




ROCK ART: THE BODY CULTURE OF MOVEMENT BEFORE BRAZIL

ARTE RUPESTRE: A CULTURA CORPORAL DO MOVIMENTO ANTES DO BRASIL 

ARTE RUPESTRE: LA CULTURA DEL CUERPO DEL MOVIMIENTO ANTES DE BRASIL 

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Abstract: This investigation discusses the relationship between the body culture of movement and two rock art scenes located in the Parque Nacional Serra da Capivara, (Serra da Capivara National Park) - PNSC, in the state of Piauí, Brazil. The scenes depict a flic flac and a human pyramid, which have been accepted in contemporaneity as gymnastics and acrobatics. An interdisciplinary theoretical apparatus based on Physical Education and its relationships with Archeology and Anthropology was used in the analysis. The analysis is based on inferences, as nothing guarantees that the hands that portrayed the scenes had the same intentions as the authors of the research. One of the findings understands that motor skills helped the daily demands of adversity for the survival of the group. In another point of view, based on the llinx concept, flic flac satisfies the search for a trance/vertigo vital to ritualistic liturgy, and the human pyramid serves the imperative task of consolidating cooperative bonds and trust between its members in a hostile environment.

Keywords: Flic Flac, Acrobatics, Rock Painting, Culture.

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[...] the reshaping of the hand,
and above all the development of that
special skill that we have of being able to put the tip
of the thumb in contact with the tips of any other fingers
- a skill that allows us to perform manual operations with versatility
and unparalleled dexterity in the field animal kingdom [...]” (Tim Ingold,
2015, p. 70).
And that’s what made rock art possible.

1 INTRODUCTION¹

The present study intends to address the relationships between corporal practices, movements, and rock art present on the rocks of the Parque Nacional Serra da Capivara, (Serra da Capivara National Park) – PNSC, in the state of Piauí, Brazil. In the scenes painted on these rocks, it is possible to denote the presence of a series of themes from the daily life of the indigenous people who occupied this region in a remote period of history.

There are thousands of archaeological sites with records of this production and others with traces of ancestral human action, such as bones, ceramics, and lithic materials, composing the context of the very ancient occupation of Brazilian History. This evidence demonstrates that there was a socio-cultural construction that extended over thousands of years. In some cases, it is possible to infer that the activities took place more than 10 thousand years ago in Terra Brasilis (OLIVEIRA; JUSTAMAND; FUNARI, 2019).

Among the various daily activities, there are rock scene representations of hunting, sexual acts, rituals, dances, breastfeeding, multiple forms of the expression of human sexualities, and, finally, body movements, taken to be gymnastics and acrobatics in contemporary times. It should be noted, however, that these are interpretations, inferences, and conjectures. It is not certain that whoever produced these images had the same intention and concern to show what it appears to be today.

It is known that all humans have had the same mental conditions (BERWICK; CHOMSKY, 2017) and capacity for knowledge (MORIN, 2005) for at least 100 thousand years. Therefore, it must be remembered that, at the moment, we are exactly the same animal that we were at least 50 millennia ago; we simply know more now than ever before (LEAKEY; LEWIN, 1988). In other words, our ancestors were as intelligent as we are today (ZERZAN, 2006).

This text sought to make inferences regarding certain scenes representing body movement practices. Among the scenes, those that attracted the most attention in the fieldwork carried out in the late 90s of last century and in the first two decades of the current century were the scenes of movements or “gymnastics”². The investigation

¹ We use the nomenclature of Rock Art to influence the recommended by the International Federation of Rock Art Organizations - IFRAO.

² Here, in quotation marks, considering the use of the term as anachronistic, but, on the other hand, making it intelligible to associate it in the context of the assertions contained in this paragraph.

sought to address these practices shaped on the rocks from an interdisciplinary theoretical apparatus, based on Physical Education and its relationships with other disciplines, notably Archeology and Anthropology.

