Journal of Physiology - Paris xxx (2013) xxx–xxx

Contents lists available at SciVerse ScienceDirect

Journal of Physiology - Paris

journal homepage: www.elsevier.com/locate/jphysparis

Children's synchrony and rhythmicity in imitation of peers: Toward a developmental model of empathy

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ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Empathy
Intersubjective experience
Imitation
Rythmicity
Synchrony
Visuo-spatial abilities

ABSTRACT

The main mechanisms of children's imitative exchanges with peers are highlighted here through a developmental approach taking into account the importance of rhythmicity and synchrony. We focused on spontaneous motor imitation to describe a playful dynamic that is paradoxical: in the experience of play in which roles are not clearly distributed, mutual discovery of the self and others gradually arises. From an integrative perspective, this form of interaction, produced by positional reversal and turn taking, is apprehended through two axis. On the temporal plan, it can be considered as a rhythmic pattern with repetition and synchrony. Moreover, these mutual exchanges between the self and others challenge visuo-spatial abilities in children who must be able to change their reference point through an operation of mental rotation. Based on this description of the intersubjective experience produced through a succession of spatial and symbolic viewpoint changes, a developmental model of empathy is offered and discussed. According to this model, the capacity of empathy has two dimensions, emotional and cognitive, and is understood as a process involved in child development. In this article, we propose that empathy is more than the "mere" capacity of decentration corresponding to the acquisition of a theory of mind. It involves an individual in relationship with others and who has the ability to integrate perspectives.

1. Introduction

Empathy consists of emotional sharing and presupposes the cognitive ability to recognize others as intentional beings and, as a corollary, the ability to differentiate one's own experience from that of others. This description suggests two dimensions, emotional and cognitive, and their articulation is difficult to conceive. We propose to address this issue by considering empathy as a process and its development as the result of an intersubjective imitative dynamic. The concept of empathy will be initially described in relation to its plurality of definitions and in an attempt to distinguish it from the theory of mind. Then, the child's imitative exchanges with peers will be analyzed through a developmental approach, focusing on spontaneous motor imitation, to better ascertain the main mechanisms. Thus, it will be pointed that the experience of play in which roles are not clearly distributed, can gradually produce mutual discovery of the self and others. From an integrative perspective, this form of interaction, produced by positional reversals and turn taking, can be understood through two axis. On the temporal plan, it can be considered as a rhythmic pattern with repetition and synchrony. Moreover, these mutual exchanges between the self and others challenge visuo-spatial abilities in children who must be able to change their reference point through an operation of mental rotation. Based on this description of intersubjective experience produced through a succession of spatial and symbolic viewpoint changes, a developmental model of empathy will be proposed. In this model, more than the capacity of decentration corresponding to the acquisition of a theory of mind, empathy involves an individual in relationship with others and who has the ability to integrate perspectives.

2. The concept of empathy and its relationship to the theory of mind (TOM)

The term empathy corresponds to a plurality of definitions and must be distinguished from the concept of theory of mind (TOM). The latter, which belongs to cognitive sciences and is part of the wider field of social cognition, designates the cognitive processes that allow the representation and understanding of one's own states of mind (faiths, desires, intentions) and those of others as well as the ability to predict one's actions. Two theories have attempted to answer the question of how this cognitive ability, which is acquired by age 4, develops: (1) the theory of the theory and (2) the theory of simulation. Each of these theories is

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0928-4257/$ - see front matter © 2013 Published by Elsevier Ltd.
http://dx.doi.org/10.1016/j.jphysparis.2013.03.012

