Analívia Cordeiro

Seeking Cyber-Harmony:
A Dialogue Between
Body Awareness and Electronic Media

Course/Program: Communication and Semiotics

PUC/SP

São Paulo

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SUMMARY

This thesis has four complementary items: the sites http://www.duCorpo.com.br and http://www.notaanna.com.br, the DVD duCorpo and the written theory. To assimilate its content, you have to read the texts and exercise your body.

To put this research into perspective, I observe today millions of people who are affected by the daily use of electronic devices. This routine infiltrates the human relationships, arousing the need for reflection about its influence on people's behavior.

These instruments dictate physical and emotional behaviors which mold the body, transforming them into daily habits which can cause suffering and pain, such as tendinitis. In other words: if we consider the body as a bone structure, covered with skin and full of diversified tissues, we can say the daily use of this body can change its structural and functional features. So, although these tissues are naturally made to resist mechanical efforts like bending, twisting, tearing and pressing; their structure and behavior can change chronically, if they are excessively taxed by repetitive efforts.

Within this point of view, this study intends to contribute to personal equilibrium in the sphere of body movements. Nowadays there are many suggestions for equilibrium; from medical treatments to religious rituals – but there are no proposals for a computer-aided organically balanced use of the body. The DVD duCorpo is a proposal in this direction. It associates corporal practice with the electronic language in a way the body can creatively experience a wholesome life involving the physical, mental, sensitive and emotional aspects.

In order to do this, we use the following theoretical tools: Endobiophilia, Eutonia, the Feldenkrais Method and the Laban Method, in the corporal consciousness field; and Nota-Anna, in the technology area, a software to read, write and learn body movements

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Instructions on the Thesis

"I had the feeling that no words we could say would be as eloquent as that simple interaction, so I gave a slight bow and moved on to the next man."
(Golden, Arthur; Memórias de uma Gueixa; São Paulo, Editora Imago, 1998, pag. 326)

This thesis consists of four interconnected elements: the websites http://www.duCorpo.com.br and http://www.notaanna.com.br (which includes the Nota-Anna app), the duCorpo DVD, and this written theoretical development. These components complement one another, meaning that a proper evaluation of this work must encompass both the textual and visual elements, as well as the bodily practice. Without experiencing these elements firsthand, it is impossible to fully critique this thesis.

The procedural criteria for this multi-action process are personal; however, I recommend extending the bodily practice for at least seven sessions, on non-consecutive days. I note that bodily evaluation may manifest as a sensation or integrate with a person's prior knowledge. In fact, "the knowledge of a trained activity remains available for use even long after it has been acquired. This indicates that the knowledge has been consolidated." (Damasio, 1999, p. 299). Such knowledge may have been acquired at different stages of life, including early childhood.

In any case, absorbing the content of this thesis should be accompanied by moments of introspection, as my work is concrete but not literal.

To conclude, I leave you with a proverb a student once taught me: A tree that falls makes more noise than an entire forest that grows.

Introduction

"Thinking about our future, our attention tends to be drawn to the curiosity surrounding inventions and discoveries yet to be made. However, this focus can be limiting. We need a broader perspective that situates future discoveries within the treasures left to us by past experiences, possessions, and ideas." (Arnheim, 2000:168)

In today's world, millions—perhaps billions—of people are affected by the continuous use of electronic devices in their daily lives. The dominance of technology permeates human relationships, making it essential to deeply reflect on the influence of these instruments on human behavior. *"Cyberculture presents itself as a partial solution to the problems of the previous era, yet it also constitutes a vast field of issues and conflicts for which no clear global solution has yet emerged. Our relationship with knowledge, work, employment, money, democracy, and the State will have to be reinvented, to mention just a few of the most brutally challenged social structures."* (Lévy, 1998)

Focusing exclusively on aspects relevant to this thesis, an insightful author on the subject states: *"Time spent on the internet is not passive. It is active time. It is time spent reading. It is time spent researching. It is time spent learning, improving, and solving problems. It is time spent analyzing and evaluating. It is time spent forming thoughts. It is time spent writing."* (Tapscott, 1998: 8). He further adds: *"When N-Geners[1] are online, they expose themselves... self-expression is a priority for those who use these means of production."* (Tapscott, 1998: 68). *"The vast majority of N-Geners do not consider communication levels or age differences. They see access to information and the right to express their opinions as fundamental."* (Tapscott, 1998: 70). Thus, the internet has embedded itself into people's lives not only in professional settings but also in personal aspects, such as dating, creating projects, shopping, conversing with friends, and expressing opinions or emotions.

Technological innovations have introduced new modes of communication, both significant and foundational to our society. *"A new youth culture is emerging—one that encompasses far more than pop music, MTV, and movies. In a broad sense, this new culture is defined by social behavior patterns, habits, and attitudes that are transmitted and shared through codes, beliefs, values, art, knowledge, and social organization."* (Tapscott, 1998: 55).

Among the emerging values, one particularly stands out: the emphasis on the individual as a unique and singular person, rather than merely a member of a mass or social stratum. *"N-Geners will profoundly reshape corporate attitudes toward human resource management, further intensifying the current debate on treating people as capital."* (Tapscott, 1998: 215).

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[1] The author uses the term *N-Geners* to refer to the *Net Generation*, which, according to him, "refers to the generation of children who, in 1999, range from two to twenty-two years old, and not only to those actively engaged with the Internet" (Tapscott, 1998: 3).

Despite the many aspects that characterize this new culture, one fundamental element remains unchanged: the way the human body interacts with machines—now defined as the relationship between the user and modern technological devices. In this relationship, the individual's uniqueness has never been considered essential to productive work. Throughout most of human history, inventors have dedicated themselves to designing machines and tools aimed solely at enhancing the body's performance in its interactions with nature and society. These instruments and machines have relentlessly dictated physical behaviors and emotional constraints, forcibly shaping the body over time. These behaviors, ingrained as daily habits, have rarely been brought into conscious awareness—only becoming evident when they cause discomfort, physical pain[2], or even death.

In other words, in everyday movement, we frequently use our hands or focus our eyes on specific tasks. These routine activities tend to be repeated for long periods. Continuous repetition leads to imbalances in the body, which unconsciously compensates by engaging other areas not directly involved in the action. These repetitive efforts, often performed automatically, can result in various degrees of physical strain and harm.

To gain a deeper understanding of this phenomenon, this thesis considers the body as a skeletal structure covered by skin, containing various types of tissues[3] whose functional and emotional characteristics change depending on daily use. Movement is seen as both a functional and expressive displacement of this bodily architecture.

With this perspective in mind, the previous argument can be refined: although bodily tissues are naturally designed to endure mechanical stress—bending, twisting, tearing, compressing—the way these structures are used can profoundly alter their capacity if they are subjected to excessive, repetitive strain.

Yet, it is often only when excessive bodily strain becomes a problem that people recognize their misuse of the body. In general, *"there are dystonias so ingrained in the body schema that people are not even aware of their existence. If these dystonias lead to reduced joint movement, this loss is not perceived as a limitation; rather, it is assumed to be the natural state of things, as there is no longer any recollection of what free movement feels like."*

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[2] The consequences of these habits vary from person to person, but medicine can identify syndromes and illnesses commonly associated with certain behaviors. One example is carpal tunnel syndrome, which frequently affects computer typists.

[3] The body is composed of tissues and substances with varying degrees of density and fluidity, ranging from water to solid bone.

(Queiróz, 2001: 23). Additionally, many believe that daily tension—despite causing pain or discomfort—dissipates with a night's rest. But this is not the case. While the pain may subside temporarily, repetitive movements or continued emotional stress can turn this tension into a chronic condition.

The knowledge of these bodily dynamics falls within the realm of movement studies, which explore the relationship between physical states, joint health, and muscular behavior. One of the most significant findings in this field is that every sensation, thought, and emotion triggers an immediate muscular response. Thus, during moments of mental stress, there is a simultaneous muscular tension—even if one is not consciously aware of it. One accurate observation states: *"During mental fatigue, attention capacity is altered, leading to the loss of important details. Emotional fatigue disrupts the body's response rhythm and abruptly changes muscle tone, potentially contributing to states of depression or excessive excitability."* (Todd, 1975: 263). Shapiro (2001: 383) further observes regarding modern society: *"Sometimes, the root of a problem is not a single traumatic event but the accumulation of stressful situations. This is especially common in large urban centers and can lead to somatic illnesses, memory problems, or disruptions in social performance."* Regarding bodily movement, philosopher Bachelard (1994: 91) envisions an ideal scenario: *"How much further could psychology advance if we could understand the psychology of each muscle! And how much of the animal remains within the human being! But our research does not go that far."*

As a central example in this thesis, I will analyze a key situation in contemporary society shaped by new technologies: the daily use of computers for several hours. This example is particularly relevant, as the posture and behavior of a computer user resemble those of a laptop user, a player of large- and medium-scale video games, or even someone using a handheld device like a Game Boy—thus impacting a vast number of people.

When observing the physical behavior of such users, the first noticeable aspect is immobility in front of the screen: the hand gripping the mouse or keyboard, the eyes making small lateral movements, the head jutting forward for better visibility[4], the back gradually curving due to prolonged use of the dorsal muscles, the neck retracting, the chest compressing, kyphosis emerging, the lower back tensing, the diaphragm constricting, and breathing becoming more restricted. The posterior leg muscles also contract, and—most concerning of all—this posture tends to persist even after computer use, potentially causing long-term postural fixation[5]. An example: the photo below shows a 20-year-old young man whose posture, although seemingly “normal,” reveals, upon closer observation, the key points highlighted in the description above.

These observations apply to most users, as evidenced by the warning label printed on keyboards: " WARNING Some experts believe that the use of any keyboard may cause serious injury. Consult statement on the back of this keyboard”.

Turning the keyboard over, the message continues: *"*“WARNING: some experts believe that the use of any keyboard may cause serious injury to hands, wrists, arms, neck and back. If you feel pain, numbness, weakness in these areas see a qualified health

[4] "The head is very often in unbalanced positions, either too far forward or too far back, leading to fatigue in the muscles that must support it and causing confusion in the proprioceptive mechanism." (Todd, 1975, p. 101) "When the head is out of balance, the curve of the cervical spine is altered. Consequently, it loses its alignment with the other curves of the spine—the thoracic, lumbar, and pelvic regions—triggering compensatory strain along the entire length of the spine and the supporting legs." (Todd, 1975, p. 104)

[5] The next chapter clarifies this concept.

professional. TO REDUCE THE RISKS OF SUCH INJURIES, FOLLOW THESE PRECAUTIONS

. Take frequent short breaks. Get up and walk around at least a couple of times every hour,

. Vary your tasks throughout the day,

. Keep your shoulders relaxed with your elbows at your side. Position your keyboard and mouse so you don't have to reach,

. Adjust your chair and keyboard so your wrists are straight,

. Avoid rest your wrists on sharp edges. If you use a wrist or palm rest, don't use it while typing,

For additional information that may reduce your risk of injury read the Comfort Guidelines included with this keyboard."

This message does not exempt the manufacturers of this device from responsibility. Given this reality, a fundamental question arises: do modern technological instruments respect the sensitivity of human sensory organs, the physiological, anatomical, and neurological structure of the body, and the unique personal history of each user? I believe they do not.

There are indeed significant differences between the studies conducted in the design laboratories of these instruments and real life. "Very often, real life confronts us with a vast variety of pictorial and linguistic material. We are faced with people and objects; with sights, sounds, smells, etc.; with scenes of varying intensity; and with all kinds of narratives, verbal or pictorial, that we create to accompany them." (Damasio, 1995:50). This richness cannot be fully reproduced in a design laboratory.

On the other hand, with the advancement of technology itself, one could argue that human history has already provided us with enough knowledge to honestly analyze the needs and test the effects of any new instrument from multiple perspectives before putting it into use.

In this context, if today's researchers were to genuinely consider the consequences of their new inventions—prioritizing respect for the biological functioning of the human body over technological acrobatics or short-term commercial success—we could stop treating our bodies as mere primitive machines. Instead, we could act with more meaningful, expressive attitudes, fostering a deeper awareness of our behaviors as we work or enjoy new human-made instruments. We could be truly respected as complex individuals. In

doing so, we would have the opportunity to create daily habits that are more beneficial to ourselves.

Thesis Proposal

This study aims to contribute to personal balance in response to the changes brought about by new technologies, particularly in how they impact human movement. Consequently, it seeks to engage the user as a complete individual. As a result of this research, I present a DVD titled *duCorpo*, which offers body movement practices. Within this theme, I believe verbal discourse alone is insufficient and incomplete, as in the realm of non-verbal language—specifically, behavioral language—what people *do* is often more significant than what they *say*[6]. Thus, this thesis is composed of two complementary parts: the theoretical (verbal) and the practical (non-verbal). The integration of verbal discourse with physical practice forms a unified whole.

The choice of a DVD as the medium for the body movement proposal is justified by the decision to operate within the electronic environment itself—the very space in which the problems caused by technology emerge. Outside this sphere, there are already numerous approaches to achieving balance, ranging from medical treatments to religious rituals. However, there are still no proposals aimed at promoting a new and healthy way for technology users to engage with their digital environment. For this reason, I consider this thesis both useful and necessary.

For users, electronic devices can be seen as intermediaries or semantic filters in their interaction with reality. “It is possible to interpret this romantic construction of nature as both a product of and a reaction to industrialization: the transformation of the natural world into a spectacle or a picnic for a population accustomed to an urban society where meeting basic needs no longer depends on hunting, shelter, or the warmth of a hostile environment—a society in which contact is mediated by multiple layers of technology… In this view, nature becomes an escape, an idealized space, distant from the machine-made

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[6] There is a fable that perfectly illustrates the relationship between verbal and non-verbal language: The cockroach asked the centipede how it managed to move its hundred legs with such elegance, ease, and coordination. From that moment on, the poor centipede never walked again.

artifacts that define people's daily lives at work, at home, in consumption, and in urban leisure.” (Huws, 2000: 33/34). For those born into this scenario, childhood naturally integrates electronic media as an essential part of daily life. “Nowadays, children are so immersed in bits that they think of them as part of the natural world.” (Tapscott, 1998:1).

Thus, I recognize that any proposal aimed at overcoming the limitations of electronic devices must be developed *within* their sphere of influence. Users are unlikely to abandon these technologies in search of an alternative activity unless faced with extreme circumstances, such as a health crisis. As writer José Saramago conceptualizes, culture is like the atmosphere—it cannot be seen or touched, yet it is impossible to live outside of it while still belonging to humanity.

This perspective creates space for the emergence of new content in the interaction between users and electronic devices, complementing the current landscape, which can be described as follows: “The poetic quality of life is the quality we find in communion between people: in celebrations, in fervor, in love, in football, in poetry—in all things that provide emotional intensity. In my view, there is an excess of prose in life because we obey the logic of artificial machines too much, artificial intelligences, without sufficiently recognizing that to live is to expand oneself emotionally and intellectually.” This traditional view of human connection holds great truth, as do observations on the current use of technology. However, there is growing evidence that technology is increasingly entering the realm of the emotional, personal, and intimate in a positive and constructive way. *duCorpo* aims to be a resource in this direction.

Objectives of the Thesis

The practice proposed by the *duCorpo* DVD aims, among other objectives, to bring balance to the user’s daily life by integrating two types of activity: interaction with technology and introspective practices. These could enable a more integrated perception of the world or, at the very least, enrich experiences on a mental, sensory, and emotional level.

I believe that the new generation—one that, on the one hand, is at least superficially familiar with meditation practices or "Eastern philosophy"[7] and, on the other, is deeply immersed in video games, computers, virtual reality, and so on—would have no difficulty in merging these two practices, provided they are properly guided. Moreover, *"N-Geners also have a strong interest in body image and health."* (Tapscott, 1998: 204). Therefore, this approach could integrate into a new universal cultural form, marking another step in the history of human affectivity and self-knowledge.

This shift is already beginning to take shape in other spheres of new technology: *"What not long ago might have been considered an inconsistency in design programming is now seen as a necessary and welcome boldness. Not necessarily in terms of functionality or technical predictability of systems, but rather in the fact that subjective elements are beginning to be incorporated into the development of products and technology. Less as war strategies and perhaps more as consumer strategies, it seems that things are blending together. The individual has never been such a valuable target."* (Mello, 2002). And further: *"The term 'affectionate computing' is being used as a 'hype' way to describe something that our instincts—perhaps heightened by the very absence of clothing—can provide us with in an extremely efficient manner."* (Mello, 2002).

Expanding Beyond Academia

Beyond the academic sphere, another goal of this thesis is to reach children, preteens, and teenagers. As a justification, I have sought not only theoretical foundations—the most common approach in academic theses—but also personal testimonies. One example is from 16-year-old Lauren Verity, quoted in Tapscott's book (1998: 292): *"I think the Net is probably changing the nature of childhood because it opens the world to everyone. We can access any information in any field, even those that previously didn't interest us. Now I think we are starting to be interested in these areas."* (Tapscott, 1998: 292). Another example comes from Thomas C. Guedes, an 11-year-old boy who, after being punished by his mother and forbidden from playing on the computer, said: *"Mom, you took away*

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[7] Today's young people *enjoy* practicing meditation or other deep introspective activities, whether passive or physically active, such as martial arts.

everything I have in life." Or the words of Patrícia, a fashion student, reflecting on her personal life: *"I need a password to enter another moment of my life."* These testimonies, among many others we hear and read daily, reveal the fundamental role of technology in young people's lives.

From a theoretical perspective, a striking daily habit in the lives of these young people is the lack of frequent physical movement. They spend hours playing, researching, socializing, or working in front of a screen, where their eyes follow the movement of a character (or car, or piece of information) on the monitor, and their fingers press buttons, controlling this virtual world. The rest of their body is left "any which way," reflecting the tendencies already described in the case of a computer user[8].

Across all age groups, we observe that in virtual culture, physical mobility has diminished in favor of the virtual mobility of information. This trend originated in postmodernity and with the emergence of new urban characteristics. *"The city has transformed the experience of time. It has created a sense of neurasthenia; that is, an excess of stimuli has given rise to new forms of perception, such as an enhanced peripheral vision and the ability to capture fleeting images, in contrast to the contemplation that characterized earlier periods. These are the hallmarks of the information culture, where time and space blur together, and a fixed sense of reality is lost."* (Folha de São Paulo, 1998: 11). The urban environment, combined with new technology, continuously stimulates vision at the expense of physical movement and other bodily senses.

In practical terms, both games and electronic devices available on the market offer users fixed rules and predetermined possibilities. New discoveries are not part of the equation. Consequently, users who play for more than an hour a day—a very common occurrence—develop a limited repertoire, which in turn influences their daily lives. This behavior is reflected in how young people use their bodies, with consequences that are quite serious, as adolescents deprived of the opportunity for broad physical movement experience developmental limitations on multiple levels.

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[8] Complaints of cervical and lumbar pain are already being heard from adolescents—symptoms that are typical of the posture described a few pages earlier.

In this context, I would like to highlight one of the fundamental differences between knowledge and information. *“Information is the abstract translation of an event. Knowledge means experience, delight—it means touching the ‘body’ of a thing. To truly know something, time is needed. One must have lived it; mere exposure to the flow of information is not enough.”* (Beraldi, 2000: 11). I can confirm this assertion after more than twenty years of teaching the art of movement. I have observed that children or adolescents who do not experience reality through physical movement fail to discover their individual potential, limiting their ability to make life rich in mental, motor, and emotional possibilities. As physician and psychologist Henri Wallon states: *“Joy is born from the possibility of movement.”* (Wallon, 1995: 120).

Given this already established reality, which is particularly impactful in childhood, psychologists ask: *"Children develop certain spatial operations at different stages of development. They deal with distances, directions, and relationships between objects in their world. How is this process affected when children engage in the virtual world?"* (Tapscott, 1998: 102). I do not intend to answer this question, but I observe that it is an inquiry that should be appropriately explored in the coming years. I simply highlight that the purpose of the DVD touches on the future of our society.

duCorpo is a body practice with a pedagogical character, among other aspects. Its objective in this context is broad, but I would like to emphasize its relevance specifically to our country. In Brazil, educational plans are formulated at various levels of society, within extensive and widespread perspectives, as suggested by the statement: *"The aim of using these new technologies is to generate significant innovations in educational processes—innovations capable of ensuring that education more clearly meets the aspirations and needs of human societies in this new global scenario, where knowledge and the ability to learn and create solutions are essential aspects of development and well-being for populations and nations.[9]”* (Scavazza, 2003: 40). He further adds: *"We then face two fundamental issues: technological development, which will continue to produce increasingly sophisticated yet more affordable products, enabling a larger portion of the*

9 "Distance education was introduced into the Brazilian educational system at the end of 1996 with the enactment of the Law of Guidelines and Bases of Education." (Machado, 2003: 38)

population[10] to access computers, the internet, and transmission networks; and the growing demand for education, training, and skills development, which is already immense and will only continue to expand[11]." (Steil, 2003: 38).Within this landscape, Total Body plays an educational and constructive role.

Another objective is leisure, creating the possibility for a purely playful, free, and light-hearted engagement with an electronic device—stepping away, even if briefly, from an attitude of relentless conquest and instead embracing a mindset of pleasure and inner self-confidence. This means allowing our desires, needs, and curiosities to flow naturally, without the physical and mental constraints often imposed on us. The attitude of relentless conquest—and often violence—dominates much of the content produced by new technologies, whether for professional or consumer use, whether for work or entertainment. This mentality has become a defining characteristic of the social behavior of a large portion of technology consumers across all age groups.

In terms of research and non-commercial initiatives, a conscious and well-structured approach is necessary. “Network communication creates a world that, in many ways, exists parallel to the real world—an extraworld, one that only occasionally intersects with reality. The greatest transformations might be happening right before our eyes, through the projection of all human activity onto the web and the reduction of both work material and biological matter into binary information. What remains is the need to process this transformation conceptually, sensorially, physically, and emotionally.” *(Beraldi, 2000, p.12)*. Movement, when properly guided, is an essential element within this reality.

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10 An example: In 2001, a Xavante indigenous teenager brought his tribe online. Tserenhihi, at just 16 years old, conceived and helped produce a CD-ROM about his culture and tribe in less than four months. He assisted his father in writing the texts in Portuguese, edited the images and sounds, and personally narrated all the texts in Xavante.

[11]1992: The first internet network is installed in major Brazilian universities. There is no graphical interface: the monitor, monochrome, displays a black screen with green letters and numbers, accessible to a restricted group of interested individuals. All they do is exchange emails.

1993: The first mobile phone operators emerge.

1995: The Ministry of Communication and Science authorizes the commercial use of the internet in Brazil.

2000: The first providers of free internet access appear. Providers offering high-speed internet via fiber optics arrive in Brazil. Currently, these connections reach 4% of the country's population. (Folha de São Paulo, January 28, 2003, page 10, Folha Sinapse)

Another goal is bodily aesthetics, with the intent of making advanced body techniques more accessible, as they are currently limited to individuals with high purchasing power[12]. The practice of physically shaping the body dates back centuries. One of the first choreographers of the 16th century, Jean-Georges Noverre, stated: “You see, sir, that in order to dance elegantly, walk gracefully, and present oneself nobly, one must completely overturn the natural order of things. Through long and strenuous dedication, we must force the body to conform to a new condition, utterly different from the one originally received.” *(Monteiro, 1998, p.312)*

This tendency has only intensified in the 21st century. The overvaluation of the body has become a focal point for media attention and economic investment[13]. In major metropolitan areas, we observe a dual reality: on one hand, a lifestyle characterized by unhealthy habits (sedentarism, stress, smoking, poor diet, etc.), often reinforced by technological advancements that encourage physical inactivity; and on the other hand, a pressing need to construct a socially acceptable body—one that can be displayed, even if achieved through artificial means such as prosthetics or extreme muscle-building regimens[14]. This imbalanced approach to physical training is part of a broader cultural landscape. As personal trainer Nuno Cobra insightfully notes: “Due to our increasingly artificial modern lifestyle, we continuously violate all natural laws of sleep, nutrition, relaxation, and basic health care. However, the body is resilient; sometimes it takes 20 or 30 years for these negative habits to manifest as illness[15].” *(Cobra, 2002, p.12)*

Among these basic health principles, regular and well-guided physical activity plays a crucial role in maintaining flexibility and balanced muscle tone. This can be achieved

[12] I observe that this DVD is a low-cost material with content equivalent to two months of daily lessons.

[13] Fashion is considered the second most profitable business in the world today.

[14] Currently, in São Paulo, there are over six hundred registered gyms.

[15] It's not the main subject of this thesis, but I would like to mention the relationship between physical health treatments and spiritual healing. Since the Greeks, this connection has been explored. Plato stated in his discourse that medicine should be an analysis of the total human being and that healing should address the soul. Socrates went even further, saying that it was impossible to treat the body without treating the soul, which was the reason many diseases elude medical treatment—because doctors often fail to understand the whole person, and a part cannot be well when the whole is not. It is from the soul that all the ailments and benefits of the body and of man, in general, originate. It is essential to treat the soul with utmost care if we want the head and body to remain in good condition. The most common approach to such treatment remains the use of beautiful arguments, words, and physical behaviors that can foster self-knowledge, transformation, and temperance.

through numerous techniques, as long as they are practiced consistently, without excessive strain, and—most importantly—with pleasure.

Unfortunately, this approach to physical exercise is becoming increasingly rare. “The culture of the body is not a culture of health, as it often claims to be. Instead, it fosters a closed, toxic, claustrophobic system. Within this unhealthy environment, social symptoms such as drug addiction (including the misuse of hormones and anabolic steroids), violence, and depression thrive. These are clear signs that when life revolves around the mirror, it becomes dangerously devoid of meaning.” *(Kehl, 2002)*

It is crucial to invest in educational processes that promote critical awareness and discernment regarding the benefits of regular, guided, and—above all—enjoyable physical activity**.** True beauty stems from a sense of well-being, encompassing both physical appearance and the pleasure of feeling good in one’s own body. Érika Mourão Trindade Dutra highlights this perspective: “Our body is a source of pleasure and happiness, constantly going through different phases—each one unique, with its own beauty. It is in continuous transformation and construction. Becoming aware of this and embracing these changes means reclaiming the full experience of being human.” *(Dutra, 2000, p.40)*
Total Body is entirely aligned with this philosophy.

Thus, Total Body aims to contribute to the development of a balanced physical, emotional, and mental state through relaxation techniques, flexibility training, muscle toning, and enjoyable movement, all guided through audiovisual instruction delivered via electronic media.

To achieve these goals, proven theoretical and practical methodologies are necessary. In the realm of body awareness, I have selected four techniques, and in the field of new technology, a motion learning and reading software—both of which will be presented in the following sections.

2. Theoretical Tools

The selection of four body awareness systems – the Laban Method, the Feldenkrais Method, Eutonia, and Endobiofilia – as the theoretical tools of this thesis is based, first and foremost, on my personal bodily experience, which shaped the conception and realization of this proposal. My knowledge of these methods came through extensive personal practice[16] combined with theoretical studies, and the absorption of their content is the product of using my own body in tandem with intellectual information, resulting in what I believe is a complete and legitimate body of knowledge.

