

En *The Cambridge Handbook of Socio-Cultural Psychology. Second Edition.*  
Cambridge (Estados Unidos): Cambridge University Press.

# **Early infancy: a moving world. Embodied experience and the emergence of thinking.**

Español, Silvia.

Cita:

Español, Silvia (2018). *Early infancy: a moving world. Embodied experience and the emergence of thinking.* En *The Cambridge Handbook of Socio-Cultural Psychology. Second Edition.* Cambridge (Estados Unidos): Cambridge University Press.

Dirección estable: <https://www.aacademica.org/silvia.espanol/149>

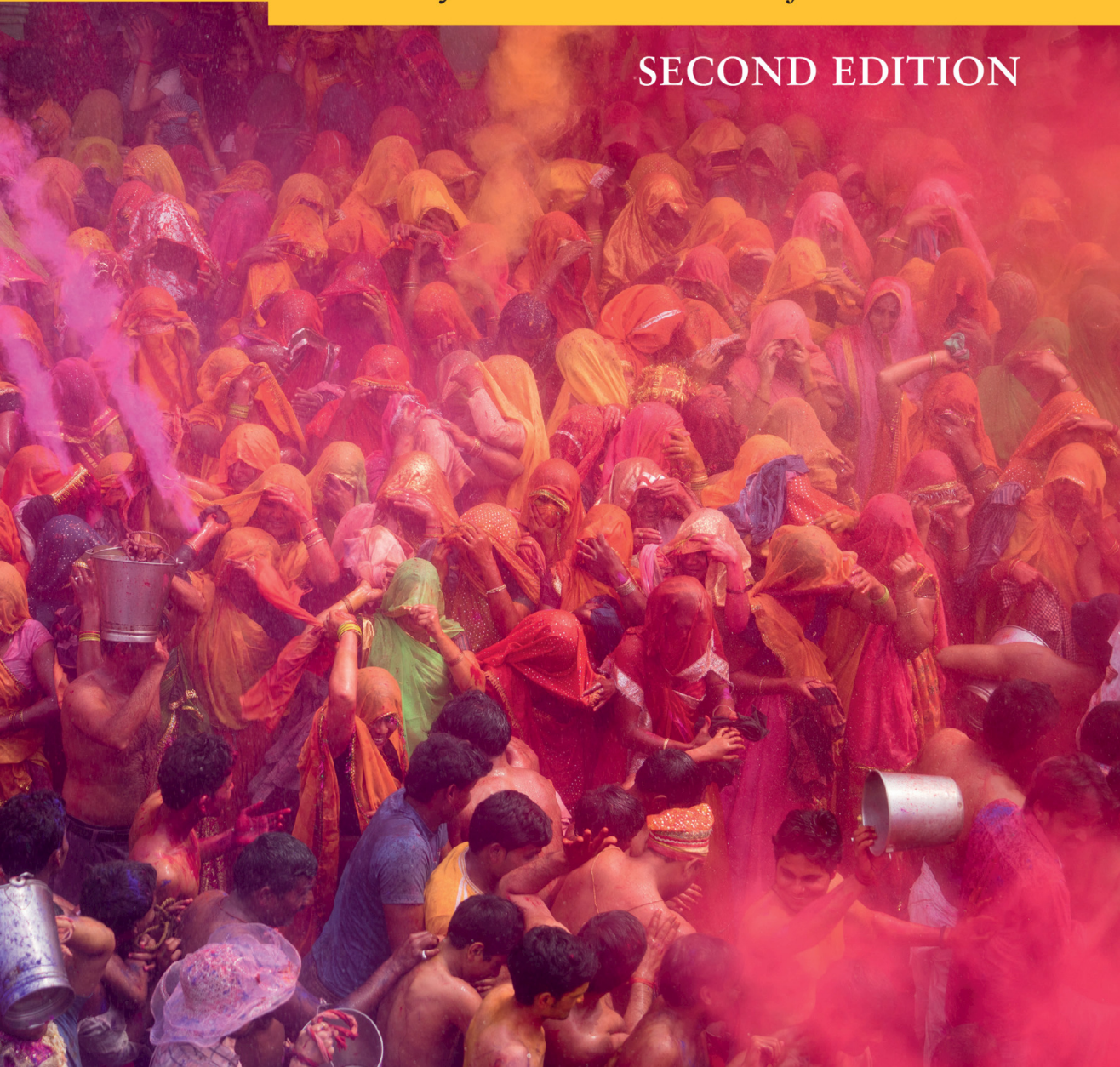
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# THE CAMBRIDGE HANDBOOK OF SOCIOCULTURAL PSYCHOLOGY

*Edited by Alberto Rosa and Jaan Valsiner*

SECOND EDITION



# The Cambridge Handbook of Sociocultural Psychology

Second Edition

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**CAMBRIDGE**  
UNIVERSITY PRESS

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UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi - 110025, India

79 Anson Road, #06-04/06, Singapore 079906

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[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781107157699](http://www.cambridge.org/9781107157699)

DOI: [10.1017/9781316662229](https://doi.org/10.1017/9781316662229)

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First published 2018

Printed in the United Kingdom by Clays, St Ives plc

*A catalogue record for this publication is available from the British Library*

ISBN 978-1-107-15769-9 Hardback

ISBN 978-1-316-61028-2 Paperback

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# 11 Early Infancy – a Moving World: Embodied Experience and the Emergence of Thinking

