PERCEPTION, EMOTION, ACTION IN EARLY DEVELOPMENT: EMPATHY FROM AN INTEGRATED PHILOSOPHICAL-NEUROSCIENTIFIC APPROACH

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"I'm not inventing an abstract theory of mind and human conscious thinking but attempting to describe the natural, but miraculous, vitality of human minds from their beginnings".
Colwyn Trevarthen

1. Basic concepts

Empathy translates the German *einfühlung* and it can be defined a "biological, cognitive, social and spiritual phenomenon. In the studies about thought, it has been considered an "identification" (Freud), an emotional fusion with people and things in the aesthetic experience (Hender, Novalis, Lipps), an emotional intuition, perception of the values and of psychic background (Scheler), an intersubjective and transcendental relationship (Husserl), an optimal replyness in the constructive interaction (Kohut), other's experience as the ego and the ego's one as other (Ricoeur), syntonization, *attunement* (Stern), full immersion in the others' subjective world (Rogers), process of sharing emotions (Bonino), phylogenetic tendency as a strategy wired in the deep cerebral circuits strongly self-structured (Trevarthen, Brothers), that is a universal group of conditions and emotional innate expressions that makes the child already able to exchange empatically the emotions with another person.

Empathy can be defined is a process of sharing of the emotions, a basic intra-psychic variable of the relationship, a getting hold of someone else's conscience, the ability of immersion in someone's else world. So, empathy is the ability of seeing the world with other's eyes, leaving own values, feelings, knowledge out of consideration in order to perceive not only the meanings about what we know, but also the meanings staying below the conscious surface.

According to Trevarthen's (1,2,3,4,5) theory the emotions direct the knowledge (that is the attention, the behaviour and the learning) and give them a subjective and communicable valuation. They belong integrally to subject's reasons and they present a strong innate adaptable organization.[1] Human emotions preside over the regulations of the body, of the conscious self, of the intersubjectivity.

The emotions resound among the subjects coupling their reasons and their consciousness and animating them reciprocally. Human emotions are elaborated through socio-cultural and inter-subjective learning, but their origin isn't in it.

The concept of empathy is strictly joined with that one of intersubjectivity that may be defined as the act "to be attuned' with others intentional states, ability of meta-representation of other people's mind (thoughts, emotions, intentions), meta-communication, because it transmits to the other confidence in the possibility to contact emotions, to value and formulate decisions, to discover meanings and personal motives.

The emotions, affection – modification of the soul (Aristotele, S.Tommaso, Cartesio), invisible principle of visible actions (Hobbes), confused obscure and involuntary thought (Leibniz), predominance of the feelings over the rationality (Kant), emotional expression functional to the communication and to the cohabitation (Darwin), visceral and neurovegetative reaction (James), or in actual terms, mental or affective state in which the subject realizes-perceives the value of a situation, is a complex subjective experience, less steady and strong than feeling and passion, cognitive–affective organizer, mediator between organism and environment, push made dynamic from the need according to the trajectory need – emotion – action. It's, evidently, a very complex phenomenon. According to the theory of the evolution, fear, anger, sadness, joy are basic emotions regulated from the neuronal programmes associated to the adaptation.
Psychoanalysis reads the emotions as spies of conflicts and as openings from which the denied lustful energy flows away, repressed or removed, interface between beat and action.
For the cognitive psychology, on the contrary, the emotion is the interface between organism and environment and has got two functions: that one of the monitoring of the environment in order to grasp the meanings and the motivational one that pushes the subject to the action.
The constructionism defines emotions as social construction associated to languages, techniques and values of certain cultures. The neuroscientific searches of LeDoux (6_A) have explained the iter of emotions: from the input of senses the route arrives at the thalamus that sends the signals to the amygdale that pushes immediately to the action and to the neocortex that, slower but more precise, works out an action plan not impulsive but aware.
The reactions in the prefrontal lobes, in the amygdale and in the hippocampus activate moreover the immune, nervous autonomous, endocrine systems in a circuit where synergically act perception, emotion, physiological reaction, action.
The emotions, therefore, seem to confirm the existence, in the man, of a rational mind and an emotional impulsive and immediate mind, having its own logic, and therefore not irrational. This is the demonstration that *via rationis* and *via amoris* may be integrated with reciprocal gain.
The emotional competence, that is the capacity to be in touch, to monitor and to manage our own emotions and to be empathic with others' ones has been defined, by Goleman (7) , emotional intelligence and, by Gardner, intrapersonal and interpersonal intelligence.
We have shown as emotions may be defined a complex state of the ego including an increased perception of an object or a situation, deep physiologic modifications (tachycardia, paleness, blush, perspiration, gastro-enteric disorders), attraction and aversion (behaviour of an approach or of hesitation, push to the action).
The emotional intelligence (empathy, vision of the heart) about which Goleman speaks, includes consciousness of himself and ability to monitor his own emotions recognizing dysfunctional and destructive emotions (anger, wish, illusion).
According to Paul Ekmann and Richard Davidson (8_A), the most important emotions are ten: hanger, fear, sadness, disgust, contempt, surprise (amazement, astonishment), amusement (happiness, joy, serenity), embarrassments, fault, shame.
LeDoux's neurophysiological studies and Goleman's searches have noticed the existence of an archives of an emotional memory, the amygdale, that is situated on the cerebral trunk, near the lower of limbic system. There are two amygdales, one on each side of the brain.
The human amygdale is relatively voluminous compared to that one of the other primates (the species more similar to us according the evolutive point of view).
The hippocampus and the amygdale were two basic parts of the rhinencephalon that, during the phylogeny, gave rise to primitive cortex, and then to neo-cortex. Today, these limbic structures make a large part of the work of learning and memorization performed by the brain; the amygdale is specialized in the emotions: if it's resected by the rest of the brain, the results is a very clear inability of valuing the emotional meaning of the events –a condition defined emotional blindness. Without their emotional meaning, human relationships lose their importance.