2 STARTING THE CONVERSATION

“And on the other side of the river were many of them, dancing and diverting themselves before one another, without taking each other by the hand, and they did it well. [...] and they were delighted and laughed and accompanied him very well to the sound of the pipe”³ (GEBARA, 2005). The two periods portrayed in Pero Vaz de Caminha’s letter to the King of Portugal describe the first contacts of the colonizers with the population that held the primacy of the lands today called Brazil. It is considered by Gebara (2005, p. 2): “a testimony of the primeval roots of physical activities in the country by its indigenous inhabitants”. The author emphasizes that the narrative of Caminha (1500) cannot be mixed with what is currently called the body culture of movement or, in her words:

[...] with the current sports practices nor with the leisure activities of the present times, the manifestations of dance and physical abilities were noted with emphasis by Caminha. At the time, swimming, fishing, hunting, canoeing, running, bullfighting, and horseback riding were physical activities of Brazilian Indians relevant to the maintenance of their lives, the search for food, and protection. But, on the other hand, they reveal the universal and historical existence of homo *ludens*, the human being who plays in permanent contrast to the struggle for survival (GEBARA, 2005, p. 2).

Regarding Gebara’s (2005) statement, for the first recorded occurrences of physical activity in the country, it is suggested that the author committed a factual time lapse. It can be explained that long before the scene described above by Caminha (1500), our ancestors may have developed what are contemporaneously known as manifestations of leisure and adventure in nature. These are referenced in the “graphic representations of the social representations of the ethnic⁴ groups that performed them” (PESSIS; GUIDON, 1992, p. 20). This was in course much earlier than that reported by Caminha, in the region where the PNSC⁵ is located. The present work will discuss the relationship between the body culture of movement and two rock art scenes present in the PNSC, leaving a posteriori to explore dance, rituals, and manifestations of leisure and adventure in nature, such as hunting, among other possibilities within this mix of activities. It should be emphasized that the rock scenes of body fights configured as “games” have already been examined (PAIVA, 2019, 2021; PAIVA *et al.* 2022).

3 Letter from Pero Vaz de Caminha to the king of Portugal in 1500.

4 The works of Pessis (2003, 2013) indicate relational inferences from the SCNP paintings with indigenous ethnicities, especially in relation to rituals, based on existing ethnography. Morales Júnior (2002), in turn, carried out this approach considering, mainly, the mask rituals performed in the Alto Xingu.

5 To better understand the creation of the Parque Nacional Serra da Capivara, (Serra da Capivara National Park), see Almeida and Justamand (2021) and. (Cotes *et al.* 2021).

Although there are five rock art traditions⁶ in the PNSC called Nordeste (Northeast), Geométrica (Geometrics), Agreste (Wild), Itacoatiara do Oeste (West Itacoatiara), and Itacoatiara do Leste (East Itacoatiara), this study focused only on paintings from the Nordeste⁷ tradition. These are “characterized by the wealth of information represented through human figures and everyday scenes that often offer an impression of movement” (JUSTAMAND, 2014, p. 121).

The Nordeste tradition is formed, among others, by themes of anthropomorphic figures⁸ with easy visual and thematic recognition, such as hunting scenes, dance, ceremonies, and sexual scenes. The tradition covers the states of Rio Grande do Norte, Pernambuco, Bahia, Sergipe, Paraíba, Piauí, and northern Minas Gerais in Brazil. The scenes are elaborations from the work of researchers Niède Guidon, Sílvia Maranca, Anne-Marie Pessis, Susana Monzon, Laurence Ogel-Ross, and Bernadette Aranud, possibly originating in the state of Piauí. The main sub-traditions⁹ of this tradition are Salitre and Várzea Grande¹⁰, located in the PNSC. However, there are others located in the region between Rio Grande do Norte and Paraíba (Seridó Sub-tradition) and in the hinterland of Bahia and Chapada Diamantina (Central Sub-tradition), covering the northern region of the state of Minas Gerais (GUIDON, 1991; MARTIN, 2008; PESSIS, 1999).

This text does not intend to exhaust the interpretative discussion on the relationship between rock art and physical activity or the body culture of movement, but to be a preliminary appreciation of this nexus from the point of view of the area of knowledge of Physical Education.