Silvia Español

## 11.1 Introduction

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The linguistic turn that occurred in human sciences in the twentieth century produced extraordinary conceptual reorganizations. It especially gave us the chance to see the implications of language and hence the symbolism in almost every human issue: in the construction of reality and subjectivity, in our criteria of truth, and in our interpersonal relationships. From it, a second turn seems to have been born and is now bearing its first fruits. That which Maxine Sheets-Johnstone (2009) calls the corporeal turn. It proposes that we open the door to ways of thinking outside any system of symbols able to mediate a reference to something else. It assumes paying attention to what is and what is presented (not what is represented). It is also expected that we see our dynamic body in resonance with others as an indivisible unity with our mind (see [Chapter 1](#), this volume, for a clear argument in favor of this indivisible unit). Concomitantly, the corporeal turn leads to a shift toward the study of the body in movement. For example, in the twentieth century cave art was seen as the first manifestations of the human symbolic world, its possible nature of symbolic representation monopolized attention. Currently, however, Lambros Malafouris (2013, cited in [Chapter 6](#), this volume) analyzes cave art from the movement that produced it: the stroke. He thinks those strokes did not begin as an attempt to produce a finished product, or a representative intention of something, they are the result of intentions into

action. Alberto Rosa ([Chapter 6](#), this volume) suggests that, with repetition in time, strokes would become ritualized gestures intended to produce forms; and in the very long term, these first “graphic babblings” would derive in progressively more complex ways.

As shown, the foregrounding of corporeal perceptual/kinesthetic present experience does not deny our symbolic nature, but does limit its domain. In relation to early development, it leads us to notice the self’s and the other’s non-symbolic, essentially kinetic perception and organization (Stern, 1985, 2010; Español, 2010, 2014). It evidences the biological, psychological, and cultural weaving of the first “strokes” in ontogenesis. These are strokes in the air or on the ground: the marks of playful movement and movement toward the standing position. The singularity of our prolonged immaturity is probably human ontogeny’s most impressive biological fact (Bruner, 1972). This fact is linked to several features that make us who we are. Among others, the emergence of adult–infant social play forms, between a baby’s second and fifth months (Fagen, 2011), and with our slow (compared to other species) motor development (Feldenkrais & Beringer, 2010).

Social play requires an organization of sensitivity toward the other’s behavior to act as part of a coordinated system (Rączaszek-Leonardi, Nomikou, & Rohlfing, 2013). When adults play, they color the baby with their personal movement style. In the heart of their social play they make the baby’s first strokes appear. His first

kicks, arm movements, head turns, and spine column snaking will have roughly the timing, scope, and intensity of the movements of their culture. In the Afro-Colombian community of Guapi in Colombia, it is possible to see a six-month-old baby girl resting on her sit bones on her mother's lap, letting a pulsing and striking rebound of her mother's legs pass through her own body. And later one can see her incorporating the rebound to generate a strong and broad flexion and extension movement involving her whole body resembling the snaking column of the *mapalé*, a typical dance of their region. Her movement is only possible because support in her seat bones leaves her pelvis free to move back and forth. Such freedom and vitality of body movement is characteristic of adults in her culture who transmit it to their babies through early social play (Ospina & Español, 2014). The spirit, as lived in each culture reaches the baby through movement. As noted by Jaan Valsiner and Alberto Rosa (Chapter 1, this volume) a living body can be encouraged by the spirit of a culture.

Our long immaturity period also affects our motor development. The road to bipedalism is not phylogenetically programmed. We learn to move, turn, sit, and stand up and we need time to do so. Moshe Feldenkrais showed that this – never error-free – organic learning provides experiences of freedom and self-control every time a reversible movement is reached (Feldenkrais & Beringer, 2010). Each culture's raising patterns affect the baby's organic learning, building his corporeality. Some tie or wrap their babies tightly around their bodies so that they can barely move (as Hopi tribes, Bolivians, the Turks), in turn, others encourage movement, as in the Colombian Choco where it is thought that if not allowed to move their little baby bones become stuck, impeding normal movement later on (Arango, 2014).

When a catastrophe occurs early in life, such as anaclitic depression in socially deprived babies (Spitz, 1963), motor development breaks down.

In the short film, *Emotional Deprivation in Infancy: Study by Rene A. Spitz* (1952; [www.youtube.com/watch?v=VvdOe10vrs4](http://www.youtube.com/watch?v=VvdOe10vrs4) – specifically from 2:22 to 4:30 minutes) it is possible to see how psychological pain is expressed by Lam, a 9-month-old baby, unsuccessfully trying to join hands (something usually achieved by three–four months), it can also be seen how after each attempt, with stiff fingers and palms, the baby goes back to a tense undifferentiated side-to-side balancing movement of his entire body. Pain is seen in his movement's form and quality. Movement fully expresses our being in all stages of life's cycle.

In developmental psychology, the increasing shift toward the study of movement is grounded in theoretical, gradual, and profound changes. In the first place, it is given by psychology's deepening in embodiment theory, and in social cognition's second-person approach; and second, by the relationship established with the somatic discipline. This work is the product of the second change, which is even more recent than the first. In Section 11.2, I discuss fundamental aspects of these theoretical bodies: the role of experience in motor development, the enactive program's quality of mindfulness, the emergence of the field of somatics, and the qualities of body awareness. In Section 11.3, I attempt to outline a developmental trajectory of the first months of the baby's life that does not have the emergence of the symbolic capability as an ethos (ending point of the most acknowledged developmental theories). By rather paying attention to the baby's experiences with gravity, of being held, of breathing, I intend to show our initial ways of being in the world and of organizing our experience. This is a status that, although with changes and transformations, subsists in adult life. To outline this psychological path, I use a progression of corporeal patterns proposed in the somatic discipline. In Section 11.4, I briefly present the kind of thinking that the corporeal turn allows to recognize and name, and give some examples of how they

operate. Finally, I point out the main conclusions of this work.