Life without amygdale is a life without a personal meaning. All passions, including love, are bound to the amygdale.
The amygdale, because it receives the input before they are recorded by the neo-cortex, picks the micro-impressions and harmonizes the cerebral areas using neural connections and the same rational mind. So, our emotions have a mind that is able to have different opinions by the rational mind's ones.
The empathy, according to Goleman, has got its roots in the self-consciousness. The emotional wavelength is the result of the capacity to contact our emotions and to read tones, emotional expressions, gestures that reveals other's feeling also when they aren't verbal.
The empathy, as we can see from this researches, is a very important component in child's development. In very little children the sight of others' suffering causes a kind of *camouflage of the movement* , a reaction to the other people's agitation experienced like his own, that disappears around the two years.
We have to add that the resound, or the lack of it, between mother and her child, shapes one's future emotional expectations as concern the possibility that other people want and can share his feeling. The lack of tuning between parents and children has got as consequence the atrophy of the emotions, as we can see from criminals' stories of life. According to Goleman the empathy has its source on physiological bases and it's also the root of the morality: in fact, there's a strict link between empathy and altruism and the same fact to put oneself into others' shoes makes the application of moral principles easier.
Already in the childhood it's possible to share sick persons and outcasts' suffering but in the adolescence the empathic capacity becomes proactive and pro-social making more vigorous project directed to the justice and to peace. The emotional intelligence is, therefore, certainly, a basic aptitude of life, that may be shaped from family and school influences: it promotes healthy and durable relations and makes the school and work success easier. Just as plastic, the emotional intelligence must be cultivated in the childhood and in the adolescence.
The neuroplasticity of the brain pens it to develop always new synaptical connections. Richard Davidson's (8_B) search has shown that the functions of prefrontal lobes in relation with the limbic system let us mix thought and feelings, knowledge and emotion. Emotions involve an orchestration of the activity of the circuits of all brain, in particular of the frontal lobe in which reside the executive functions (for ex. planning), in the amygdale, very active when we feel negative emotions like the fear; and in the hippocampus that is involved in both explicit and implicit memory processes. Besides, the frontal lobes, the left for the positive emotions, the right for those negative ones, the amygdale and the hippocampus are connected with the immune, endocrine, nervous autonomous system.
The emotions, therefore, push over the mental health but also over that physical one.
The lack of empathy exposes the subject to a range of risks that go from blues to troubles of the feeding, to the violence, behaviours, unfortunately, in increase in the new generations. Conflicts, faults and suffering are the emotions that we cannot manage and that may destroy us: the hanger is mother of violence, the wish and the illusion produce dependence. It's urgent to discover, to understand and to take care of those ones that Goleman calls destructive emotions: hanger, wish, illusion to cultivate positive emotions. The task of education in that is essential.
Education harmonizing mind and heart means promoting consciousness, empathy, self-control, cooperation, sociality. It's about, Goleman concludes, to bring the intelligence into our life of relation.

2. Communication, emotion, perception, action in the childhood

Trevarthen (9) introduces an interesting series of questions about the presence of the emotions in child's first year of life, explaining the functions of the emotions as power stations of the regulation of the brain, produced inside, that unify the conscience and coordinate coherent and mentally active subject's activity. We present here the main topics of his studies.

2.1 Perception and action in animals

According to Trevarthen (9), animals *move* to live. Their bodies are formed to allow intricately timed pulses of muscular energy in harmonius complexes of plastic transformation that push against the environment, to drive displacements of the whole body in the gravitational field – through water or on air by stepping over solid surface or by climbing in 3D mazes. Every animal embryo has genetic symmetry and polarity that the feels a locomotive self, and in the process the 'prefunctional morphogenesis', anatomy elaborated before any muscle moves, specifies a mobile future and a maps out the principal of a geographical territory for action. Time and space made in the body become the condition and context for individual animals activity, as well as for the social life, and ecological specialization of the family and social group (9) .

