SPATIO-TEMPORAL CONSTRUCTION IN HUMAN DEVELOPMENT: A STRUCTURAL ANALYSIS

A construção espaço-temporal no desenvolvimento humano : uma análise estrutural

Construcción espacio-temporal en el desarrollo humano: un análisis estructural

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Abstract: *This article addresses the structural character of spatio-temporal construction in human development. It starts by presenting rhythmic skills and behaviors based on an evolutionary theoretical framework, which emphasizes the need for psychological research on the subject, following in its broad lines the embryo of the evolution of human cognition, through the analysis of the action of prehistoric culture in its spatio-temporal patterns. It highlights the presence of awareness of the own territory in this evolution. Approaching the child's development, it brings considerations about the relevance of ludic in the construction of their spatio-temporal notions. Next, it presents Kurt Lewin's topological structural view and illustrates it by means of a brief analysis of the free play of an 18-month-old child and her early spatio-temporal organization.*

Keywords: *spatio-temporal structure; rhythm; topology; Kurt Lewin; sensorimotor play.*

Resumo: Este artigo aborda o caráter estrutural da construção espaço-temporal no desenvolvimento humano. Inicia-se por expor habilidades e comportamentos rítmicos a partir de enquadre teórico evolucionista, que enfatiza a necessidade de pesquisas psicológicas a respeito; acompanha a seguir em suas grandes linhas o embrião da evolução da cognição humana, por meio da análise da ação da cultura pré-histórica em seus padrões espaço-temporais. Assinala a conscientização do próprio território nessa evolução. Abordando o desenvolvimento da criança, traz considerações sobre a relevância do lúdico na construção de suas noções espaço-temporais. A seguir, expõe a visão estrutural topológica de Kurt Lewin e a ilustra por meio de breve análise de brincadeira livre de criancinha de 18 meses e sua precoce organização espaço-temporal.

Palavras chave: estrutura espaço-temporal; ritmo; topologia; Kurt Lewin; brincadeira sensório-motora.

Resumen: *Este artículo aborda el carácter estructural de la construcción espacio-temporal en el desarrollo humano. Comienza exponiendo habilidades y comportamientos rítmicos desde un marco teórico evolutivo, que resalta la necesidad de investigaciones psicológicas sobre este tema; acompaña en sus líneas generales al embrión de la evolución de la cognición humana, a través del análisis de la acción de la cultura prehistórica en sus patrones espacio-temporales. Aborda la conciencia del propio territorio en esta evolución. Abordando al desarrollo del niño, trae consideraciones sobre la relevancia de lo lúdico en la construcción de sus nociones espacio-temporales. Luego, expone la visión estructural topológica de Kurt Lewin y la ilustra mediante un breve análisis del juego libre para un niño de 18 meses y su temprana organización espacio-temporal.*

Palabras clave: *estructura espacio-temporal; ritmo; topología; Kurt Lewin; juego sensoriomotor.*

Space and time as an inherent part of life

Bisham (2006a; 2006b), when studying rhythmic skills and behaviors, from an evolutionary theoretical framework, emphasizes the need for psychological research about it, with valid definitions of what Rhythm is, that may help clarify potential hypotheses about the fact that skills with rhythmic characteristics have been developed. By following the human biological impetus, in turn, Coppens (2015) shows the great reconciliation that exists between the endless repetition of what we did and the extraordinary changes we produced, by acting in an increasingly complicated and organized way.

Understood by Fraisse (1956, 1963, 1974, 1980, 2012) as "the order of movement", every rhythm has a temporal base. The sequential description of this order requires a structural analysis of the dynamic organization of the patterns in question. Human

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activities, such as swinging, are very precocious and loved by children, they provide pleasure and tranquility, and are also used in dances and playing situations. Studies on rhythm, however, have not yet found a precise definition of what will be. Etymologically, they come from Greek and literally means "a particular way of flowing". In short, it turns out to be the ordering of a succession, conceived or perceived. It is a mental inference, which makes it possible to anticipate its sequence, starting from its base, which is repeated. Every rhythmic experience is plurisensory, requires movement, produces and feeds affective reactions, receives impact and reverberates socially.