Nevertheless, “the cave paintings are aesthetic representations of life, human actions and tasks, and their most sensitive desires. They are expressions of human needs” (JUSTAMAND, 2014, p. 120); moreover, “they were able to guarantee the satisfaction of man’s organic and emotional needs, as demonstrated by the scenes of courtship and collective arousal” (JUSTAMAND, 2006, p. 32).

In the field of Physical Education science in Brazil, numerous authors have long reflected on the movement of human beings (BETTI, 1994; BRACHT, 1999; FREIRE, 1989; KUNZ, 1991; TANI *et al.*, 1988). Some of these researchers did not discuss or deepen the concept of culture, as Daolio (2007) suggests. In this regard, the present study does not intend to delve into the field of these terminological and conceptual discussions. On the other hand, there are paleoanthropological theories of human evolution¹¹ with distinct historical views that involve bipedalism, encephalization,

6 For a brief description, “Tradition” refers to the visual representation of an entire primeval symbolic universe (natural and imaginary), which may be millenary (PESSIS, 2003).

7 In the PNSC this tradition is predominant, dated between 15,000-6,000 years B.P. (PESSIS *et al.*, 2018).

8 Stylized rock record of human figure – head, trunk and limbs (MARTIN, 2008).

9 “Subtradition” is a denomination introduced to define a group detached from a tradition and adapted to a distinct geographical and ecological environment, implying the presence of new elements (PESSIS, 2003).

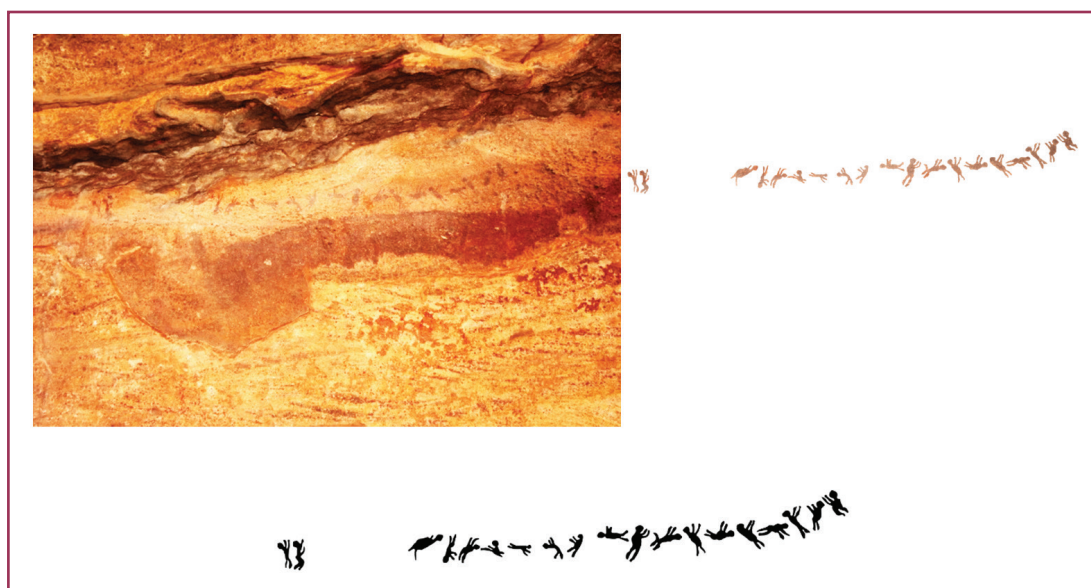
10 It is composed of three styles: Serra da Capivara, Serra Talhada stylistic complex, and Serra Branca (GUIDON, 1991). It should be noted that “Style” corresponds to the most particular class resulting from changes in a sub-tradition, denoting differences in technique and graphic presentation, with thematic innovations reflecting the creative manifestation of each collective (PESSIS, 2003).

11 In this text, the word “evolution” is anchored in Herbert Spencer’s definition, not in the sense of progress, but in the meaning of events that select adaptations to the local environment as a result of the changes produced.

terrestriality, and civilization. Although anthropologists disagree with the sequence of these four episodes in the evolutionary process, there is a certain consensus that these facts were present in how *Homo sapiens*' evolved (LEWIN, 1999). Furthermore, upon admitting the sequence of civilization, the process of culture of this human being is recognized, to the point where Geertz (1989) defends that it is the cultural human brain.