Animal bodies have muscles than can attack things in environment (including other animals of plants) to assimilate nourishment, as well as muscles that distribute vital fluids gases and chemical products around the organs inside their bodies. Brains give the muscle masses and skeletal mechanics unified purpose and calculate the future economy or effort. The socially sophisticated forms grow extra muscles and neural motor nuclei that elaborate states of inner self-regulation into signals of motivation – of interest, intended effort, investigative strategy and state of well-being. Eventually, in response to socially aware others, these self-revealing expressions become social-devices regulating companionship with selected others. Signals of the visible surface of mobile bodies, or thrown from the interior of the body by vocal or chemical means, condition and guide affective relationships, giving rise to the 'ethical' implications Whiting referred to-of affiliation, enmity, loyalty and betrayal (9).

The nature of animal motives need claryfing because muscular action with its prospective guidance by intelligent perception and learning, as peculiar features of rhythm and grace that machines may never reproduce, except by slavish copying of effects without cause. Mathematical analysis of the dynamics of movement in animals, all animals, appears to reveal conservation of prospective control in time and space that are unique in the universe. The same principles have been found in the activity of large populations of neurons in the motor cortex, and elsewhere in the brain, some moments before a given movement is exercised. This kind of collective nerve activity is also indicative of a capacity to imitate or 'mirror' agency, enabling one animal to take up the motives of another, and execute a matching act.

The society of animals is possible because the minds that motivate animal bodies have evolved ways of detecting and engaging with the purposes in concern of other embodied and animated minds. The 'motor images' that make vital action coherent, efficient and purposeful in relation to the word can be a change between individuals elaborated cooperatively (9).

2.2 Perception, emotion and action in the foetus stage

We have to think about how an infant comes about as a trapped and parasitic embryo and foetus, how is prepared for free livings before entering the uniquely emotional epigenetic world of human society. In the earliest stages of a form that will have an elongated locomotile body, the body is mapped with polarity, dorso-ventral asymmetry, and bilateral symmetry, and this same map is impregnated in a prototype CNS while it is still a sheet of undifferentiated cells interconnected by tight junctions (9,10). There is a somatic rind to the body, destined to be muscular and fournished with sense organs and internal viscera adapted to internal metabolic and reproductive concern, and the embryo CNS maps these regions, too. In the late embryo the first cells aggregates and axons of a neural net appear in the core of brain and spinal chord as the head is elaborated with potentialities for forward looking special exteroceptors, but at this stage there is no movement and no sensation. When the first motor axons grow to the muscles, and even when the first movements occur, there is no sensory input to the brain to advise on how circuits should form.

The first elaborated systems are the core motivation ones, and those later to be identified with the neurohumoral systems of emotion (9,10). The emotional mechanisms serve as morphogenesis regulator of the neocortex, which is in a rudimentary condition, just sheets of neuroblasts, well into the foetal stage. Indeed the emotional and communicative mechanisms serve as controllers of the cognitive machinery of the cortex at all subsequent stages of development Emotions, generated and regulated in the brain stem first, are causal in both mind development and mind functioning, not just self-regulatory responses or outputs.
The whole process has an astonishing plannedness or what Sherrington speaking of the integrative action of the nervous system and consciusness, called 'projiscience'(9,10).

2.3 Perception, emotion and action in infant

Trevarthen shows how an infant, with its already complex and yet rapidly developing brain, moves to find companions, and to engage with and to learn about the resources and risks of the physical but mentally transformed world that may be shared – how he or she gains an individuality in the family and active understanding of society, learning a culturally extended consciousness of the narrative of being in the history of a community, its acquired beliefs, knowledges, skills and language. Infant becomes interested in the meanings by which other persons live their lifes, in the culture that patterns the collective consciousness of the society into which the baby has been born. Through the first year an infant fist seek care and comfort, and also engages in rhythmic protoconversational transactions with familiar and trusted others. In early weeks they play together, learning routines of joking and teasing, consolidating trust with affection (11,12).

2.4 Musicality in human moving

In the same stages before cited infant exhibits the most wonderful 'musicality of human moving' – the intricate rhythms and frasing, the subtle variation on expression in tone and melody, and the develop of narrative forms that guide excitement and promise repetition of climactive movements and calming resolution. From 26th week of gestation, infants are sensitive to the moods and time patterns of music. This is possible because human body is inherently polyrhithmc and melodic in its expression (9)..