The reality experienced in its dynamic process, inserted in time and space, develops according to the possible regularities related to the different contexts. Discovering, describing and analyzing such regularities is a great and constant challenge for science, which is based on a systematic classification, whose description can be synchronous or diachronic. The term 'structured' refers to the organized form of the relationship between the parts and the whole. Such organization can have a temporal structural continuity, as is the case with living organisms, such as individuals or societies. The structures remain alive through the continuity of their functioning in time and space (Radcliffe-Brown, 1989). When stressing the importance of temporal structures, Segre (1986) reminds us that the rhythm of what is said or done in a situation, as well as the recursiveness of the living moments are built in its narrative. As an order of irreversible succession, time becomes the basic element that enables events to unfold. It is in the temporal dimension that repeated phenomena occur, which make it possible to reinforce facts that have occurred, as well as the identity of people and situations. On the other hand, it is the passage of time that permits mutations in the system of interactions, and each change that occurs is opposed or related to the previous phases, stored in memory. In relation to Time, as Prigogine (1996) points out, in humanities, as well as in geology, cosmology and in many other theoretical readings, past and present are part of the arrow of time, a term he coined, which evades a deterministic view, being the formulation of the time paradox as an extraordinary example of human creativity and imagination.

Following in its broad lines the embryo of the evolution of human cognition, it is made possible by Stout, Passingham, Frith, Apel and Chaminade (2011) and Stout (2011), with the help of the analysis of the action patterns of prehistoric culture, that we try to synthesize here. The interaction between human cognition and cultural evolution finds in the chipped stones of that time valuable paleolithic records, evidence of an increasingly diversified and complex operating chain, which reveals previously programmed action sequences. Such presence of a hierarchical and sequential structure in the action also presents the flexibility contained in this program that aimed at an end, since it was also taken into account the variety of types of stone to be worked, a factor that could change the result of the action. In short, a hierarchical and sequential structure was built with its elements grouped into categories, with the lower levels grouped in bundles and linked to the upper ones, culminating in a single end, at the top of the chain. Such hierarchical complexity enabled an increasing development of manual skills associated with cognitive development and social interactions.

The history of the manufacture of hunting and fishing equipment, as well as weapons, reports the search for identification, not only of the attributes of the object, but also of the human perceptual and motor possibilities, in relation to these attributes. Such possibility of discriminating and associating at the beginning is done through the body, which already involves a form of practical intelligence and creativity, focused on everyday life, specifically associated with areas of survival, and necessarily assuming social interaction. Body awareness and action in the living environment, in turn, germinate and substantiate symbolic awareness and its manifestations. When Ramozzi-Chiarottino, Franck-Cunha, Freire and Ferraz (2017) say that what is significant for the subject is what it has of mental structure to perceive, it is based on the Piagetian perspective that proposes an evolutionary bio-mathematical model, which with extreme happiness, reconciles the subject's life history with its logical-mathematical abstraction, based on a hypothetical model that assumes the integration of the cognitive to the affective-emotional, as well as, from the timeless to the historical.

Cassirer (1972), from a broad and thorough evolutionary reading, follows the specific characterization of human, personal and intentional responses and finds in the symbol the key to understand the nature of Man, evidencing his power to build and manifest his originality, individuality and

creativity. According to Leroi-Gourhan (1964; 1965), the achievement of the vertical position caused profound brain changes. The relationship between the face and the hand provided the possibility of the utensil for the hand, and language for the face. In this escalation, the replacement of the hand by the artifact required planning, technical skill and observation of the temporal sequence of gestures in its manufacture, that is, of its processing memory. According to Mithen (2002), this learning was supposed to identify and associate the gestures with the results obtained in time and space, that is, to generalize the production techniques, identifying their main common procedural rules.

In a complementary way, the progressive conquest of the territory itself leads mankind to organize his space and time, based on the rhythm, as in the calendar of the seasons, which is repeated every year. The territory, as a refuge, becomes the organizing nucleus of his spatial notion, to which he can return whenever he needs or wants. The possibility to relive and recognize situations becomes part of his life, as well as to imagine what could happen, and to represent through his narrative, his drawing or sculpture what he fears, believes or wishes, that is, to make art. The history of human techniques reveals itself as a rise from the simplest to the most complicated, from the perceived to the believed or imagined. In this time chain, however, it maintains a permanent record of the achievements already made. Each generation inherits a solid technical base, from which it can add something new through its reflective and creative intelligence, according to Leroi-Gourham (1983).