Secondly, this selection was based on the possibility of a scientific approach to bodily work through these systems, which operate on the neuro-anatomical-physiological structure of the body and treat movement as an objective language in time/space. This is essential because this proposal, aimed at a general public, requires control over its predictable effects on users' bodies, both in the short and long term.

The movement software to be used is Nota-Anna, conceived by me in collaboration with electronic engineer Nilton Guedes[17]. The design of this software was specifically created to read movements for the purposes of learning and body training, perfectly aligning with the objectives of this thesis.

I observe that a creative approach to body language, such as DuCorpo, must seek theoretical-practical foundations that have, at the same time, experiential depth. I could never have conceived this work without the maturity gained from decades of teaching people of various age groups, as well as personal experimentation in fields such as dance or body therapy, which involved extensive observation of both my own body and those of others. This is because to feel non-verbal language, one must simply live it in everyday life, but to understand it, one must live it consciously. From this latter form of experience, one can read or write, or translate into verbal language – and in this specific case, into an academic form – any content considered meaningful.

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[16] I have been practicing Laban for 40 years (with professional training), Eutonia for 15 years (with professional training), Feldenkrais for 20 years (with some interruptions), and Endobiofilia for 2 years.

[17] For more information, please refer to the website http://www.analivia.com.br or the book/video: Analívia Cordeiro; Nota-Anna – An Electronic Notation of Human Body Movements Based on the Laban Method; São Paulo, Annablume Publishing, 1998.

I clarify that the body communicates per se in a language where all its parts and details compose a message. Body language encompasses all movements, from the most subtle and delicate, almost imperceptible, to the most expansive and exaggerated, which make a strong impression. Considering that no movement is ever exactly the same as another, the study of this language can detect the specific manifestation of each movement. This is the central objective of research into non-verbal communication, which includes several disciplines such as psychology, psychiatry, anthropology, sociology, ethology, and movement consciousness research. Each of these disciplines has a different focus. Psychologists, when observing body movement, generally select behavioral units to analyze: eye contact, smiling, touch, or combinations of these elements. Psychiatrists, like psychologists, agree that the way a person moves provides clues about character, emotions, and reactions to those around them. Anthropologists have analyzed the different cultural languages of body movement and discovered that an Arab, an English person, an African American, or a white person of the same nationality do not move in the same way. Sociologists have observed and described a kind of subliminal etiquette to which all of us are subject, shaping our behavior on large and small scales. Ethologists, after decades of studying animals, have uncovered startling similarities between non-verbal behavior in humans and other primates. This phenomenon has led them to study how people court, raise children, fight, reconcile, and so on. And movement consciousness researchers aim to understand the internal processes of the body, with a neuro-physiological and/or philosophical approach, that guide movement in objectively structured space/time. Under any of these approaches, specialists base their work on the concept that what people do is often more important than what they say.

I will now present the content of these tools, but I emphasize that any doubts about their understanding should be resolved through practical and kinetic experience of the body, or even intuitive engagement by the reader. I do not recommend heavy mental gymnastics, as this subject does not belong to an exclusively rational universe.

2.1. Body Awareness Methods

"It is not only perceptual moments, simple physiological moments – although these are underlying everything else – that seem to constitute the core of our being, but moments of a distinctly personal kind." (Sacks; 2004: 11)

The systematization of body language began at various points in human history. Classical ballet began in the 15th century, martial arts are millennia old, sports have developed since the 18th century[18], and gymnastics emerged in the 19th century. The central goal of systematization has always been controlled and technical improvement in executing body movement. The factor that differs is the destination of each area, which could be art, self-defense, sports competition, or body health, defining the target audience, which could include future professionals in dance, martial arts, sports, or simply amateurs.

In this thesis, the focus is on the general public. The systematization of movement practice for these individuals emerged with gymnastics in the 19th century in several European countries. "In its development as a model of body education, as a pedagogy, gymnastics prioritized a scientific knowledge located primarily in anatomy, physiology, hygiene, and mechanics, drawing on music to explore the possibilities of the body in motion. Science and technique seem to have always been present to affirm it as a tool for acquiring health, aesthetic formation, and training. They are primarily present to reveal gymnastics as a protagonist of what is rational, experienced, and explained." (Soares; 2002: 18). Based on these principles, body training was practiced in schools, clubs, and homes during the 19th and 20th centuries, and continues today in most institutions.

As a complementary reaction to this training, in the mid-20th century, scholars added the spontaneous and emotional expression of body movement in opposition to the mechanical and rational view proposed by gymnastics and other movement systems like classical ballet. This perspective, put into practice over the years, resulted in a new branch known as body awareness.

This brief explanation historically locates the body awareness methods within the framework of understanding movement both as expressive language and as a health approach. The central point of body awareness as a discipline is the concept of the human

[18] "Modern sport developed from the 18th century in close relation to the development of English capitalist society [...] and was fundamentally built from activities related to the entertainment of the dominant classes during their leisure time and popular games [...] The development and expansion of sport occurred against the backdrop of the modernization process of the 19th and 20th centuries [...] Many of the characteristic elements of modern society, particularly industrial capitalism, were incorporated into and/or present in sport: focus on performance and competition, the scientificization of training, bureaucratic organization, role specialization, pedagogization, and nationalism – the latter being central to the expansion of sport promoted by the Olympic movement. This form of physical practice, with these characteristics, i.e., focused on performance and competition, began expanding from the 19th century to Europe and transformed throughout the 20th century into the hegemonic content of movement culture worldwide." (Bracht, 1997: 95-97)

being as a unit where everything is interconnected and interdependent—whether body/mind, individual expression/systematic organization, perception of the external world/internal organism, material reality/spiritual world, etc.

One of the pioneers in this research said in 1937: "Relaxation is the watchword of our time, but what it is and how to achieve it is still an unanswered question." (Elsworth, 1975: xiv). In this search, some researchers have achieved profound and effective results, with a common characteristic: the valorization of the individual in their unique and personal action alongside the scientific foundation of body movement, aiming to lead to self-knowledge[19]. In practical terms, this simply means that the student can develop according to their possibilities, not aiming for a pre-established result. They have the opportunity to develop their capacity for self-observation and observation of their environment and the people around them, acquiring behavioral flexibility.

In a statement about physical activities for laypeople, an expert says: "Self-knowledge generates pleasure, even if this knowledge about oneself involves confronting the body's limitations and difficulties. Only from this awareness can strategies for dealing with the situation be devised [...] the very nature of physical activities offers various opportunities for self-knowledge. The activities may involve the desire to overcome challenges, to interact, to be accepted by peers, to play with the body, to feel attractive, to surpass oneself. ... It is important to remember, however, that self-knowledge through body movement is not the result of any physical activity and also depends on how it is performed and perceived by the individual practicing it." (Lee-Manoel, 2002: 36/37). What is being said here is not the simple substitution of one activity for another, but a change in how it is practiced, so that the new method, conscious and flexible, can even be more effective than the old, mechanical, and repetitive one.

Thus, changes in the distribution of muscular activities are not consequences of movement per se. Changes only occur when consciousness is directed toward the movement of the studied part. And this alters not only the studied part but also the organization of the entire musculature and other tissues of the physical body and mind.

[19] "Self-knowledge is characterized by the human being's ability to build an internal representation of the universe and also an internal representation of oneself." (Lee-Manoel, 2002, p. 34). How to operationalize this process will be explored next.

"The significance of practicing movements with body awareness lies in the fact that they transform the person, leading them to create an experimental trajectory that allows for a new body-movement image[20], that is, altering their mind-body relationship. 'Developing the mind means developing representations that become conscious as images, giving the organism new ways to adapt to the environment that were not contained in the previous genome.' (Damasio, 1999: 229).

As a practical result, there may be more harmony in daily life, especially in urban centers, where the excess of stimuli and obligations generates stress, potentially trapping it and even leading to its own destruction. Moshe Feldenkrais reinforces this point of view: 'The theory of degeneration is nothing more than the admission of ignorance about how to effect the changes we want in our minds to satisfy our yearning for happiness... It seems we know so much, but we are still unable to use our knowledge to live a full and satisfying life. It is important, therefore, to discover exactly what the elements responsible for this deplorable situation are, and if we know, we can control it.' (Feldenkrais, 1979: 10).

Another result to be achieved extends to professionals: nowadays dancers, fighters, athletes, and others attend body awareness classes to optimize their movements and expressions or recover their bodies injured by excessive training characterized by mechanical, segmented, and exhaustively repeated movements.

Before presenting the body awareness methods used in this work, I would like to suggest reading the appendices on homeostasis, consciousness, bone structure, movement, and skin, which are key elements for understanding any of the methods presented below.

I will present these methods in alphabetical order, as I do not consider one more important than another. On the contrary, each has left its mark and contributed to the development of this work."

[20] See appendix on Consciousness.

Endobiophilia

This technique was created by Odile Vaz-Geringer. A brief description of her journey reveals that she attended medical school in Paris for four years but, before completing her degree, decided to take a different path. She moved to Denmark to enroll in the Eutony Training Course with Gerda Alexander. As she explains: "Medicine seemed excessively mechanical and theoretical to me. I realized that I wanted to give people the key to discovering their own principle of health. This key also entails the responsibility of each individual to find their well-being and should serve as a clue, a pathway." (Vaz-Geringer, 2003: 7)

During her training, Gerda Alexander asked her to develop a monograph on transport in Eutony, which, according to Odile, refers to the righting reflexes from head to toe. From this perspective, she developed her own way of teaching Eutony. After teaching Eutony for fifteen years, she initiated her own method of bodywork, with the approval and encouragement of Gerda Alexander herself.

The need for this new method arose during her classes when she realized that Eutony did not fully address the demands of modern life. "I noticed that people often have issues with emotional energy loads. And because they do not dare to talk about these loads or mobilize them in any way, they become trapped in the cardiac plexus or in the body's tissues. Instead of remaining elastic, these tissues become increasingly rigid. I also realized that solving this issue is not just about talking about repressed emotions, but about finding keys to dissolve these energy loads." (Vaz-Geringer, 2003: 8)

For her, the elasticity of all body tissues—the skin, muscles, tendons, ligaments, veins, arteries, supporting connective tissues, fasciae, and bones—is one of the keys to bodily fullness. A person who constantly acts out of duty gradually loses their elasticity. Another key is the fact that the body inherently possesses all the means to resonate and experience life. Based on these principles, Endobiophilia works on the overall fibro-elasticity of the body, including the muscular, osteoarticular, circulatory, and lymphatic systems.

As a rule, the greater the tissues' capacity for compression, the equally complementary and proportional is their elasticity. Elasticity presupposes two opposing yet complementary

actions: compression and expansion (or relaxation or stretching). When a person relaxes their tissues, they move from the interior of the body toward the exterior. By loosening their cells, they increase the space between molecules. When compressing the tissues, the opposite action occurs. Thus, by compressing, the possibility for expansion is created. The more one contracts, the more they expand afterward. This generates a spring-like movement that spreads through all body parts and tissues, creating a spiral resonance within the space occupied by the body. A relevant example concerning bone tissue: from the perspective of bone architecture, the movement of the pelvis while walking combines three undulating movements forming a spiral. These occur simultaneously: a side-to-side sway, a forward and backward tilt, and an upward and downward motion, creating a spiral. This concept of spirals can be applied to the movement of the entire body, introducing the idea of a spring to describe movements executed with the proper use of the body's structural integrity.

The reach of the concept of elasticity extends, as mentioned, to all body tissues. Experiencing this concept concretely leads to a holistic awareness of the person as a whole. According to Odile, "The human being is filled with elasticity. When one becomes aware that this is the soul of emotion, they connect with their own life." (Vaz-Geringer, 2001: 109)

In her work, Vaz-Geringer addresses emotions as key elements, as we will explore later. However, what stands out in her discourse is how she specifically refers to affectivity: "Love is greater than thought or understanding. It is the strongest energy that exists in the world... The more a body moves with grace and fluidity, the more it is inhabited by love." (Vaz-Geringer, 2001: 121)

Thus, by encompassing the physical, emotional, and mental body, she seeks the wholeness of the human being. Referring to this broad scope, she frequently cites a quote from Jung: "It is not about being a perfect being but about being a complete being." (Vaz-Geringer, 2001: 111)

Thus, the term that designates this method of body awareness is justified. Endobiophilia is a word of Greek origin where *endon* = from within, *bios* = life, and *philos* = friend, thus signifying respect for inner life, listening to what lives within our body, and understanding what it needs to live well with ourselves.

In practice, Endobiophilia functions as a pedagogical approach conducted in groups, aiming to provide individuals with the key to body awareness, which they can integrate into their daily lives according to their personal rhythm.

The class unfolds in two interwoven phases: listening and expression.

Listening aims to lead to the discovery of:

- The inner space, vibrant from the skin's surface to the depth of the bones;
- The skin, which is elastic and leaves an imprint on the ground;
- The tissues, which also possess elasticity and require water, space, and air to breathe;
- The bones, forming the deep support structure, also elastic. According to Odile, bones form two axes: the vertical and the horizontal. Experiencing the vertical axis fosters the connection between sky and earth, leading to balance and grounding while encouraging the body's upward and downward sway. Experiencing the horizontal axis allows the freedom to open the arms and connect with others. This dual-axis concept is frequently employed in the exercises of this phase and serves as one of the pillars of her work;
- The rhythms experienced through the respiratory wave and the internal, personal rhythms, which fluctuate according to activity, emotion, and environment; She explores this concept in her exercises, frequently referring to the respiratory wave;
- The content repressed within each person, causing tensions in the tissues, including the muscles. In this phase of listening, the goal is to unconditionally welcome one’s bodily reality, without molding or judging it, in order to truly know oneself, treating oneself with gentleness and care.

In this phase, various objects are used, such as gas-filled balloons on which the body lies, releasing its weight without bursting them. At other times, the tissues of a partner’s body are compressed as if squeezing a sponge, then slowly released, allowing the "sponge" to expand and fill again. Many exercises involve refined and scientifically guided touch, always aiming for tissue elasticity through movements that have a bouncing and reverberating effect, like a spring. Everything is done with great subtlety and delicacy, producing a deep effect on every sense of the body.

The next phase, expression, consists of externalizing what has been repressed for years and imprinted in our tissues. This is achieved through free movement, respecting one's limits while reaching the deep bone structure. The movement and the body's sound come charged with emotion and color. Sound releases the plexus, diaphragm, torso, and lower jaw. In this phase, participants dance freely to music, expressing emotions openly and with sophistication. If necessary, there is a space afterward for conversation, allowing verbal expression of what still needs to be clarified or experienced in the group. As one student put it, if compared to clothing, the sensation that Endobiophilia brings is that the seams of the garment have been widened.

An important observation is that the studies on elasticity refer not only to body movement but also extend to various aspects of life, including nutrition. Unlike Gerda Alexander, who was a vegetarian, Odile advocates for the consumption of meat, as proteins are the fundamental basis of cellular life and allow for tissue elasticity. To be well-adapted to life, one must maximize the variety of protein sources in their diet[21].

Endobiofilia is still in development, and with each period, Odile makes new discoveries. It is still too early to formulate principles and rules, and, in this case, perhaps a rigid theoretical approach will never be appropriate. Its essential content lies in a formulation by its author:

Ecouter attentivement notre corps, lieu de note vie

Ne plus penser, ne rien dire avant d'avoir senti.

Déliver nos tissus de leurs conditionnements,

Offrir nos maux, ne rien garder, lâcher prise jusqu'aux ligaments.

Bailler, se delier, s'etirer, retrouver notre espace

Intérieur et sacré où vit une Présence.

Ouvrir tous nos plexus par l'alchimie des sons

Pour que du fond s'exprime la "grande gamme" émotions.

Habiter nos deux axes osseux où est inscrit le Sens:

Infini de la verticale, équilibre, ressort, grâce;

[21] For a better understanding of this subject, one may refer to the book: Jean-Marie Bourre, *La Diététique du Cerveau*, Paris, Poches Odile Jacob, 1990

Liberté de l'horizontale que s'enrichie de ce quélle donne, ataraxie.

Inspirer, au rythme de nos cellules, l'énergie de conscience

Et, par dessus tout: dire "oui" au présent, le corps reconnaissant.[22]

Odile Vaz-Geringer

(from a leaflet explaining her classes)

[22] **E**ngage attentively with our body, the place of our life
Never think, say nothing before you have felt.
Deliver our tissues from their conditioning,
Offer our pains, keep nothing, let go even of the ligaments.
Breathe, unbind, stretch, rediscover our space
Inner and sacred, where a Presence lives.
Open all our plexuses through the alchemy of sounds
Private depths express the "great range" of emotions.
Habit our two bony axes where Meaning is inscribed:
Infinity of the vertical, balance, spring, grace;
Liberty of the horizontal, enriched by what it gives, ataraxia.
Inhale, in the rhythm of our cells, the energy of consciousness
End, above all: say "yes" to the present, the body acknowledging.
(ChatGPT translation)

Eutonia

Eutonia was created by the German Gerda Alexander in Denmark. She developed her work through experimentation, observing her students and herself. It became clear to her that when working with the ability to move and position oneself in space consciously, not only can there be an improvement in the effectiveness of the movement itself, but a transformation also takes place in the person as a whole.

Gerda concluded that Eutonia is a quest, adapted to the Western world, that helps people find a deeper awareness of their spiritual and bodily reality as a unified whole. This quest is an individual and unique process, where each person has their own characteristics, a fact that Eutonia respects and considers fundamental. The true goal of Eutonia is to develop in each person the possibility of becoming their own master and achieving their unique, personal, and individual balance.

Personally, after several years of practice, I define Eutonia (eu = harmony, tonia = tone[23]) as: through the balanced opening of the joints and the flexibilization of the body's tissues, Eutonia allows for sensitive, pleasurable, and intimate contact with one's being, resulting in a deeper knowledge of one's individuality.

Since Eutonia is an open process, where each individual defines and describes their personal process, I find it interesting to mention the conceptualizations of what Eutonia is for different eutonists, seen as individuals who have practiced this method for many years:

- "Eutonia is a proposal to achieve a deeper awareness of the bodily, mental, and spiritual reality as a true unity." (Alejandro Odesky, 2003).
- "Eutonia is a practical work to expand the perception of the body: simple, efficient, and of great beauty – like supporting one foot after the other and walking. It is based on the functional structures of the body and the physical laws that act upon it. It invites self-awareness in the world and autonomy in self-care." (Cilô Lacava: 2003).
- "The combination of the Greek words eu and tone, which give rise to the word 'eutonia,' can be understood as an enigma to be deciphered by those whose

[23] Where the name Eutonia comes from: 'It was given by an Austrian doctor who understood that this body research concerns the base tone. For example, if someone is very tense, this work helps to release their muscles and tendons. If, on the other hand, the person has very low tone, the active listening practiced in Eutonia will help them find their tonic balance.' (Vaz-Geringer; 2001, 45)

'curiosity' once led them in this direction, and whose knowledge could only be revealed through practice." (Gabriela Bal: 2003).

- "Eutonia is a method of body education that enables the regulation of body tensions and aims at expanding body awareness through the development of attention and perception. In the broader sense, it is considered a path to self-knowledge or the expansion of the psychosomatic reality, a pedagogical method, and also a philosophy of life." (Hissako F. Takehara: 2003).
- "Eutonia is a working space where the body is worked as a means of access to the being." (Maria Thereza Feitosa: 2003).

The concrete need for this method of work in our current life is pointed out by a physiotherapist and eutonist: 'I will mention some factors that I believe delay or hinder body perception and consequently cause dystonias:

- Little superficial and deep tactile stimulation (e.g., loss of contact with nature),
- Little experience with the infinite possibilities of body movement, meaning that the individual performs the same movements daily, usually in the same way (not changing rhythm, tone, speed, amplitude, etc.),
- Negative emotions and stress,
- Anxiety,
- Certain professional activities that reinforce poor posture and require inappropriate or even highly immobile bodily positions,
- Competitive sports that develop strength rather than body perception, overloading the basic joint system,
- Mechanized movements,
- Loss of pleasure,
- Others.' (Queiroz; 2001:19). We can say that these factors are easily observable in people from today's urban society, legitimizing the need for methods of body awareness.

Technically speaking, Eutonia advocates for the restoration of body perception as a procedure to dissolve dystonias and tonic fixations. Body perception can be achieved through the stimulation of superficial and deep sensitivity, through the perception of the skin,

bones, internal spaces, the volume of the body, and joint movement, i.e., through the development of exteroception and proprioception[24]. This stimulation gives the individual the possibility of conscious control over their muscle tone[25], potentially restoring the balance of muscle tone in various parts of the body and also in neurovegetative functions.

Tone is a fundamental concept for Eutonia. In brief terms, we can say that, according to psychophysiologists, muscle tone, one of the types of tone present in the body, is the activity of a muscle in apparent rest. 'Normal tone consists of a slight permanent tension in the normal muscle, such that the limbs oppose slight resistance to displacement when handled or moved passively.' (Kandell and Schwartz, 1985 in Russo; 2001, 9). Tone is determined by interoceptive, proprioceptive, and exteroceptive stimuli (skin and sensory organs) and is present in all living organisms. Only under ideal conditions does tone have a homogeneous level throughout the body; but in reality, in the same body, the three types of tone generally coexist, which causes the imbalance that Eutonia combats. Variations in tone are closely related to emotional states, physical and psychological exhaustion, increasing with activity and decreasing with rest. High tone leads to muscle contractions, inspiration limited to the chest, accentuated spinal curves, and reduced joint mobility. Medium tone leads to a lower capacity for emotional fluctuation; and low tone leads to a feeling of heaviness and flaccidity, joint instability, and low abdominal tone. In other words, 'one of the functions of proprioception is the maintenance of muscle tone, this slight contraction observed in all muscles, also present in tendons and fascia. Muscle tone is of fundamental importance in maintaining posture and support; furthermore, when tone is appropriate, it allows for less fatigue during actions. The explanation for this slight contraction is that muscle fibers do not all contract at the same time, but in layers, allowing for less muscle fatigue. An imbalance in tone is often accompanied by a neurotic disturbance.' (Todd; 1975, 31.

Within this framework, by flexibilizing neuromuscular tone, Eutonia restores flexibility to the muscles, 'dissolving' tonic fixations[26] and providing the body with the possibility of experiencing infinite tonic variations, i.e., by 'dissolving' them. Eutonia releases joint

[24] Proprioception is the ability we have to perceive the position and movement of body parts with our eyes closed, due to the properties of our central nervous system.

[25] The concept of tone will be clarified below. I only observe that there can be variations in tone (high, medium, low) in different parts of the same body, i.e., the thigh may have a high tone, for example, while the arm has a low tone.

[26] See appendix on movement

movement. By influencing muscle tone, it acts on all the tones in the organism, i.e., neuro-muscular tone, vegetative tone, and psychological tone. It is important to note that general tone, i.e., the sum of the tones of the various body tissues, is the foundation upon which all emotions occur. For example, a person with a tonic fixation lacks the capacity for emotional or expressive variations and can be considered ill[27].

Synthesizing the neurological concepts upon which Eutonia is founded:

. The harmonic tone, considered ideal for Eutonia, is a floating tone that allows for constant adaptation to any life situation;
. In the relationship between tone and brain activity, the combination of postural tone, the neurovegetative system, and the set of physiological regulations acts directly on both the conscious and unconscious levels;
. The tonic function is sustained by different levels of the central nervous system;
. The motor neuron is always active in the muscle, in any of its activities, even during rest.

Thus, the balance of both general tone (the different types of tone in the body) and the neurovegetative system is fluctuating and plastic at all levels of the organism, from the conscious mode to the involuntary systems. Dr. Alfons Rosenberg, in Gerda Alexander's book (apud 1991:5), says that "The purpose of Eutonia is not the disappearance of existing tensions, but the establishment – as the word itself indicates – of harmonious tension, that is, the balance of the different tensions that coexist in the body, a balance of general tone."

Eutonia, as a procedure aiming to achieve this balance, employs conscious practices that start from the physical reality of the body to reach other spheres such as the emotional and spiritual ones.
With regular and disciplined practice, whether individual or in groups, the person develops

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[27] There are several theories regarding the genesis of tonic fixations and dystonias, which, briefly stated, include:
- the mother-child relationship, in which the child is seen as a sponge;
- emotional attitudes that take root from childhood;
- experiences that prematurely force neuro-motor development (such as performing movements before the body has reached the necessary maturity);
- alterations in body perception (for example, a person with scoliosis who does not perceive it and believes their condition to be normal).

the ability to perceive their own organic functioning and, through it, acquire knowledge of biological laws, learn about their reactions, habits, and personal emotional needs, as well as their general relationship with the external world, contributing to the organism's homeostasis.

This method has been applied in various fields as a therapy that opens up possibilities for treating neurological, orthopedic, psychiatric, and other conditions, and as a pedagogy applicable from early childhood to adulthood, with various purposes, such as training athletes, musicians, dancers, and actors. For Gerda, pedagogy and therapy act simultaneously, since the practitioner is never called a patient, but always a student. As mentioned earlier, the true goal of Eutonia is to develop in each person the ability to be their own master and achieve their individual, personal, and unique balance.

The eutonist's attitude towards their students is unique. Gerda expresses herself on this subject: "The tonic communication is the bodily foundation of the social attitude for any true communication with another individual. The pedagogy of Eutonia creates a situation that allows each student to discover their own possibilities and explore the causes of their difficulties in daily attitudes." (Gainza, 1997:136). And she adds, "The unique character of each personality and their reactions (students) taught me to constantly revise my observations and experiences from always new points of view." (Alexander; 1991:VII).

The elements that constitute the technique of Eutonia include the development of bone awareness, skin sensitivity, perception of the internal space, conscious contact, and transport resulting in eutonic movement. The types of eutonic movement formally studied are the pushing, vital stretching, active movements, and active/passive movements.

Next, I will explore the practices of Eutonia related to the elements mentioned above: conscious touch, conscious contact, internal space, transport/pushing, activity/passivity, micromovements, microstretching, sliding, prolonging, vital stretching, and eutonic movement.

Conscious Touch

Touch is one of the forms of human perception, and it occurs through the stimulation of the skin. In common understanding, we often think of touch as involving the hands, but, on the contrary, it can involve any part of the body.

In Eutonia, touch takes on the characteristic of **conscious touch**, i.e., it becomes present, intentional, observed, and non-mechanical. To develop it with this characteristic, verbal instructions and/or objects (such as fabrics, bamboo sticks, tennis balls, balloons, etc.) are used.

Through conscious touch, a person experiences the limits of the body and gathers essential information about the world – its shapes, texture, temperature, consistency, pressure, etc. The entirety of this experience can reveal much about sensations and emotions such as tenderness, pain, fear, indifference, aggression, etc., facilitating the formation of a unified body image.

Conscious Contact

It is the reciprocal and interactive exchange established with oneself, with an object, or with another person, based on an intention[28] to act toward someone or something.