subdivided into two sub-theories, (a) and (b). In the theory of mind (1a), the child is an apprentice-scholar for whom exposure to social situations is an opportunity to test scientific hypotheses of the faiths or the desires of others, which the child gradually refines and rectifies (Gopnik, 1996). In the theory (1b), based on the modular theory (Fodor, 1983), this capacity for mentalization is the result of the maturation of innate mechanisms such as pretend play (Leslie, 1987) or joint attention (Baron-Cohen, 1989). This latter mechanism depends on a specific cognitive module that facilitates the connection of mental activities between the self and others in an inferential use of visual knowledge. From another perspective, the theory of simulation (2a) is based on one's own mental states and real-life experience (Goldman, 1992); simulating others' perspective is thus a matter of introspection. In contrast, the theory of simulation (2b) is based, for the upholders of a radical simulationism (Gordon, 1996), on the existence of early imitative mechanisms, and is rather a question of considering the mental perspective of other people to understand their mental states. Therefore, in the simulation theory, the mentalization ability involves either the preservation of an egocentric position, or a radical decentration that requires the individual to create a tabula rasa of his/her own states of mind. However, this model does not satisfactorily cover the term empathy, whose polysemy can be explained by the diversity of approaches used for its comprehension, and because it is a common term belonging to different languages in various fields (clinical psychopathology, psychoanalysis and neurosciences) (Georgieff, 2008). Empathy consists of an emotional sharing and presupposes the cognitive ability to recognize others as intentional beings as well as the capacity to differentiate one's own experience from that of others. This description suggests two dimensions, emotional and cognitive, which must be articulated.

Decety (2010) proposes a neurodevelopmental theory in which these dimensions are integrated but registered in different trajectories. The emotional component is ontologically the earliest. Emotional contagion with the sensibility of the distress of others, "emotional or empathic arousal" (Decety, 2004) is a nonverbal communication form, based on mechanisms of mimicry and motor reasoning. These protoconversations are made from the sharing of affects with others "like me"(Meltzoff, 2002). The empathic arousal present in the human newborn reveals two essential aspects of empathy: (1) the sharing of emotions, which can be described as "sympathetic" and (2) the distinction between oneself and others. Indeed, time (1), which is synonymous with sharing representations rather than intentional emotional reasoning, cannot, in itself, account for the empathic process (the term representation is used here in the sense of data processing supported by neuronal networks). It is followed by a second, cognitive aspect, that is closer to the TOM in its simulationist perspective: a time of understanding feelings underpinned by the ability to consciously simulate mentally the subjective perspective of others. It requires the inhibition or control of the egocentric perspective. This ability for emotional regulation is based on mental flexibility, which is an inherent property of executive functions and allows one's actions to be distinguished from those of others, providing access to agentivity (Stern, 1989).

Similar to Decety, Georgieff adds that this modality of communing action (1) could be extended in a sharing of deliberate and emotional driving representations, which would be precursors of empathy (Georgieff, 2008). Georgieff assumes the existence of a "system of the same" that would report a general neurocognitive property mirror, or specular, transitive and mimetic that produces patterns of cerebral activity and mental representations similar to oneself and others. In the same way, Georgieff and Jeannerod (1988) propose a neurocognitive specific system antagonist for the first one, which they call "system of the others," guaranteeing the self/non-self distinction.

Those theories have addressed the question of the dialectical relationship in the development of the individual, between the representation of a differentiated self as a precondition for interaction and the construction of the self as a product of interaction. Furthermore, these theories seem to highlight a solipsistic and intellectualist point of view of the individual that does not involve the relation to others. The objective of these theories is to describe the cognitive mechanisms that allow knowledge of others, but not the intersubjective experience itself, in mutual exchanges.

The notion of empathy (*Einfühlung*) was proposed by Vischer in 1873 to reflect a form of aesthetic sensibility. It was echoed by Lipps (1903) to become, in a broader sense, a mode of knowledge of the subjective experience of others. In *Einfühlung*, which means to feel one's own experiences in others, according to Petit (2004), judgment and reflection have no place in a meeting with aesthetic objects. Jorland (2004) evokes the psychology of Lipps: We would not be aware, a priori, of ourselves. The empathic movement is source of jubilation insofar as it is an objectification of oneself; a meeting with a thing or with another offers us the means to put a shape, an image, to this multiplicity of sensations that constitutes us. To experience oneself by taking shape thus requires going through the detour of the other.