The recording and recognition of the path taken were already present in the topographic memory of primitive man, helping him to locate and orient himself with precision and speed, as highlighted by Vygotsky and Luria (1996). According to Garcia (2005), Konrad Lorenz points out that the ability to explore and record attributes of his territory, its limits and access routes is already inscribed at different levels in the phylogenetic memory. The significant physical nucleus therefore was and is of paramount importance, from which it builds its history. It is in its territory that its roots settle and feed. It is from it that mankind feels more secure in exploring the environment and recording his ways of coming and going.

The articulated and preserved ritual of coming and going repeated in fetching and bringing to oneself, is based on the security of returning to the demarcated territory, which will remain where it is and, therefore, guarantee its reunion. This ritualistic sewing, of coming and going, has a relevant function, since it marks significant places and times and also substantiates the courage to innovate, to explore new paths, to unveil the unknown.

It concludes with the demonstrated precociousness of the mental structure of the child in the sensorimotor period, as well as the relevance of free play for the cognitive and affective-emotional development of the child, starting from an early age. Performing the structural reading of a given situation presupposes, first of all, identifying, verifying, listing and interpreting its various steps in a coherent and dynamic whole, from a logical and significant point of view. For their part, the playing situations are characterized by their great variety and versatility, with their own characteristics according to the child, his time and space lived, and can be analyzed from the point of view of their formal structure, according to cognitive and affective-emotional criteria correlatively.

Play

The structural reading of a playing situation describes the course of events, identifying and predicting their patterns and strategies. It supposes analysis and survey of the categories of action that compose it in its classification and its causal and spatio-temporal ordering (Pontes & Magalhães, 2002). Recognizing matrix discursive structures of playing in its points and modalities of articulation, according to Vorcaro and Veras (2008), is to see symbolic playing as the practice of language produced by the child as an author. The precocity of this achievement is highlighted, since it is considered that in the period of its elaboration, the sensorimotor play already develops a scheme of recursive personal action in space and time, an action that will allow the germination of symbolic play. The relevance of motor organization in childhood and its biomechanical characteristics favorable to healthy development are highlighted by Bigongiari, Cosme and Mochizuki (2009); Teixeira-Arroyo, Feitosa and Gobbi (2009); and Vallis and McFadyen (2005).

The integration of cognitive and emotional processes during early childhood takes place in an

articulated way with the development of working memory (Wolfe & Bell, 2007). Playing, according to Cailllois (1967), implies freedom, spontaneity and pleasure, as well as the right of not wanting to play, and the option to play becomes the main engine of the current improvisation and joy, which the Author designates as *paideia*, which joins the taste for challenge, for solving the unexpected, as well as the *ludus*, which leads to progress in the way of thinking and acting. In this sense, Smith and Gasser (2005) emphasize the fact that intelligence emerges from the children's interaction with the environment, being crucial that, since they were babies, they have grown up in a social and linguistic environment, where they can develop in a spontaneous, flexible and creative way. The need for the children to be respected in their self-determination finds in playing a valuable subsidy. According to Lordelo and Carvalho (2003), the utilitarian framework of play in early childhood education in Brazil, in turn, reveals worrying limitations when playing, such as the absence of recognition of their intrinsic self-motivation, being even advocated the need to be oriented.