The forms of conscious contact formally practiced in Eutonia are:

. Contact with oneself;

. Contact with another person, which can occur through one person touching another or from a distance, with the contact in both cases being either radiant or in one direction only;

. Contact with extension, which is the projection of the bone or limb into space;

. Contact with space, which can involve the skin coming into contact with the external space or one part of the body with another part or an object.

In daily life, making conscious contact can become a routine attitude present in all moments. Contact can be made with everything: plants, animals, the environment, people, objects, ideas, etc. This practice, in general, creates a more vivid relationship with both the internal and external world, as long as the perceived sensations allow for the emergence of associations of ideas or emotional reactions that may explain or clarify the person's behaviors, helping them modify inappropriate or undesirable habits in their life. Thus, conscious contact provides the individual with the ability to adjust their tone according to the activity at hand, i.e., to perceive whether the force is excessive or insufficient for the action's intention to be adequately expressed; and, most importantly, to enable the awareness of how these adjustments are made within the body, making the person conscious of this process.

[28] In this case, intention is the result of careful observation of the object in focus, a goal, and a decision to act. The resulting action can be considered a mode of human expression.

The most easily detectable effects of conscious contact are the development of superficial and deep sensitivity, refined perception, sensory memory, recognition of one's own body, and integration with others and oneself.

Internal Space

It is the space defined by our skin, which contains the body's tissues, organs, fluids, etc., forming the external-internal binomial. Eutonia objectively defines this space in its practice, making it tangible for the student through work with the entire skin, joints, bones, and internal organs.

One possible practice to refine bone awareness: touching the bone through the skin, sliding it, moving it from one end or along its length, vibrating with an object, resting on small balls or bamboo, examining a skeleton, and imagining that bone within one's own body, etc. The practical effects are immediately reflected in the whole body and its behavior. Another practice example: when one clearly perceives a bone in its volume, shape, and texture; the muscles connected to it have their tone balanced, enabling proper postural alignment and conscious movement where one clearly perceives one bone moving followed by another, producing an economy of effort in any activity such as carrying, pulling, caressing, etc.

In Eutonia, one learns to perceive the skeletal structure in its entirety, creating an image of body unity. Psychologically, one of the effects of this work may be greater self-confidence and security in the real contact with the body's supporting structure.

The experience of internal space reveals the meaning of the body's three-dimensional space. And through objective contact with the elements that make up the human body, it becomes clear that internal space also includes thoughts, emotions, both linear and non-linear time; opening up the possibility of reconstructing a perception of the internal and external world.

Transport/Repousser

Repousser[29] is a push exerted by the body's support point(s) on the supporting surface, whether the ground, a wall, or any other surface. Transport is the communication, the

[29] In French, "repousser" means "to push."

sequencing of the displacement of the bone joints, a result of the repousser from the body's support point(s), moving from the support point to the joint furthest from this point.

The practice of transport teaches us to allow force to pass consciously through the skeleton while releasing all peripheral muscles, called dynamic muscles. Therefore, the base structure of transport is the bones, muscles, and tendons under motricity.

For the movement to be the product of balanced displacement of the bone joints, there must be space between the joints, and the body must be able to remain passive (or neutral) to initiate the repousser. If this happens, the movement originating from the pushing of the support point is transmitted throughout the body. For example: the conscious postural tonic reflex begins with the repousser from the three points of support on the foot, which is transmitted to the foot arch, the tibia and fibula, the knee joint, the femur, the head of the femur, the hip joint, and follows to the upper part of the sacrum, towards the fifth lumbar vertebra, then passing through the entire spine until reaching the atlas and the skull[30].

It is crucial for an efficient transport to properly use the bones that support the body, according to the architecture of our body. In the standing position, the correct supports are the three points of the foot, and when sitting, they are the seatbones[31].

Gravity plays a significant role in transport because it is a vector quantity with a vertical direction and a sense toward the center of the Earth. Therefore, in addition to the active force of the repousser, transport always also has the force of gravity present, which adds up with the repousser vector. The sum of the direction of the repousser and the force of gravity (generally with opposing senses) results in the final transport vector. This vector begins at the support point, redirecting itself according to the longitudinal direction of the long bones, and in flat bones, such as in the pelvis, the transport may split into two vectors or unite (if the repousser comes from two or more points simultaneously). For example: the repousser of both feet sends the transport through both legs, and when it reaches the pelvis, it transforms into a single vector, which transports through the spine. One effect of

[30] To understand the functioning of transport in our body, we can begin by researching walking. We have three key support points on the foot for walking and for grounding the feet on the floor. These are the sesamoid of the first toe, the fifth toe, and the center of the heel, which form a triangle. The two toes form an arch that allows a spring-like effect in the displacement movement, called the spring arch, and is responsible for the flexibility of walking. This flexibility enhances the rooting of the foot. There are also two other arches, from the first toe to the heel and from the fifth toe to the heel, which serve the same function as the other arch.

[31] Which, interestingly, are called "seatbones" in English.

this work may be the awareness of the body's axis, the force of gravity on the skeleton, and the body's posture during activities.

In terms of psychological effects, efficient transport can lead to a change in our behavior, resulting in an economy of effort and the optimization of body movement.

Active/Passive

The active/passive binomial exists in nature, along with numerous other binomials such as full/empty, sympathetic/parasympathetic, high tone/low tone, tension/relaxation, extroversion/introversion, life/death. Eutonia encompasses both poles of any binomial, transitioning between them in terms of alternation, interaction, complementarity, modulation, cycle, and flexibility.

In movement, there are four phases: the action time, the pause time, the passivity time, and the reverberation time. When movements follow each other, this cycle repeats in time, always globally, involving the whole body.

Within this cycle, there is a presence of a moment of activity and another of passivity, which can occur simultaneously in the same body or sequentially over time.

During passive movements, there is inhibition of voluntary motor innervation and awareness of the action of the force of gravity, but this does not mean that in passive movement, there is abandonment of the musculature—in fact, quite the opposite. It is necessary to know how to be active when desired and to master the transition from passive to active state (and vice versa).

In Eutonia, the proper practice of alternating between active and passive movements aims to discover and relieve tensions, complete the body schema, expand body limits, recover strength and energy, and optimize the force used for executing any movement.

Micromovimento

It is almost invisible, resulting from an intention to move, preparing the tone for a minimal displacement. To make a micromovement, it is necessary to make conscious contact with

the joint that is intended to be moved. In this way, the body directs all its attention to that region, and the movement occurs in the deeper musculature, allowing the displacement of the bones that make up this joint, always followed by an observation of changes in the whole body, such as the increased contact of the body with the ground, because the micromovement eliminates unnecessary tensions in the body, allowing it to yield to the force of gravity. Therefore, this is an excellent type of movement to eliminate very old tensions in the body because the joints involved begin to receive attention and intention for movement[32]. Sometimes, a simple micromovement can produce a very effective effect on the entire body.

The microstretch is a micromovement that occurs longitudinally to increase the joint space between two bones. “Note that a change of ¼ millimeter has a perceptible effect on muscle tone, breathing, and body metabolism.” (Russo; 2001:5). For the micromovement to be effective, muscle tone must reach the appropriate level, because too high a tone produces a muscle contraction that reduces the bone space.

This practice is linked to the stimulation of the mechanoreceptors of the joint capsule, and the effects obtained can be regulation of tone, increased circulation, release of breathing, and greater joint flexibility.

Slipping

Bone slippage is the voluntary movement of a bone within the tissues surrounding it, stimulating blood circulation and recovering the resting tone of the limb, allowing the release of deep tensions. We can also say that slippage is a stimulus that establishes a conscious bridge between the skin and the bone, passing through all the tissues in between.

Extension

It is the projection movement that a part of the body makes in contact with external space. For this to happen, previous work of perceiving the skin, bones, internal spaces, volume, slippage, and contact is necessary. The practice of movement through extension can bring about metabolic changes, such as increased circulation and tissue temperature,

[32] The micromovement activates the perception of the joint's design and brings awareness to the type of movement and displacement in space that the studied joint can make according to its bone design. The micromovement is best executed when the exact design of the joint in its three-dimensionality is consciously understood. I observe that the correct use of each joint is a decisive factor for achieving movement efficiency.

normalization of tone, a reduction in the sensation of body weight, and an increase in joint mobility.

Vital Stretching

Also known as conscious stretching, it is the natural and spontaneous movement of stretching the body, giving a sense of well-being. It allows the execution of movements that the person feels like doing while remaining conscious and observing themselves. It is a natural need that arises and should not be suppressed.

Eutonic Movement

It is the result of regular and disciplined practice of the procedures already described. Thus, the distinguishing feature of this type of movement is the integration of the base tone, the neurovegetative balance, motor innervation, and the awareness of transportation.

Movement performed in an eutonic way becomes light, using little energy, as muscle fixations are eliminated and the muscles not involved in the work become toned instead of loose. Thus, an economical movement is achieved, which, according to Gerda Alexander, is characterized by “minimal energy expenditure, without interference in vegetative functions, especially respiratory and cardiac functions, movements that respect the laws of biomechanics and the freedom of the body, allowing it to express itself.” (Alexander, 1991: 11)

Finally, I would like to say that Eutonia, after years of practice, leads to movement characterized by ease and simplicity.

The Feldenkrais Method

Moshe Feldenkrais (1904–1984) was born in the Russian city of Baranovitz. Being of Jewish origin, he emigrated to Palestine in 1918, where he worked in the construction sector and also practiced the martial art of judo. At the age of twenty, he seriously injured his knee while playing soccer, underwent surgery, and, in an effort to recover his own body, began researching body awareness. At twenty-three, he enrolled in the Faculty of Mechanics and Electricity. In 1930, he earned his doctorate in applied physics from the Sorbonne in Paris. That same year, he met Professor Kano, the founder of judo, with whom he developed a close friendship. This relationship led him to become the first Westerner to receive a black belt and to establish the first judo club in France.

During World War II, he fled France for England, where he worked as an official scientist for the Scientific & Technical Pools of the British Admiralty's submarine department until the end of the war.

Since 1924, he had been developing his method through self-experimentation and work with students. His first book, *Body & Mature Behavior*, was published in 1949, marking the point at which he fully dedicated himself to his method until the end of his life.

The foundation of his method is based on the notion of self-image, as formulated by Feldenkrais himself[33]: a person tends to perceive their self-image as something given by nature, even though it is actually shaped by personal experience. Appearance, voice, thought patterns, environment, and relationships with time and space—just to name a few examples—are often taken as innate realities. However, in truth, every significant aspect of an individual's interaction with others and society is generally the result of extensive training. Walking, reading, and recognizing three dimensions in a photograph are all skills accumulated over years of experience.

Thus, a person acts in the world according to their self-image, which, for Feldenkrais, is shaped by three factors: hereditary, educational, and self-educational. The hereditary factor relates to physical structure in morphological, anatomical, and physiological terms. The educational factor is linked to the cultural and social conditions in which the individual is embedded. The self-educational factor, in order to be exercised, depends on the inner

[33] There are other definitions of self-image that differ from one another, depending on the author.

strength of personality, which leads to individuality and fosters the development of a distinct personal behavior.

Among these three factors, Feldenkrais identifies self-education as the only one that is not imposed. Although influenced by the other two, it is the most flexible and self-directed component, as it allows individuals to select what they want to learn and to discard what they cannot or do not wish to assimilate[34]. Its expression is revealed through the effective functioning of the nervous system, which serves as a means to assess the individual impact of educational factors that have been imposed with severity and persistence.

Therefore, examining and improving self-image opens the possibility of living in accordance with one's natural constitution and talents, rather than according to a self-image that was established more or less by chance—without our awareness—through imposed social norms. Feldenkrais states: "Each person speaks, moves, thinks, and feels in different ways, according to the image they have built of themselves over the years. To change our way of acting, we must change the self-image that exists within us. Naturally, what is involved here is a change in the dynamics of our reactions, not merely replacing one action with another. Such a change involves not only a transformation of our self-esteem but also a shift in the nature of our motivations and the mobilization of all parts of the body in relation to one another." (Feldenkrais, 1977:27)

According to him, self-image is composed of four elements: movement, sensation, feeling, and thought. The sensation component consists of the five senses—hearing, vision, smell, taste, and touch—along with the kinesthetic sense, which includes effort, work, spatial orientation, the passage of time, and rhythm. Feeling encompasses not only familiar emotions such as joy, sorrow, and anger but also self-respect, inferiority, hypersensitivity, and other conscious or unconscious emotions that color our lives. Thinking includes all intellectual functions, such as distinguishing between right and left, good and bad, right and wrong; understanding, knowing that we understand, classifying things, recognizing rules, imagining, knowing what is perceived and felt, remembering all of the above, and so on. Movement involves changes in time and space regarding the state and configurations of the body and its parts, including breathing, gustation, speech, blood circulation, and digestion.

[34] Learning is essential. However, the level of learning required for human development is much higher compared to other animals, as we have no instincts—only the ability to learn.

The contribution of each of these components varies for any given action and for the individual performing it, yet each component is always present in every action. To think, for example, a person must be awake and aware that they are awake rather than dreaming. They must feel and perceive their physical position relative to the force of gravity. Thus, movement, sensation, and feeling are also involved in thought. To feel—to see, hear, taste, smell, touch, or move—a person must be interested, attentive, or aware of an event occurring around them. That is, they must move, feel, and think. To move, they must use at least one of their senses, whether consciously or unconsciously, which means that feeling and thought are also involved—since life does not exist when a being is deprived of all senses.

Because sensation, feeling, and thought are linked to movement, their functions form the foundation for the creation of self-image through movement. In every movement, the entire system reaches a certain level of overall integration, which the body expresses at that moment through motion. Thus, one cannot perform an action and its opposite simultaneously—the body is an integrated unit.

Movements reflect the overall state of the nervous system and are also the foundation of *awareness*[35]. Stimulation of certain cells in the motor cortex of the brain will activate muscles[36]. "The state of the cortex is directly visible through attitude, posture, and the muscular configuration to which we are connected. Any change in the nervous system is clearly reflected in a change in attitude, posture, and muscular configuration. There are not two states but two aspects of the same state." (Feldenkrais; 1977:82) This is why Feldenkrais chose movement as the means to understand and influence self-image. In his first book, *Body & Mature Behavior*, he outlines the main reasons for this choice: 1. the nervous system is primarily concerned with movement; 2. it is easier to distinguish the quality of movement; 3. we have a rich experience of movement; 4. movement ability is important for self-worth; 5. all muscular activity is movement; 6. movements reflect the state of the nervous system; 7. movement is the foundation of *awareness*; 8. breathing is movement; 9. the power of habits is deeply rooted in movements; 10. bodily movement is

[35] The word *awareness* could be translated as "consciousness," but this translation would not capture the broad meaning it has in English. Feldenkrais, in particular, defines *awareness* as kinesthetic perception, a way of feeling the necessary pattern (Feldenkrais; 1977, 21).

[36] It is now known that the correspondence between the cells of the cortex and the muscles they activate is neither absolute nor exclusive—that is, motor cortex cells do not act on just one particular muscle. However, some researchers find it experimentally justifiable to admit that cells activate specific muscles, at least in basic and elementary movements.

connected to emotion, ″What is important for us is that every sensory and motor experience is accompanied by some emotional discharge. The voluntary muscular patterns corresponding to these emotions are preceded by a sensory experience and by learning.″ (Feldenkrais; 1979, 58)
In conclusion, ″the nervous system is fundamentally engaged with movement—whether thinking, feeling, or experiencing emotions, an intricate series of actions is triggered by the brain.″ (Feldenkrais; 1979:81)

Feldenkrais emphasizes that proprioceptive senses and feelings are factors that receive less attention and trust in our culture. However, this bias is detrimental to the individual, as the kinesthetic factor provides the internal sensation of our self-organization. It is through observing one's own movements and those of others that a person can make profound changes in their kinesthetic perception, their sense of self-image, and all aspects of their self-organization.

To this end, Feldenkrais' work highlights and reveals to students the function of any action they perform, such as walking, standing, or twisting. During lessons, he seeks to demonstrate that function is integrated into our being as a whole when performed without external commands—that is, when we act solely based on our individual and personal experience, without obeying imposed rules.

In practice, his method acknowledges and utilizes the interdependence of the four components of self-image—thought, senses, feelings, and movements—within a sophisticated yet simple system of sensorimotor instructions based on physics, neuroscience, biomechanics, and motor development.
His teachings are transmitted in two forms: Awareness Through Movement – ATM – *awareness* through movement in group sessions, and Functional Integration – FI – in individual sessions.

In Functional Integration (FI), the practitioner touches the student, creating changes in movement patterns through the communication of touch. The practitioner explores what is necessary for the student's learning at that moment, and through the feedback loop between the student and the practitioner, the student perceives a new pattern of possibilities resulting from the delicate and refined action on their body.

Awareness Through Movement (ATM) is a verbal technique used in group sessions lasting about an hour, where the teacher directs movement and draws attention to aspects of the movement according to the functional theme of the lesson. Through the proposed movements, the student has the opportunity to form a new neuromuscular image for modifying existing movement patterns that they wish or need to change.

In ATM, passive, active, or imagined bodily movements are used. Passive movement, among other aspects, saves effort; active movement, when functional, clarifies and optimizes self-organization; and if a person mentally imagines the movement they have just performed, attempting to reproduce it in their brain, this activity affects the state of the central nervous system, indicating a new organization of movement. By simply imagining a movement, the nervous system is stimulated, and the movement is outlined through subtle muscle activities, resulting in bodily changes that are sensitive to the person and visible to an attentive observer.

The proposed exercises are simple, requiring only easy movements designed to be executed without excessive effort so that practitioners can discover changes in themselves shortly after the first lesson.

The Feldenkrais Method invites the individual to relive their basic movements: rolling, sitting, crawling, walking, with the aim of clarifying this process experienced spontaneously during their development, which can provide, in adulthood, a reorganization of the individual as a whole.

The goal is to improve ability, that is, to expand the limits of what is possible: to make the impossible possible, to make the difficult easy, and to make the easy pleasurable. Feldenkrais believes that only those activities that are easy and enjoyable will become part of habitual life and be useful at any time. The difficult actions, for which a person must force themselves to overcome internal opposition, will never be part of daily life; as they age, the person will lose all ability to perform them.

During the lesson, the student experiences a movement verbally proposed; they can then change the orders of that same movement, for example, twisting the hip to the right and the head to the left, and then trying to rotate the hip to the right and the head to the right as

well; they can return to the first movement and perceive how they feel at that moment and whether there has been an expansion in the limits of that movement. The individual allows themselves to become familiar with their movements without attempting to perform them according to already known patterns. Therefore, their sensation may be that they are performing the movement for the first time.

This routine opens up the possibility for greater organization in executing the movement, increases motor coordination ability, enhances joint mobility, and provides a greater functional understanding of the body.

The changes that may occur in the distribution of muscular activities are not consequences of the movement per se; they only happen when the student directs their awareness to the parts of the body involved in the proposed movement. This attention can alter not only the involved parts but also the organization of the entire musculature of the body. What is important in learning is not what you do, but how you do it.

To learn, time, attention, and discrimination are needed; to discriminate, one must feel. This means that, if we want to learn, we need to fine-tune our ability to feel, and if we try to do things by brute force, we will achieve exactly the opposite of what we need: wasting energy and not feeling pleasure in movement.

Therefore, the instructions for performing the movements in the lessons emphasize that: first, each movement should be done with the greatest ease, smoothness, and comfort possible, with its limit being the point at which the student begins to feel tension or pain, depending on their own assessment of the movement.

Second, the body should move slowly enough to allow the motor cortex, the part of the brain that organizes action, to perceive the action being executed. It is based on the Weber-Fechner Law[37] that Feldenkrais proposes the execution of slow and effortless

[37] The Weber-Fechner Law describes human perception of various physical stimuli. Ernst Heinrich Weber (1795-1878) was one of the first researchers to study responses to physical stimuli quantitatively. In one of his classic experiments, Weber gradually increased the weight a person, blindfolded, was holding, and asked them to respond to how they felt as the weight increased. He discovered that the response was proportional to the increase in weight. If the mass was doubled, the sensation of weight also doubled. This type of relationship was described by an equation: dp=k ds/S, where dp is the differential change in perception, ds is the differential increase in the stimulus, S is the stimulus at the moment, and k is the constant factor determined experimentally.

movements, as the lower the muscle tone, the better one can perceive the smallest differences in the execution of the movement in terms of force for that action.

Third, everything the student does should be pleasant. When the student becomes tired or restless, it is time to stop. If they are enjoying it, they can continue until they no longer wish to.

Fourth, listen and move simultaneously. "In my lessons, the student learns to listen to instructions while performing exercises and to make the necessary adjustments without stopping the movement. In this way, they learn to act while thinking and to think while acting." (Feldenkrais; 1977:4)

In summary, Moshe liked to repeat a Chinese saying:
I hear and forget.
I see and remember.
I do and understand.

The conclusion of this explanation comes with a phrase from the creator of this method: "The theory of degeneration is nothing more than the admission of ignorance about how to achieve changes in our minds to attain happiness... we are still incapable of using our knowledge to live a fuller and more satisfying life. It is important, therefore, to discover what the elements responsible for this deplorable situation are; and if we can know them, we will be able to control them." (Feldenkrais; 1979:10)

The Laban Method

Rudolf Laban (1879-1958) had an eclectic education through the travels he undertook with his father, getting to know various types of people and cultures, such as those in Czechoslovakia and North Africa. At the age of 21, he went to Paris where he attended the *École de Beaux-Arts* (1900/1907), showing a special interest in stage design, drama, dance, costumes, and theater architecture. During this time, he drafted the idea for what would become "Kinetography" or "Labanotation" – the notation of dance.

Laban sought an art form that involved action and people. He was not a solitary artist; on the contrary, he sought an art that required the active participation of a group, and in 1910, he created the *Dance Farm*, a dance based on the occupational experience of the community of Lake Maggiore.

He formulated his philosophy of human movement based on studies of patterns and spatial harmonies, creating a discipline called *choreutics*. This term is adapted from the Greek word for the logic or science of circles. Choreutics is the study of the various forms of harmonious movement. Laban structured this research as a search for a syntax or grammar of movement, focusing on spatial patterns through lines and shapes described by movement in the kinesphere[38]. He also explored the semantic aspect, seeking the emotional and mental content of this spatial harmony.

World War I interrupted his work. He moved to Zurich (1915-1918), where he established his own dance school and produced several performances. During this time, he began working on dance notation and choreology. After the war, he returned to Germany, where he directed the ballet company of the National Theatre in Mannheim. In 1912, he produced *Swinging Cathedral* in Hamburg, which became his first major public and press success.

In 1923, Laban founded dance schools in Basle, Stuttgart, Hamburg, Prague, Budapest, Zagreb, Rome, Vienna, and Paris. Each of these schools was led by a teacher trained by

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[38] Kinesphere, also known as personal space, is the space that surrounds us. When we move, changing the spatial position of our body, we carry our kinesphere to another place. Thus, our movement never leaves the kinesphere, and we always carry it with us like an aura.

Laban and featured its own group dances with the local community. His curriculum aimed to rediscover dance as a form of education and therapeutic treatment, based on the aesthetic experience of some teachers, doctors, and industrial workers participating in the group dances.

Laban's schools attracted modern dancers from all over Europe, such as Kurt Jooss and Mary Wigman, his two most prominent disciples. His choreographies were designed for both large groups and small companies, for both amateurs and professionals.

In 1926, Laban's Choreographic Institute moved from Wurzburg to Berlin, and during this time, he visited America and Mexico, giving lectures in New York, Chicago, and Los Angeles. In 1927, Laban published his book Schrifttanz or Kinetographie Laban, which aimed to enable the precise reconstruction of dance through writing. In 1929, Laban directed a major event for the 'Crafts and Guilds' in Vienna, which involved 10,000 performers, 2,500 of whom were professional dancers. That same year, he led a group dance with 500 people at the Mannheim Festival. These two events gave him the opportunity to study the movements of industrial workers, sparking his interest in understanding the psychological attitudes of industrial men to refine their work movements.

In 1930, Laban moved to Berlin to direct the Allied State Theatre for four years. Laban's last year of work in Germany was 1936, when he directed the dance productions for the Berlin Olympic Games, whose content was not approved by the Nazi government, which prohibited its public presentation. He emigrated to Paris, where he fell ill. In 1938, he moved to England, invited by Lisa Ullmann and Kurt Jooss. His work was very well received in the country. In July 1940, Laban held his first course for teachers, called the Modern Dance Holiday Course, which continued until 1961 at various locations such as Moreton Hall School, Chichester Training College, Darlington College of Physical Education, Ashridge College of Physical Education, and Chelsea College of Physical Education.

In 1942, Laban was invited to give a lecture titled "Modern Educational Dance," which indicated the emphasis and the field for which this dance was intended. In the same year,

he was hired to investigate movement in the industrial process, together with businessman F. C. Lawrence. The movement recordings were made on film, but due to a lack of film stock, they sought another form of recording and decided to use "Labanotation." This research led to the book *Effort*, published in 1947.

In 1946, Lisa Ullmann, his most faithful disciple, opened her “Art of Movement Studio” in Manchester. This became the center of Educational Dance in England. Her curriculum was based on the spatial patterns and harmonies, as well as Laban’s theories of expressive movement. In 1948, Laban published *Modern Educational Dance*, his most famous book.

Laban founded the Laban Art of Movement Centre (1954) and published *Principles of Dance and Movement Notation*. Eight years later, Lisa Ullmann published *Choreutics*, considered Laban’s major work, containing the author’s concepts on spatial harmony, the analysis and synthesis of physical movement in choreography, and also a study on functional, educational, and artistic movements.

Within movement studies, Laban expanded the scope of human movement study by focusing on Universal Basic Principles of Human Movement, not just specific dance styles. He proposed a structural approach to movement that is still used by many choreographers today.

Laban’s work is also used in psychology. From his observations of movement qualities, which focus not on what you do but how you do it, it is possible to extract elements for the study of personality. This analysis of personality structure through movement was developed by Marion North (1975) and presented in her book *Personality Assessment Through Movement*. It was further pursued by other therapists, with a broad bibliography available on the topic[39], and can be considered a pioneering method in body awareness[40].

Laban's work is of great importance in the history of dance. "We cannot neglect, in the context of modern dance, the influence of the theoretical writings of Rudolf Laban and Mary Wigman, pioneers of German expressionist dance" (Popper; 1985:103).

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[39] Laban's research continues to be developed at the Laban Art of Movement Center in London, at the Laban/Bartenieff Institute of Movement Studies in New York, and at LabanArt in Brazil.

[40] To understand the importance of this method, we must take into account the period in which it was formulated: between the First and Second World Wars, i.e., approximately 30 years before any other body awareness method.