Petit (2004) resumes the example given by Lipps of the spectators to the circus who, observing an acrobat, mime his movements; they feel in the body of the tightrope walker on his thread. The fusion would be first, the separation second, (as if their) individuality derived from a secondary differentiation with regard to a primitive state of fusion between their subjectivity and that of others. Indeed, the capacity to distinguish the attributable movements that they experience in their own bodies to the tightrope walker, only occurs through a subsequent act of reflection. We thus depart from the field of the TOM, which is by definition intellectualist and a site of knowledge by inference and co-thought, for the field of experience of a co-feeling that includes the understanding of oneself and the other's experience, from a reflexive approach. In this context, the motor dimension seems essential, as do the primacy of sensation and the emotion on cognition. We propose a developmental model in which the empathic process is the product of an intersubjective dynamic that focuses on play. For this purpose, we were interested in the imitative exchanges of children and their peers in an attempt to understand specific mechanisms of these interactions.

3. Imitative play mechanisms in children

Beyond its learning function, imitation plays a major role in the development of intersubjectivity in terms of communication and social cognition, and as a precursor of intentionality (Piaget, 1962; Meltzoff and Gopnik, 1993; Nadel and Potier, 2002; Rogers et al., 2005). With the perception of motion, babies have an innate ability to produce motor responses. Meltzoff (2002) observes that from birth, the meaning of human actions are directly interpretable in terms of emotional sensitivity. Regarding this early infant imitation, some researchers, such as Want and Harris (2002), suggest that the term imitation should be reserved for behaviors that involve understanding of both the goals and means of the model. They specify that, by approximately 1 year of age, infants have a basic understanding of others' goals and intentions. Yet mimicry is considered a powerful contributor to interpersonal emotional transmission and is an important process underlying social relatedness and the development of other mental state knowledge (Carpenter and Nielsen, 2008). When children are engaged in an imitative exchange, they can communicate mutually and share understanding with another person (Hatfield and Rapson, 2004). Imitation can allow children to respond to another, take interactive

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turns and sustain verbal or motor interchanges. Most importantly, the preverbal imitation innate in human beings is a necessary step in the development of empathy (Meltzoff and Decety, 2003). Gergely et al. (2002) assume that the awareness of one's own emotional states and intentionality arises gradually from intersubjective experience in a play of mirrors between the emotional child and his parents. However, the term mirror does not seem to be appropriate for this dyadic situation, which is dynamic, triangulated by time, with its rhythm of anticipations and necessary delays and its tempo favorable to the quality of interactions and reciprocal adjustments. Furthermore, this imitative experience also relates to the child's relationships with peers. Focusing on motor imitation, we examined the main mechanisms of this process.

3.1. Imitation from a developmental perspective

From a developmental perspective, drawing on Buhler's (1927) works, Wallon (1956) describes imitative play between children in interactive exchanges that gradually allow each of the partners to reach beyond a first time of specular confusion in which the identity of the ego vacillates with that of the alter. The child is qualified to be profoundly social, emotion and its sharing appear as the first means of communication. Wallon evokes, from the first months of life, the sensibility of the child to significant persons. In the second half-year of life, emotional mimicry appears, a type of pre-language involving similar or contrasting but complementary attitudes for the participants, in which the self and the other appear there and are reduced there, in a kind of beating. These movements gradually give way to an equilibration of the relation, with the possibility of changing roles and real reciprocity. During the third year, transitivism is a stage of relative confusion where the subject undergoes its representations under their most total form, without managing still to subordinate the exteroceptive aspect to the proprioceptive or the proprioceptive to the extéroceptive, and precede immediately the moment when the child will know how to distribute, without error, states or acts, between him and others. This essential absence of a real border between the self and others thus leads to relative uncertainty regarding the location of the experience. Between two and a half and three years, illustrating the previously described transitivity, Wallon describes a period called the exchangeable personalities stage (Wallon, 1934), in which the child can realize the fusion of several persons or can produce the halving of the same. The use of personal pronouns, particularly "I," remains irregular, and a type of ubiquity reigns regarding the apprehension of space or the localization of others as oneself. This reciprocating imitative movement becomes progressively richer with regard to linguistic, cognitive, and motor development; now, the two poles of the situation, instead of being complementary and located in two distinct individuals, are integrated by the same (Wallon, 1956). Finally, Wallon adds that beyond these first interpersonal experiments, "I" and the other join a real intersubjective relationship only between 3 and 6 years, during the stage of personalism, when one is able to differentiate one's own roles and motives. Imitate others is less make an exact copy of the other's posture or behavior, than a similar version in which a little of oneself, albeit insufficiently individualized, is inevitably present. This mimic contagion is thus synonymous with transformation because it is the repetition of the same, rather than the repetition of the identical (De M'uzan, 1970).