Freire (1989) admits the absence of movement patterns, given the various cultures existing in the world, where social, economic and cultural discrepancies are observed, which in itself would make the methodization of these movements unfeasible. The reflections of this text are similar to those of Daolio (2007), in defending the cultural human being from a denser description permeated by anthropology, immersed in subjectivity. The question remains as to what one should subjectivize or reflect on in regard to the rock art scenes found in the PNSC. In response, specifically, the scene depicted in Figure 1, similar to the sequence called flic flac¹², will be considered for analysis¹³, as will the scene in Figure 4, analogous to the current denomination as the human pyramid – a collective manifestation considered for centuries as acrobatic.

Figures 1-3 - Scene that suggests a flic flac sequence (Figure 1: below left. Note: contrast increased by 50% in Microsoft Word); cutout in detail (Figure 2: below right), and vectorization¹⁴ (Figure 3: in black and white, below the two previous figures).



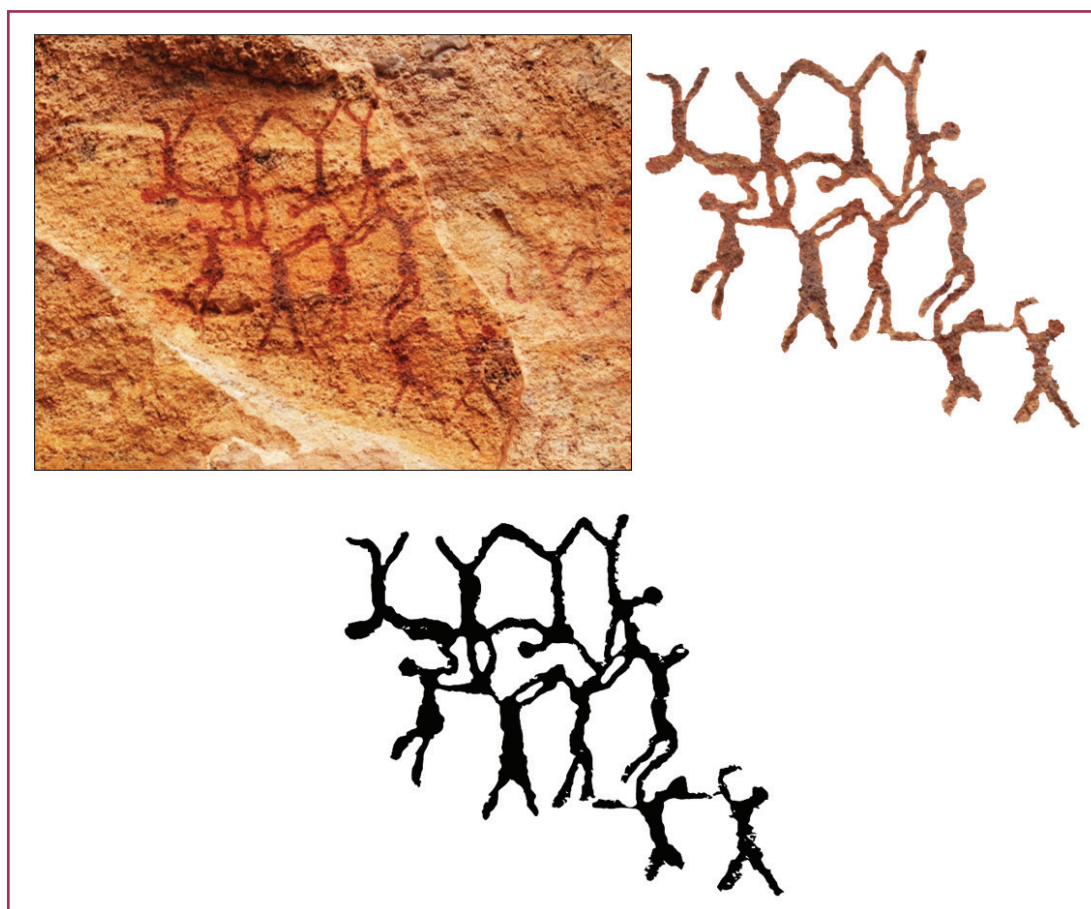
Source: Marcial Cotes (Photography). (Toca da Fumaça 1 Archaeological Site – PNSC, Brazil, 2015). Cutting and vectoring: Iasmine Orleans Pinheiro Monteiro.