## 11.2 Motor Development, Experience, and Body Awareness

### 11.2.1 Motor Development and Iterative Experience

Esther Thelen (2000a) discusses Piaget's founding assumption that the goal of human development is increasing abstract thinking and estranging from its predecessors, perception, and action. Like all those defending embodiment theory, she believes that the endeavor of mental activity is to continually perceive and act in the world not only in the initial state, but throughout life. The mind is embodied: it emerges from corporeal interactions and is continually influenced by it. It is not just a matter of seeing the sensorimotor origins of cognition, but the intimate and inextricable linkage between thinking and action throughout life. Thinking starts with perceiving and acting, retaining its sign of origin forever. From day one, in the embodied experience, motor and nervous systems relate with the environment. The nervous system is dynamic and embedded in and with the body. Nervous system and body are inserted into and coupled with the environment; at no point in development are they not paired. What changes is the nature of the coupling. In development, it is not about describing how purely abstract cognition structures arise but to understand the emergence of a flexible and dynamic merge between direct online cognition and one less closely connected to the immediacy of the senses. Adopting Edelman's theory of neuronal group selection, Thelen (2000a) points out that the brain's functional mapping depends on experience, especially on experience coming from perception and motor examination. When babies are awake they continuously move and search for things. Every acquired experience adds to a net-

work where some paths are strengthened. We are talking about experiential selection: the weakening and strengthening of synapses populations in virtue of experience. The neural map is based on lived experience. Experience shapes the brain.

Thelen's view of development implies understanding children as online problem solvers and emphasizing goal-oriented actions. This is her theory's great directive line. In earlier work she noticed that rhythmic movements of the baby's body parts (such as rhythmic kicks) were repeated at least three times in intervals of a second or less. She described around 47 types of rhythmic stereotypes, thought of as transitional behavior when preceding more complex activities or appearing while the baby gained control over new positions. She stated that development proceeds from non-goal-oriented stereotyped behaviors toward more variable and goal-oriented ones (Thelen 1979).

In Thelen, Corbetta, and Spencer (1996), the infant's reaching is a natural solution to get a distal object and bring it to the mouth. It has one goal: to orally examine the object. Dynamical systems theory emphasizes that new skills must arise from the interplay of new demanding tasks with already existing movements. In line with this, they describe movements involved in reaching and non-reaching (like bringing hands to the face, a pattern established before the baby can grasp an object). They point out that some non-reaching movements, like certain rhythmic arm movements, are spontaneous and act in conjunction with goal-oriented ones (reaching an object). Sooner or later, each baby in its own unique manner makes contact with the object – through padding, touching, or sliding its hand over it. These moments of contact select certain moves, carving patterns that are repeated more frequently. The cycle – arousal activation by the sight of an object, action, and occasional contact – will be repeated for weeks. Finally at about the fourth month, the efficient, successful action of object reaching emerges. The movements

involved in the whole cycle are described in the same way: direct or indirect, soft or abrupt, fast or slow, or with sudden or tortuous sections. Regardless of the action being performed, movement has inherent traits that define it. However, the description is subsumed to the action's crucial feature: its goal-oriented nature essentially defines it in terms of success or failure. The authors note that babies have different initial conditions, such as body size and energy level, thus face different postural and biomechanical problems so that each child finds a solution following individual developmental paths. Some have hectic movements of arms and legs, like a working windmill. From the beginning, they have to learn to control their arms' agitation in order to grab the object and bring it to their mouths. Others are quieter and spend much time with hands close to the face: they must learn to expand and extend their arms enough to reach the toy. As we can see, biomechanic and postural descriptions focus on the limbs' distal movements unattached to the center. It is proper of academic psychology to pay attention to hands, mouth, and eyes forgetting the center, the navel area, the *tantien* zone of Eastern tradition, thinking it is possible to describe baby movement evolution without considering it.

While far from proposing phylogenetically prefigured complex behaviors, Thelen does not militate in favor of a *tabula rasa* either. In Thelen (2005) she says that in order to be formed through self-organization, patterns must be minimally organized in their initial state. Development cascades and is organized around a small node or disturbance in the homogeneous field. Opposing to Colwin Trevarthen's patterns of visually elicited pre-reaching in newborns explained in terms of maturity (the reaching pattern is there waiting to be refined), Thelen wonders if this apparent visually elicited pre-reaching is not simply a tightening of the extremities, accompanied by a flexor tone, that activates at object sight. She wonders about the minimum that needs to be built

to trigger the developmental cascade leading to reaching.

In an exercise of admirable parsimony she suggests that reaching may arise from a few perception/action biases, some basic processes, and the infant's active problem-solving skills. By bias she means that certain neuronal connections are intrinsically favored and their activation strengthens and increases. Biases considered are: (i) looking at contrasting patterns and moderately complex stimuli (babies like to look at interesting visual stimuli); (ii) suction – having something in your mouth feels good; and (iii) grasping or hand closing when hand receptors are stimulated (although some believe it is a remnant reflex from climbing trees, she believes it is only a reflection of the newborn's flexor muscle tone, not a remnant reflex from climbing). These biases, together with (i) basic processes of interest and habituation (that ensure the baby fills his visual world with changing scenarios); (ii) the tight coupling between vision, hand, and mouth touch (the tendency to put your hand on the mouth, to respond with mouth movements to interesting visual stimuli); and (iii) the ability to repeat a pleasant result or circular reaction is sufficient to start a cascade culminating in the emergence of distal object reaching to the mouth. Initial biases and basic processes establish the substrate for motivation. The action of reaching is not prefigured.

As Thelen (2000b) notes, descriptive studies on motor development flourished around 1920 with the work of Arnold Gessel, Myrtle McGraw, and others. The notion that motor development was due to universal principles ended this line of research in the 1950s. Thelen's findings show that motor development is an interesting field of study that can be reopened. If maturation is not decisive, there are interesting psychological processes to be explained. Thelen was intensively trained in the Feldenkrais method of somatic education – which she referred to in one of her articles (Thelen, 2005). It probably enhanced her clear awareness on experience as a

fundamental category of analysis in development and on the relevance of *iterative movement experience*. She focused on a fraction of the experience of baby movement: one voluntarily self-made, goal-oriented in relation to objects out in the physical world. In [Section 11.3](#), I will show that self-oriented or oriented-to-others baby movements can also be interesting. Apparently the brain's functional mapping depends on repeated experience through perceptual-motor examination. If, as actually occurs, the baby's perceptual-motor examination is not limited to the physical environment but encompasses the exploration of his own and the other's body, the brain is shaped by corporeal experiences lived by the baby on his own and in early reciprocity patterns.