3. Emotions in Infancy

The emotions are communicated among subjects and operate at three levels and in three different spheres: a) to protect subject's vital integrity and the "milieu interne" of subject's body; b) to guide the action, the perception and the learning by the valuation of opportunities (that is of the possibilities that you may perceive for a correct use of the body); c) to promote and develop the interaction with the behaviours and other subjects' motives in the social environment (13).
So the emotions create intersubjectivity, cooperation, culture. They guide the knowledge (that's attention, behaviour and learning) and give them a subjective and communicable valuation. They are an integral part of subject's motives and present a strong innate adaptive organization.
In children the emotions have to be analyzed by the light of five principle (13):

- coherence inside to a subject acting in an intentional and integrate way;
- self-regulation that protects integrity and well-being;
- regulation and knowledge valuation of objects and outside events;
- communicative regulation of the relations between the subject and the other subjects;
- intersubjective value.

Even if the personal emotions have got a great influence on the others' emotions and may be changes from the culture, their origin is innate. The communicative function is the most important function of the emotions: they don't exist out of their intersubjectivity, they have evolved functioning in presence of a person-emotive object.
The emotion isn't only an energy fact and it doesn't develop in parallel with the knowledge as Piaget said.
According to Trevarthen the emotions are the cause of the perception and of the action: even if they're reactive they may produce future conscious and intelligent actions. From the interactions between emotions relative to the subject's body, to the outside objects and other subjects, learning, adaption and habits have their source (13).
The practice of the communication, in which style and instructions of expression are modelled from rules and prohibitions, makes the emotions significant and functional.
In a child the emotions, innate, are present but immature because they haven't been changed from the social conventions yet. In the foetus already exist a certain coordination of the movements, from which, harmonious or not, we deduces well-being and suffering. In the uterus the foetus perceives the sounds and , after the birth, he'll recognize mother's voice; newborns have got great ability of learning that develop the efficiency of the behaviours of survival. Their movements and crying indicate embarrassments and wishes and activate the intersubjective communication. Newborn recognizes the smell, the tone of the voice, the caresses, the way in which his mother keeps him; his mother's behaviour causes emotions that regulate and support him.
Babies' face and movements show the existence of cerebral states of relaxation, curiosity, excitement, perplexity and frustration and an affectionate mother perceives them as strong interpersonal communications to which she can't escape.
Then, even if baby may sleep satisfied, relaxed, warm and well fed for all day, with his eyes half-closed rotating without going in for any stimulus, the watchful newborn can look for vocal and visual contacts with a partner who may tenderly interacts with him to create an intimate communication lasting several minutes.
Already after some minutes after their birth, babies go in for the human voice and they express differentiated expressions of the face, signs of emotions. A not traumatic birth is typically followed from a period of vigilance and birth arousal that offers the best opportunities to observe the innate abilities to answer in the context of an affectionate dialogue with another person.
A two months child, even premature, may undertake with the caresses, the vocalization and the movements of the body of a person who offers him a support in a kind and affectionate way and he may do some movements that the adult perceives as efforts to speak and to gesticulate. This empathic and unconscious involvement, foundation of every future development of every human form of signals, language included, influences on child's neurohormonal functioning that contributes to the regulation of the brain growth. Mother's affection, her maternal worry and the bonding becomes in this way a key factor of the self-regulation of the child's brain in rapid development, and part of the adaptive schema of child's mental growth (13).
According to the cited author, the actual searches about the psychology of the immature brain have shown the role of the imitation. Child imitates vocalizations and movements of the hands: lallations, smiles, gurglings, gestures are protoconversations made dynamic from interpersonal feelings (13).
Child's communication is preceded from a real learning inside the uterus thanks to the cerebral structures that are an endogenous and autonomous location of emotions. Therefore these ones aren't completely learned: a premature child, in fact, can already vowel and smile interacting with his mother's love and cares.
Microanalysis of observations of the dialogic communication made by the double screen by Trevarthen show the richness of the protoconversations mother playful expressions and vocalization. Already when he is two months a child has got competences that let him manage a dynamic relation (13).

He vocalizes, smiles, moves his lips, his tongue and the eyebrows and his look, he rotates his head, he synchronizes himself with the other person. The child dances and sings with his mother. The protoconversation can prime coordinated systems in two individuals who, having found his way to express themselves by the simultaneous movement of different organs, they give birth to a contact, a reciprocal regulation and they make their motivational states more intense.