In a critical analysis of this description, Nadel (1986) underlines that Wallon's term for imitation is reserved for acts supposing a representation, for deferred imitation. These first exchanges would reflect more of mimicry than imitation, and there would be a solution of continuity between both. Like Nadel, who highlights direct and spontaneous imitation between peers during the pre-linguistic period in its function of communication (Nadel-Brulfert and Baudonnière, 1982), we believe that mimicry and imitation are part of the same developmental process. In sum, these imitative exchanges between peers that are produced by role reversals and reciprocity through repetition are paradoxical; from the experience of the intersubjective game, in which roles are not clearly distributed, the discovery of the self and others emerges.

3.2. Synchrony and rhythmicity in imitation

Originally studied by developmental psychologists, synchrony has recently been the object of studies in the fields of neurophysiology and social signal processing. From birth a child is motivated to engage with the rhythmic actions and awareness of other persons, to move in synchrony with them (Trevarthen, 1998, 2004, 2011). A newborn infant has a predisposition to engage intimately with the actions and emotions of other human beings, *intersubjectively*, resonating with their intentions and emotions, reacting to them as persons with whom communication may be sustained by means of synchronized expressive gestures, and to whom an intimate emotional attachment is sought (Trevarthen, 2012). Synchrony can be defined, according to Bernieri and Rosenthal (1991) as the degree to which the behaviors in an interaction are nonrandom, patterned or synchronized in both form and timing. It corresponds to the adjustment of movements and to the degree of congruence between the behavioral cycles of engagement and disengagement of the partners in an interaction (Condon and Ogston, 1967). Thus, synchrony provides a dynamic impression of fluidity in the coordination of movement between partners whose interaction changes from one state to another (Newman and Newman, 2009). As such, synchronic imitative exchanges are extended by several elements: mutual attention engagement, turn taking and reciprocity between partners, affect attunement and temporal coordination. Moreover, as real choreography, they are supported by rhythmicity; as underlined by Ciccone (2007), after a moment of exchange, of contact with the world, the fold, the retreat, allows to replay in itself the shared experience. Examined more closely, this dance reveals moments of discontinuity. From the existence of these moments of discontinuity occuring in a background of continuity, may emerge the pleasure inherent in the playful exchange (Marcelli, 2000). This characteristic rhythmicity of ludic interactions, that combine both continuity and discontinuity, is guaranteed at the individual level by the control and inhibition activities inherent in the executive functions and, on a collective scale, by the family or social setting that requires to deal with an alter ego that is both similar and different. It is noteworthy that this combination of continuity and discontinuity might play an important role very early in fetal and infant development. Thus, according to Tordjman (2011), mother–infant/fetus relations fulfill a twofold need, providing a safe environment based on repetition of "invariants" (regular physiological rhythms such as cardiac rhythm provides the fetus with auditory and vibratory stimuli that are repeated in a stable pattern creating a container—a holding environment—made up of "invariants"), while at the same time promoting adaptation to change through the presence of "variants" such as variations in the mother's cardiac rhythm due to changes in her state (lying down, sitting down, standing up, walking, emotions, etc.).