In Brazil, this method was introduced by Maria Duschenes, who was always very wise in her teaching approach and knew how to guide each student to their own individual expression. For her, "movement is fundamental to life. When movement happens, involving the human personality as a whole, it leads to a state of mind that brings well-being and joy. In this moment, conscious and unconscious are in perfect harmony and communication. Experiences like this aim to stimulate and develop personal awareness, knowledge, and acceptance of others, making people skilled and creative." (Maria Duschenes, 1989, transcription of verbal testimony)

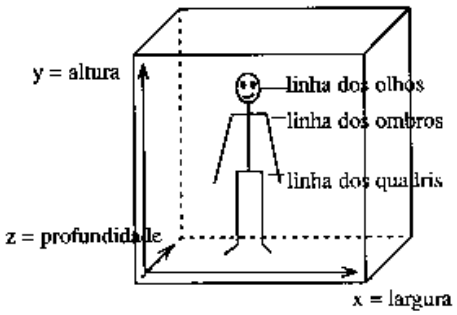
For Laban, the study of movement has two combined directions: the mathematical approach and the semantic approach. In mathematical terms, it studies the spatial organization of the trajectories that the movements of body parts describe in the kinesphere.
In semantic terms, movement is a universal human experience; studying one's movement is studying the individual, as movement is, at the same time, the means and vehicle for all human activities.

The union of the mathematical and semantic approaches to body movement results in a movement analysis method structured from four component factors and their combinations. There are two types of combinations between the factors of movement: when it involves two factors, we refer to Incomplete Efforts, Moods, Climates, or Atmospheres. When the combination involves three factors (force/weight, time, space), we have Complete Efforts or Dynamics.

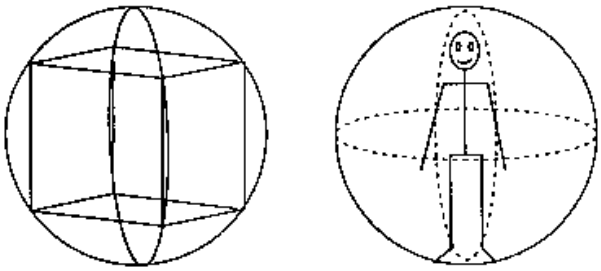
Movement analysis opens a field for understanding the inner world of the human being, their ways of thinking, acting, and feeling through the visible use of movement factors, incomplete and complete efforts. Thus, the Laban method involves much more than the simple movement of joints and muscle strengthening. This system explicitly addresses the expressive quality of movement, allowing "movement specialists" to observe many subtle details of the physical and emotional state of individuals.

The factors of movement – force/weight, time, and space – are measurable, and fluency is not measurable. Therefore, the three measurable factors, each with two opposite values, form a unit expressed through the Cartesian reference system (x, y, z), which gives rise to

the geometric figure of the cube, defining a geometric representation of the kinesphere. Its center corresponds to the body's[41] center of gravity when standing. The front of the body is represented by the parallelism between the eye line, the shoulder line, and the hip line, corresponding to the frontal plane of the cube (x, y).



REPRESENTAÇÃO GEOMÉTRICA DA KINESFERA



(Laban, R.; 1966)

O HOMEM E SUA KINESFERA 42

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[41] The center of gravity is approximately 4 fingers below the navel.

[42]
y = height
z = depth
x = width

eye line
shoulder line
hip line

THE GEOMETRIC REPRESENTATION OF THE KINESPHERE.

THE HUMAN AND HIS KINESPHERE.

Thus, the movement of the body can be described as the weight of the body or any of its parts being suspended and carried in a vertical direction (y-axis), for a certain duration of time, depending on its speed represented by the depth line (z-axis), in a wide or restricted space represented by the width line (x-axis), and regulated by the fluency of the movement. Therefore, movement is the combination of force, time, space, and fluency, varying quantitatively between its opposite poles:

The force/weight factor: The primitive concept of force is a push or pull exerted by our muscles, whose function is to overcome the force of gravity, which pulls everything toward the center of the Earth. So, in order to move, without being dragged by gravity, we must overcome it by using muscular force in our movement. When at rest, the two forces (gravity and muscular) are in perfect balance, meaning they have equal value in opposite vector directions.

Attitude towards gravity force: The appropriate use of the force/weight factor favors energy economy in body movement because it balances activity, passivity, and the degree of force.

The time factor: Space and time are abstract. Our mind does not contain "time" and "space," but contains ideas and concepts about time and space. Time can be defined as the duration of movement, perceived between its extreme qualities: speed and slowness. If the movement time is very slow, it is not perceived as movement, as a spatial displacement, or as a change of place. If the time is too fast, the movement is not seen, leaving only a trace in space.

Speed and slowness are movement speeds, and their perception is relative, i.e., after a very slow movement, any other seems fast; and vice versa. For example, when someone rushes to a meeting and, upon arriving at the location, the other person is not there yet, waiting for just two more minutes may feel like an eternity. Hence, the meanings of speed are for rapidity a great power with little resistance from the environment; and for slowness, little power with much resistance from the environment.

The succession of movement speeds in time generates rhythm. This is the design of time; it is the movement or sound that repeats at regular intervals, with strong and weak

accents. The rhythm of ocean waves, breathing, the oscillation of a pendulum, the gallop of a horse, or the dripping of a leaky faucet are good examples.

The universe is rhythmic in its essence. In the macrocosm, we find several rhythms: the orbit of the planets, the expansion and contraction of celestial bodies, the seasons, the phases of the moon, day and night, the tides, etc. All life on Earth is governed by these rhythms and adapts to them through periodic variations, constituting ecological balance. Thus, migratory cycles of birds, mating periods, and the flowering and fruiting phases in plants, etc., occur.

Being a part of nature, the human being also lives according to these rhythms, which are found in the heartbeat, the menstrual cycle, the functioning cycles of vital organs, and even inside cells. These body rhythms are called internal and biological rhythms. As some people know from personal experience, this rhythm can change under extreme conditions, such as the stress of urban life, and lose its regularity. Thus, the meaning of body rhythm is the human being's adaptation to different life situations, seen in a unique way for each person.

In daily practice, self-knowledge about an individual's behavior towards time facilitates their adaptation to external rhythms and leads them to execute movements efficiently with minimal effort. When these movements are poorly executed, with inadequate body rhythms, they result in inefficient movements, leading to unnecessary fatigue.

Rhythms are perceived through various senses, not limited to body limb movements: by vision, when looking at a sculpture; by hearing, when listening to music; and by touch, when sensing the vibration of sound, as done by hearing-impaired individuals or as felt by a person receiving a massage.

Space Factor: The concept of space is the place where we exist. We always occupy space and are surrounded by space, whether we are static or moving. Movement is the displacement of space occupation with our body. Thus, "Movement is the visible aspect of space. Space is the hidden feature of movement." (Laban; 1966:100)

In our culture, spatial changes, either individually or in groups, are a fundamental part of human communication. For Laban, his study includes several aspects: amplitudes, degrees of extension, levels of space, spatial sensations, action zones, and spatial attitudes.

Spatial amplitudes are: internal, personal, general, and social space. Internal space is inside our body, and its limit is the skin, i.e., internal space is the body's own form delimited by its own skin: "Besides the motion of bodies in space, there exists motion of space in bodies..."[43] (Laban; 1966: 101). Awareness of internal space and its three-dimensionality opens channels for the free circulation of vital energy.

The kinesphere can be defined by poetry:

The sphere
Within reach around each dancer
And in which movement is made
Is the kinesphere.

Psychologists call it personal space,
A domain belonging to the individual
As personal to him as his body.
Sociologists call it a territory
To be defended from invasion
Or shared with invitation. (Preston-Dunlop; 1998: 123)[44]

General Space is the environment where we move. It can range from a small scale (such as a room) to a universal scale (like the entire planetary system).

Social Space is the spatial relationship between bodies when we move in a group, i.e., the relationship between our kinespheres. "Countless directions radiating from the center of our body spreading through its kinesphere and going into infinite space" (Laban; 1966: 92).

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[43] In addition to the movement of bodies in space, there is the movement of space within the body (our translation).

Degrees of Extension: the experience of movement for each person within their kinesphere exists from the moment of conception. Initially, the mother's womb is a large space for the baby's kinesphere; but, at birth, it becomes a small and restricted space. Thus, in the last month of pregnancy, the baby's body movements have a smaller degree of extension. This fact illustrates the different amplitudes of our kinesphere.

Levels: after birth, we experience space in different levels: when lying down, rolling, crawling, and reaching the crawling position on all fours, we are in the low level; when crawling in various ways, sitting, and reaching a standing position (to walk), we are in the medium level; when standing on tiptoe or jumping, we are in the high level.

Spatial Sensations are ways of occupying the three dimensions of space, classified as piercing, separating, and enveloping. In daily movement, we constantly go through these three sensations: when we make movements that emphasize a line in space, the sensation of those movements is piercing because the body concentrates its intention on a line. For example, the movement of pointing in a direction with the index finger defines a line. When movements happen in two dimensions of space, they emphasize the plane, creating a sensation of separating or dividing. For example, moving forward divides space into two sides: right and left. When we make movements that use the three dimensions equally, we create volume. For example, embracing a person emphasizes volume.

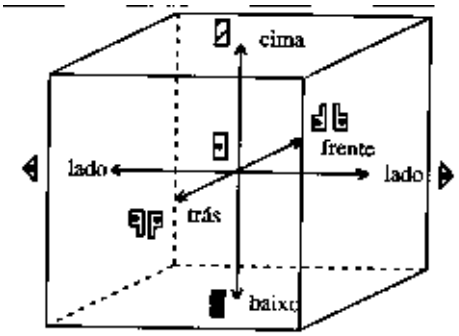
Action Zones: due to the body's anatomy, each part has its specific areas of movement within the kinesphere. Within its action zone, each part of the body can describe countless trajectories to connect one point of space to another. Training the proper use of the body's joints allows us to reach any point within the kinesphere, even the most difficult-to-reach areas, such as behind/above with the foot. Thus, the kinesphere can be defined as the sum of the action zones of the body parts.

Spatial Attitudes: we have two types of attitudes toward space: the objective attitude, which directly connects two points, and the flexible or non-objective attitude, which creates meanders to connect two points in space.

The Fluency Factor: is the sensation the individual has of movement. This can be freedom, when movement happens without inhibiting spontaneity, or control, when it is guided. Released fluency occurs when it is impossible to deliberately interrupt a movement[45]. Being knocked over by the wave of the sea, being carried by the current or the wind exemplifies released fluency. Controlled fluency occurs when the movement can be easily interrupted at any time. Carefully orienting oneself in a completely dark room exemplifies controlled fluency.

For Laban, fluency is the connection of life experiences that occur in the different situations we go through from birth. This factor is very significant for humans because when movement flows truly, a unity of thinking/feeling forms; attention and decision merge with intuition and sensation.

Dimensional Cross: mathematically, it is the union of the three movement factors corresponding to the three dimensions of the cube.



[46]

Incomplete efforts: These are also called moods or states of mind and result from the combination of two factors. For example, movements with slow time and weak force, with space and fluency being variable. When two movement factors relate, two defined

[45] The released fluency can be abruptly interrupted by a reflex reaction, which is an emergency interruption.

[46] top
side
front
side
back
bottom

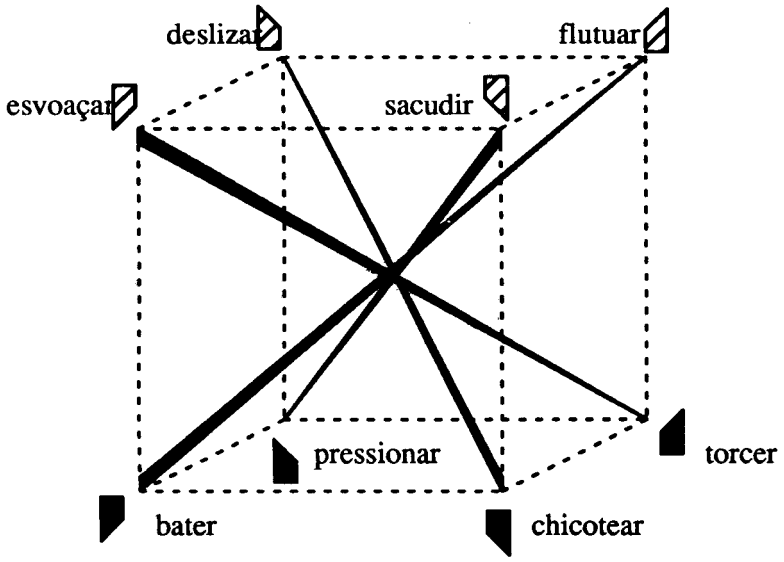
attitudes are also connected. Incomplete efforts reveal the internal attitudes and emotional states of the individual.

For the analysis and understanding of the content and the interrelation of incomplete efforts with behavior, an acute perception is required, which comes from years of training in observing movement in various cultures. Experimentally, the classification of climate types was reached, based on the relationship each movement factor has with an attitude: force/weight with intention, or what is moving; time with decision, or when it is moving; space with attention, or where it is moving; and fluency with progression, or how it is moving.

Complete efforts: These are also called dynamics or basic actions and result from the combination of the three movement factors in defined degrees, i.e., weak/strong or light/heavy force with fast or slow time, with flexible or direct space, with fluency being an underlying factor not conditioning the definition of complete efforts.

In daily life, we rarely complete a basic action, but instead move from one incomplete effort to another, as dynamics is a radical action with the factors at their maximum graduations. It only occurs when functionally necessary, such as pushing or carrying a very heavy object, expressing strong emotion, or in an extreme situation like a serious accident.

The eight dynamics, basic actions, or complete efforts are: float (weak or light force, slow time, and flexible space), glide (weak or light force, slow time, and direct space), shake (weak or light force, fast time, and flexible space), fly (weak or light force, fast time, and direct space), twist (strong or heavy force, slow time, and direct space), press (strong or heavy force, slow time, and direct space), whip (strong or heavy force, fast time, and flexible space), and hit (strong or heavy force, fast time, and direct space).



DIAGONAIS dinâmicas para o lado direito do corpo

47

Although there are eight dynamics, each individual is generally more attuned to one or two of them. Therefore, training and experimenting with all the dynamics—whether through scales or improvisation—broadens the movement vocabulary, enriching expressiveness and improving the efficiency and precision of actions.

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[47] slide
float
flutter
shake
hit
press
whip
twist

DIAGONALS

dynamics for the right side of the body

The practical knowledge of Laban's theory consists of experiencing the dynamics, the factors individually, and the incomplete efforts in various areas of the kinesphere, using different parts of the body. Generally, the hands and face are anatomically more suited to this diversity, but it is important to explore other body parts as well. This training takes place through exercises and pre-set scales determined by the teacher or through individual or group improvisations based on a theme related to movement factors and their relationships. Both executing and observing movement require extensive training, as the body needs time to solidly absorb new information. A movement specialist must be able to see movement and detect, through its factors and efforts, the feelings, ideas, and intentions being expressed.

The importance of this training in varied sequences is reflected in the enrichment of daily life, as it allows for the experience of new physical sensations that rarely occur in everyday routines, which tend to involve repetitive movements. Experimenting with new sensations is both healthy and pleasurable for the body and mind. When movement truly flows, thinking and feeling, intuition and sensation, become unified. Through the Art of Movement, Laban proposed a retrieval of spontaneous motion and an integration of mind and body. In this way, each person can find their own expression, executed with an economy of effort.

In the stress of daily life, movement loses its harmony, becoming excessively draining. As a result, there is little opportunity to understand the true value of economy of effort in our lives.

The knowledge of Laban's Method, through years of consistent training, makes these words meaningful and applicable. It is difficult to put into writing the profound impact that this physical experience has on enriching an individual's perception of life, as well as on the readiness and self-confidence it fosters in their actions. This is why the method's usefulness goes far beyond theoretical understanding—especially considering that the theory itself was developed only after its practical effectiveness had been established. In Laban's Method, one of the tools used to communicate movement—through pencil and paper—was the creation of the movement notation system known as Labanotation, based on the spatial representation of movement described earlier.

To conclude, I highlight two fundamental characteristics of Laban's Method: the first is its universality, as it applies to any kind of bodily movement; the second is that it teaches us to think in terms of movement, which is different from thinking in words.

I would like to close the discussion on body awareness methods with a poem by Valerie Preston-Dunlop (apud 1998: 57), a specialist in Laban:

You don't have to be told where to put your body
You function by becoming,
By stepping, turning, falling, balancing,
By holding still, resolving, dissolving, crystallizing.
You solve the problems,
You find the transitions
Because you live into them and out of them.

As Alexander Lowen states (apud 1995: 40), "An observer can notice tensions and, if properly trained, can interpret them to understand the person and their history."

2.2. Movement Application: Nota-Anna

"Geometry exists everywhere, as the philosopher once said. However, one must have eyes to see it, intelligence to understand it, and a soul to admire it."
(Tahan, 2002: 53)

2.2.1 Movement Notation

Considering that a notation system must satisfy three fundamental criteria:

1. Describe the movements of all body parts with spatial and temporal precision;
2. Record these movements in an economical, legible, and easily decodable manner;
3. Enable creation and innovation;

An analysis of the three traditional notation systems[48] - Labanotation, Benesh Notation, and Eshkol Notation - reveals that while they meet the first and third criteria, they fall short in terms of ease and efficiency of communication. These systems require highly specialized study, which limits their use to movement research and choreographic documentation. This highlights the need for a more accessible form of movement recording. Merce Cunningham aptly expressed this challenge: "Symbol-based notation systems don't work because of how dance steps are interpreted. Authors translate the steps into symbols. The dancer studies the symbols and reinterprets them back into steps. This is not an efficient process for dancers." *(Menosky, 1982: 61)*

Computers have attempted to address this issue. In early computer-notation experiments, Labanotation and Benesh Notation were translated into computer language. The input consisted of the symbols from these notations, which were decoded by the computer, and the output was represented as small animated figures on the screen. However, this approach failed to solve the core problem: the input still required the original notation, meaning that specialists were needed to transcribe real movement into notation before it could be entered into the system. This method was complex and costly, underscoring the need for a new notation system. As a result, alternative systems emerged that utilized electronic language, and today, several options are available on the market.

The first step in structuring a notation system is to analyze movement objectively. From this perspective, movement is the visual and temporal expression of energy release, resulting from muscular responses to internal or external stimuli. It can be described precisely by specifying its elements:

- The body part(s) in motion,
- Use of space (direction and level of displacement),

[48] There is video tape, which records movement in a two-dimensional format and does not allow for the creation of new movements.

- Duration in time (according to a pre-established metric unit),
- Flow (controlled or free).

If all these elements are described as they occur, we achieve a complete representation of the intended movement. The method used to describe these elements is notation—a field still to be further developed in the study of body language.

In the case of Nota-Anna, movement is recorded through its trajectory. This choice stems from the fact that, for both the Greeks and Laban, trajectory was understood as the way the eye perceives movement. In the past, this perception relied solely on human sensitivity, but with new technology, it has become a tangible reality, allowing movement to be transcribed onto video or paper. *(For a demonstration of this notation system, visit www.analivia.com.br.)*

This approach captures trajectory as the paths traced by body parts through three-dimensional space over time[49]. In other words, it is the line drawn between two points in space—the initial and final positions—defined by the body's spatial placement at the beginning and end of the movement. A spatial position is a movement at rest, marking the start or end of locomotion. Even when still, we occupy space, and it is possible to describe the spatial configuration of each body part.

Nota-Anna efficiently describes movement trajectories while specifying all the essential components of movement language:

- Body parts are represented by the trajectory lines;
- Spatial design is the shape of the line;
- Time is the length of the line;
- Flow is the relationship between the line and the force of gravity.

Furthermore, since it is iconic[50] and isomorphic to movement, Nota-Anna eliminates the need for symbols, making it easy to read and requiring no prior study to use[51].

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[49] For the mathematical description of this trajectory, the three Cartesian directions (x, y, z) are used as a reference.

[50] An icon bears some resemblance or analogy to its real-world referent. Example: a statue or a pictogram.

[51] This is because the trajectory itself induces the kinetic sensation in the student-interpreter. (The scientific explanation for this fact can be found in the book *Analívia Cordeiro: NOTA_ANNA – An Electronic Notation of Human Body Movements Based on the Laban Method*, São Paulo, Annablume Publishing, 1998).

The trajectory is a non-anthropomorphic way of recording movement, representing the movement itself, independent of the physical appearance of the moving person (such as hair, clothing, etc.). Nota-Anna writes pure movement, introducing humans to a new universe, comparable to that of music: “Humankind was only able to explore the full potential of music when it began to write musical scores.” (Hall, 1969: 13)

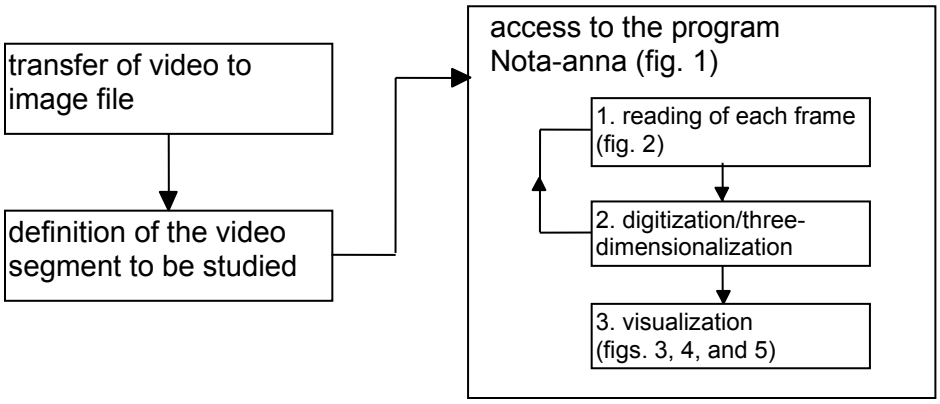
2.2.2 Functional Description

Through the computer-dance experience I developed between 1973 and 1976, I realized that for a student/interpreter to see a movement, it was not necessary for a human figure to be moving. It was enough to show the path traced by the basic joints of the body in space. Based on this, I began my research into trajectory notation. The first result I obtained revealed the expressive richness and emotional content of human movement, as seen in the example of a jump movement, extracted from a Yemeni folk dance. The illustration below shows the trajectory of the body's joints within a 1/3-second interval during this jump, where we can observe the coordination of body parts as a unit and the non-mathematical organicity of the lines in space, working in uniso

I will now describe the characteristics of Nota-Anna, which graphically translates real movement into its trajectory, using video tape and a computer. A video camera (VHS or DV) and a computer with a video capture card are used to capture the image. To run the program, any computer with JavaTM software installed (J2SE[52] version 1.3 or higher) can be used, which can be obtained from the website http://java.sun.com.

The operation follows the sequence below:

[52] Java™ 2 Standard Edition



The first step of the process is the transfer of the video to an image file:
The video, shot with a single fixed camera, serves as the input material. The video device is connected to the computer through a video capture interface. If a person uses stickers or wires on the body, like goniometers[53], they may lose spontaneity; and the movements of everyday life cannot be studied in an artificial laboratory system. Therefore, I opted for a data entry method using a frame-by-frame system of video movement records, which provides excellent fidelity for my objectives. The next step is to define the video segment to be studied

The Nota-Anna program provides a command menu, illustrated below.

[54]

The data input sequence occurs in three phases:

[53] goniometer: An instrument equipped with radio transmitters that measures body angles. It can be strapped to the body's joints to transmit information directly to the computer for input. Other methods include using luminous markers on the body's joints for video capture or alternative technologies for inputting body movements into the computer.

[54] File
Video
Dimensions
Scan
Model
3D Figure
Exit

1. Frame Reading: The SCAN command provides the sequence number and stores the image of the frame to be digitized. Defining the video segment to be analyzed: This can range from a few seconds to several minutes, depending on the subject studied. Its content is divided into intervals compatible with trajectory reading, as an excessively long segment may cause overlapping lines and become confusing. This interval can follow various criteria (musical unit, division of codified gestures (as in traditional Indian dance), or any other parameter) with either a standardized quantitative time division or a semantic division, allowing the number of frames per unit to vary. Thus, based on the video segment to be analyzed, it is possible to calculate how many frames will be digitized. Below is an image of a frame from the sequence of a kick by the player Pelé, to be digitized.

2. Digitization/Three-dimensionalization of each frame: Accesses the POINTS command and enters the data according to Fig. 1. Then, it enters + or - as shown in Fig. 2, which three-dimensionalizes each part of the body.

fig. 1[55]

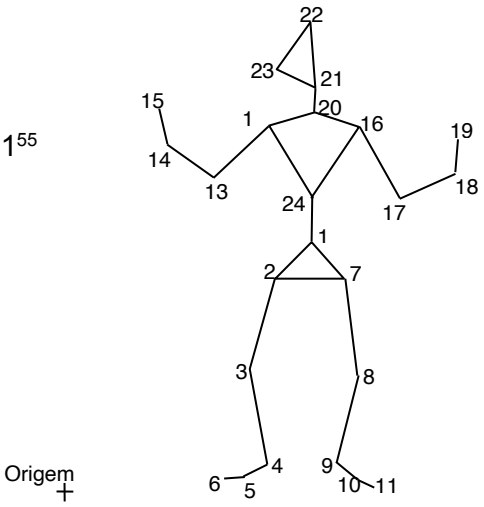
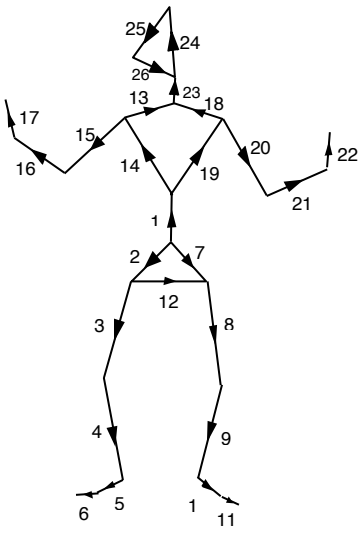


fig. 2



Observe the example of the three-dimensionalization of the leg.

.

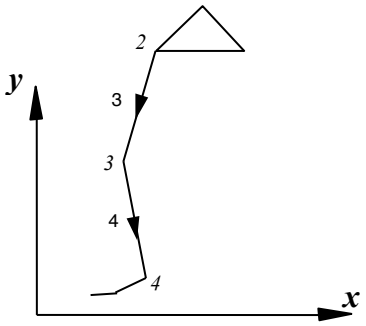
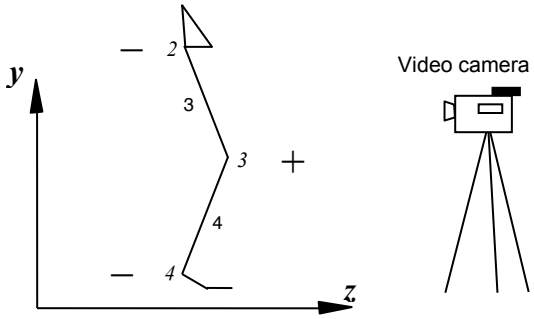


Image in the video of the right leg, composed of parts 3 and 4 (points 2, 3, and 4).



Left lateral image, showing the direction of parts 3 (+) and 4 (-) in the three-dimensionalization.