4. The baby-talk

In all cultures, mothers produce a language that give an emotional help, made of brief words, a melodic progression, rhythms and repetitiveness: it's the *motherese*, that is the intuitive language in which the variation tones indicate "going and coming" of the emotive contact and mother-child empathy. Baby talk aids to modify the innate children's expression but touch and empathy demand privacy and emotional touch.
Trevarthen's studies (6_B) show the effect, in child, of modifications of mother's behaviour. If mother's face is inexpressive, child knits his brows and he's sad and diligent, then detached and distressed or angry and rebel.
Trevarthen's researches on effect of post partum blues on child's development indicate the importance of the emotional mother – child exchanges. Blues mothers don't establish a happy communication with their children and their physical and cognitive development may be slowed down. So, autism can also deviate the natural mother's behaviour and it can transform it in an unaffected or intrusive one's. Assuming a positive perspective, teaching to a mother how to model the answers to her son in order to encourage him and to strengthen his attempts for an happy touch or to participate to a shared communication in which the emotional changes can shade each into other one without shocks, may help her in order to answer to an infantile or unsound mind.
Adults positive empathy makes children's communication coordinate and fruitful. This confirms that there's a dyadic structure of emotions that in the positive emotional exchanges shows the presence of innate motivations which allow adult and children sharing good or bad emotional standards and reactions.
Brain development born by a happy and harmonious continuity and by a flowing back of love that is basic for the complex interaction of expressive modulus. An excessive blues or agitation, and the bipolar trouble too, restricts the ability of proto-conversation between mother and child and, if prolonged, the possibility of action and cooperation between them.
Already in the fist months of his life, child can recognize and show preferences for identity patterns of persons that strengthen both positive and negative feelings: we can see in him a preference towards charming faces with promise a lovely emotional exchange foreshadowing the cooperation. On the contrary, a mother's imagine who express unfeelingness, indifference or pushiness cause a conflicted or evasive behaviour. A dislike learnt a few days after birth shows a characteristic of child's emotional system which appears structurally open to the touch according to a special relational quality. The begin of the cooperation relationship can be set in the prenatal period.
So, we cannot say that in the child there aren't cognitive patterns, a conception of the ego, social script and emotions.
Piaget asserted child isn't able to feel emotions before achieving cognitive stage of the object constancy and Stern declared there isn't afraid before six months years old; on the contrary Trevarthen asserts that some videotapes about protoconversations and mother-child's games show the presence of lots of emotions from birth regulating the intersubjectivity.
The infant, then, already possesses not only a consistent and differentiated system of emotions, generated by autopoiesis, since his embryo stage, but also the fundamental distinction between emotional functions, regarding the person, the objects and the body, the genetic base of brain epigenesist (9).

The infant senses effects of moving his or her body and engages with objects action of exploration and manipulative investigations. The human body is built for grace and power one finds in cultivated music and in dance or sport. The versatility of our motor expressions is the secret of story-making cosciousness and of capacity to invent powerful the ever changing tangible and intangible works of culture (9).

The infant senses effects of moving in his or her body, and engages with objects that passively receive actions of exploration and manipulative investigation. We have seen before as, before the end of the first year, infant searches actively the sights and sounds of a partner's actions to share their purposes. The one-year-old is intentionally cooperative, wiling and eager to take up the interests and actions of others as meaningful. This is he unique motivation of the human that inevitably lead to mastery the symbols of language and every other kind of cultural invention. The infant's personal identity becomes a reflection of what others seek in him or her form company, and for aharing meaning (9).

In the same way, the colour, the heat, the tones, the times and the rhythms of mothers' protoconversations, or however adult protoconversations with infants, are not learnt but are innate. The proof of that is the similarity of such vocalizations in all kinds of cultures.

So, we can assert that the neuro-physiological substratum of the emotional codes is the same both in children and adults whose emotional answers "inter-animate each other".

Vasudevi Reddy, Professor of Developmental and Cultural Psychology at the University of Portsmouth, in his book: "How infants Know minds" (14), overtly inspired by the work of Trevarthen, introduced to the abiding epistemological problem of how infants come to understand people, how they can become aware of others minds, how they perceive them as persons, as psychological being.

Reddy evidences the problem of a pervasive yet disconcerting tendency in the practices and the theories of a psychology which holds on, surreptitiously, to dualism it claims to have discarded and, more openly, to methods of investigation more appropriate to non-sentient subjects.

The problem is a result of the misguided assumption of thinking of the organism capacities separately from the environments in which it functions. Returning the infant is interactively human, familial context and allowing that affective interaction or exchanges between an infant and its caretakers constitute an embodiment of minds is the means of resolving the puzzle of one mind comes to know others non inferentially, engaging with other minds and becoming aware of them in an emotional process from start to finish. So the minds don't develop in isolation: they are intrinsically connected from the beginning by way of emotional engagements and not through the related consequences of a rationally constructed understanding.

Even if most psychologist claim that we begin to develop a theory of mind at age of two or three by inference, deduction and logical reasoning this doesn't mean that small babies are unaware of minds and they see other people simply as another kind of object. There is compelling evidence that babies in the first year of life can tease, pretend, feel self conscious and joke with people.

Using (as we've done to realize this paper) observations from infants' everyday interactions with their families, Reddy argues that such early emotional engagements show infants growing awareness of other people's attentions, expectations and intentions.

Reddy delays with the persistent problem of "other minds" by proposing a "second person solution: we know other minds if we can respond to them. And we respond most richly *in engagement* with them.

Reddy challenges psychology's traditional "detached" stance toward understanding people, arguing that the most fundamental way of knowing minds – both for babies and adults- is through engagement with them. According to this argument the starting point for understanding other minds is not isolation but emotional relation.