Nadel (2011) showed that from the first year (especially, between 2 and 4 years), imitation as synchrony is, before access to language, a preferred way to communicate. The spontaneous imitation by children of their peers, with mutual continuous adaptation and turn taking, is the result of an interactional synchrony (Fogel, 1993; Ikegami and Iizuka, 2007; Wilson and Wilson, 2005) initialized by mirroring and mimicry. These similar and simultaneous nonverbal communicative behaviors find their intra-cerebral confirmation in the discovery of neuron mirrors

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(Rizzolatti et al., 1996). These neurons, which are present in the human brain (Iacoboni et al., 1999), are also useful for the coding of an action according to its purpose, thus allowing the categorization of actions at an intended level. As suggested by Delaherche et al. (2012), these mirror neurons are an example of a more general mechanism: the neuronal structures involved when a mental state (action, sensation) is experienced are also used perceiving others experiencing the same mental state. Furthermore, this mechanism also applies to emotion contagion. Decety et al. (2002) showed that there is a large overlap of brain activation between the imitator and the imitated. It has been suggested that the right temporoparietal region plays a pivotal role in social interaction (Decety and Lamm, 2007), including sociocognitive processes involving the sense of agency, self-other discrimination, perspective-taking (Blakemore and Frith, 2003), and visuomotor processing (Desmurget et al., 2009; Pineda, 2005). Dumas et al. (2010) use hyper-scanning recordings to examine brain activity, including measures of neural synchronization between distant brain regions of interacting individuals through a free exchange of roles between the imitator and the model. Their study was the first to record dual EEG activity in dyads of subjects during spontaneous nonverbal interaction. 5 female–female pairs and 6 male–male pairs were scanned. They showed that interpersonal rhythmic oscillations were correlated with the emergence of synchronization in the brain's alpha–mu band (an area involved in social interaction) between the right centroparietal regions. Biological correlations have also been found between the concentrations of oxytocin in partners who share better interactions (e.g., between fathers and infants in Weisman et al. (2012)). Delaherche et al. (2012) offer a state-of-the-art of the methods applied to the evaluation of synchrony, including an overview of non-computational and computational approaches. They describe future research directions in the field of developmental robotics.

3.3. This imitative play requires an intermediate step with the representation of a double

During child development, the initial access to others is constituted, through mimicry, by copying the other's behavior. Thus, due to my acts, I become, for a moment, the other's double. In return, the model can see his intentions enacted through the behavior of the imitator. However, in this interaction, imitation involves originality, which feeds the exchange, and an interaction partner that modifies the behavior in turn. The representation of a double constitutes an intermediate time which ultimately produces three roles within this seemingly dual relation, and clearly reveals a change of position and, at the same time, the maintenance of the initial benchmark. Freud wrote: ''From identification a way leads through imitation, to empathy, that is to say, to the understanding of the mechanism which makes possible any stand with regard to another life soul'' (Freud, 1921, p. 181). Indeed, from a psychoanalytical perspective, the issue of the double is illustrated in a particular form in relationships with peers, the fraternal experience, understood in terms of its horizontal dimension (Xavier, 2010), corresponding to the process of identification between the partners. This experience is constituted by role-playing games with incarnate doubles, past, present and future self's analogon as many facets of self, as indicated in the complex of intrusion (Lacan, 1938): an elder brother, contemplating his alter ego in relation to their mother, sees the updating of an initial experiment, but this time from the observer's position. The capacity of identification of the elder brother with his younger is thus prior to feelings of jealousy. From this point of view, feelings of rivalry are connected to the repetition of a past that implies a double. It is also outstandingly described in the ''identification dédoublante'' (De Wolf, 1976) for Hans and Lodi, his imaginary daughter. In Freud's narrative (1954), Hans imitates his mother by reproducing happy moments with her, by assuming an active role and by involving Lodi with whom he renews the moments of tenderness of which he was previously the object. In this operation, Hans performs a double movement: his identification with his mother is not reduced to a simple passive/active reversal, but requires a double that assists him in the place now left vacant. With the aid of this intimate double, he is simultaneously the one who caresses and the one who is caressed, as situated in an observer's third position. In these repeated and seemingly dual relations, a third party is thus convened, and to this third party is delegated, by proxy, the passive position. Successful identification is a mechanism that involves a more intersubjective relationship that the object itself, and is only possible with another who is both similar and different. What is internalized is less the image of the other than the experience of an interpersonal relation that requires, initially, a passage through the figuration of a double. This intermediate time, which ultimately reveals three roles in the dual relation, clearly highlights both this change in position and the maintenance of the initial benchmark, both of which are necessary for the understanding of oneself in relation to others.