¹² Nomenclature of this movement in Artistic Gymnastics.

¹³ For this undertaking, in addition to *in-situ* field research, image processing (cutting and vectorization) was subsequently carried out so that they could be better analyzed.

¹⁴ Also denominated “segregation” or “graphic etching”. In summary, this is a technique using a program or software to transform an image into essential points and lines, with a view to separately modifying its elements: “...automatic or manual highlighting of the colors (brightness, contrast, saturation, level adjustment by color). The application of color curve effects to highlight the paintings and carry out the elaboration of virtual tracing through the color selection tool (edit, rotate, move, recolor, among other changes)” (SILVA, 2012, p. 65).

Figures 4-6 - Scene that suggests a movement analogous to acrobatics with the formation of a human pyramid (Figure 4: below left. Obs.: contrast increased by 40% in Microsoft Word); cutout in detail (Figure 5: below right), and vectorization (Figure 6: in black and white, below the two previous figures).



Source: Marcial Cotes (Photography). (Toca do Boqueirão da Pedra Furada Archaeological Site – PNSC, Brazil, 2015). Cutting and vectoring: Iasmine Orleans Pinheiro Monteiro.

3 DISCUSSION

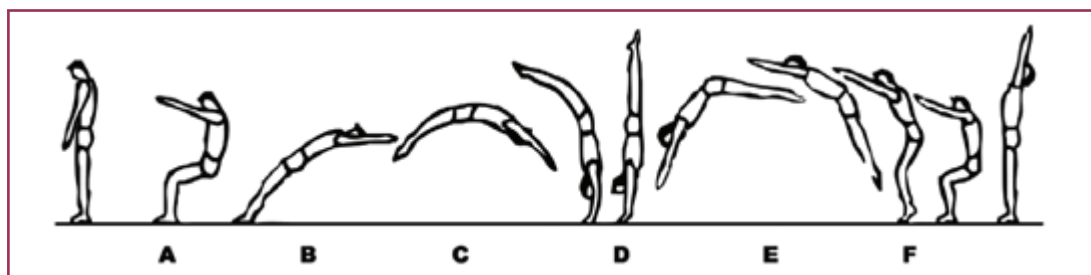
Apparently, the two rock art scenes suggest an expression of physical activity, within the contemporary context that is known and proposed to interpret, that is, flic flac and the human pyramid, permeated by the general theory of gymnastics. Modern gymnastics began with the development of “its activities in theatre, music, and dance” (LANGLADE; LANGLADE, 1970, p. 39). In this study, the proposal is to take the understanding beyond the performing arts, bringing the body culture of movement shaped by Physical Education to the discussion.

To explore the two scenes, it may be more productive to refer to the past to infer what reality our ancestors lived in, befitting at least one question: what demands were necessary for survival? To answer this, the researcher needs to reflect and ponder in an attempt to produce a meaning for the scenes within the context that has taken place. Therefore, we intend to make an analogy with what is called the body culture of movement, emphasizing that the body is the human being’s way of being in the world and that each group builds its body from its beliefs and customs. The body is like a crystal ball that serves to see the society where it was built, and the body

culture of movement encompasses all the bodily manifestations of a society. When observing something that can be associated with a *flic flac* and a human pyramid in the cave paintings, it is assumed that this culture of movement is something specific to the species and that it has been installed for a long time, only adapting to social changes in historical time.