For corrections, the DELETE command is used. To continue, the ADVANCE command positions the next frame to be digitized. At the end of this phase, a dimension in VG[56] is indicated for the calculation of the proportions of the stick-figure according to the real model's body measurements, stored in the BODY file.

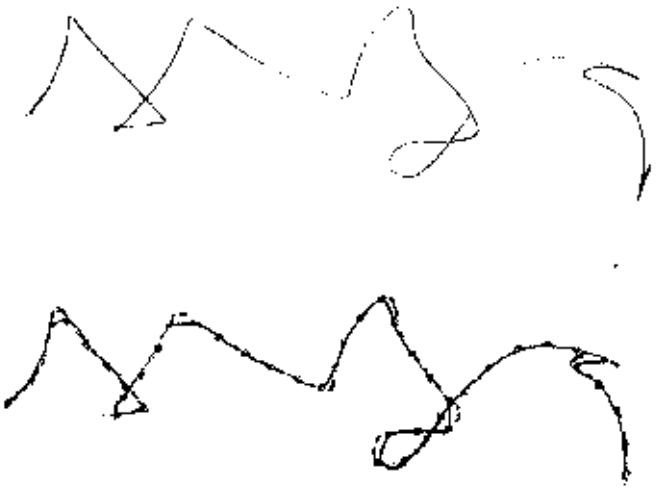
[55] Origin

[56] VG (Visual Geometry**)** is the basis for calculating the angle of each joint in the three-dimensionalization.
OR
VG (Verdadeira Grandeza) / TM (True Magnitude) is the basis for calculating the angle of each joint in the three-dimensionalization.

3. Visualization of digitized images**:** The result, in the form of a line that corresponds to the drawing of the body's joint displacement in three-dimensional space, awakens the kinetic sense in the student/performer and motivates them to reproduce the movement with their own body.

Both in practice and in theory, this statement is confirmed. Since the Greeks, movement was seen as a trajectory in the ethereal; but with technology, this perception has become a reality: the Nota-Anna and other similar applications already existing on the market make the trajectory clearly visible. This is its striking feature: the result (program output) shows the student-performer the displacement of the body parts, representing the visualization of the essence of the emotional expression of movement in its smallest nuances.

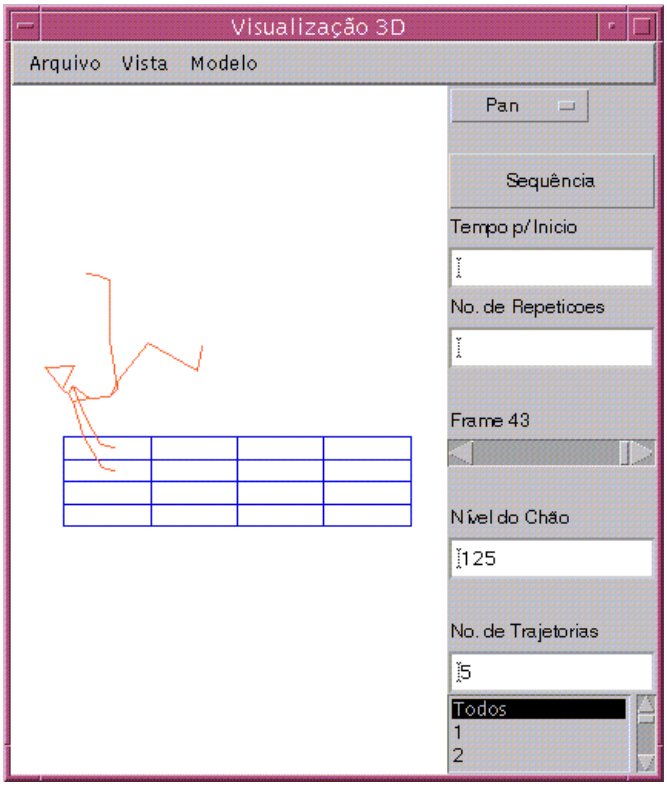
Since the movement is executed by people, the notation provided by the computer does not need to be an anthropomorphic figure in motion, as in animation. It can communicate movement, independent of the human figure. The notation provided by the computer should primarily induce the execution of the movement[57]. At no point is the objective to transform real people into cartoons. That is why mathematical artifices, such as interpolation, are not used to make the trajectory aesthetically more "legible." To clarify this aspect with an example:



[57] In the case of dance, notation can induce expressiveness because, in this field, movement conveys a clear message and achieves its meaning through gestural intention and interpretative subtlety.

The trace of the real movement (upper figure) compared to the interpolated one (lower figure) shows a smoothing of the curves (loss of the angles in the line), implying a significant difference in the expressive content of the lines. The interpolation is responsible for the mechanical appearance of the movement, as the joints of the body parts in the figure describe trajectories without peaks or angles, making the movements rounded with an always similar expression. The "expression of emotion," as dancers would say, does not occur. This technique is widely used in computer animation.

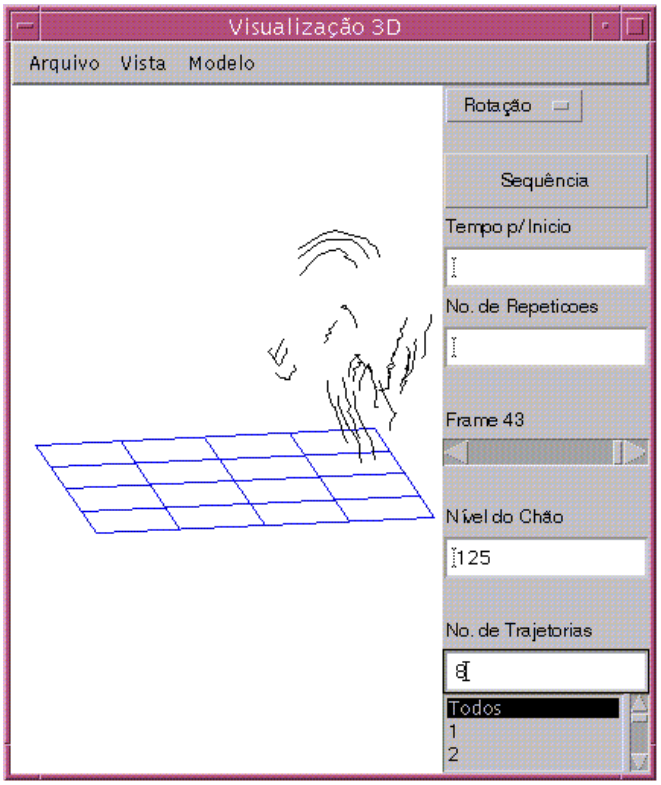
To obtain the final result, the 3D FIGURE key in the menu generates an additional window offering several observation options for each unit of the sequence under study. This command shows the movement of the stick-figure, as seen in the image below:



58

[58] 3D Visualization
File
View
Model
Pan
Sequence
Time to Start
Number of Repetitions
Frame 43
Ground Level
Number of Trajectories
All

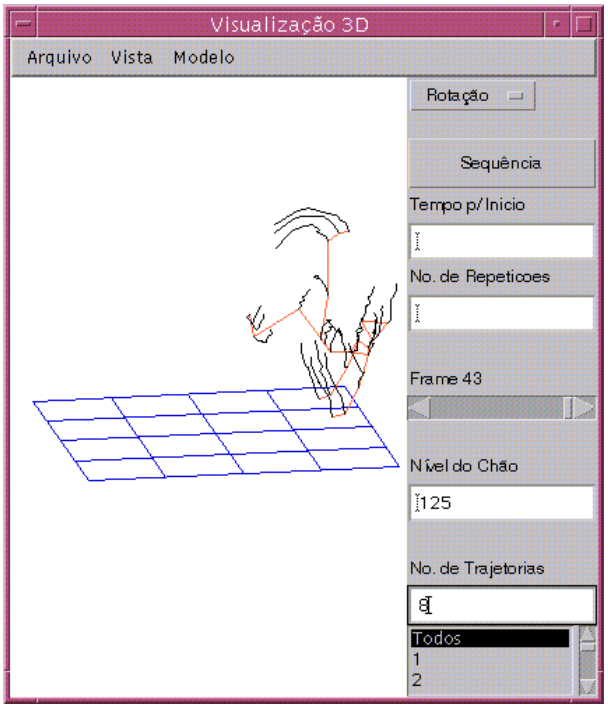
TRAJ. shows the trajectory, as illustrated below.



[59]

[59] 3D Visualization
File
View
Model
Rotation
Sequence
Time to Start
Number of Repetitions
Frame 43
Ground Level
Number of Trajectories
All

and BODY&TRAJ. shows both together, as below:

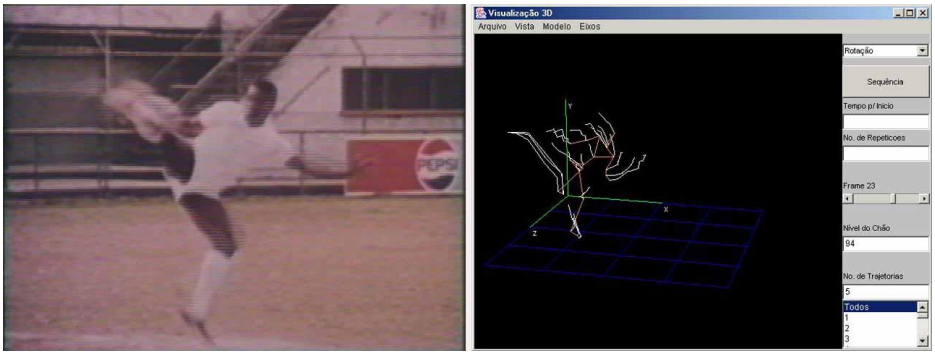


[60]

With the POINTS key, the complete set of trajectories can be visualized or each one separately. ROTATION shows a stick-figure rotating on the z-axis. SEQUENCE displays the entire sequence, as in the video. FRAME advances the sequence according to the mouse manipulation speed (To see how this example works, visit the website www.analivia.com.br).

The illustration below shows the end of a movement and its notation:

[60] 3D Visualization
File
View
Model
Rotation
Sequence
Time to Start
Number of Repetitions
Frame 43
Ground Level
Number of Trajectories
All



In conclusion, we remind that the final objective of this proposal is the practical experience of recording and reading real movement. Exploring the potential of movement is to use its language as a form of communication, establishing connections between people with a code that varies individually and culturally. The study of this code requires a recording and analysis tool, which is movement notation, always emphasizing that its use does not replace practical training and the observation of reality. Only these experiences prepare the researcher to understand bodily behavior in analysis and/or creation.

There are two disadvantages to this system. One is the long input time for the images (3 minutes for each). Thus, it takes an hour and a half to digitize/three-dimensionalize one minute of video, not including corrections. The other is the fixed video camera, which limits the reading of old films with multiple camera movements.

As advantages, it is considered that input through movement recorded on video can capture free body movement, uninhibited by technological apparatus. On the other hand, the use of a single camera opens the possibility of reading old films and videos, a fundamental condition for creating an efficient memory and history of dance.

With information from a single camera, the three-dimensionalization of the figure is processed, thus characterizing the simplicity of this system. Moreover, the application can be ported[61] to more popular and affordable machines, such as PCs, which makes its use easier and more accessible. Thus, the simplicity of its external appearance and organization, aligned with current technological conditions, together generate a low cost,

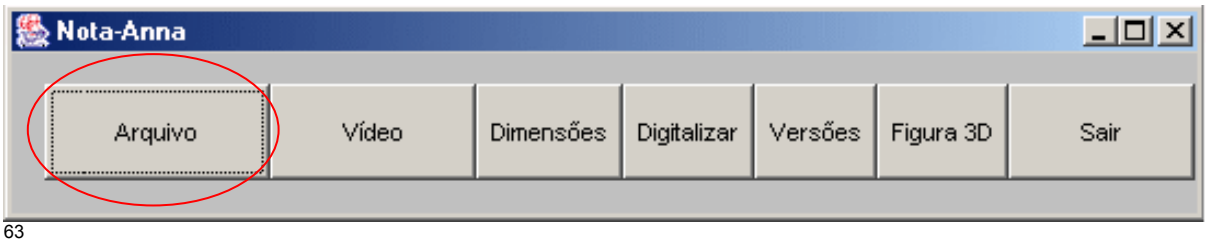
[61] Port means converting the software to another platform or computer system.

an essential factor for an audience of artists and Brazilians.

The synthetic design of the stick-figure, which uses the exact number of points to show the movements of the body's joints, including the points of lightness and gravity of the torso[62], makes reading the figure efficient and fast. Also, for the trajectory, the reading of the movement is immediate, without the need for prior study. This flexibility allows both intuitive and systematic knowledge of the syntax and rules of relationships between the elements of the body movement language, making it useful for various fields of study.

To conclude, I point out the last advantage and essential characteristic: this system reaches the poetry of movement, expressed by Aristotle's phrase, “What is given to the eyes is the intention of the soul” (Rollo; 1992, 250).

Next, I will briefly present the functionality of each command of the Nota-Anna program. When we activate the Nota-Anna program, the following screen should appear:



[63]

1. On this screen, we have the following commands:

- **File:** Allows the selection of the sequence of movements to be worked on, recorded in video. It also allows the selection of a pre-digitized video, for viewing purposes only.

[62] The smaller joints, such as those in the hands and feet, were not included in this stage of the research but can be added in the future without compromising this application.

[63] File
Video
Dimensions
Scan
Versions
3D Figure
Exit

- **Video:** Shows the original selected video.

- **Dimensions:** Allows you to view and modify the body's dimensions, according to the scheme indicated in the figure.

- **Digitize:** Allows you to determine and modify the digitization and three-dimensionalization of the frames.

- **Version:** Allows you to create a new version of the original video, with a new figure having different dimensions but performing the same movement as the original video.

- **3D Figure:** Allows you to view the three-dimensionalization of the video.

- **Exit:** Closes the program.

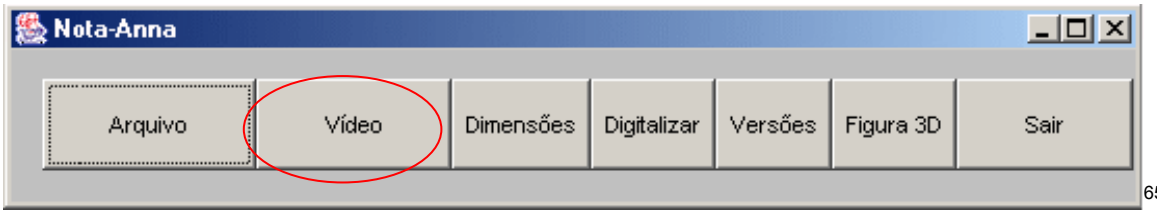
2. By clicking on File, the following screen will appear:

[64]

In this interface, it is possible to choose the video with which we want to work.

If the reader wishes to access a video that is not yet available in the choices we offer, please contact analivia@dialdata.com.br.

3. By clicking on **Video**:



[65]

---

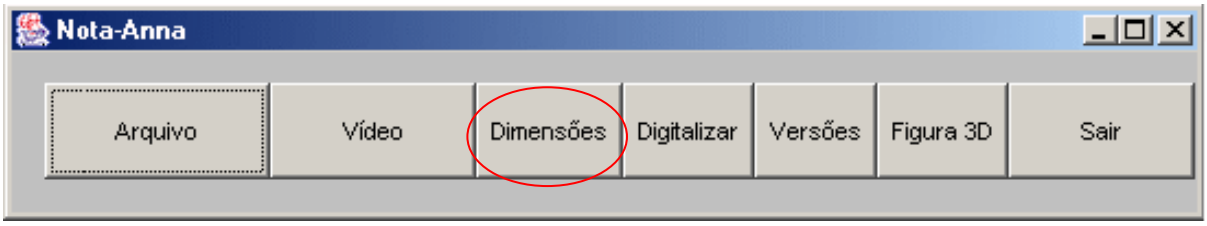
[64] Updown

[65] File
Video
Dimensions
Scan
Versions
3D Figure
Exit

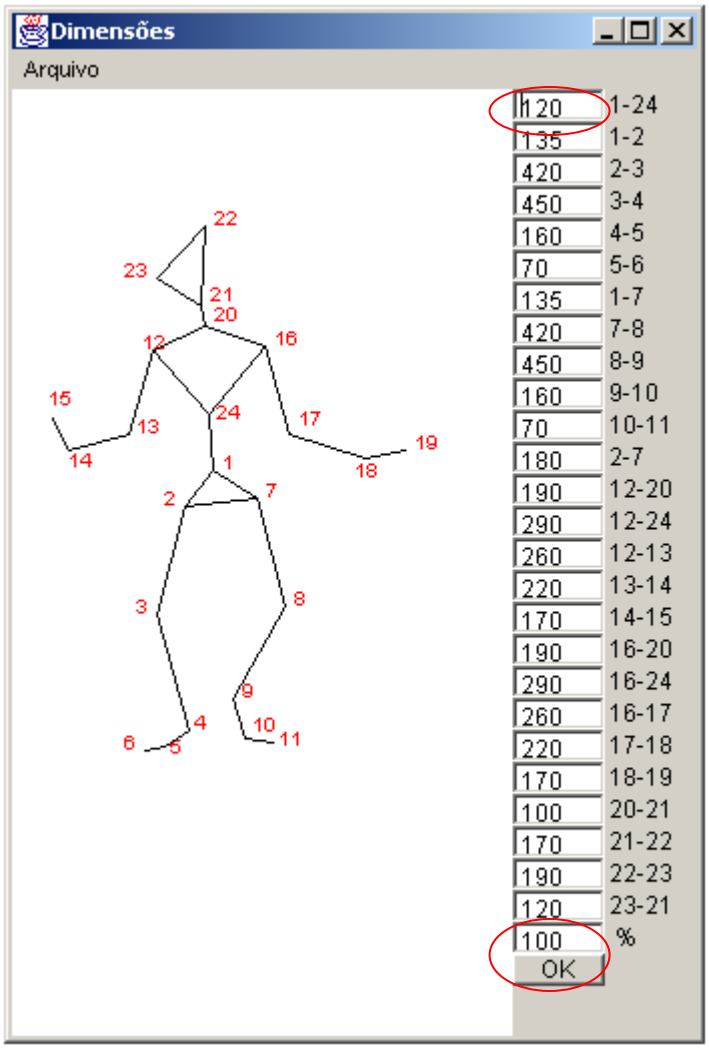
You will then be able to view the selected video, as shown below.

To exit this window, click on **File** and then select the **Close** command.

4. By clicking on **Dimensions**:



The following screen should appear:



Changing only one dimension

Changing all sizes simultaneously

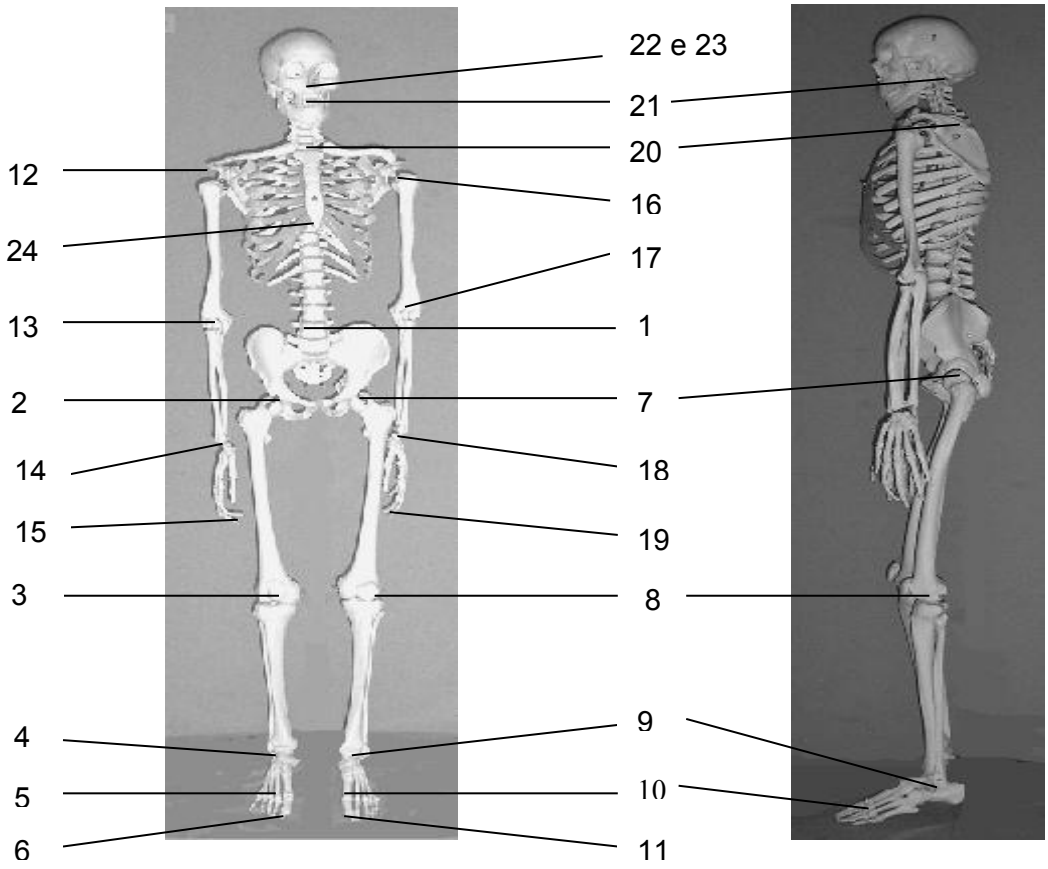
On this screen, it will be possible to change the dimensions of the body used in the three-dimensionalization in two distinct ways.

The first option involves individually changing the size of each of the 26 body parts by editing each of the measurement fields, whose numbering corresponds to the stick-figure model next to it. It is important to emphasize that the measurements should be entered in centimeters (cm). The second option is to change only the **%** field. This way, all measurements will be altered proportionally.

To determine the measurements, the body's joints should be observed according to the table below:

1- Umbilicus,
2- Right hip joint,
3- Center of the right patella,
4- Central point between the two right malleoli,
5- Right metatarsophalangeal joints,
6- Tip of the right foot,
7- Left hip joint,
8- Center of the left patella,
9- Central point between the two left malleoli,
10- Left metatarsophalangeal joints,
11- Tip of the left foot,
12- Right scapulohumeral joint,
13- Tip of the right elbow,
14- Right wrist,
15- Tip of the right hand,
16- Left scapulohumeral joint,
17- Tip of the left elbow,
18- Left wrist,
19- Tip of the left hand,
20- Seventh cervical vertebra or top of the sternum,
21- First vertebra-skull joint,
22- Upper posterior tip of the skull,
23- Tip of the nose,
24- Lower tip of the sternum.

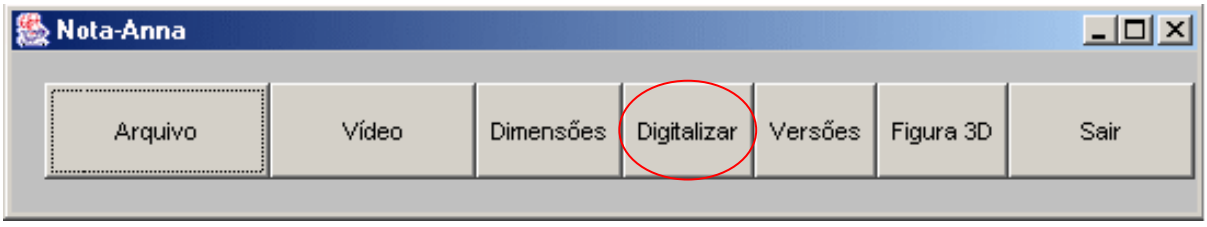
In case of doubts about the names of the joints, you can refer to the figure below:



Suggestion: To better understand the location of the joints in the figure, locate and touch your own body (or another person's body) and feel the joint you are working on.

To exit this screen, click on **File** and then select the **Close** command.

5. By clicking on **Digitize**:



The following screen will appear:

66

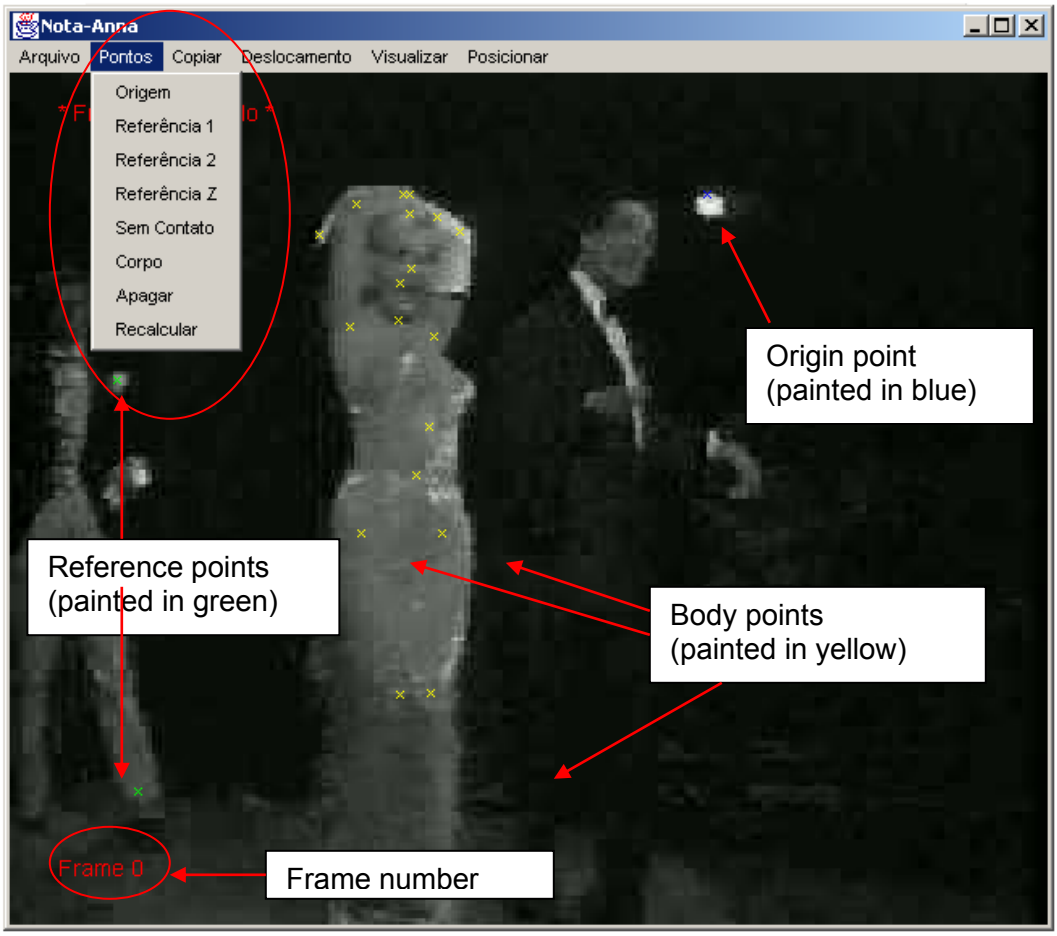
Note in the bottom left corner the frame number to be digitized. We suggest that, to start digitizing a sequence, frame 0 be chosen.