### 11.2.2 Experience and Awareness

In a sense, Thelen seems to adhere to the cognitive school's tacit and arguable assumption that cognition is all about solving problems. Also, her concept of embodied experience seems limited. It is not enough to indicate that in embodied experience the motor system is related to the nervous system and the environment. The embodied experience supposes a body consciousness and a sensemaking of our world.

The enactive program proposed by Francisco Varela, Evan Thompson and Eleanor Rosch (1991) is probably the intellectual initiative that more openly addressed the experiential dimension of human life in cognitive science. This program's basic intuition is that our understanding is rooted in the structure of our biological embodiment but is lived and experienced within consensual action and cultural history.<sup>1</sup> Cognition is not understood as problem solving (from representations) but as a world enactment – bringing about a world – through a viable history of structural coupling. Cognitive skills are linked together as vivid stories. Thus, intelligence is not the ability to solve problems but the ability to enter into a

shared world of significance, allowing us to make sense of our world or to “have a world.” They suggest embodiment has a double meaning: the body as (i) a lived experiential structure and (ii) a field of cognitive processes. Our bodies are lived and experiential structures, biological and phenomenological events. Cognition depends on the experiences originated in possessing a body with many sensorimotor skills embedded in a biological, psychological, and cultural context. Cognition rises from repeated sensorimotor patterns that allow action to be perceptually guided. Motor and sensory processes cannot be separated from lived cognition.

The enactive program is constructed on the concept of experience. Although Varela, Thompson, and Rosch recognized phenomenology as a Western philosophical perspective dealing with human experience and emphasizing its pragmatic corporeal context, they noted that it was put together in a purely theoretical way. Merleau-Ponty – they argue – tried to learn the immediacy of our nonreflective experience and to give it a voice in conscious reflection. But because it is a *post factum* theoretical activity, he failed to capture the wealth of experience. Thus his work could only be a discourse on experience. Searching for a tradition that examines human experience in the aspects of reflective and immediate life, and allows cognitive science to include immediate experience, they turned to Eastern philosophy, particularly to the Buddhist tradition of mindfulness/awareness.<sup>2</sup> I always thought this program puts experience in its rightful place since it does not limit or destroy it (as do other versions of enactivism). But my ignorance on Buddhism and meditation practices, and my belief that they are essentially first person activities, prevented me from following them.

Recently, Schmalzl, Crane-Godreau, and Payne (2014) distinguished the “movement-based embodied contemplative practices.” They include Eastern meditation practices, such as yoga, and modern approaches to somatic

education, such as the Feldenkrais method and the Alexander technique. The cultivation of interoceptive, proprioceptive, and kinesthetic awareness combines these Eastern and Western practices entwined with the enactive program proposal opened by Varela, Thompson, and Rosch. Schmalzl, Crane-Godreau and Payne make the interconnection clear. In embodiment theory, it is understood that one's experience in the world as a cognizant being portrays a complex interplay between brain, body, and environment, and the seamless integration of interoceptive, proprioceptive (including vestibular), kinesthetic, tactile, and spatial information. In consonance, movement-based embodied contemplative practices all emphasize on paying attention to the interoceptive, proprioceptive, and kinesthetic qualities of experience. They also use expressions like "being in one's body," to promote an embodied experience of the self. Likewise, they stress that movement is a fundamental characteristic of the embodied state, and the enactive approaches propose that one's ability for self-movement is a constitutive part of all cognitive processes. Movement-based embodied contemplative practices are based on internally generated self-willed movement that, opposed to externally evoked or purely passively imposed ones, is intrinsic to the sense of agency, thus central to self sense development. Every contemplative practice involves some sort of movement. Even in the most static forms of seated meditation the whole body is constantly in subtle motion with the breath's rhythm. The principal focus of movement-based practice is on the intentional induction or the disinhibition of overt movement or subtle internal sensations of movement. In a similar way, in movement-based practices, redirecting attention entails cultivating awareness of bodily sensations and proprioceptive feedback related to the specifically used movement and breathing techniques. Regarding the neural mechanisms under contemplative states, studies in neurophenomenology show that

practices based on meditation engage selective brain areas and neural networks involved in attention, body awareness, emotion regulation, and the sense of self. Finally, they say they are also forms of movement-based embodied contemplative practices (as many Eastern movement-based systems) that involve two people (master and disciple, teacher and student, therapist and client, or co-practitioners). Together, they enter a state of enhanced connectivity referred to as "resonance." In this state, affective and somatosensory experiences are largely automatically shared; apparently they involve a simultaneous activation of affective and sensory brain structures in both individuals.

Although now included in the enactive program, these practices have been a subject of reflection for some time in the nonacademic world. Thomas Hanna (1986, 1988) identified a broad field called "somatics" which he defined as the art and science of processes or concurrent synergistic interaction between awareness, biological functioning, and environment. Somatics refers to practices in the field of movement studies emphasizing internal physical perception. Used in movement therapy the term signifies an approach based on internal body perception, and in dance is an antonym for techniques such as ballet that care about the audience's observation of movement. The field encompasses Eastern practices and various methods of somatic education, among others, the Feldenkrais method, body-mind centering, Laban-Bartenieff fundamentals – that is, contemplative embodied movement-based practices – but also extends to certain dance techniques like contact improvisation. In all cases, there is an appreciation and a validation of the living body experience closely linked to how we organize ourselves as we move into our coupling with the world. And the body of proprioception and interoception is addressed, the one perceived from within. It is about interactive practices affecting two or more people. Some involve hand-on practices or listening to the other's body

through one's whole body; the latter have, as a distinctive feature, the corporeal contact or touch with the other. They all intend to refine the kinaesthetic and proprioceptive senses and assume that consciousness can be expanded. They look for the expansion of awareness of the vital moving body in its physical and social environment.