Therefore, from the rock art scene in Figure 1, a typical exercise of contemporary artistic gymnastics can be inferred. Nevertheless, for comparative purposes, Lovencchio *et al.* (2013, 293) describe the sequence of movements (Figure 7) as follows: “The flic flac is a full-body rotation around a horizontal axis, with an inverted intermediate handhold (IIH). It consists of two flights, the first going from the feet to the hands, the second from the hands to the feet”. When carrying out a comparative analysis, considering the past, the scene can be considered an unpretentious exercise designated in contemporaneity as *flic flac* (LOVENCCHIO *et al.* 2013), even though the sequence of 19 anthropomorphs in the highlighted painting (Figures 1-3) does not suggest the same order proposed by Lovencchio *et al.* (2013).

Figure 7 - The six phases of the flic flac technique according to Lovencchio *et al.* (2013, 294), namely: 1st backward projection; 2nd take-off; 3rd first flight; 4th inverted handhold; 5th second flight; 6th final position.



Source: Lovencchio *et al.* 2013.

Returning to the previous question of what possible demands were necessary for survival? The apparently simple question brings complex reflections to understand the scene and attempt to deduce its purpose in the past. It is evident that, in the past, motor skills such as speed, dexterity, reaction speed, strength, and endurance, determined the opportunity to survive, given the hostile environment our ancestors lived in, corresponding to a process of natural selection, that is, the survival of the fittest (DARWIN, 2009). However, what is the point of performing a flic flac to survive this past moment in the exposed scene? The movement recorded in the rock art of Figure 1 for the purpose of preserving life seems paradoxical since the primordial thing was to run, to have muscular/cardiorespiratory resistance, to know how to throw efficiently, and to be able to dribble adversity. Thus, a flic flac would not contribute in a utilitarian way to these demands. Also, considering that the scene in Figure 1, apparently, would not represent a “mystical adornment, but an instrument for the realization of man in his environment” (JUSTAMAND, 2014, p. 126), what social fact was the flic flac intended to represent regarding the conditions lived in that past time? According to Justamand (2014, p. 127):

[...] the rock inscriptions recorded the knowledge accumulated and improved over time, expanding the forms of communication and enabling the survival

of ethnic groups. They therefore function as testimonies of prehistory and marked the collective memory in their scenes. Furthermore, their shapes signaled the identity of each group.

Considering the previous statements and, in an attempt to deepen the above fragment to the discussion, Ingold (2007) is used in complement, to reflect and extrapolate on at least one elementary movement: walking. The author explains that the five senses of sight, hearing, touch, smell, and taste are present in the process of walking, and together and practiced synchronously, they support the ability to reason and acquire learning. Such perceptions entail the requirement to look at the world that makes up the surroundings, always with the observing subject in motion in order to perceive and appropriate the information coming from their surroundings.

Following this line of reasoning, for Ingold (2015, p. 36), from this perspective within an ecological analysis, human beings ‘deftly perform within and through their surroundings, employing capacities of attention and response that have been, through their development, embodied through practice and experience’. In this complex movement of perceiving our surroundings, we are exercising a sensitive aptitude to know and experience preconscious learning skills that demand constant communication with the other, who is also in the environment adjacent to ours during displacement in the experienced world (JARVIS, 2015). Returning to the scene, would the subject who performs the flic flac have the unique and exclusive function of educating or transmitting information on the life path that they intend to follow to the younger ones? Based on the above, it can be reasoned that, in the same way that Gaspar (2003) admits that there was the role of the expert who produced the cave painting, it can be accepted that there was a “specialist” in movements. When considering this reflection, it is possible to infer an answer, in a way, to the initial question. Based on the opinions of Ingold (2015) and Jarvis (2015), the character in the scene develops two essential items of knowledge to maintain life in the reality of the flic flac painting. First, the capacity of perception, directly persuaded by the second, namely, the movement, considering that this enables us to grasp the world, otherwise, in contrast, we would be dependent on perceiving the place where we remain static.

This same perception translates into complete body satisfaction during the action of moving around the environment. “Observation implies movement, that is, locomotion with reference to the rigid environment because all observers are animals and all animals are moveable” (GIBSON, 1979, p. 72). Furthermore, if perception is attributable to movement, it can be deduced that perceiving “must, at least in part, depend on how we move” (INGOLD, 2015, p. 88).

