memory, first by asking questions on recent experiences or experiences lived together, then leaving behind the time passed after the action which is to be remembered more and more.

Such a treatment can help the child refer to emotional and motor-sensory experiences, which were previous to the trauma caused by cerebral damage, making him get back and put together the fragments of his foetal personality; thus, the rehabilitating process, while improving the motor-sensory act, promotes the child's integration and development.

## Note

<sup>1</sup> In the animal species we studied it is evident that the sensory systems mature according to an ordered progression. While studying the ontogenesis of the sensory functions of birds and mammals, man included, Gottlieb (1971) saw that the sensory system matures according to an unvarying sequence. The sensory systems start to function with skin-sensitivity in the mouth-region and of face-block; then the vestibular, acoustic and visual functions follow. The sense of smell and taste starts to function after the vestibular function but before the auditory function (Gottlieb 1986). Many research projects show how the sensory system starts functioning before its structures are completely mature and that, in ontogenesis, there is a reciprocal influence between structure and function. This is no contradiction of the powerful contribution of genes in the process of sensory maturation. The fact brings to mind what we find in Gottlieb's words: "Genes start the structural maturing processes that can be influenced by (and they often even depend on) the influence of the active function before maturing is finished." Gottlieb stresses that the spontaneous or evoked function does not only have a supporting role but it can, in addition, exercise a facilitating and inductive influence on neurone maturing and on behavioural evolution.

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