In the field of somatics, body awareness is at the center. As Alan Fogel (2013) points out, formal education emphasizes awareness of our thinking processes and the ability to regulate them toward specific goals, such as planning or problem solving. However, self-consciousness – in the sense of thinking about oneself – is not the same as feeling yourself in a corporeal consciousness. Embodied self-awareness involves interoception (sensing our breathing, arousal, emotion) and the body outline (movement awareness and coordination between different parts of the body or between the body and the environment). Embodied self-awareness begins before birth, during the last months of life in utero and continues to grow throughout life as we learn more complex living and acting in the world forms. It is fundamentally linked to the conscience of others. Interoception begins with ergoreceptors, receptors placed in different body tissues that sense internal states. Exteroception includes receptors for sound, light, taste, and smell. Interoception and exteroception rely on different sets of receptors and different neural pathways to and through the brain. The afferent nerve cell fibers that originate in the ergoreceptors are small and unmyelinated. Myelin is a protective coating around nerve cell fibers that speeds transmission. Therefore, unmyelinated fibers are slow conductors. This partially explains why it often takes several minutes to feel particular embodied sensations and sense their source within the body. Expanding embodied self-awareness is slow and deliberate when compared to the rapid and instantaneous generation of ideas and thoughts in conceptual self-awareness. The faculty of conceptual reasoning is so powerful and rapid in humans, it can

hinder the growth of embodied self-awareness which requires our conceptual mind to slow down and take a break from its continual stream of ideas. According to Fogel, there's an indirect transition between embodied and conceptual self-awareness. We cannot be in conceptual and embodied states of self-awareness at the same time, but under certain circumstances we can regulate the switch. Taking on Fogel's assumption, Silvia Mamana (2016) says that keeping the perception of sensations active requires a deliberate and systematic training that implicates learning to quiet our minds among other things. She prefers the term "open awareness," closer to Varela, Thomson, and Rosh's proposal (instead of embodied self-awareness), more consistent with the goals of somatic education: opening to internal perceptions consciousness, but also to environmental stimuli.

Many methods of somatic education have a direct link with motor development knowledge. Feldenkrais's (1972) awareness through movement classes are based on accurate observation of baby movements. Bonnie Bainbridge Cohen (2012) – creator of body-mind centering – describes in detail the patterns of movement from life in uterus to bipedalism. Peggy Hackney (2002) reinterprets Bainbridge Cohen's post-birth patterns linking them to Bartenieff fundamentals (where Rudolph Laban's imprint, father of modern dance, is obvious). Years ago, Fogel explicitly proposed linking the science of movement to developmental psychology (Fogel, 1992). I want align with his proposal and extend that link to other ways of movement knowledge. In the next point I will concentrate on the baby's development process following Hackney's synthesis on afterbirth patterns, and I will attempt to cross it with some of the ideas presented above.

In terms of movement, birth involves a drastic change: the baby faces gravity and the experience of being supported by some kind of surface. He also transitions from being in the womb, fully in contact, to, especially in our culture, be

dispossessed of full contact, be released in the air, and experience partial contact (the back, the stomach) depending on how he is supported. He goes through the birth canal and breathes on his own for the first time. Gravity, support, breathing will be constant throughout our life history (except under singular conditions) and are key to the formation of our psyche or our way of being in the world. I will try to demonstrate this in the next point.

### 11.3 The Fundamental Patterns of Total Body Connectivity

The essence of movement is change. As we move we are constantly changing. In the process of movement change we go on creating our embodied existence. Change is not random or pre-established. It is relational. As we move we are always making connections, building relationships within and among us and the world. Connections created by the use of our body become patterned as we grow. Some patterns, like primitive reflexes, righting reactions, and equilibrium responses, are built in our neuromuscular system. But every human being is physiologically compelled to perform certain bodily developmental tasks to become fully functional and expressive. We all go through a similar progression of movement patterns from lying down to standing up. This progression is largely made possible by the display of fundamental patterns of total body connectivity. They represent a primary level of development and experience. Each one of them organizes a way of relating with oneself and with the world. As development patterns are being established, each individual is forming its experience of interaction with the world, and, consequently, this interaction is included within the body pattern. Although there is a sequence, development is not linear and patterns overlap. There is not a single path for all people; each engaging story is unique and culturally defined. This is Hackney's (2002) idea in a nutshell. Her

work, as a proposal for somatic education is focused on the process of re-patterning (returning to basic patterns to facilitate skill development or technical virtuosity or personal creativity and artistry). My interest, however, is in her description about patterning; I think it opens the door to a dimension of the baby's bodily experience that psychology has not incorporated until now. In this, my first approach, I will consider only some aspects of the first three fundamental patterns (out of six described) and combine them with some concepts mentioned above to draft a comprehensive description of the baby's kinetic experience during the first months. All I present below on fundamental patterns of total body connectivity is taken from Hackney's text.

#### 11.3.1 Breath Pattern

Birth is the entrance to the world of breathing air. The baby fills and empties his body, expands and contracts his whole being on his own, tuning in with his internal body impulse, being an undifferentiated whole. It is the breathing pattern. Breathing is our first experience with internal space. The space in our world is displayed in three dimensions – vertical (up and down), sagittal (forward-backward), and horizontal (side to side). With each breath you may experience changes in all three dimensions. In inhalation, the diaphragm expands the thorax area's three dimensions (the vertical by pushing down the tendon, the horizontal by raising the lower ribs, the sagittal by raising the higher ribs using the spine). During exhalation, the diaphragm movement contracts the three dimensions of the thorax area. Though breathing is involuntarily, it is influenced and is a reflection of changes in consciousness, feelings, and thoughts as these are developed. Therefore it is considered a pattern. In the baby we can assume it is a reflex influenced by arousal changes in performed activities and the stimuli received.