5. Emotion and development of perceptive systems

Since 1988 Trevarthen 's studies (2) evidence the role of emotions in the development of cortical perceptive systems and in the learning and the memory, too.
We have already said maternity blues may draw on child's cognitive functions and particularly on his language, whose development results from the positive syntonization with the emotional partner.
Already in the child, the expression of emotions such as vocalizations, faces and gestures is very diversified and it doesn't result from social learning. Even if social customs limit or support the expression of emotions, a child is already able to exchange emotions empathically with another person, provided that this person wishes being emotionally helpful with the child in the ways which he can understand. To conclude, we cannot imagine an "innate culture".
Socialization starts from innate motivations residing in a playful, expressive, inventive, experimenter, organized, coherent, strong-willed and wilful child's ego.

6.The reciprocal perception in the mother-child relationship

Children are exceptionally able to teach their mothers singing.
The systematic observation of the mother-child protoconversations shows the presence of a coherent and autonomous ego already suitable to the situations, able to distinguish between himself and others. This difference is not necessarily acquired: it is its quality to change!
In fact, there's an emotional foundation of human communication by which symbolic communication articulates, for example, game and sing communications: games and sounds structure is innate and universal. Lullabies and singsongs are emotional tales.
It isn't a comprehension of words, but a comprehension – sharing of an emotional flow characterized by little *micro-emotional transfers* in the vocal tone and in facial expression.
After six months years old, children quickly repeat what has been funny for the family. Demonstrative acts, gestures or expressions of this kind may be defined *"proto-signs*. And they has got a particular vigour in child's mind. When he has learnt a "trick" that his family finds funny, child can repeat it in the presence of a stranger, as if he tries to make friends with him. The offering usually doesn't work since the stranger isn't able to understand. The fact that children try to offer some signs in embarrassing situations is a proof that they consider it a gift, a kind of symbols of friendship or of "commerce" (4).
The community who shares symbols with a six-months-old child is the family, a very small community. But a two-years–ago child begins to pick up words in order to use the objects are part of a larger community. We would be able to comprehend a bit more the evolution of the symbols if we went further on mental development in order to understand their main function in its communities (4). Trevarthen explains why it's difficult for him to accept those analysis founded on clinical stories of retired into themselves or blues adults or teenagers who are defending their life in difficult circumstances. He's not able to convince himself that a distressed and anxious adult, whose mind and ego are insecure and whose memories are unreliable, can represent a good model to comprehend children. He's very sceptical about the concept of regression. His study gives him to the conclusion that the system of the emotions is complete in its general pattern, before birth, and that since birth drives conscience, action and learning. Like an adult, a child can endures chronic blues and anxiety (such as Selma Fraiberg in 1980 has shown) and temporary unpleasant emotions, too (4).
Moreover, Trevarthen notes: "Who is able to explain me how we can enjoy starting from Melanie Klein's theories? Freud also feel us guilty about the jokes, and Bettelheim writes about new terrors in the fairy tales. Robert Emde is right; psychoanalysis would ear with more optimism of the positive emotions, and with more respect, too" (4).

To conclude, in Trevarthen's opinion "mythical figures" like Klein and Winnicott, in spite of their basic discoveries, seem not to consider children's competences who are able to agree with conversational methods interacting with empathic patterns.
Briefly, we can assert that culture arrives to child spread, warmed and peppered with expressions and emotions.

7. Action and perception in *zòon politikòn* child

The expressive sequences of the human communication are connected with those ones of persons physically present; this allows to communicative actions to adapt themselves gradually to the circumstances.
In child, smiles, grumbling, gestures adapt themselves to external circumstances; it's a communicative channel that, when it is stopped because of interferences or inattention, causes trouble and emotional retirement because of the failure of the communication (13).
We know the embryo has already got draft of tissues and organs that make him a human being; embryo has already got a nervous system able to elaborate behavioural maps. More, we know that child is the author of the psychogenesis of his mental states, of intentional acts always more specific and complete as answer to the stimulations of external world (13).
The reiterated attempts of child's exploration answer to his exigency of building a social life rich in emotions. In order to this, he produces communicative acts always more complex that introduce a real communication.
Exploration of the reality is favoured by the contact with people available to play with the child. In this way, he makes a distinction and makes better his senses and his sex and personality, too: it's a first draft of his identity.
The absence of social patterns cause insecurity, trouble, lack of empathy and curiosity.
Parents' figures before, and friends' ones then, influence the consecutive development of the intelligence and the psychological grown-up. After the fourth month, social game will activate emotional relationship that will become sharing and cooperating behaviours. They are acts of signification, instruction, greetings, recognition, interest; they are act lived with enthusiasm and pleasure.
We may define this behaviour *protolinguistic, protocultural, protocivil*, since the comprehension of the name of object and people put the child in his cultural environment, in the language, in techniques, in the values of a specific time-space.
Trevarthen (4) writes that all these behaviours, characterizing the syntax and the grammar of the language, in addition to the emotional tone and the prosody, anticipate cooperative actions of all kinds and the cooperative research of the knowledge, show the state of human cerebral system, which works in a helpless organism, so undeveloped as to feed him and to protect him by extreme environmental conditions. The strategy of this life tale symbolize an important inversion of the evolutive course.
Human in its being, the brain can start the process of the human communication before learning any concept about the objects or the ways to move in the world, and it is able to start its involvement in the acquisition and in the cultural extension of the experience before it can speak about it. Human brain corresponds to a cultural organ that stimulates in an intuitive way the obtaining of the education by other people who know better the details of the world. The transfer of knowledge is an answer to a child's demand.
The actuality of these researches, considering the progress of the neurosciences since 1977, shows clearly the possess, in children, of the germ of the cultural cooperation. Since the beginning of life, in the brain, plastic and mysterious organ, there are some strategies and potential reserves that allow the personal development and the configuration of the identity: it isn't something of physic and chemical, but, Trevarthen concludes, of *epiphysical and epichemical* since our brain is programmed to grow and mix with other brains through cooperative acts (4).