For Piaget (1994), the great significance that children attribute to play is generated by the pleasure involved. The repetitive and functional character of the act of playing in the sensorimotor period substantiates and allows the gradual emergence of symbolic play, which rehearses the walking over time. Such ludic situations, in which the children feel safe and free to play what and how they want, are a condition for the formation and manifestation of symbolic manifestations, which are already beginning to emerge, such as pretend play, language, expansion and the use of evocation memory, based on perception, among others. The children's love for repetition, present in playing situations and drawings, is highlighted by Chateau (1987), who points out how early the rhythms become part of the babies' everyday life, who love the cadence of songs and the cradle rocking. The attachment to what is known, to the regular, to the predictable that is repeated, is also evident in the fear of the unfamiliar. When the tension because of the unknown decreases, the attachment to repetitive activity also decreases and children dare to innovate. The role of emotions along with playing is fundamental for memory, attention and learning, and every learning is the source and provider of a historical process, in which affective-emotional and cognitive aspects are intertwined in a

continuous and dynamic way (Gray, Ambady, Lowenthal & Deldin, 2004). Every playing situation assumes space and time, variables that can be investigated from different angles and dimensions in relation to behavior, and be addressed in their seasonality, duration, spatial orientation, interaction, or in many other ways. In children's plays and activities the time limit is very scarce, perhaps because time is an abstract category that needs codes and devices to be dimensioned. Regarding space, however, its demarcation is very precocious, with the phenomenon of territoriality being observed in the occupation of spaces by children, with psychosocial and communication implications, involving sharing and distancing, approximation and separation (Carvalho & Pedrosa, 2003).

Kurt Lewin and the topological view: a brief introduction

Lewin was a passionate defender of freedom and democracy, which he considered essential to life, and particularly to learning. In his view, human behavior is structured and seeks balance in the face of the complex field of environmental forces. Its concept of self-organization finds similarity in the one advocated by theorists of complexity theory (Sarayreh, Khudair & Barakat, 2013). Lewin, according to Burnes (2004), seeks to formulate rules of interaction between individuals and not for an entire population. It considers this interaction based on self-organizing natural nonlinear systems.

He based his work on the theory of relativity and quantum physics to create his field theory, which studies behavior in a natural context, seen as dynamic, in which each of its parts interacts all the time with the others. He used the concept of "force field" to explain the various environmental factors of the present moment, which act and influence the behavior. Among these factors, basically there are those that attract us because they are pleasurable and offer no risk, with positive valence, and those that have a repulsive effect, having negative valence, valences that can be changed according to the needs of the organism at the moment. The field undergoes a constant restructuring but, in general, the aspect marked by the arrival becomes dominant. He considered the organism as a closed system, which is preserved as a separate whole with regard to the environment, a definition that varies according to the

situation. In the case of children, this variation would be even greater, as this border line would be being built, and in certain situations, they assert themselves and act spontaneously, while in others, under great tension, they are unable to organize themselves actively with regard to the environment (Lewin, 2014).

According to Lewin (1973), the application of mathematics to psychology may be related to an empirical problem or to pure mathematics, both, however, related to each other. Despite the indeterminacy and possible instability of psychological situations, the vital space can be considered to be structured to a certain degree with the possibility to determine the direction and distances within it, which is already enough for a psychological situation, in which there is always a structuring of the person in his space.

Lewin, as a neogestaltist, emphasizes the force field of the environment in which the organism needs a closure, to protect its autonomy, according to Von Bertalanffy (1971). On the other hand, it focuses on the openness nature of the system, a condition for its survival, through continuous exchanges with the environment. As Oliveira (2020) summarizes, both see the organism as an eminently interactive and dynamic system that is preserved and developed thanks to continuous and complementary movements of opening and closing with regard to the environment. From a rhythmic movement, from a pulsation in and out, it starts to self-regulate, gradually increasing its capacity to self-inform and to perceive itself as a whole, at the same time separated and interactive with the environment. Burnes (2004), more recently, resumes Lewin's trajectory and his contribution to the organizational view, recalling that it has undergone major changes in the last 20 years, due to the theory of complexity. He emphasizes, however, that the discussion and distance between these two approaches is currently undergoing a revision, since both are seen as having consistent common points, which suggests a new reading of Lewin today.