Breathing is a rhythmic movement that contains the phrase's key. Movements happen in



phrases. Each individual organizes and sequences their movements within meaningful units. Breathing's round phrasing "inhale-exhale-pause" is the base of voluntary movement phrasing; it organizes all subsequent fundamental patterns. The breathing pattern is the foundation and support base of those coming next. All movements emerging later will organize and find support in the breathing pattern. Breathing also allows a primary experience of being with others. In Bartenieff's fundamentals, in body-mind centering and in the Feldenkrais method (and other methods of somatic education), there are many exercises promoting participation in the "Mind of Breathing" (in the words of Bainbridge Cohen taken up by Hackney). Using breathing as the central organizer of consciousness, moving in such a way that reality's nature is experienced as the pace of the birth pattern organization, and providing bodily knowledge of what it is to be empathically attuned with another person through a breath pattern (walking, dancing, running, quiet). The conscious cultivation of breathing is also recognized in several Eastern disciplines – like t'ai chi – as an important element for attuning individual and universe in a spiritual connection.

We can then imagine a newborn baby in arms, participating in the "mind of breathing" attuned to the other's body breath pattern, living one of his first mutuality experiences where each other's phrased breaths fall into place. The baby is there almost an undifferentiated totality with the other. We can also imagine him awake and alone, leaning against a nonliving surface (which does not provide reciprocal information about his own vitality and experience), tuning in with his inner space and respiratory phrasing. Breathing is a dynamic way of being with himself and with others as an undifferentiated unit. The baby experiences vitality forms in the movement of filling and emptying his body, or in the inhale-exhale-pause original phrasing. When in arms, adult and baby live the same form of vitality in the respira-

tory phrase's unity (see next point for an explanation of the concept of vitality forms). Since the baby is unaware of any disturbing consciousness (such as adult conceptual consciousness, the quick and almost permanent flowing of ideas, images, memories), he fully and deeply lives his breathing in open awareness.

### 11.3.2 Core-Distal Connectivity Pattern

The fundamental pattern of core-distal connectivity or umbilical radiation is one of radial symmetry, with the center of control in the middle of the body. Patterns of flexion and full extension develop in the uterus during the last trimester of intrauterine life and both contribute to the basic postural tone. Being born is experiencing gravity, when the baby is prone there is an increased flexor tone throughout his body, when lying supine there is an increased extensor tone. Both lead the baby to the ground and provide a sense of grounding. The baby feels the connection with the earth. The center's value becomes apparent when holding a newborn: you have to continually hold his head because at any moment he will pull it backwards. But if you pay attention you will see that the movement does not start in the neck but in the navel. And when the baby cuddles in arms one can see that the total bending of the body occurs from the navel. The core-distal pattern holds the basic rhythmic relationship to go inward, toward oneself, and out into the world in an organism with limbs connecting to the center. The baby radiates outward, away from his center, and returns to it. The organized pattern of flexion and extension emerges.

This movement pattern establishes the "twoness" of the "inward-outward" experience as opposed to the "oneness" of the breathing pattern. In the basic patterns of entering and leaving the center, and of breathing, the rate of "input and output" is essential. But there is a difference: breathing organizes our entire body

in a fluid form, while the pattern connecting center with limbs is less circular. It resembles a star that presses and releases energy from the center toward the ends. The pattern of becoming concave or convex can be seen as a primary experience of phrase contrast, this means a phrase built in two differentiated parts. In microanalysis of adult movement in contexts of social play, particularly in infant directed performances, adults often build multimodal phrases on movement phrases resembling flowing backgrounds of going to and fro in the sagittal plane (Español & Shifres, 2015). Apparently, when the baby enters into the primordial experience of phrase contrast through this fundamental pattern, adults show and illuminate (by using temporal arts' resources) the same kind of phrase contrast in social interactions.

From the theoretical framework of communicative musicality – very close to this work – Gratier and Trevarthen (2008) describe adult–infant early vocalization exchanges as a nonverbal, musical narrative or a narrative with communicative musicality. They recognize that narratives are typically about something worth telling, about events involving other people that a person feels impelled to recount. But suggest that although baby and mother do not relate events or talk about other people's actions, they construct a nonverbal narrative with contents in the form of "aboutness." In the same way that Jazz musicians describe the feeling of telling something through music, or telling a story when jamming, mother and infant tell something in their vocalization exchanges. "Phrases" – they say – might constitute the events that build narrative. I'm not sure adult–infant exchanges are a narrative. I think that perceiving, creating, and exercising units of meaning is a basic mode of organizing the world and ourselves. And although subsumed to the creation of linguistic, gestural, or musical narratives, it also forms non-narrative non-referring ways of organizing the world. The phrases' value must not be reduced to narrative or reference, both

linked to language and symbol. When thinking in movement, phrasing organizes our corporeal coupling with the world, this means with the earth and those that inhabit it. And that is relevant. Phrase sequence does not necessarily generate narratives; it could result in dance improvisation, scaling a mountain, simple repeated baby movements, or simple vowel exchange sequences. This might make sense in the next section, when I talk about thinking in movement.

### 11.3.3 Head–Tail Connectivity Pattern

Returning to fundamental patterns, the following is linked to the spinal level. Head and tailbone are the spine's ends; they are in a constant and ever-changing interactive relationship. The spinal movement is organized by differentiating *yield and push* and *reach and pull* patterning. Development is never linear, it occurs in overlapping waves, first the baby learns to yield and push and later to reach and pull in an effective phrasing. During life in the uterus, especially in the last weeks before birth, the spine is primarily flexed. Both, head and tailbone, have chances of being in contact with the uterine wall. The fetus gains proprioceptive knowledge when yielding and pushing against this container, sending messages through the spinal cord from the head to the tailbone and vice versa. When holding or watching a newborn in the cradle one can notice he continues to push the head or the tailbone by elongating and shortening. Some seem to like pushing against the end of the crib. Others seem to climb upwards when resting on their caregiver's chest.