From another perspective, when consulting Caillois (1990) and his four game definitions – Agôn/competition, Alea/luck, Mimicry/simulacrum, and Ilinx/vertigo – it is possible to perform another interpretation of Figure 1, by resorting to the concept of Ilinx. Ilinx is used in reference to other cave paintings present in the PNSC, diagnosed as “the ritual and/or ceremonial forms with religious aspects of these peoples” (JUSTAMAND, 2014, p. 123). In his work, “Man, Play, and Games”, Caillois (1990, p. 32) describes the meaning of Ilinx as: “we play, provoking in ourselves, through a

rapid movement of rotation or fall, an organic state of confusion and disorder (Ilinx)". When comparing the images that Justamand interprets as "ritual and/or ceremonial", is it legitimate to suggest that the flic flac could be a moment of preparation for these liturgies? Ilinx fits into a form of clash, where vertigo is sought, or a state to annihilate, for a moment, the solidity of the human being's sentient capacity with the sole purpose of "inflicting on lucid consciousness a kind of voluptuous panic" (CAILLOIS, 1990, p. 43), in other words, something perfectly acceptable, for example, in incorporation into a ritual trance.

In another focus of analysis, while flic flac refers to a possible individual acrobatic movement, the same cannot be said about the human pyramid. This configures a collective movement suggesting previous rules common to collaboration, that is, running the risk of injuring some of the participants or even of the acrobatics not taking place, in the case of disrespecting these determinations in the pyramid. Inferences can be evoked by swinging more toward collaborative games – as is conventional in Physical Education (ALENCAR *et al.*, 2019). The main purpose would not be to compete but to provide an atmosphere of cooperation and assistance among the participants, whose scope would fall on solving the task with effective mutual collaboration. Despite the fact that human pyramids were made both for entertainment and for military purposes (access to high places) in the Middle Ages, in this specific period of rock records in the PNSC¹⁵, playful scenes are more relevant¹⁶, as attested through several surveys carried out in the PNSC (PESSIS, 2003, 2013). However, without access to the codes/symbols of those past groups, this question will forever remain open.

In this preliminary hypothesis, both the flic flac and the pyramid could be shaped into a human impulse without any apparent or immediate use - the simple pleasure provided by these activities. In this regard, Bartra (2014, p. 197) states:

[...] we can recognize that playful activity is closely linked to neuronal circuits. [...] is a tendency to fill a void, to complete through [...] the game what is not possible to achieve through innate instinctive impulses present in the brain networks.

Cooperative (and competitive) games (playful or otherwise) can be considered elements of the exobrain, serving to fill gaps, or rather, spaces that remain incomplete in the brain, which otherwise would not be filled to satisfaction (BARTRA, 2014). In common with the two scenes analyzed in these pages, lies the fact that "playful behavior erupts in current daily life" (BARTRA, 2014, p. 196). Furthermore, for the author, it does not go unnoticed that ludic activities are distinguished from the neuronal mechanisms that trigger fright, fight or hunt, inherent to these situations. Indeed, they would produce an emotional locus free from apprehension, stress, restlessness, or fear.

15 Period corresponding (Figures 1 and 4) to the oldest relative dates – Nordeste Tradition/Serra da Capivara Style (PESSIS, 2003, 2013).

16 According to Pessis (2013, p. 125), at the time of the Serra da Capivara Style (12,000-9,000 B.P.) "the staging overflows with joy and playfulness".

4 FINAL CONSIDERATIONS

This investigation aimed to analyze two rock art scenes from the body culture of movement, namely, the flic flac and the human pyramid, located in PNSC archaeological sites. It is important to point out that the study has the perspective of inference, given the impossibility of affirming that the interpreted pictures had the purpose of expressing what they appear to suggest in contemporary times.

Do the authors propose to return to the reality of the moment of the scenes to try to reflect on how the ancestors lived and what demands were required in order to survive? In modernity, the movements perpetrated in the images denote what is known as flic flac and human pyramid. The first is a rhythmic gymnastics exercise, and the other is an acrobatic scene that fits within the concept of the social meaning of the body culture of human movement.