3.4. Imitation and visuospatial abilities

From a cognitive perspective, this intersubjective dynamic reveals changes in perspectives due to successive reversals of position, both self- and hetero-centering. These movements challenge the motor skills (in their kinesthetic dimension) and the exploratory visual strategies of the child. Visuospatial dyspraxia (VSD) constitutes a disorder of the motor skills (developmental coordination disorder in DSM-IVTR) belonging to the subgroup of constructive dyspraxia, in which oculomotors and gaze disorders are observed (Mazeau, 2000; Sigmundsson et al., 2003). Concerning the activities of assembly and construction, VSD is supported by a spatial organization impairment. Visuospatial impairments penalize the child who must imitate a complex movement or must participate in team sports because deficient eye movement does not allow the child to suitably estimate the trajectory or speed of a ball that must be caught or, because of difficulties in the exploration of space that may lead him/her to neglect important elements in the field of the game. Furthermore, VSD may have impact in the global functioning of the child: some children do not participate in social games and are solitary (Smyth and Anderson, 2000). They present higher scores on the Child Behavior Check-List (CBCL, a scale of child behavioral disorders) for somatic complaints, anxiety, depression and social withdrawal (Dewey et al., 2002). Finally, certain relatives report more difficulties with the socialization and emotional tuning of children who are delayed in their capacity for imitative exchanges (Green et al., 2007). Thus, it seems particularly relevant to study the validity of the link between empathy and VSD. Thakkar et al. (2009) conducted a study using a questionnaire on empathy in 40 young adults (21 men and 19 women) and subjected to visuospatial tasks. They found a significant difference between the male and female groups and an unexpected result for women of a negative correlation between the capacity for empathy and speed in the visuospatial tests. This subject was poorly studied in children with pervasive developmental disorders, notably in children with multiple developmental disorders which belong to the nosographical category of pervasive developmental disorders-not otherwise specified (Tordjman et al., 1997). Indeed, empathy impairment is found consistently in multiple developmental disorders, regardless of whether they present a VSD, but it may have variable severity. The question is whether this variability is related to the presence and the intensity of VSD.

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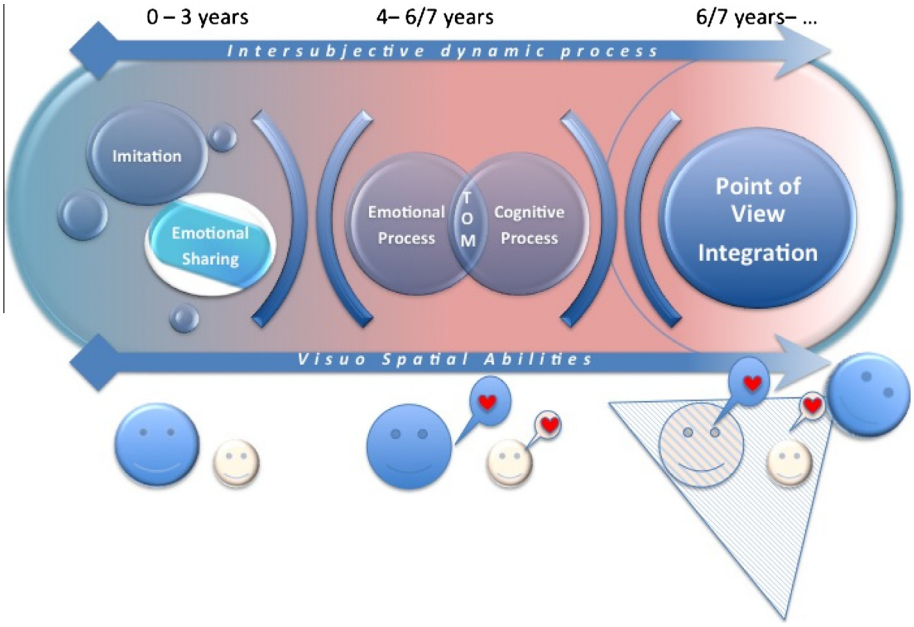

Fig. 1. Developmental model of empathy. The development of empathic processes is part of the intersubjective dynamics produced by imitation and emotional sharing. It challenges the visuospatial capacities of the individual. At approximately 4 years of age, the acquisition of the theory of mind (TOM), the fruit of the combination of emotional and cognitive components, signals the capacity of the child to decenter. Empathy corresponds to the integration of points of view. Broadly, both individuals (blue and white) interact; the blue imitates the white (smile) by feeling and then understanding his emotions (TOM). Finally, the blue individual is capable of decenter without losing sight of its initial point of view, to occupy an autoscopic position.