Yielding provides a supporting bond, before pushing for separation. Reaching provides space goal-orientation before pulling. The yield and push pattern relates to grounding and to a sense of self. When resting on our belly and actively yielding the body weight on the ground, passing the weight through the forearms, we feel an immediate confirmation of our embodied

existence. When ground and yielding meet, yielding turns into pushing and raising up from the floor is possible. Yielding before pushing connects us with gravity and earth and creates a link behind the eventual separation brought by the push. By pushing, the baby momentarily compresses his body (bones, muscles, and organs), stimulating proprioceptive knowledge about the strength or structure of being. Pushing also empowers getting away, separating the self from the ground or a supporting other; establishing one's own kinesphere, becoming an individual. The yield and push pattern at the spinal level usually develops during the first six months and relates to strength development. It promotes internal attention to heavy and grounded movement. The reach and pull pattern gives us the ability to move in the world, in a space beyond the individual. Attention is focused outwards enabling the baby to move toward the environment. This expands attention and limbs into a space beyond personal. It is the beginning of intended-to-space movement (key to movement in dance), an open door to the possibility of going somewhere or toward someone. The reach and pull pattern involves more outside attention and lighter movements. Yielding and pushing has to do with establishing the kinesphere, reaching and pulling with going through it. Both are linked to the molding of the baby's spine. The spinal curves are different in newborns and adults. Newborn's vigorous kicking and crying during the first months of life develop the muscles needed to produce and stabilize the lumbar curve in its convex direction toward the front. This curve needs to be established for the baby to lift his head up. When the baby throws his arms and legs, turns his head side to side, or lifts it up when he lies down, he is gradually developing the muscles and ligaments that control the secondary curves. From here on, the cervical and lumbar curves, and therefore the ability to support himself, come in response to his desire to see the world, to develop in interaction with the world.

Discriminating between yielding and pushing and reaching and pulling – with their unitary phrasing stated at the spinal level – will continue in all the following fundamental patterns. Reaching (the action of reaching an object) is linked to yielding and pushing and reaching and pulling patterns, and immersed in other fundamental patterns that I will not describe here. But their beginnings are here. Reaching's developmental history – which called much attention in developmental psychology – is bounded by the grasping bias, the desire to mouth a distal object, and other processes described by Thelen summarized in the previous section. But the evolutionary history leading to the motivational cascade starts here. Reaching is not a natural solution to obtain a distal object and bring it to the mouth, or is not only or essentially that. Reaching is a manifestation of the baby's vitality and complex history of blending with the ground and the world. It allows him to rise from the floor and stand on his own, roll, and change positions. It moves him into a direction he finds attractive due to light, temperature, company, or an eye-catching object.

## 11.4 Thinking in Movement

Developmental psychology has recognized the existence of two modes of thought: the mathematical logical thinking and narrative thinking. Undoubtedly, the second is one of the major reformulations of the linguistic turn. Jerome Bruner (1990) contrasted the narrative to the logical thinking and drew attention to the child's ease or readiness to organize experience narratively. He suggested that the narrative structure is present in social interaction before acquiring its linguistic expression and provides a certain prelinguistic predisposition for meaning. Narrative thinking has referential palatability (Español, 2012), its analysis showed everything there is to language before the child acquires language (protoconversations, protodeclaratives, deictic and symbolic gestures, pretend play).

Sheets-Johnstone (2009) proposes there is a way of thinking that is not “about something,” that does not represent something different than itself. This is thinking in movement. She takes improvised dance, particularly contact improvisation, as a paradigmatic example of thinking in movement. She describes it as a continuous flow of movement from an ever-changing kinetic world of possibilities where goal-reaching is not required, where nothing is achieved or fails to be so. And suggests that ways of thinking in movement may differ considerably: it has exploratory-organizational purposes in infancy and aesthetic ones in dance. In both cases it is not necessary to refer to, or to have a verbal level to create meaning. Thinking in movement in infancy creates (does not refer to), among other things, a sense of self as separate and bonded to others, largely thanks to movement’s double mode of presence. This means the bimodal nature of self-produced movement – visual and proprioceptive – that allows us to perceive movement from within and from outside.

Sheets-Johnstone links thinking in movement with processes described in current developmental psychology, especially in social cognition’s second-person approach. Reciprocity characterizes all of our interpersonal encounters. In these moments of meeting, behavior is influenced by each other’s presence. Locating reciprocity in the center of our interpersonal world arises from the adoption of a comprehensive second-person approach on it. The second-person approach is part of the embodiment framework in which the emotional world, the perceptual processes, movement, and action take center stage for the understanding of psychological processes. In this framework, our interpersonal world is mainly based on perceiving others directly, the experience of “making together,” and dynamic and reciprocal exchanges. According to Reddy (2008), being in contact with another person presupposes an assembling between exteroception and proprioception:

perceiving someone directing their attention and action to oneself inescapably involves the proprioception of our response to them. Many exteroception/proprioception phenomena reflect movement’s dual mode of presence. For example, a baby bringing hands together collects proprioceptive information that allows him to organize his own movements (where to stop moving one hand in order to touch the other) and also receives exteroceptive information (sees his hand passing in front of his eyes). The baby feels and sees how his hands move at exactly the same time and apportioned. On countless occasions he experiences the perfect exteroception/proprioception contingency. It will become a self’s invariant that will last a lifetime. It will be faced against the different and repeated noncontingent experience between the exteroception of the other’s hand and the proprioception of his own moving hand (or lack of proprioception if not moving) that specifies others (Reddy, 2008, Sheets-Johnstone, 2009). Other cases of thinking in movement that relate to the sense of authorship or agency have been described (a synthesis can be found in Español, 2010, 2012).