Lewin's psychology (1973) is based on topology, a science that studies the possible spatial relationships between the various regions contained in a person's psychological environment, considering the changes in connection that have occurred as the most important. Such topological relations suppose to take into account the spatio-temporal articulation and can

benefit from their mathematical transcription. It derives its conceptual set of experimental investigations and does not propose to promulgate a new system, but rather, to describe a tool, through which one can represent the psychological reality. In this sense, it highlights the main characteristics of this approach, which aims to build a cohesive, representative, constructive structure and derived from psychological processes. According to Lewin (2014), the adaptation to what he calls psychological vital space includes characteristics of the subject and the environment, and proceeds according to the method of successive approximations. The behaviors that occur in the vital space depend on the situation. The impressions that the person has when entering and moving in an environment depend on the presence and location of other people and objects in the place. His perception and representation of that moment and that specific space are also related to his mnemonic records and his emotions.

Locomotions are the most suitable procedure for assessing the qualitative characteristics of each region, considering not only the physical displacements, but also verbalized and ocular ones. Related regions are those that suffer mutual influence. A space of free movement may be interrupted by "forbidden islands", as they are called, that is, regions classified as high risk. One region can influence another, which is called degree of communication. Regions of greater unreality, which here we can even consider make-believe plays, have in general a greater degree of fluidity. Locomotions are considered as events carried out in a temporal process and are independent of their speed. The fluidity of a situation depends on the ease of its changing conditions. Physical and/or emotional factors, such as fatigue, insecurity and anxiety, can cause instability in behavior. In short, if we choose a mathematical language, the behavior, C, is in function of the interaction of the person, P, with the environment, A, that is, C = f (PA).

Next, this approach is illustrated by an experience report of ludic observation of an 18-month-old child, followed by structural analysis, with focus on her spatio-temporal construction. It is emphasized that this observation was performed in a familiar environment to the child, by two psychologists, one of them being already known by the child, here named E, and the other, unknown to the child, named O. The ludic material consisted of objects of a human-like

body scheme (a doll, a bear and a small pillow with a cord tied up simulating a doll); in addition to a basin, a shoe box, a small rug (continent material) and graphic material (crayons and sulphite paper). Due to the richness of the behavior observed, it was chosen to transcribe it step by step, trying not to lose its guiding thread, so as to better illustrate its structuring.

> "Since the beginning, Sand, here called S, has been active in posture. In a brief visual recognition of the environment, she attributes valences to the regions, according to her memory, being positive to two regions: E (the one she knew), where she came to sit very close to her, thus configuring her territory, O, and P/D (playing and drawing material region). Negative valence is attributed to O (the one she did not know), avoiding any kind of contact. Then, she makes three similar dislocations, round trip, between her territory, S, and P/D to search for toys with a body scheme similar to the human, that is, the doll, the bear and the doll-pillow. She avoids looking and passing near O".

The structural analysis of this playing situation reveals since the beginning Sand's great mental agility when assigning valences to the people and objects that are present, based on her life experience, which allowed her to demarcate her territory and thus configure her connectedness with the regions occupied by E and by P/D, both with positive valences. Such an agile and precocious demarcation of her territory provides her emotional security. It also assures her of the possibility of getting around and returning, whenever the level of risk increases, since she already mentally articulated the desire to fetch toys, as confirmed subsequently, without running the risk of passing through the region occupied by O. Considered risky, it thus has a negative valence, becoming what Lewin calls the "forbidden island", with which the person avoids any type of contact, including the visual one. In this beginning of the protocol, the active role of Sand is observed, which is already articulated in space and time, outlining a network, by giving the organizing character of memory the ability to recover what it needs, to define its territory and organize its movements and actions.

In this sense, no data when perceived and recorded is neutral, being evaluated by the different subcortical and cortical levels. The living experience is slowly mapped into the brain, which builds an organized record, relating objects to each other, contextualizing them. Mind maps are similar to the graphics we see, they have landmarks and connections. The selection of a space as its own (the territory) is fundamental for the determination of other landmarks related to it and the possibility of outlining ways of coming and going. The network of contacts with defined valences is then fundamental. Regarding Sand, the same was observed: the demarcation of her territory very close to E, whom she trusted and knew well, and being attentive to her surroundings, building a dynamic and flexible network between her memory and her perception, all the time worked by her heuristic intelligence. A territory is not perceived in isolation, but as part of a system formed by other neighboring territories. Every constitutive process takes place in a historical sense, with retro and proactive ties, keeping the body of stored experiences active, and every action is based on retroactive reports. There is, therefore, a dynamic and extremely flexible web between memory and perception, worked all the time by heuristic intelligence. As Winnicott (1975) recalls, in a small child, the personal organizing nucleus at the beginning is coupled with a nucleus that it feels as its protector, maintaining constant distal and proximal contacts. The living experience is slowly mapped into the brain, which constructs an organized record, relating objects to each other, contextualizing them.