Recent studies about cerebral embryology illustrate the process of interaction nature/culture in the construction of neuronal networks and on cerebral maps (Edelman, Cowan, Levi Montalcini, Fracokwiak).
Therefore, the theory of genetic regulation of the birth and the selection of the synaptic connections confirms the existence of innate systems of perception, motivation, action that make possible an adaptation and a modification of the environmental offer.
Cognitive psychology has contributed to elaborate the theory of the brain-computer that processes the experiences. But, according Trevarthen (9), what we know of the early life of human individual demonstrate how far we are from robotic. Simulating psychology with computational machines is unthinkable: a mechanistic cognitive psychology forgets or misrepresents the natural intentionality and emotionality that makes cognition useful.
The areas pertinent to the *intuition* and the *motivation*, residence of *the creative power* are explored in a very interesting work of Nancy Andreasen: "The creating brain: the neuroscience of genius" (15) that investigates on the neural basis of creativity.
According to Andreasen , creative people often slip into a zone in which ideas and thoughts come up freely in a disorganized way. During that state a the association cortex becomes very active: this brain region is known to be able to link up ideas or thoughts in potentially novel ways. Creativity and brain plasticity are seen as functions of person-environment interaction revealing the brain's own ability to re-make itself in an adaptable, responsive and continually changing way. Andreasen sustains that neurosciences makes us aware that experiences throughout life change the brain throughout life: we are literally remaking our brains –who we are and how we think, with all our emotions, actions, reactions, perceptions, postures and positions- in every moment of our entire lives.
It would be suitable that studies, researches, applications, put together phylogenetic and ontogenetic history of the brain with the study of the prenatal behaviour that discovers the existence, in the child, of a kind of *know how* towards the emotion, the communication and the involvement with partners. Trevarthen says that he's sure that a child knows and is able to enter in empathic contact with his mother's emotions because he's able to map her body. Throughout the same principle of intersubjective mapping, the mother is clearly empathic towards the emotions that child's body, rhythmically mobile, declares. The mutual regulation of children and adults throughout the emotions during the communication makes possible the regular development of the self-consciousness.
So, in undeveloped brains, there is the ability of emotional coupling of child's perceptions, emotions, actions with thoughts, feelings, conscious acts regulated by developed brains. This communication, as we've said before, affect the process of intercellular maturation that, started in the embryo, arrives to the construction of the neo-cortex, residence of the conscious thoughts associated to events, situations, memories.
In Trevarthen's opinion, the consequence is the consciousness that in the cerebral embryo there is, *in nuce*, the *human spirit* that energizes the pre and neonatal behaviour naturally open and able *to dance* and *sing* the transitions with the other men.
In short, we are *innately human* and this is both horrifying and charming.

8. Children's perception and aesthetic judgement

As the most important philosophers had already understood, the perception of the beauty, according to Frederick Turner (16) is the taking of a universal, transcendental, constituent characteristic of the world shared from our brains. In a simpler way, we want to say that exist some universal parameters that are useful to exchange means and that depend on the anatomic configuration species-specific of the human brain.
In everything perceived like beautiful exists a common characteristic that may be defined as *style of the beauty* that our innate sensibility is able to grasp since our birth.

Children and adults are attracted from looks that show interest and from affections voices. The chromatic vision, besides, is source of information according to the reality and useful for the ecologic aspect. The red and the yellow, for example, indicate sweetness and maturity for birds and mammals, and, in the same way, they feel, if integrated from spots and strips, - the presence of poisons. The chromatic vision is valuable because full of affections and aesthetic values are in relation to the cerebral chemistry of the emotions, as known by the students who, having to put in evidence the subjects to memorize, prefer to employ the red.