In this window, we have a menu with the following action options:

Points Menu**:**

---

[66] File
Points
Copy
Displacement
View
Position



[67]

The commands in this menu have the following functions:

- **Origin:** Define an origin point in the displayed frame. This point must be visible from the beginning to the end of the sequence to be digitized.

- **Reference1 and Reference2:** Define two reference points that will be used to calculate the three-dimensionalization of the frame. These two points must be visible from the beginning to the end of the sequence to be digitized. They correct the variation in body size due to the camera's zoom. The distance between these points must correspond to 1 meter in reality.

---

[67] Origin
Reference 1
Reference 2
Reference Z
No Contact
Body
Delete
Recalculate

- **Reference Z:** Determines the contact point of the body with the ground, which will be used to create the displacement on the Z-axis in the three-dimensionalized animation. (This point only needs to be defined if there is displacement on the Z-axis).

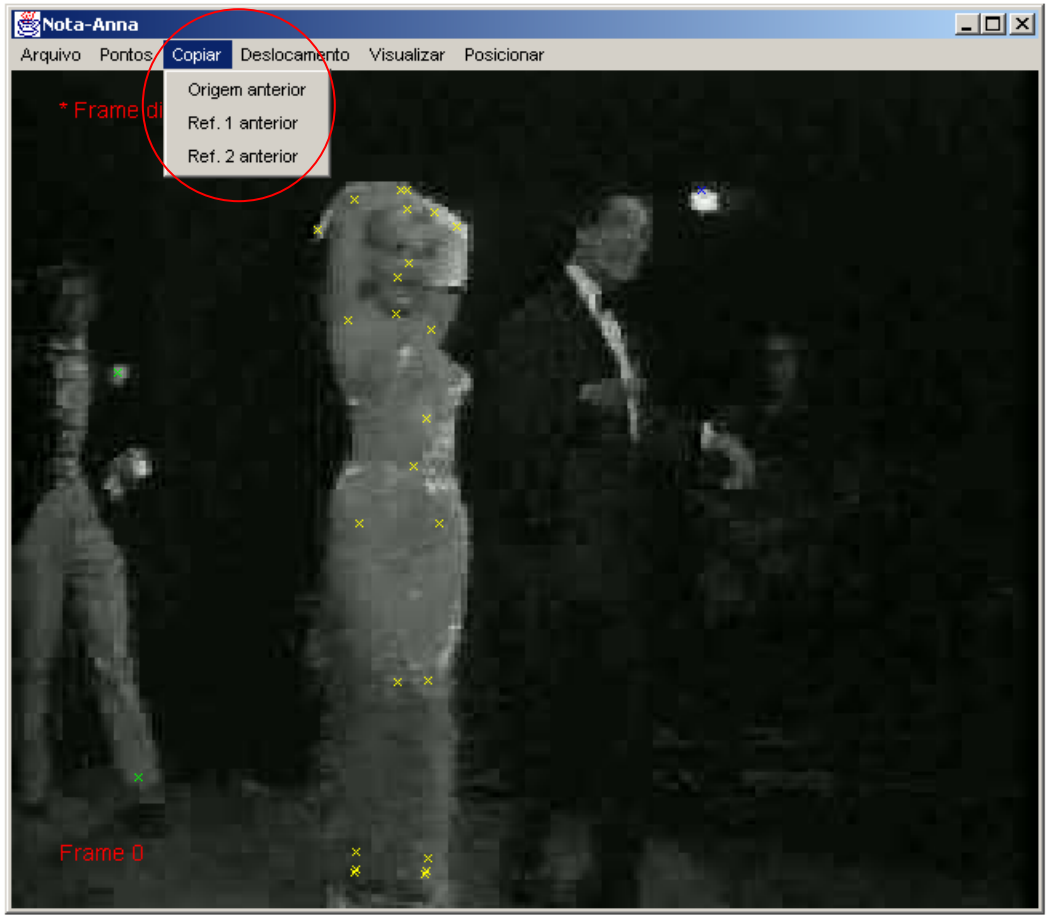
- **No Contact:** Indicates that there is no contact between the body and the ground in this frame.

- **Body:** Defines each of the 24 points of the body.

- **Delete:** Deletes any point visualized on the screen.

- **Recalculate:** Recomputes the calculations of the digitization for this frame.

Copy Menu**:**



The commands in this menu have the following functions:

- **Previous Origin:** Copies the **Origin** point from the previous frame to the current frame.
- **Previous Ref.1:** Copies the **Reference1** point from the previous frame to the current frame.
- **Previous Ref.2:** Copies the **Reference2** point from the previous frame to the current frame. If there has been no camera movement, these points will remain the same from the beginning to the end of the sequence.

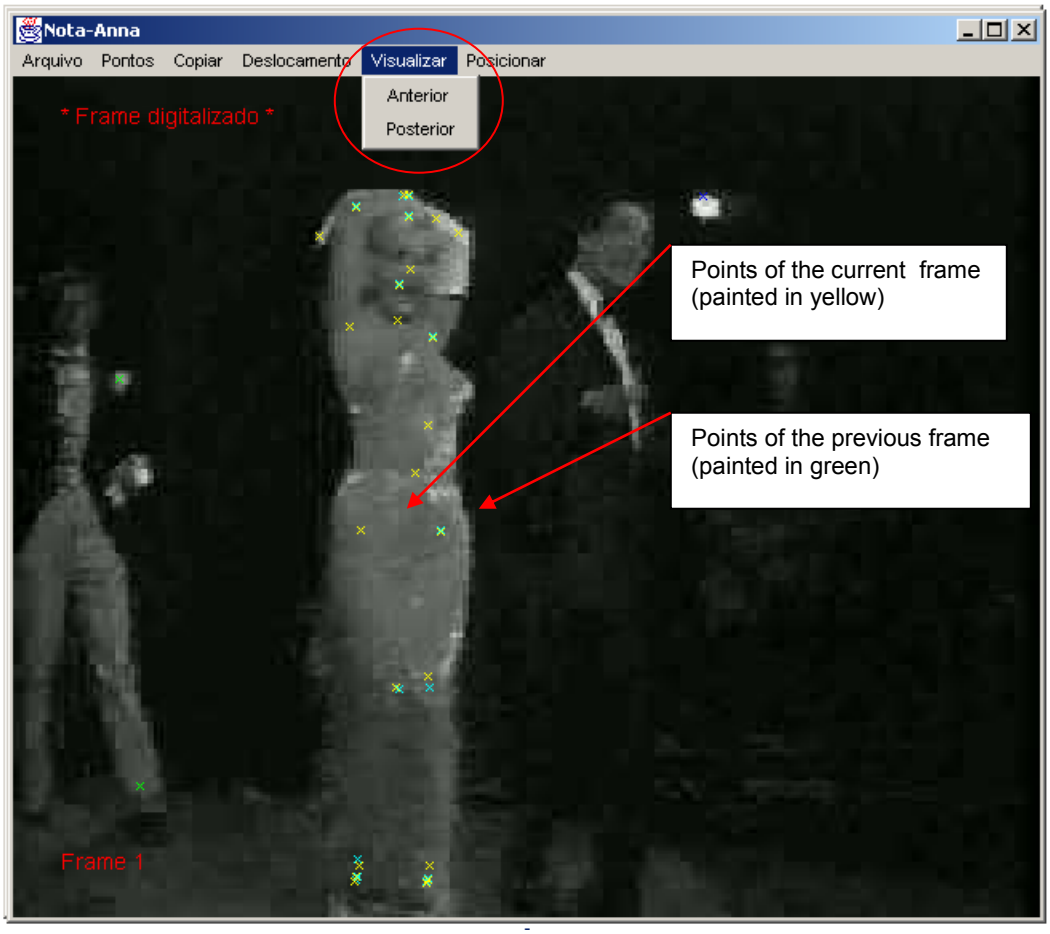
Displacement Menu**:**

68

The command in this menu has the function of **defining a new origin**, i.e., allowing the definition of a new origin point in this frame, if necessary.

[68] defining a new origin

View Menu**:**



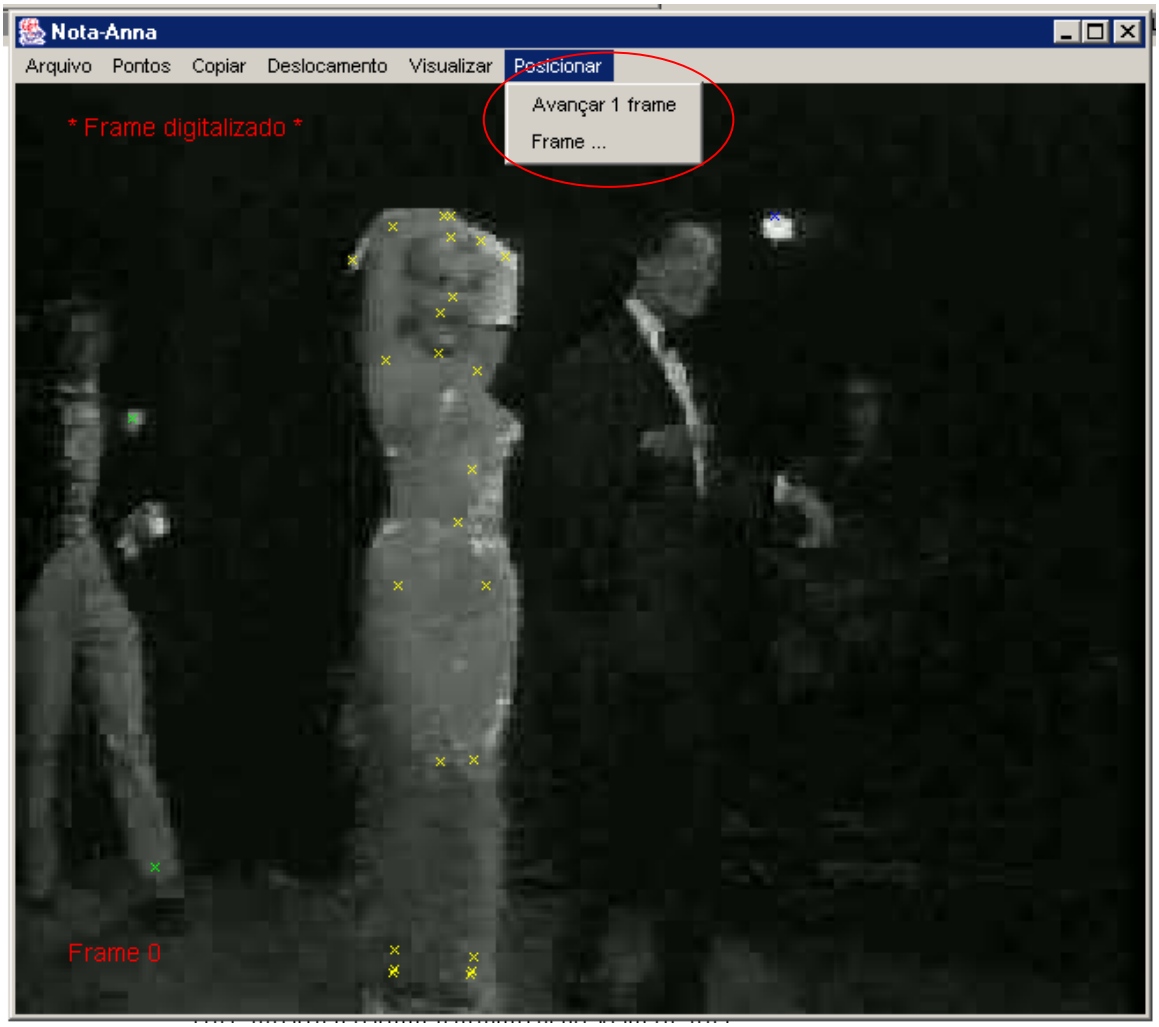
69

The commands in this menu have the following functions:

- **Previous:** Displays all the points of the previous frame painted in green.
- **Next:** Displays all the points of the next frame painted in purple.

[69] View
previous
next

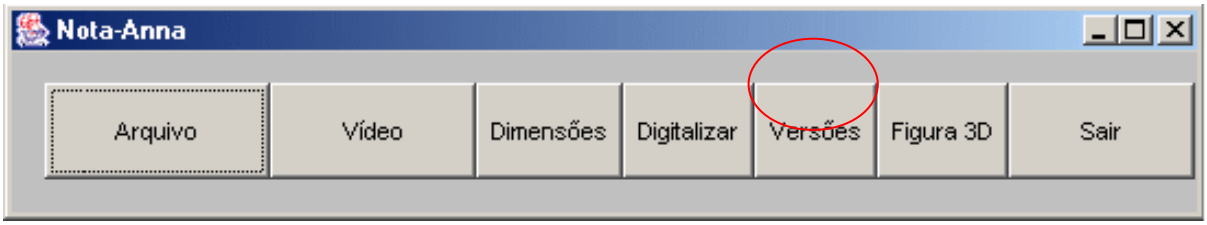
Position Menu**:**



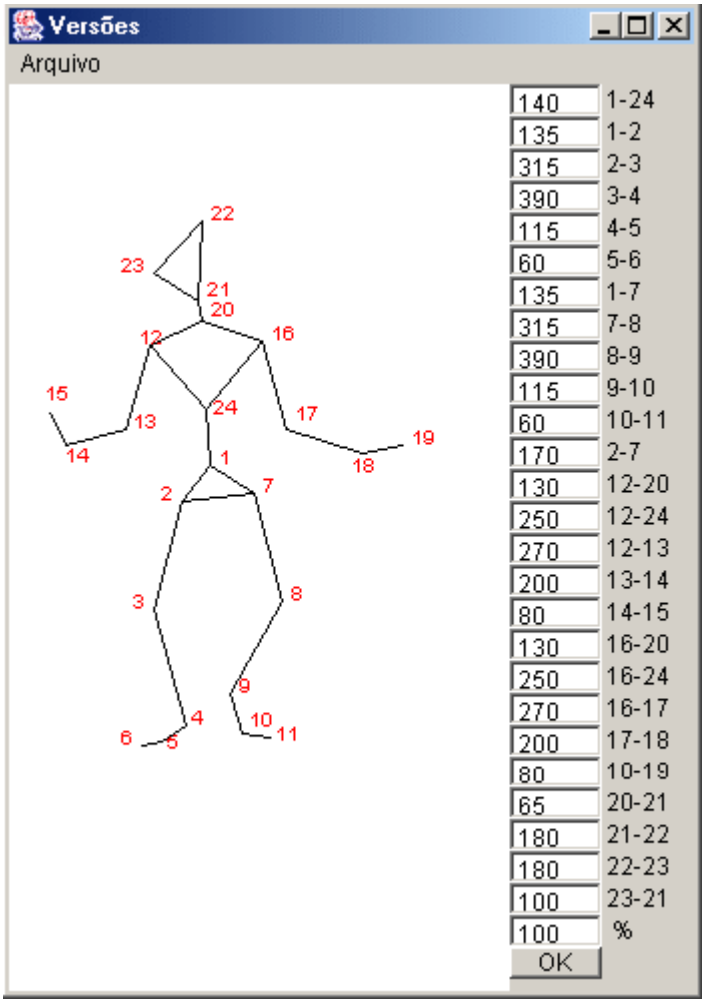
The commands in this menu have the following functions:

- **Advance one frame:** Displays the next frame.
- **Frame...:** Allows you to choose the frame to be visualized through the following interface:

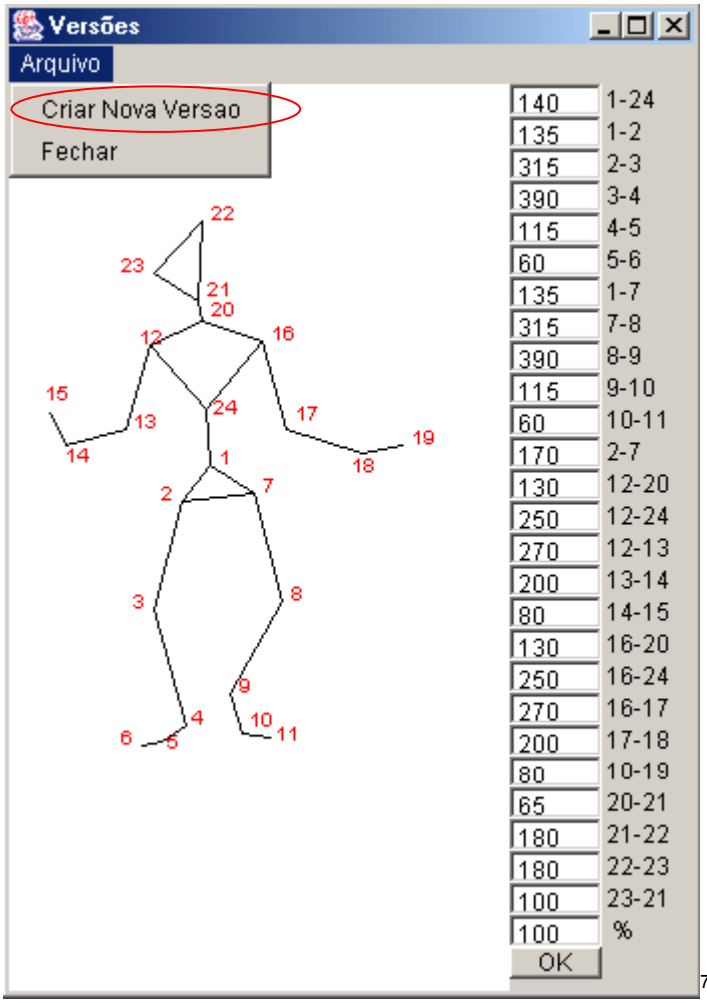
6. Clicking on **Versions**:



The following window opens:



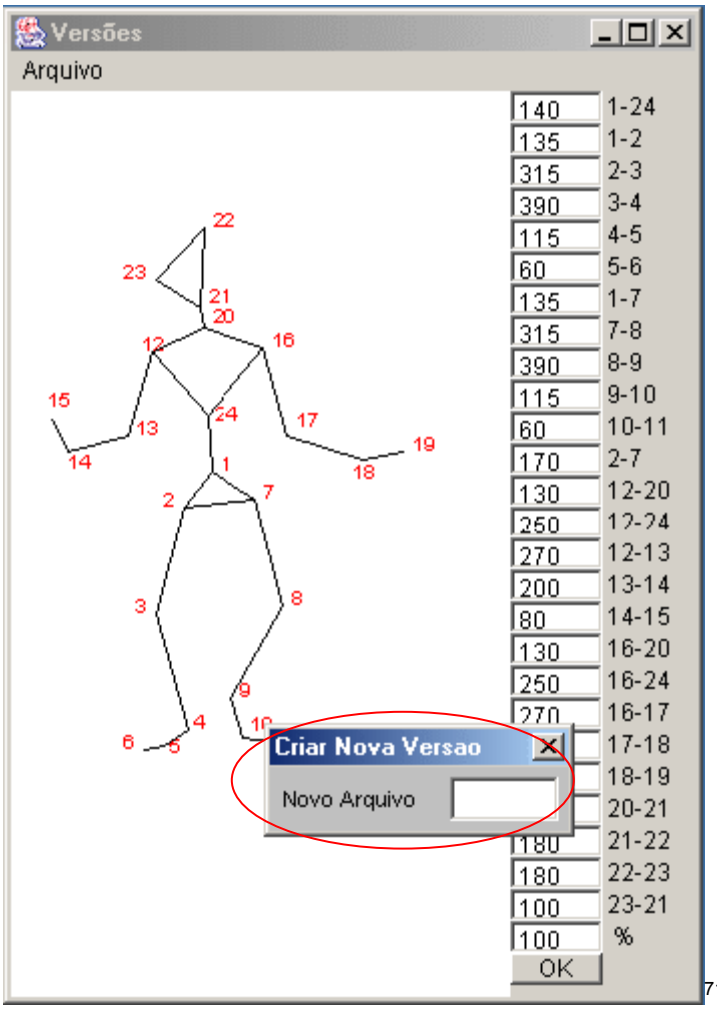
This command allows you to alter the dimensions of the body after the sequence has been digitized. This way, you can generate the same movement sequence with different bodies (represented by stick-figures).



[70]

After making the changes to the dimensions in the table on the side, press the OK button below. Then, activate the **Create New Version** command.

[70] Versions
File
Create New Version
Close

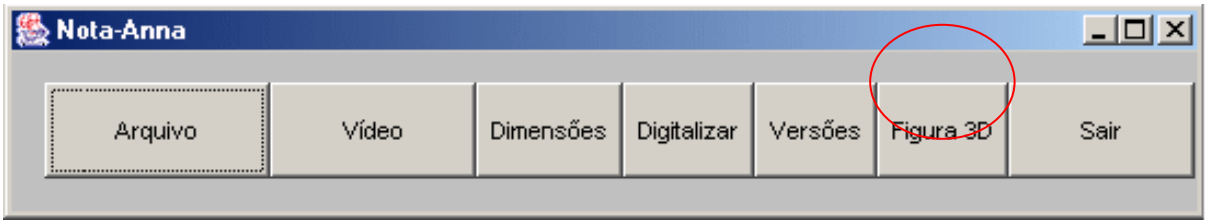


[71]

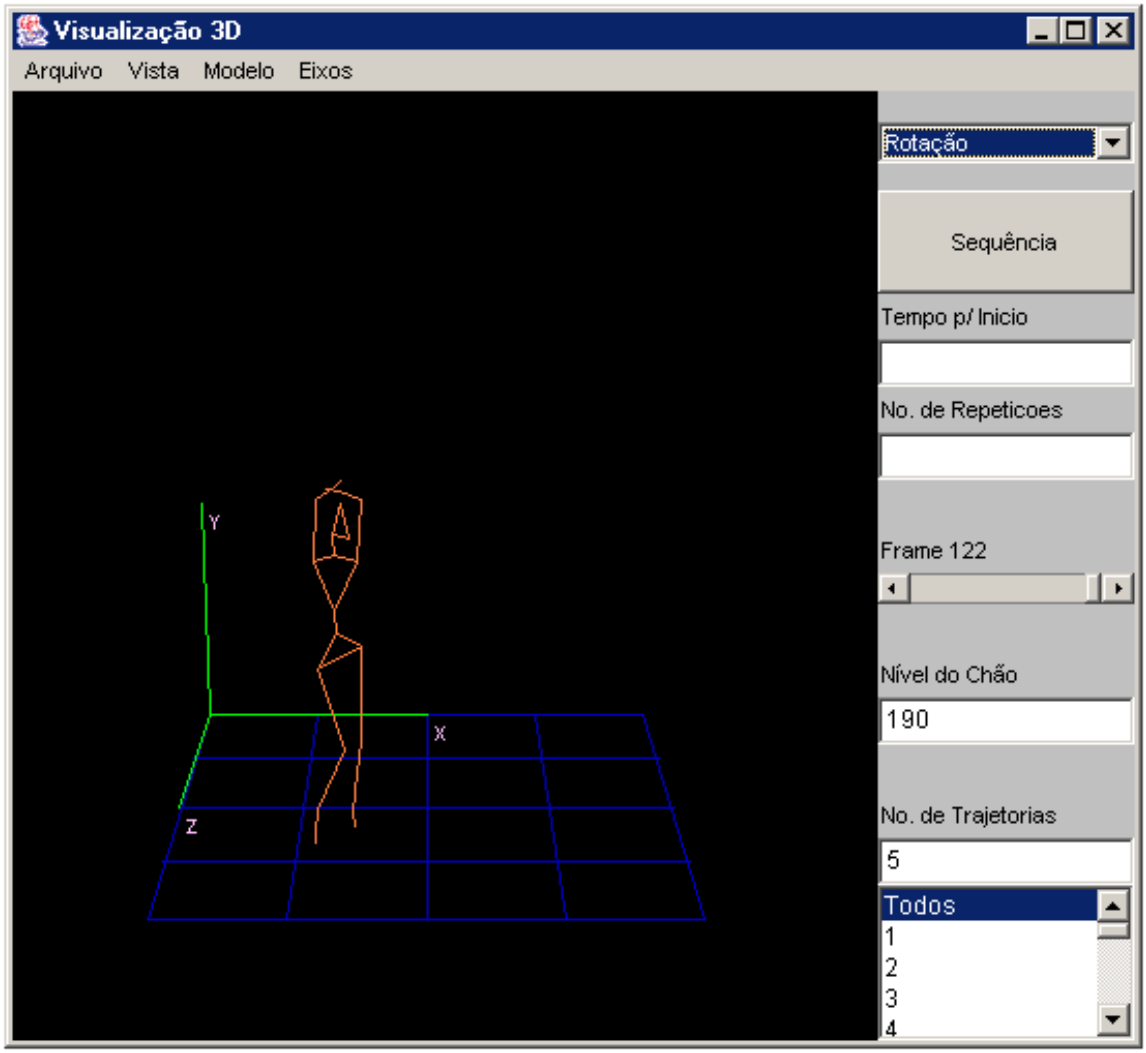
Another menu appears requesting the name of the new file to be created based on the dimensions of the new body.