> "Next, based on the mapping of different spaces, new displacements begin. Sand performs a ritual of comings and goings in search of more ludic and graphic material, selecting possible places to put the 'babies' to sleep, as noted below, such as the basin and the rug. There is a criterion in this choice, based on an object-spatial serial correspondence, term by term, which obeys the criterion most similar to a baby: this way, the doll is placed on E.'s lap, the bear, in the basin, and the pillow, on the rug, both rectangular. She manipulates graphic material".

Vygotsky and Luria (1996) emphasize, just like in the little child, the excellence of the topographic memory of the primitive man, with the recording and recognition of the environments traveled, which helps him to locate and orient himself with precision and speed. The ability to explore and to record attributes and physical relationships of the territory itself, its configuration and demarcation of boundaries, as well as the access and exit routes, is already inscribed at

different levels in the phylogenetic memory itself, as Lorenz points out (Garcia, 2005). In this protocol, similarly, the recursive ritual of searching for toys made possible by the connectedness of the regions, which predisposed to free movement, took place in a cyclical temporal ludic sequence, with a predominantly rhythmic character, data that confirm the child's love for repetition, also emphasized by Chateau (1987), as well as by his attachment to the known and fear of the unfamiliar. Such a confluence of rhythmic, intentional and emotional functional components in Sand's ludic structuring, already shows common structural elements similar to the musical, as described by Bisham (2006a), as well as the fact that ludic mental processing involves the integration between structural and syntactic components (rhythm, structure, intentionality) of brain functioning, as it happens with musical processing, as already verified (Sarayreh, Khudair & Barakat, 2013; Tomaino, 1998). It can also be noted that the Lewinian temporal process of locomotion does not depend on its speed in topological reading; however, it is important to emphasize, as Segre (1986) reminds us, that it is in the temporal dimension that the repeated phenomena also occur, which make possible to reinforce facts that have occurred and to provide new ones; therefore, it can be noted in the symbolic playing situation that had been prepared since the beginning, developing in space and time, concomitantly, according to two interwoven plots, with beginnings in different times. That is, as a ludic action is being fully developed, that is, a child is put to sleep, another is already outlined, the power to go drawing. It is as if Sand were putting together a significant larger set, articulating two smaller ones. For Piaget (1994), the semiotic instruments that comprise the mental image of evocation and imagination, language and symbolic play, are being constructed as the physical organization takes place through the action of the child. The possibility of coming to symbolize becomes effective as the body awareness, now nascent, perceives the object as permanent, recognizes it from different angles and learns to locate himself in immediate time and spaces and relative to his practical life.

"With 'the children accommodated', with pencil in hand, she goes to the P/D region. She explores various ways of drawing with pencils, on paper, on the floor, in the air. With loose movements, at the same time she keeps her expression focused on what

she is doing. She moves around the room again, now with paper and pencil in hands. She looks at the closet. Sits in her territory, S, and watches the pencil in her hand and the pen in E's hand. She goes to the closet, stick the pencil in the keyhole and also her little finger. Then she gets back to S. Draws on the paper. Takes the pencil case and a few pencils fall through the opening. Then she tries to put her hand inside the box. Draws on the box. She plays with putting the pencils in and out of the box".

Her capacity for observation and comparison between what she does and what she sees someone else doing, and so she tries to imitate, is already observed here. Imitation precedes and substantiates the formation of mental images. It is the attempt to reproduce with the body what is good in the other, which is meaningful to her, which allows the little child to internalize her action and to store - in an imagetic mental process, which will enable her to reproduce without seeing further. This is the case when S is attentive to the way E holds the pen and her manipulation of the crayons to scribble. In the same way, when it is observed that Sand, only 18 months old, finds and explores different possibilities of fitting/penetrating the pencil and her own hand, in different openings, such as the pencil case and the lock of the cabinet. In my opinion, she is a great researcher! She also alternates these moments of exploration with those of drawing, varying the places where she scribbles and the colors of the pencils. The rhythmic character prevails in her behavior, and the alternation of situations of exploration that demand greater reasoning and concentration, alternate with free moments of leisure and relaxation, such as scribbling.