The vision of the *red* motivates the production of a neurotrasmitter that has a role in regulating emotions, influencing attention, conscience and memory. It deals with innate aesthetic judgements that, together with the knowledges learnt , may contribute to the constitution of a mature social personality with regard to the perception, the control of the emotions and the integration.

In child, the most important primary mechanisms of the cortex are influenced from external contacts that resound with and support the central regulator states: it's an intercerebral process in which cares, warmth and maternal affection take a great importance for the hormones of the growth.

Trevarthen thinks that inputs of the limbic system to the frontal, temporal and parietal lobes regulate the intra-cerebral connexions that allow the development of the system of knowledge. Shortly, the child may be an example of the existence of aesthetic innate universals that articulate and grow in the communication. The neonatal imitation is, in fact, immediate, trans-modal and, therefore, an artistic experience.

At last, a mother, like an artist, is never icy and objective: she communicates emotions transmits new and subjective values, imagines and shares and myths and musical inventions, opens to his little child the universe of the communication.

9. Mirror neurons and empathy

Actual searches about empathy explore neurophysiological side of empathic imitation, key-factor of self-regulation of child's brain, natural, preverbal and prerational base of intersubjectivity.

The actual situation of the searches about the empathy explores the neurophysiologic and neuropsychiatric side of the empathic imitation, key-factor of the self-regulation of the child's brain, natural, preverbal and prerational basis of the intersubjectivity, evident in others' behaviour in the politic and ethic one (sociability, pity, emulation, conviviability, social engagement). The discovery, by Rizzolatti (17), of the mirror neurons has shown us that doing an action or imaging to do it activates the same cerebral area

The techniques of visualization of the cerebral activity have allowed the discovery of these mirror neurons, groups of cells situated in cerebral areas stimulated from perceptions and emotions, giving the beginning to the searches based on the images of the brain made by the fNMRi. From the experiments made it follows that the empathy activates automatically, in observing pain in other persons, the *insula* and the anterior cingulate cortex. The areas of the brain seem involved as if the pain is derived from a physical intense and real pain (18).

In a successive experiment, the subject whose reaction is studied is separated by the person whose suffering may be conscious not by a direct observation but looking at a pointer showing the levels of the pain: the subject was imaging other's pain. So, even without the ocular contact that makes the emotional identification easy, the subject activated pain's specific cerebral areas (18).

So, the mirror neurons mechanism of observation – imitation – comprehension, defined "embodied simulation", has demonstrated that exists a neural basis of the empathic consonance. All that shows the neural connections between perception-emotion-action.

So, if our brain resounds with another person's one, if there's a certain meta-communication between them. If I and the other person think, hear and act in the same way (intentionality and teleologicity) then we both aren't stranger.

The human brain then represents a cultural organ which intuitively stimulates the ability of absorbing education by other human beings who better know world details: the transfer of knowledge takes place as a response to a request from the child. Matthews (19) supporting Trevarthen's theory, says that an interpersonal space formed between caregiver and infants, facial expressions, gesture and vocalizations are orchestrated together. Exploratory actions impelled by the infant are organized by patterns bursts of emotions. The rhythmic periodicities of these actions form the structure of later abilities as early drawing, painting and dance, with several important educational implications concerning the optimal conditions to promote these understandings in childhood.

So, my personality and the identity that is the *proprium* of it, is really *moi-monde* not solipsistic ego but ego that resounds of other subjects, with other subjects, for other subjects, a human being that is possibility of *with-being, pro-being, in-being* (13).

The consciousness of a neural base in relation to the other (mirror neurons turn on not only when we act but also when we watch another's subject action) represents therefore the base of the preverbal and prerational existence of the social identity (20).

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[1] I'm an Educational Psychologist and Psychoterapist, Professor of Educational Psychology and Psychobiology at the University of Salerno. Before to teach at University, I was for 15 years teacher in infant, primary and secondary schools. The co-author of this article, Maria Donnarumma D'Alessio, Educational Psychologist, Professor of History and Philosophy, was my mother. We're working at this study when she is dead, on april 28, 2008. I'm sure that too if she can't stay here, she ***is*** here. She has taught me everything I know on empathy. This study is based, in its theoretical aspects, mainly on Trevarthen and LeDoux researches; more, it's based on observation of 43 children, from birth to adolescence, in ecological contexts. All children are member of my large family. Reddy's research, cited in this work, that represent a very important contribute in the field, is been conducted with the same methodology: an emotional, affective, involved, aware, continue, non-invasive and careful observation of children for very long times in their lives. I think it's impossible to reproduce certain kinds of phaenomenon in a laboratory's setting. The lack of "scientific objectivity" is largely supported by the richness of informations that one can acquire in ecological situations. EBM (Evidence Based Medicine), an emerging approach in medical research, today is largely based on results of studies conducted with this methodology.