[71] Create New Version
New file

7. Clicking on **3D Figure**:

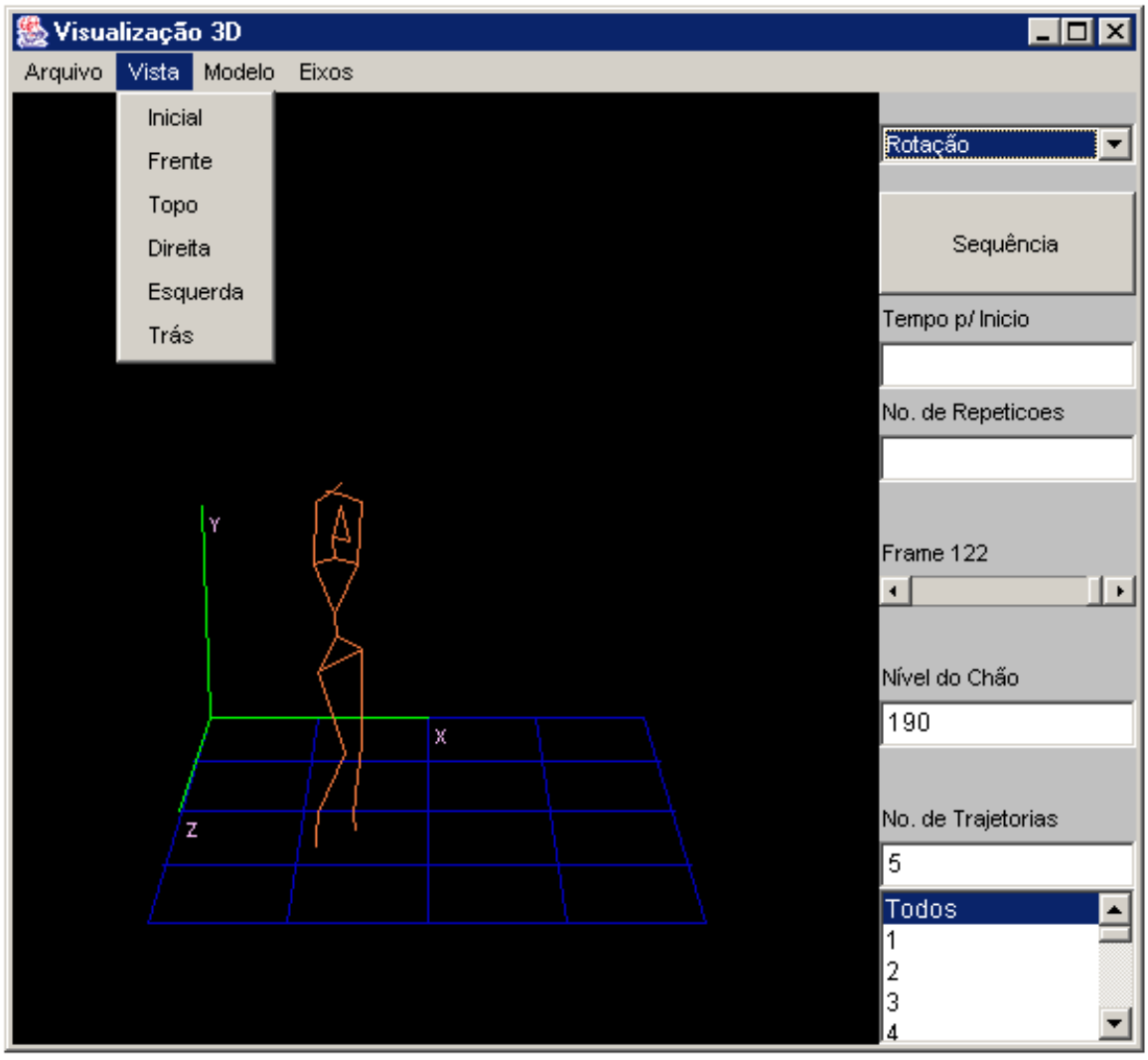


The following interface will appear:



This interface offers the following menus:

View Menu:



72

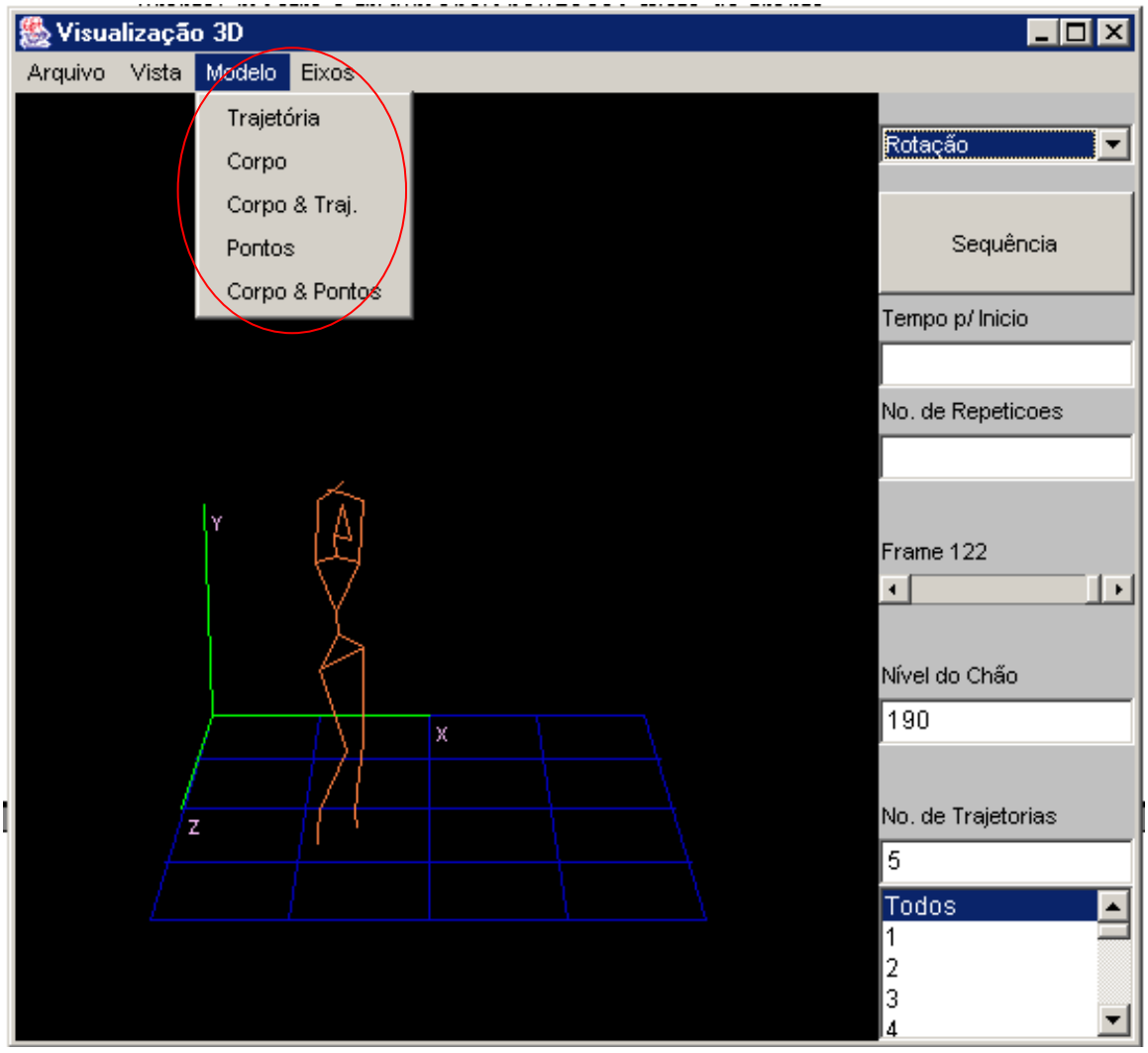
The commands in this menu have the following functions in visualizing the body movements generated by the digitization:

---

[72] File
View
Initial
Front
Top
Right
Left
Back

- **Initial:** Shows the 3D visualization from the initial view, corresponding to the camera viewpoint of the digitized frame.
- **Front:** Shows the 3D visualization from the front view.
- **Top:** Shows the 3D visualization from the top view.
- **Right:** Shows the 3D visualization from the right view.
- **Left:** Shows the 3D visualization from the left view.
- **Back:** Shows the 3D visualization from the back view.

Menu **Model**:

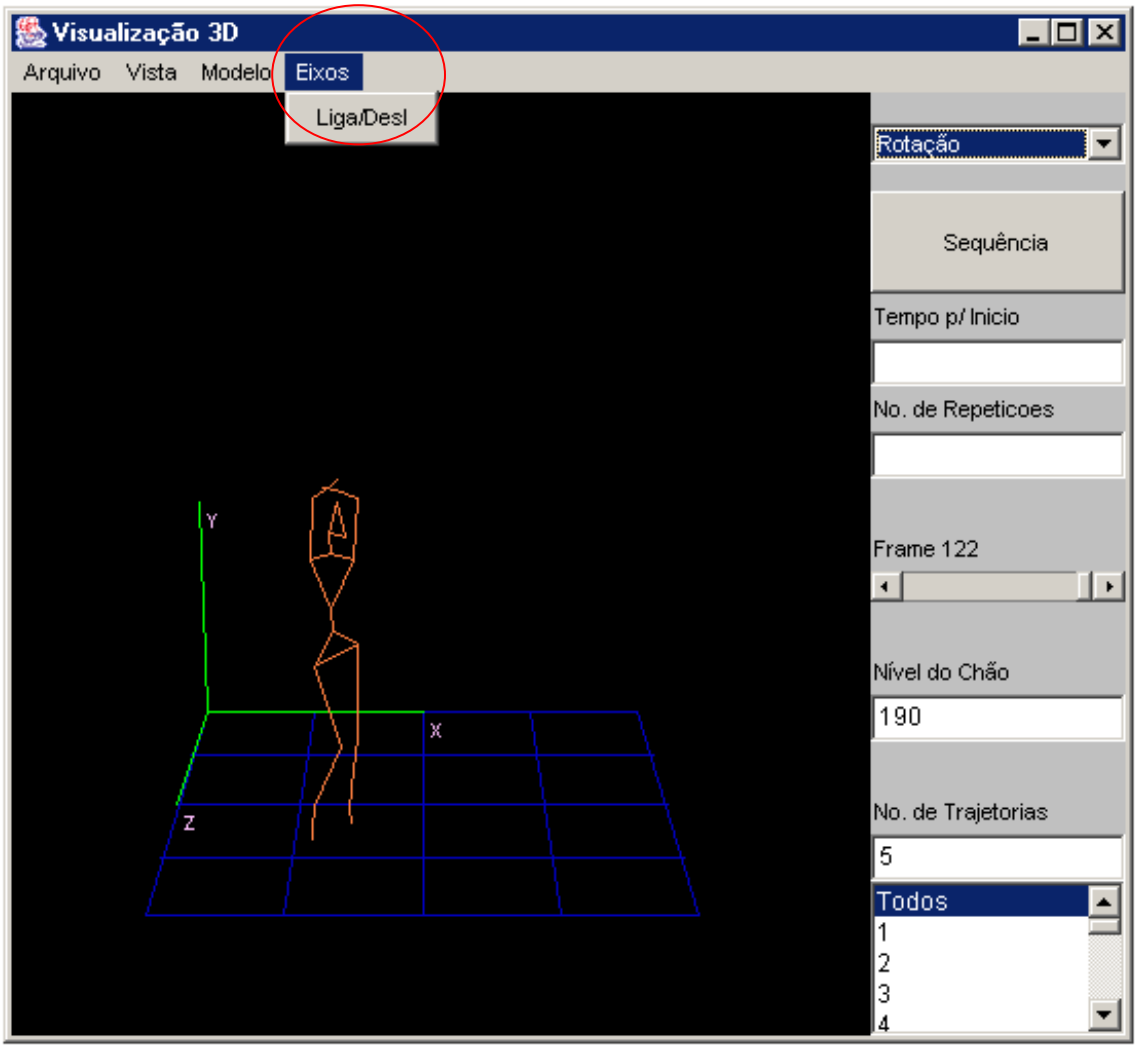


The commands in this menu have the following functions in the visualization of the digitized movement sequence:

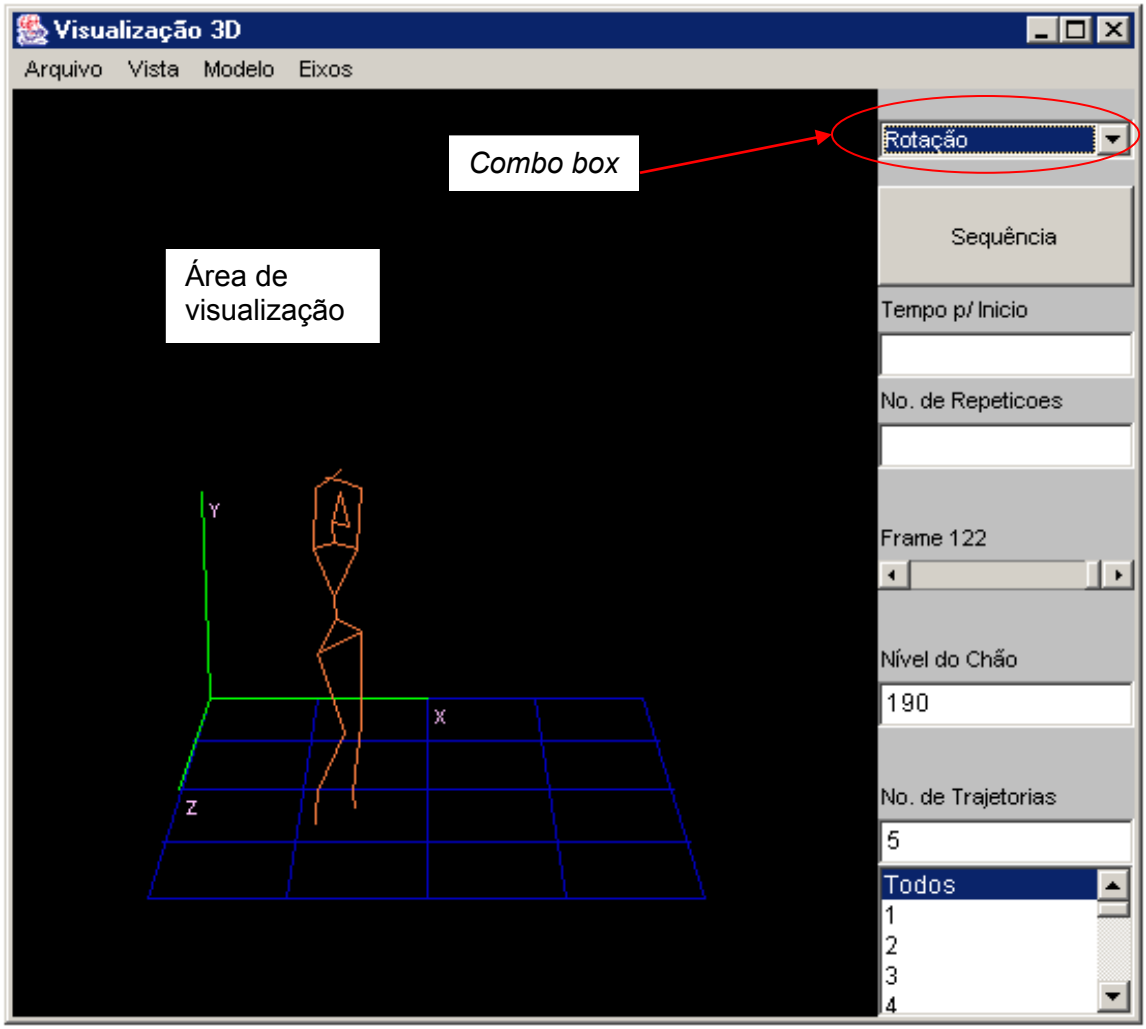
- **Trajectory:** Displays only the trajectories of the points in the 3D model.

- **Body:** Displays only the body in the 3D model.
- **Body & Trajectory:** Displays both the body and the trajectories of the points in the 3D model.
- **Points:** Displays only the points in the 3D model.
- **Body & Points:** Displays both the body and the points in the 3D model.

Axes Menu**:**



The **On/Off** menu command allows you to show or hide the axes. On the right side of the screen, the following commands are available:



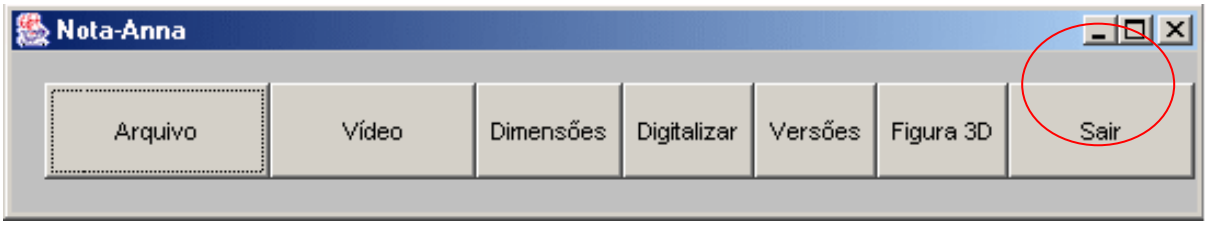
Combo box: defines an action when the mouse, with the left button pressed, moves over the viewing area. The options are:

- **Rotation:** rotates the image in motion by 360 degrees.
- **Pan:** moves the image along the x-axis.
- **Zoom:** zooms in or out on the image.
- **Zoom Area:** selects a portion of the image to be viewed in greater detail.

- **Sequence:** starts the visualization.
- **Start Time:** sets the interval in seconds if there are two or more repetitions.
- **Number of Repetitions:** defines how many times the visualization will be repeated.

- **Ground Level:** sets the position of the imaginary ground in the visualization.
- **Number of Trajectories:** determines which points will have their trajectories or positions displayed.

8. Clicking **Exit:**

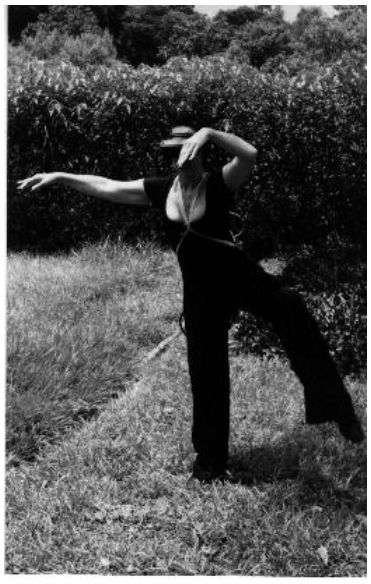


The program will close.

2.2.3 Possible Uses

Observation must precede the interpretation or coding of movement. The task of "coding" human movement has not yet been accomplished, though many proposals—grand proposals—have been made and failed. It is a serious mistake to attempt to codify a movement as if it were a word in a dictionary, a single emotion, or a solitary message, as movement does not have a single, fixed meaning. On the contrary, it conveys multiple meanings simultaneously through the posture of the torso, face, hands, feet, and the movement of body parts through space. These elements always act together but rarely in unison, bringing past, present, and future into play at the same time. Any attempt at codification requires a long period of observation and documentation. A researcher can only begin to establish control over movement after extensive practice, self-observation, scientific knowledge, and the observation of others. And after such a complex journey, they will likely become acutely aware of how little they truly know to attempt to control movement to a high degree.

For this reason, **Nota-Anna** is open to the user's imaginative capacity, requiring sympathy, intuition in visualization, talent for analyzing and deconstructing its images, an understanding of reality, and the good fortune of having this system "fall into their hands." Thus, to quote a Chinese proverb: The net is used to catch fish; let the fish be caught, and the net be forgotten.



Analívia's movement based on the reading of Nota-Anna, using virtual reality glasses and a notebook on her back, 1998.

One can imagine the use of this notation for the reconstruction of historical dances or the anthropological study of gestures across various cultures. In sports, it can be used to train athletes by observing progress and identifying weak points in their performance during training and competitions. Among the many possibilities that can be mentioned, pedagogy, artistic creation, and scientific research are also addressed.

Pedagogy**:** Most dance schools and academies of aesthetics, sports, or martial arts are commercial. They place as many students as possible in the classroom and repeat mechanized movements that train students like circus animals. For these people, the art of movement is a sequence of memorized movements based on counting, without engaging the full capacity of the body[73].

High-quality practice and repetition require the conscious participation of the student in a relaxed and pleasant work environment. When this happens, the sessions become enjoyable, sparking the student's curiosity and the desire to expand their knowledge. Even difficulties become exciting challenges to find a personal solution, eliminating the attitude of suffering to achieve technical or expressive quality. Teaching takes on an intelligent quality[74], encompassing the entirety of the body in action with full expressiveness. Technical skill and physical preparation, awareness and mastery of the principles of movement as language, as well as sensitivity and expression, are observed and practiced in everyday classes. The student becomes capable of relating daily life to the class, applying the class knowledge in everyday situations and vice versa.

Another essential aspect of the training of body professionals is the teacher as the central figure—an example to be followed and emulated by the student, the ideal prototype that the student dreams of reaching. In reality, there are few great artists or masters to be

[73] The correct teaching of dance should make the student experience the expressive emotionality of movement through individual and collective creation, knowledge of the parts of their body, the suggestion of various motor coordinations, and the possibility of movement in different rhythms. The teacher should act as a guide, facilitating the body's skill in alignment with the desired expression. In this way, with precision and clarity, the teacher encourages moving with pleasure and intelligence, whether in free dance or any style (ballet, jazz, samba, belly dance, modern dance: Graham, Limón, Cunningham, and many others).

[74] I tested the ideas I present as both a student and a teacher, particularly in early childhood education.

copied, and many schools or academies. As a result, most students have teachers of poor quality, without a solid basic education.

Currently, one of the possible resources to address this gap is multimedia[75], which allows the dissemination of current and historical videos featuring high-quality performers, knowledge of anatomy and kinesiology, didactic sequences, art history, writings, and biographies of great performers or creators, as well as access to famous schools, providing information to all movement art teachers in its various forms. This resource shows students and parents a larger universe than just the school they attend.
I observe that multimedia provides a visual-auditory information that does not replace the constant practice of movement. In addition to increasing cultural knowledge and helping parents and students in the search for proper education, the practice of movement uses computer resources in learning and training physical skills. This is the goal of some existing applications, including Nota-Anna, which aim to make information absorption easier and knowledge non-superficial. And for the student's satisfaction, it requires the use of their full potential.

Artistic Creation: With the creativity, sensitivity, and technique of dancers, the choreographer creates scenes of moving figures in time, creating different environments that provoke striking sensations in the eyes and ears of the audience. When the computer is used in this process, it acts as an intermediary in the choreographer/dancer communication. The choreographer observes, records, composes, and instructs the computer; and the computer produces a notation that the dancers interpret. To clarify their ideas to the computer, the choreographer formulates hypotheses about how we think, compose, and dance choreographies. The errors and failures of computers are valuable experiences because they show us the flaws in the program developed by the choreographer to simulate our thought and action processes during the dance composition. Thus, through trial and error, the computer simulates our own mental operations. With this mindset, "the contemporary artist is a programmer." With or without technological means, they approach the artistic phenomenon based on the creativity or manifestation of the spectator, who should complete, through an action or reaction, the creative process initiated. (Popper, 1985, 106)

[75] Multimedia used to be a set of slides with a sound background. Today, it is an interactive communication system based on computers, which creates, stores, transmits, and retrieves networks of information in graphics, texts, or sounds. And, most importantly, it rearranges information in entirely new ways. In the future, the definition of multimedia will change as new devices will enable voice recognition and synthesis, controlled by touchscreens, hand gestures, or eye movement.

Scientific Research: In physiotherapy, for example, Nota-Anna is used to assess the progress of motor skills in learning programs for school students or patients undergoing treatment. A record made before the start of the course (or treatment) and another after completing the program can clearly reveal the progress made by each student and pinpoint exactly which joints of the body have changed their behavior.

On the other hand, it can contribute to research in Artificial Intelligence by proposing a human-machine interaction. Resources used in this field, such as Virtual Reality[76], Telepresence[77], and Artificial Reality[78], could be integrated with the output of the notation, opening up opportunities for studying body behavior in interaction with the machine, since the machine is not human and the human is not a machine.

As the mathematician Luiz Velho states in the preface of the book/video about Nota-Anna: “In its current stage, it is undoubtedly an instrument that allows the recording and visualization of movement in a direct and natural way. With its evolution, through the incorporation of computer vision and artificial intelligence techniques, Nota-Anna will likely also become a powerful tool for the analysis and conception of movement. Who knows, it might even be widely used by all those who cultivate this art.” (apud 1998: 14)

[76] The basic device of Virtual Reality is the combination of a helmet, a glove, and a "mouse" or "joystick." The helmet has a sensor to detect head movement. The glove records finger movements with fiber optic cables that detect hand gestures and a sensor that locates the position of the hand in space. The sensors together detect the observer's position and transmit the information to the computer. The computer then calculates the artificial world based on the angle the observer is looking from and draws it in three dimensions, so the observer sees it as if they were inside it. From a kinesiological perspective, looking at this artificial world in motion with the helmet induces the body to make movements and micro-movements in the spine and limbs.

[77] Telepresence, a technology created by NASA engineers, is a system that uses a mask with glasses to display the environment that the user is going to explore: their body is at the center of gravity, and everything happens for and to them, utilizing their vision, sound perception, touch, and kinesthetic sensations. In this way, "Telepresence is not a transport of images, but the immersion of the body, the appearance of a new medium for physical and mental experience." (Weissberg, Jean-Louis. **Telepresence, Naissance d’un Nouveau Milieu d’expérience**. Paris, Les N.T. dans les N. T., Art Press, 1991, n. 12, p. 171)

[78] Artificial Reality: A term coined by artist Myron Krueger in 1973 to describe his computer-controlled environments. “Artificial reality perceives the participant’s action through the relationship of their body with the graphic environment, generating responses that maintain the illusion that their actions occur in this unreal space. Thus, new ways of connecting people are created, even if they are physically distant. One of its objectives is to allow people to interact with technology freely, with their entire body. Artificial reality encompasses virtual reality. The first experiment in this regard was conducted in 1971 at the 'Psychic Space' exhibition at the University of Wisconsin’s Memorial Union Gallery, where people walked in a space with hundreds of pressure sensors on the floor, enabling various types of interaction, both visual and auditory.” (Krueger, Myron; The “Art” in Artificial Reality. In: Jacobson, Linda. **Cyberarts - Exploring Art & Technology.** San Francisco, Miller Freeman Inc., 1992)

2.2.4. New Features for Nota-Anna: Real-Time Motion Capture

A new motion capture capability has been incorporated into Nota-Anna, designed specifically for real-time movement. This introduces a system that reads body movement while simultaneously functioning as an interface for this system.

There are various types of systems and technologies for capturing human body movement. Most of these systems come at a high cost, making them nearly inaccessible to research and study institutions in Brazil. The goal of this new development is to create a low-cost, easy-to-implement motion capture system.

Currently, motion capture is used in a wide range of applications across different fields: computer animation for films, medicine, video game development, sports, forensic analysis, biomechanics, education, physical therapy, and more.

The Most Commonly Used Motion Capture Technologies

- Optical**:** This system uses video cameras and small reflective markers (about the size of an olive) placed at strategic points on the body, such as joints. The body is illuminated with infrared light, which reflects off the markers and is captured by multiple cameras (typically 4 to 6) positioned around the space where the movement takes place. These cameras have filters that allow only infrared light to pass through, making the markers visible in the images. Once captured, these images are sent directly to a computer, which identifies each marker using specialized algorithms and calculates their positions in three-dimensional space. The advantages of this system include good flexibility with minimal interference in movement and the ability to track multiple bodies simultaneously. This is the most widely used motion capture system on the market.

- Magnetic**:** Magnetic sensors (wired or wireless) are placed on the joints and emit a magnetic field. This field is read by multiple receivers, and based on the field's intensity, the distance can be determined. Using triangulation, a computer calculates the sensors' positions on the body. This system is relatively restrictive in terms of movement and requires constant calibration, which has led to its decline in use.

- Ultrasound**:** This system follows the same principle as the previous one but uses ultrasound instead of a magnetic field. In addition to the same movement restrictions, it has the added drawback of interference caused by ultrasound reflections in the environment, which significantly affects its accuracy.