"With the doll in her lap, she plays with E of "giving and taking back the pencils", in a cheerful, flexible and quick way, varying the places where she puts the pencils. Near the end of the session, E communicates briefly with O, which causes the immediate interruption of S.'s activity. After the break, however, she picks up the basin and plays hide-and-seek with O, using the basin to hide. She smiles, relaxed, with loose and happy movements. On the way out, she gives E a hand, smiles and waves goodbye to O".

She reconciles symbolic play with exercise play, which already indicates her satiation, considering that the symbolic play demands greater mental

structuring. In this way, it is observed how the cyclical character of repetitive-sensory-motor play, as well as cradling the symbolic play in its imaginary climbing, accompanies it in its decline, as if helping the child to step on the ground again, leaving the ground of imagination. On this return, she maintains ludic contact with E, who provides her security and support. The end of this session also highlights her great capacity for emotional mental reformulation, since she overcame the fear of O, with ludic rhythmic behavior of hiding and showing herself to her, where her joy predominates.

The data resulting from this experience were not expressed in mathematical language in order to facilitate their reading, since the use of verbal discourse for their description is also offered by Lewin. The experience reported above highlights the importance of the child's life history, of her affective-emotional memory, the basis of her mental organization, which decisively contributes to her spatio-temporal organization. Such topographic organization finds similarities in the survey of the causal and spatio-temporal organization, as mentioned by Pontes and Magalhães (2002), as well as recognized rhythmic structures in sensorimotor play, and matrix discursives, in symbolic playing as a practice of language. In general, it emphasizes the precocity and relevance of sensorimotor play, which substantiates the symbolic one.

The transcription of the experience report described above, as well as the recording of many other ludic events, which allow its registration and analysis for a new reading with mathematical analysis, becomes opportune, including with an algorithmic language. Harari (2015; 2017) highlights the role of algorithms in the 21st century. He also defines them as a set of steps that can be used in calculations, as well as to make decisions, which can be followed countless times, with small differences, obtaining, in this case, slightly different results. From the 50s and 60s on, he recalls that they have also been used taking into account the role of emotions in the organization of action, in intersubjectivity, memory of life, imagination and creativity.

An algorithm, in short, turns out to be a finite sequence of rules, ratiocinations or operations that, applied to a finite number of data, allows solving. The narrative description becomes a form of mathematical representation, in which the algorithms are expressed in natural language, step by step, followed by their resolution. Clarity in its linguistic expression is required, in order to avoid distortions of interpretation. The flowchart, in turn, uses graphic elements.

Still in this sense, it should be recalled that, based on Lewin's mathematical spatial analysis, Bärbel Inhelder and others (1996) developed a game that aims to analyze the way a person thinks and acts to achieve a certain objective by means of spatial displacements, which, recently, was named Topological Trail Game, and implemented in digital form by Barreira, Marques, Oliveira and Motta (2012).

Final considerations

It is curious to observe how, after each new reading that is made of an experience observation already carried out, the possibilities to expand, diversify and deepen our analysis are verified. Just as the recursiveness of the sensorimotor period leads to the symbolic reading, throughout life, the act of doing a theoretical analysis again and again seems to break our resistance, widen and deepen our gaze, find new paths and possibilities. And it is in this sense that I see this structural analysis described here, which exposes the incredible mental capacity of an 18-month-old child from a less favored socio-economic environment, who is barely beginning to speak and who is already organizing herself in life in a so creative way, clearly demonstrates her ability to organize herself in time and space in an articulated, dynamic and functional way, a mental evolutionary heritage that is its due by the long human conquest throughout History. Such a finding, I believe, highlights the relevance of a more agile and broader treatment of data about it, made possible by the current resources of information technology, hence, they were suggested at the end of the text.

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