Some assumptions were suggested from the culture of homo sapiens and their natural movements portrayed in the reality of the historical time of that society. When considering the hostile environment of the recorded instant and the search for adaptation to the difficulties, in an ecological analysis, the representations of the images may be the construction of a life path for the acquisition of skills through experiences that, in some way, helped in the unusual daily tasks of the period, whereby survival required a complex framework of motor skills for group continuity. This intricate foundation of knowledge imposed the requirement of physical, communicational, sensitive, and pre-conscious aptitude of the collectivity to interpret and act based on the stimuli of the natural environment and its adversities because to perceive the surroundings it is crucial to move.

By employing the llinx interpretation, flic flac could be kinesis to give rise to the trance/vertigo of a ritualistic liturgy. On the other hand, the human pyramid is inferred from the prism of strengthening cooperative ties with the aim of aggregating them to tasks that require trust among its members.

It is opportune to highlight that it is not plausible to affirm the symbolism of societies so distant from the current knowledge of life. Thus, it is suggested that further studies be carried out in order to broaden the horizon of possible interpretations of the analyzed scenes.

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Resumo: A investigação discute as relações entre duas artes rupestres – flic flac e a pirâmide humana –, admitidas na contemporaneidade como ginástica e acrobacia, localizadas no Parque Nacional Serra da Capivara – PNSC, no Estado do Piauí, Brasil, e a cultura corporal do movimento. Utilizou-se de um aparato teórico interdisciplinar fundamentado na Educação Física e suas relações com a Arqueologia e Antropologia na análise. Trata-se de inferências, pois nada garante que as mãos que retrataram as cenas tinham a intencionalidade dos autores da pesquisa. Uma das ilações entende que as habilidades motoras auxiliavam as demandas do cotidiano de adversidades para sobrevivência do grupo. Por outro prisma, a partir do conceito de llinx, o flic flac atende a busca de um transe/vertigem vital a liturgia ritualística, e, a pirâmide humana serve a imperiosa tarefa de consolidar os laços cooperativos e de confiança entre os seus membros em um ambiente hostil.

Palavras-chave: Flic Flac, Acrobacia, Pintura Rupestre, Cultura.

Resumen: Esta investigación discute la relación entre la cultura corporal del movimiento y dos escenas de arte rupestre ubicadas en el Parque Nacional Serra da Capivara/PNSC, en el estado de Piauí, Brasil. Las escenas representan flic flac y pirâmide humana, que han sido aceptadas en la contemporaneidad como gimnasia y acrobacia. Se utilizó en el análisis un aparato teórico interdisciplinario basado en la Educación Física y sus relaciones con la Arqueología y la Antropología. El análisis se basa en inferencias, nada garantiza que las manos que retrataron las escenas tuvieran las mismas intenciones que los autores de la investigación. Uno de los hallazgos comprende que la motricidad ayudó a las exigencias diarias de la adversidad para la supervivencia del grupo. En otro punto de vista, basado en el concepto llinx, flic flac satisface la búsqueda de trance/vértigo vital para la liturgia ritualista, y la pirâmide humana cumple la tarea imperativa de consolidar lazos de cooperación y confianza entre sus miembros en un ambiente hostil.

Palabras clave: Flic Flac, Acrobacias, Pintura Rupestre, Cultura.

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CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest in this study.

AUTHOR CONTRIBUTIONS

Marcial Cotes: Author of the main writing base and the selection of bibliographical references, carried out the field work to collect the images, made the revision and translation of the text.

Leandro Paiva: Writing, revision, selection of bibliographical references and vectorization of images.

Artemis de Araújo Soares: Contributed to the development of the writing of the text.

Michel Justamand: Performed the writing, indicated bibliographical references and revision of the manuscript. **Gabriel Oliveira:** Contributed with writing, bibliographical references and revision of the text.

Vitor José Rampaneli de Almeida: Contributed to the writing, prepared the layout and final revision of the text.

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EDITORIAL RESPONSIBILITY

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