4. From intersubjective imitative experience toward a developmental model of empathy

We propose a developmental model in which empathy has a double valence (emotional and cognitive) with the neurocognitive model offered by Berthoz (2004, 2010). The author fits this relationship into a dynamic model of empathy consisting of auto- and heterocentration, allowing each partner to experiment, in turn, changes in perspective. In its spatial dimension, empathy corresponds to the acquisition of the ability to manipulate space by changing the reference from the ego to allocentration. However, this mental rotation is only possible when the intellectual space overrides the perceptive space, from the age of 8 years, after which the child can move from the egocentric point of view described in the Piaget's task of the three mountains. Nevertheless, as mentioned, in the field of TOM, post-Piagétian discoveries revealed more precocious skills targeted on the inference of true or false beliefs from 4 to 5 years of age. At this age, children are capable of inhibiting their own beliefs to mentally feign the false beliefs of others; in other words, they can adopt others' point of view. However, faithful to the chronology established by Piaget and Inhelder (1948), Berthoz focuses on the acting body to propose a theory of empathy with a more complex mechanism in that it goes beyond a simple movement of decentration (which constitutes the first stage in a simulation theory) to involve a subject in a relationship: empathy is the ability to enter into dialogue with ourselves while integrating the other.

Following the example of the previously mentioned psychodynamic perspective, Berthoz (2004) describes the necessary capacity to be in two places at once and occupy a third, heautoscopic, position. To understand others' point of view, the child must be able to keep an egocentric point of view by putting himself in the place of the other one; in other words, he must be both himself and the other, and have an overview perspective. This ability presents the possibility of changing of point of view. Berthoz (2010) underlines that this capacity to integrate into one's real-life experience the experience of the other must be distinguished from sympathy, which is a "simple" emotion from an egocentric position and is attributed to the system of neuron mirrors.

In our model, empathy is understood in terms of the process included in the development of a subject interacting with his peers. Integrating the different mechanisms previously described, this capacity gradually arises from intersubjective experience, from a type of repetition that is synonymous with transformation and that involves the mutual discovery of the partners of the interaction. This dynamic, in addition to the other developmental dimensions (linguistic and cognitive), becomes more complex in terms of motor skills, from simple mimicry to spontaneous imitation and then to differing imitation.

These synchronic exchanges challenge the visuo-spatial abilities of the child who must, through an operation of mental rotation, be able to change of reference point. The acquisition of the theory of mind establishes a necessary stage in the development of empathy. The capacity to change spatial perspectives precedes, at a symbolic level, the capacity to integrate points of view (See Fig. 1).

5. Conclusion

We have attempted to show that through the repetition of the same on the grounds of intersubjective experience of imitative exchanges, the child synchronously accesses a reflexive consciousness in parallel to the representation of the thoughts of others. This subtle play of conversational turns by alternating the roles of the imitator and the model is only possible with reference to a framework (familial, social) that allows, in pretend play, to act and express emotions with another who is both similar and different. This participates in a developmental path of empathy which is inseparable from the process of self-construction. For these reasons, we believe that identification, imitation and empathy are three dimensions of the same process. This description is the result

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of a multidisciplinary and fortunate conjunction of perspectives. Thus, this model follows a clinical integrative approach in which psychopathology has to be enriched by psychodynamic as well as neuroscientific perspectives.

Acknowledgment

The authors thank Pr. Alain Berthoz for his availability and enriching discussion.

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Please cite this article in press as: Xavier, J., et al. Children's synchrony and rhythmicity in imitation of peers: Toward a developmental model of empathy. J. Physiol. (2013), http://dx.doi.org/10.1016/j.jphysparis.2013.03.012

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