I believe that thinking in movement is paying attention to the experience of forms of vitality. Daniel Stern (2010) had set movement at the forefront by saying that the dynamic experience of movement is the original source of psychological life. Movement and its consequent proprioception are the earliest manifestations of being animate, providing a primary sense of aliveness. He proposed a “dynamic pentad” that creates the experience of vitality composed by movement, time, force, space, and direction/intention. A form of vitality is a gestalt, the spontaneous integration of these five elements emerging from holistic experiences. Our minds grasp dynamic events through this pentad. Vitality forms are perceived as felt experiences of temporally contoured moving forces, and a sense of being alive. Forms of vitality outcome form experiences and can be directly observed in another’s behavior.

They involve the style in which we make things, the “how.” Di Cesare et al. (2013) used functional magnetic resonance imaging (fMRI) finding that the somatosensory-insular-limbic circuit could be under the observers’ capacity to understand the vitality forms conveyed by the observed action.

Stern (2010) found in early social play a ground where forms of vitality become evident. Sometimes early social play is almost purely a play on vitality forms (e.g., sudden almost explosive movements when a mother tickles her child). Adults usually play with forms of vitality to avoid the child’s habituation and boredom. The result is a theme-and-variation format of vitality forms. The form of repetition-variation helps adults to level, modulate, and play off the baby’s arousal as much as themselves. Stern also defends the idea that forms of vitality are a meeting point between early social play and time-based arts: the feelings that run from excitement to quietness, tension to relaxation, characteristic of early social play, are the same feelings that time-based arts such as dance and music express with mastery; and together with early social play they share the same backbone: the repetition-variation form. In early social play, adults manipulate forms of vitality through the repetition-variation form, while the baby participates primarily as a receptor. Recent microanalysis of early social play using analytical categories and analysis methodologies of music performance and movement analysis in contemporary dance (Español & Shifres, 2015) empirically confirm this hypothesis.

Finesse in manipulating or elaborating vitality forms is most likely to be acquired along development, and interactive play is certainly a privileged context for a safe rehearsal. At some point in infancy, early social play turns into forms of vitality play when the child actively wields these vitality forms with repetition and variation. Now child and adult play together with forms of vitality. Forms of vitality play is a pleasant and joy-

ful play frame, where adult and infant elaborate units (or motifs) of movement and/or sound (like moving a spring forward, stretching and shaking it) according to a repetition-variation form. These units are repeated at least twice with variations in the rhythm of sound and movement patterns, in the form, the dynamic or the quality of movement, in melodic contours, sound sonority, dynamics, and timbre. The whole activity unfolds around the varied repetition of sound and movement, making it the core of this activity (Español et al., 2014, 2015).

Original and improvised adult–infant social play are ways of thinking in movement, as are forms of vitality play, proper to the third year of life. Their improvised character and the unattachment to the achieved unity, liken them to contact improvisation. The fundamental patterns of total body connectivity described in the previous point are also ways of thinking in movement. In fact, Bainbridge Cohen (2012) suggests that contact improvisation – the paradigmatic example of thinking in movement – is a recapitulation of early experiences of the baby’s movements, which makes it a very enticing form of dance. However, with all these, descriptions happens as with the most recognized embodiment approaches in early development (see Needham and Libertus’s [2011] state of the art description on embodiment in early development): they treat specific issues, isolated, without tracing a path or a developmental becoming.

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## 11.5 Conclusion

This work’s pledge has been linking developmental psychology to scientific, practice, and experiential understanding of human movement. I think it opens the door to a dimension of the infant’s bodily experience that psychology has not incorporated until now. By paying attention to interoceptive, proprioceptive, and kinesthetic qualities of infant’s experiences and his states of enhanced connectivity or resonance with others,

I tried to imagine and describe how the mapping of infant embodied awareness develops. According to somatic understanding, the fundamental patterns represent a primary level of development and experience. Each one of them organizes a way of relating with oneself and with the world. I think each one of them can also relate to ways of making contact and having experiences with others. It is what I tried to show in the patterns I described – breathing pattern, core–distal connectivity pattern, and head–tail connectivity pattern.

Each infant movement fundamental pattern is an occasion for learning, expressing feelings, and developing cognition. This is this work's first conclusion. The second one is that shared movements, even the most basic, such as breathing, are an occasion for intersubjective encounter. The third one is that the spirit, as lived in each culture, reaches the baby through movement's vitality forms perceived, received, and shared with others. This is the complex process that molds in socially deprived babies. They are the ontogenetic strokes, the sensible levels of development and experience, which are affected when motor development breaks down in socially deprived babies.

What we have today in psychology is a fragmented, incomplete, and disconnected picture of infant movement development. I think if we incorporate the vision on motor development provided in the field of somatic education (interlaced with the field of dance), if we allow the fundamental patterns to guide our look on infant development, we could have a temporal order where to place particular findings. Those coming from embodiment in early development studies, as well as those coming from cognitive developmental psychology, that are compatible. We could thus be gaining understanding of the baby's experience and his developmental changes, of his full awareness states.

In this chapter, I have only presented a few aspects of some fundamental patterns as

described by Hackney. The patterns that follow them could be incorporated and open the proposal to prenatal patterns exposed by Bainbridge Cohen and the complexity of his description of postnatal patterns, which render more explicit its obvious link with vitality forms and the second person approach. If done, I think we would be continuing the enactive program's original proposal. I think we could then expand and transform assembled intuitions we have about thinking in movement in a more precise idea. And maybe aim in that way toward the elaboration of a theory of development.

## Acknowledgment

I am grateful to Alberto Rosa who encouraged me to think and write about these issues, and his trust in how it would turn out.

## Notes

- 1 Some current versions retain this trait of origin and point to that experience, far from being an epiphenomenon, it intertwines with being alive and immersed in a world of meaning (Di Paolo, Rohde, & De Jaegher, 2010).
- 2 It is worth mentioning they distinguish the sense they give to the term "mindfulness" from the non-Buddhist meditative sense used by Ellen Langer to refer to certain widespread practices in today's Western world.

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