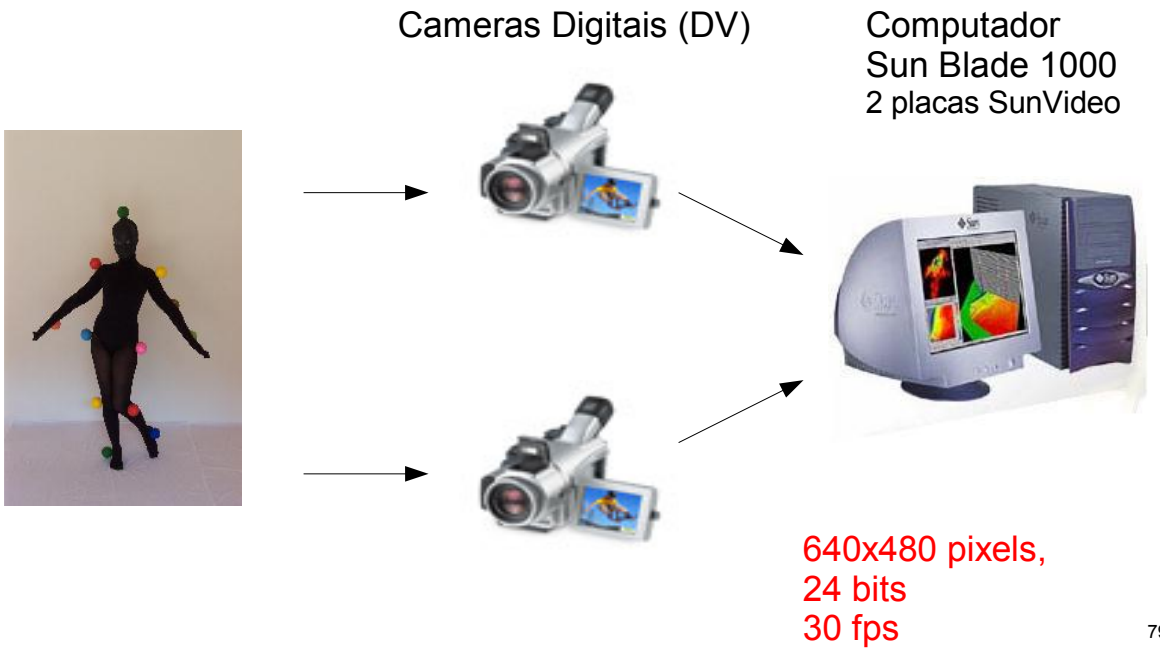
- Mechanical**:** Various mechanical devices have been developed for motion capture, but all impose significant movement restrictions on the user.

Nota-Anna adopted an optical motion capture method, adapted to ensure low cost and simplicity. Conventional optical systems are extremely expensive because they require multiple high-speed cameras (capable of capturing up to 500 frames per second), infrared lighting, fast video capture cards, and numerous reflective markers. Nota-Anna implemented several creative solutions:

- Using standard video cameras (30 frames per second);
- Image resolution of 640x480 pixels;
- Marker identification through color (instead of infrared);
- Using only two cameras;
- A custom-developed program written in Java™, executable on any computer.

The use of Java™ technology allows access to various pre-existing Java™ routine libraries (APIs), such as JMF (Java Media Framework) for handling video and audio files and JAI (Java Advanced Imaging) for image processing and manipulation. Additionally, the application benefits from Java's portability and accessibility while maintaining a low-cost approach.

The diagram below illustrates the system used for testing:



79

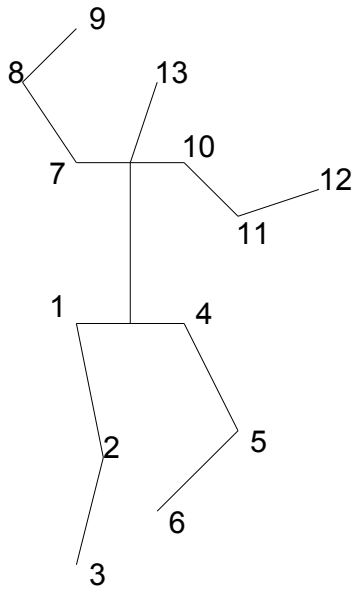
The application was parameterized to ensure good performance in real-time motion capture:

- Use of the Least Squares Method to estimate the best position of the colored markers, even if a point has not been identified;
- Use of only 13 points on the body to be captured;
- Optimization of matrix transformation calculations.

Thus, the body to be observed and captured is represented as follows:

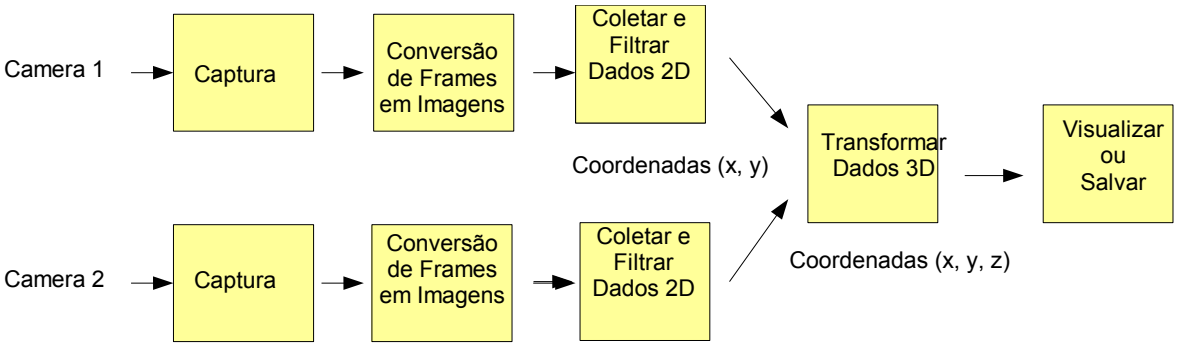
[79] digital cameras (DV)

Sun Blade 1000 Computer
2 SunVideo Cards



The intermediate points between segments 1-4 and 7-10 are calculated as the midpoints of these segments.

The complete process for capture, transformation, and three-dimensional reconstruction can be simplified in the following block diagram:



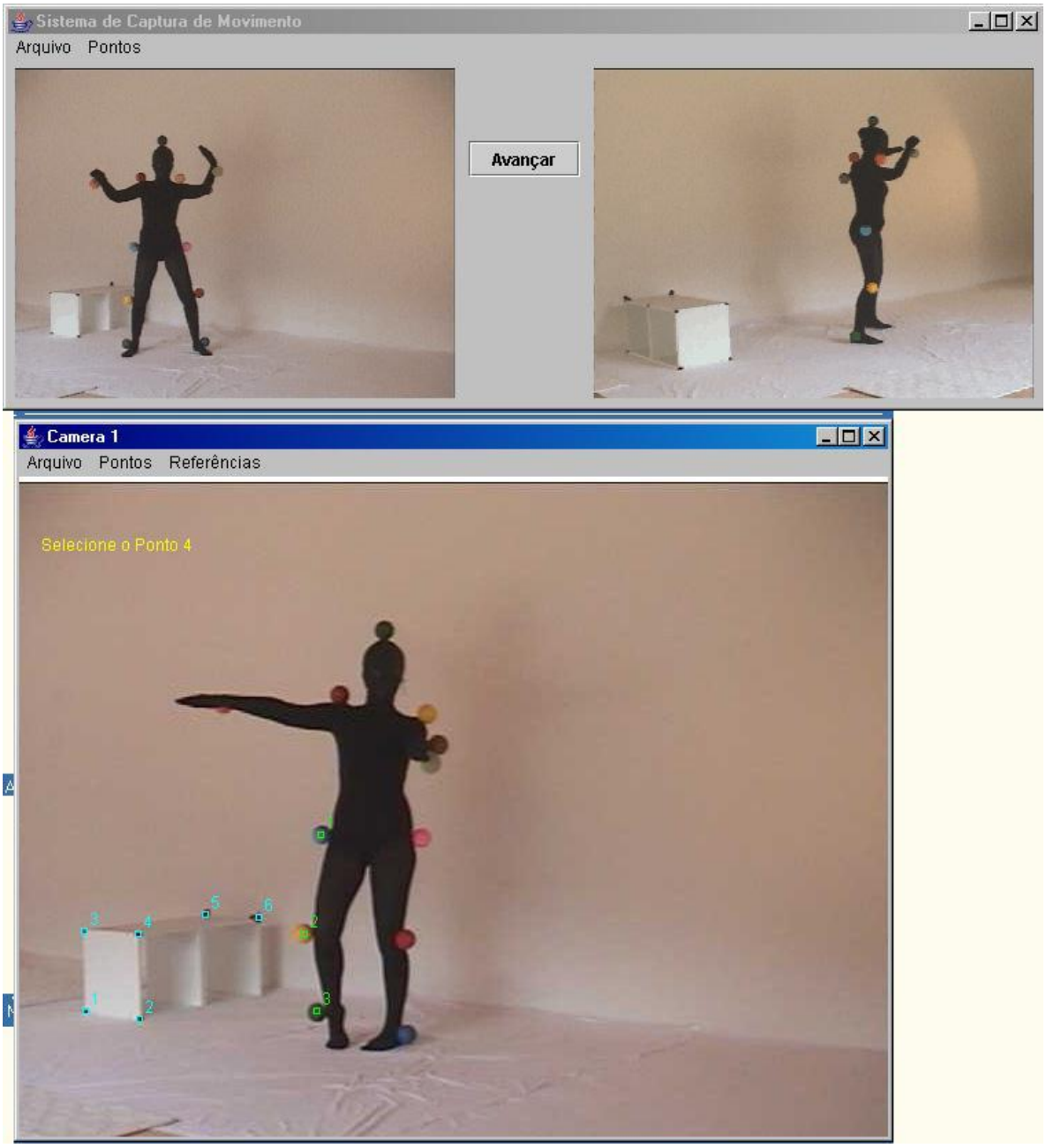
80

Explaining the process for real-time motion capture: Once the program starts, the images from the two cameras, positioned differently, are used, enabling the calculation of the transformation matrix for each of them. To obtain the 12 parameters needed for calculating

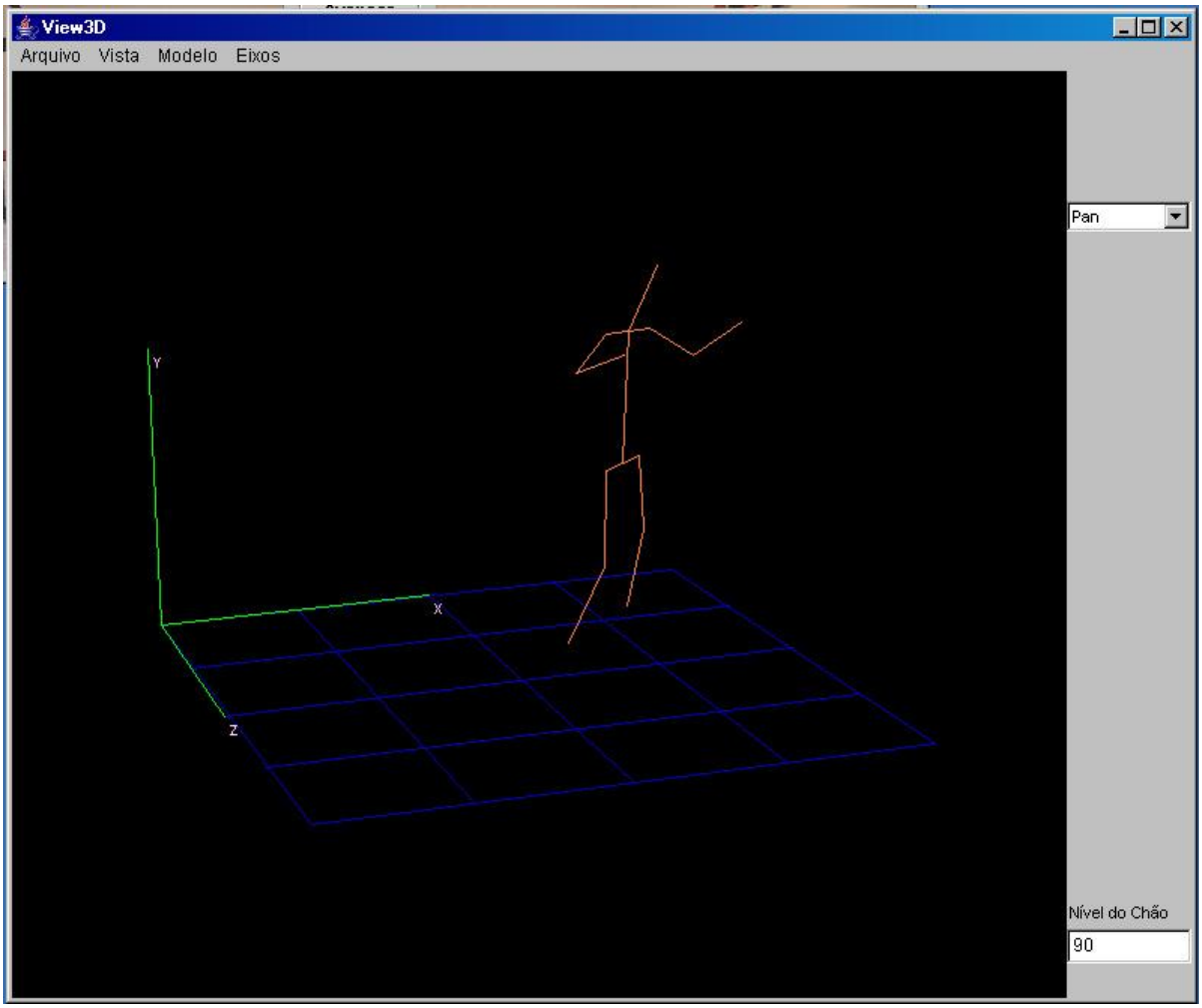
[80] Camera 1 - Capture - Conversion of frames into images - Collect and filter 2D data - Transform 3D data - View or Save Coordinates (x, y)

Camera 2 - Capture - Conversion of frames into images - Collect and filter 2D data - Transform 3D data - View or Save Coordinates (x, y, z)

the transformation matrices, we need to define 6 fixed points on each camera's image. This is done through an additional window, where the fixed points of the camera are defined, serving as reference points for the calculations. The initial points of the body are also defined, where the program identifies which point and color should be located in the subsequent frames.



Once the reference points and body points/colors are defined, the system can identify the body points in the following frames and thus present the body in 3D for visualization.



The result of the capture can be viewed in real-time or saved to a file to be used in other applications or analyses. In the case of real-time capture, it can allow the body's movement to interact with another program, such as a fighting game or another sport, for example. This could make computer games more engaging and interactive for children, offering a healthier physical activity. On the other hand, its use is considered for applications in the field of children's education, human motion analysis, and as a potential interface for computer games and/or video game consoles.

***duCorpo* DVD**

"Today, we live two senses of nature: the ancestral one, of the 'granted' planetary, and the modern one, of the 'acquired' industrial and urban. One can choose either one or deny one in favor of the other; what is important is that these two senses of nature are lived and embraced in the integrity of their ontological structure, within the perspective of a universalization of perceptive consciousness – the self embracing the world, making it one, within an agreement and harmony of emotion assumed as the only reality of human language." (Pierre Restany, Alto do Rio Negro in the presence of Sepp Baendereck and Franz Krajcberg, August 3, 1978; in Espaço Cultural Franz Krajcberg, Fundação Cultural de Curitiba, 2003)

In a positive and beneficial search for the human organism regarding the relationship between electronic media and the overall health of the human body, the DVD *duCorpo* proposes body practices aimed at anyone, regardless of culture, gender, or age.

The development of this proposal, complex and profound, is based on simplicity and the restoration of the body's functional, harmonious, and universal movement. Below, I present the theoretical and practical foundations that guided the creation of this DVD.

3.1. Object and Concepts

...Through us fly
The birds in silence. Oh, I who want to grow
Look around, and the tree inside me grows.
(Rilke, Rainer Maria; *Les Lettres*; Gallimard, Paris, p. 11)

The *duCorpo* DVD is a tool for a non-specialized, general, and broad audience. In its design, the visual and auditory images used aim to suggest a sensory experience, rather than an intellectual or rational one. This is because “images can have two meanings that are intimately related. We have images that we use in the sense of vision. We see physical objects, such as works of art, sculptures, or paintings. But we can also talk about images in a more universal sense. Our thoughts, inventions, and fantasies are sensory images not produced by the presence of physical objects. Furthermore, these images can be as still as stones or as full of action as living bodies.” (Arnheim, 2000, p. 167)

The presentation and setting images of the DVD are of a bucolic nature, chosen for the richness of the movement they suggest, whether in a static form or in video. On the other hand, they are organic, like our body, and suggest a connection with this aspect of our nature.

Aesthetically, we can find evidence of nature being appreciated, not only as a frozen image but also through its behavior. There is, for example, the simple pleasure of watching the movement of clouds in the sky, the ripples of water, or the movement of leaves on a plant in the wind. Part of the pleasure in such a spectacle is certainly in the tension between the expected and the unexpected, in the continuous surprise of the sensory experience of how each moment follows the previous one and continues into the next.

On one hand, the aesthetic viewpoint adopted can be expressed by the excerpt below, taken from a book by Valerie Preston-Dunlop (apud 1998: 51), an expert in Laban's Theory, who wrote a theoretical text in the form of poems:
"An aesthetic attitude is essentially non-hedonistic
Coming from the desire to appreciate the qualities of an object
For its own sake.
Liking or disliking is irrelevant.
They interrupt the aesthetic experience."

On the other hand, these images do not have a direct implication on intellectual knowledge, but they induce free imagination of movement. At many moments, frozen movement images were used to stimulate the user's imagination and prevent them from merely imitating the example's movements and forgetting their own body. I draw a parallel

with dance:
"Aesthetic appreciation
Is contemplation of, attending to, dwelling on,
The elements of the dance
For their own sake.
Not because they mean something or amuse,
Not because they arouse admiration, not because they tell a story,
But simply because they ARE." (Preston-Dunlop, 1998, p. 92)

I observe that even when static, the images induce the imagination of movement, stimulating the user's kinesthetic sense in a personal and creative way. Thus, their body practice can make them understand that knowing intellectually how to relax their body does not mean knowing how to actually make their body relax; and that for this to truly happen, a new discovery is necessary every day, individual and exclusive to the user who performs the movement. A quote that conceptualizes this viewpoint: "... knowledge must thus be accompanied by an equal capacity to forget the knowledge. Not-knowing is not a form of ignorance but a difficult transcendence of knowledge. This is the price that must be paid for a work to be, often, a type of beginning that makes its creation an exercise in freedom." (Bachelard, 1994, p. 68) And I add: a source of discoveries.

I consider the viewpoint expressed in the quote above legitimate within the conceptual framework of this thesis, which is based on scientific foundations. Even in the field of science, according to Damasio, “the perception that there are biological mechanisms behind the most sublime behavior of the human being does not imply its simplistic reduction to neurobiological processes[81].” (Damasio, 1995, p. 125/6) This statement is important considering that the movement of the body always carries with it the feelings[82]

[81] Patricia Churchland, a researcher in cognitive sciences, says: “We still do not know theoretically and conceptually how the nervous system performs important functions such as motor control, learning, memory recall... these are genuine puzzles. If neuroscience had progressed with brain functions as much as molecular biology has progressed in the research of heredity transmission, we would be in a different position. We can only conclude that attention, senso-motor control are mysteries and that we still do not understand their mechanisms.” (Churchland, 1993, p. 114)

[82] In theoretical terms, it is interesting to discern between feeling and sensation. Without delving too deeply into this subject, I quote the following excerpt:
“Sensation and feeling are often confused
Because words to express them
Are inadequate and imprecise.
Sensation comes from our sensory channels
Our eyes, ears, nose, skin, muscles, and more.
Feelings are different.
They come from our responses to what happens to us.
They are variants of emotional feelings,

and emotions that are notable expressive elements of the biological regulation mechanisms. According to Damasio, “the number of structures between the input and output of a response is very large, and the connection of their patterns is very complex. The natural question that arises is: what happens with this complex structural overlap, and what is all this for? The answer is that activity, together with the mechanisms of input and output of information, momentarily builds and solidly manipulates the images of our mind. Based on these images, we can interpret signals brought from the sensory cortex, organize them, and conceptualize them. We can build reasoning strategies and make decisions, we can select known motor responses or formulate new responses as we wish to perform a variety of actions such as hugging a child, writing a letter, or playing Mozart on the piano.” (Damasio, 1995, p. 93)

Thus, any action of the body resonates throughout the organism as a whole. In a cycle, it leads to a mental and emotional attitude, which leads to a new bodily action, and so it continuously follows. Therefore, “the records we keep of the objects and events we perceive include the motor adjustments we made to obtain the perception, as well as the emotional reactions that accompanied this perception.” (Damasio, 1999, p. 148)

These adjustments are always manifested within the whole body, which refers to the mind/body unity. Thus, “everything that happens to your mind occurs in the time and space relative to the moment when the body is in a given situation and in the region of space occupied by the body.” (Damasio, 1999, p. 145) In other words, “if the body interacts intensely with the brain, the organism they form interacts intensely with the environment. The mind/body relationship is mediated by the movements of the organism and the activity of its sensors[83].” (Damasio, 1995, p. 90) It is about capturing the person in their entirety. Thus, our sense of movement refers to the entire body and not to individual muscles alone. In everyday life, the person creates what they feel and where they feel it, i.e., in the space where they experience that sensation. For example, a person with an amputated limb creates the sensation of the amputated limb and places it within their real space.

Affective feelings, and states-of-feelings,
All that dancers experience and use.” (Preston-Dunlop, 1995, p. 41)

[83] The somatosensory cortex is the area of the brain that processes touch and related sensations.

Based on the concepts above, I organized the practices of the DVD duCorpo. The foundation of the strategy for this body work lies in the fact that acquired habits become automatic unless a new attitude or effort to understand behavior occurs; this can be characterized by: "1. a deconditioning resulting from relaxation[84]; 2. a change in the mental state strengthening weak associations; 3. some factor that provokes dual attention in the student, such as a past trauma competing with the present stimulus." (Shapiro, 2001: 33). This means a change in action and attitude to perform bodily tasks.

When we address habits or the memory of an action, we can say that a fact is described because it was experienced. We can say that it stayed in the memory that recorded what was perceived and lived—space, fluency, body movement, objects in the environment, sounds. Moving is coordinated, fluent, integrated, and not separate from what is perceived through the senses. When recalling, we don't exactly re-experience, but we bring fragments to the experience of movement. And each movement can thus be a new experience and a new discovery. In this way, monotony from mechanical repetition and meaningless habits is countered. Discovering again how your body moves.

In general terms, the meaning of a new discovery is freedom. In Eutonia, it is said: "We must leave everything to attain freedom, not only relatives and friends, books and furniture, but mainly our conditioning." (Vaz-Geringer, 2001, p. 23)

To define how the Total Body proposal would be concretized, I first sought to use visual and sound images of motivation to achieve appropriate movement responses that could awaken three elements: a pleasurable and functionally adequate location in the body, a direction in space, and the desire to move. This is because "a work that respects the structure of the body produces new sensations and better-coordinated actions, creating new habits and posture patterns that will bring more comfort over time" (Todd, 1975, p. 38). For this, I approached, on one hand, the body as a structure whose proprioceptive system and body materials provide what is necessary for the coordination of the body in movement over time and space.

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[84] Relaxation seen as a change of state, and not as a "dismantling" of the person. "Complete relaxation means death, and complete balance means the complete absence of activity." (Todd, 1975: 262)

The skeletal and neuromuscular structures enable locomotion and its adjustments of rhythm and balance. The respiratory apparatus provides oxygen and rhythm. The glands and the sympathetic nervous system regulate the rhythms of vital parts, aiding movement. And so on, composing a unit. On the other hand, I approached movement as a language composed of factors.

"The components of movement per se
Are the essential.
They are what must exist for movement to exist
Regardless of its motivation, its references, its intention.
They are seen as
Body coordination of all types,
Actions in variety,
Time and dynamics of action,
Relations within one body,
And between several bodies." (Preston-Dunlop, 1996, 77)

Observing these factors, I ask: what is time for someone who "works with the body"? It is not the same as science's time, nor the one on the clock. And space? It is not reduced to anatomy or physiology. Few people consciously experience space or time with their own bodies in everyday life. Most follow task schedules in time, day after day. For them, the movement of body practices becomes mechanical gymnastics, exclusively. I aim, in the DVD duCorpo, to open a space for the person to experience a new dimension of knowledge of their body.

Secondly, I considered that the electronic medium modifies the way the language of movement, typically used in movement practices directed directly by a teacher or scene director, is employed. As Possani states: "It is not enough to reproduce a text or a class on a computer screen. Since the medium is different, the structuring must be different." (Possani, 2003, 41)

Initially, the structure of the DVD as a medium conditioned the organization of the duCorpo practices. As Tapscott states: "Mass technology, like television, is hierarchical. It depends on a 'top-down' distribution...the interactive culture of the internet is non-hierarchical and not distributed; it is a true web of power." (Tapscott, 1998, 79) Just like in a plot, the

proposed body exercises can be connected in various sequences, thus valuing the possibility of personalized solutions provided by the new technology.
On the other hand, the use of the resource offered by Nota-Anna sought to sharpen the relationship between the movement of the eyes (see annex "eyes") and the movement of the body's joints (mainly the spine). This work can offer advantages, as Nogueira points out: "Test results published in *Nature* suggest that an action video game player is able to perceive more objects in their visual field and do so faster than a non-player." (Nogueira, 2003)

Another resource used is the physical position of the user in front of the computer or TV monitor. As a popular magazine reported: "Until recently, anyone who spent hours in front of the monitor was called a nerd. Now, this technology can even be used by those who like to stay in shape, as happens at the Reebok Sports Club Academy in São Paulo, which developed software that brings the personal trainer inside the computer." (Gol Magazine, page 18, May 2002)

In a broad view, in scientific terms, "the progress we have made to understand visual intelligence has transformed our technological and cultural landscape (concrete art), giving us television, virtual reality, cameras, billboards on the streets, current graphic language, and much more." (Hoffmann, 2001, 202)

In the case of Total Body, I propose a new daily attitude with technology as a partner:

I will move my body a little bit,
different each day that
I feel like it;
to warm up my spirit,
to water my ideas,
to feed my feelings,
to fertilize myself.
Make everyday life more meaningful
live and enjoy the minutes of the day
of each day
of each week

of each month

of each year

That's right, years

years have passed without meaning;

empty numbers and acts

hard to remember

because they didn't leave a mark

A fluid past

without thickness or volume at all

Move to search in daily life

the feeling

the ideas

the spirit

myself.

3.2. Structure

When a relaxed spirit meditates and dreams, vastness seems to await images of vastness. The mind sees and continues to see objects, while the spirit finds the nest of vastness in an object. (Bachelard, 1994, 190)

The DVD has a simple structure, based on a menu of options that provides information about the work and presents possibilities for formatting an individualized program or suggests pre-made physical exercises of four different levels of difficulty.

For presentation, the DVD uses two media because the complete work has twenty different chapters, each approximately 300 MBytes. This requires 6 GBytes of storage space. Since the DVD has a capacity of 4.2 GBytes, two DVDs are used.

Theoretically, the planning of the physical practices was based on the following criteria:

- Promote joy and pleasure,
- Create a protected environment free from interpersonal comparisons and competition,
- Emphasize individual improvement,
- Provide opportunities for self-discovery and decision-making,
- Consistently accept the individuality of each person,
- Encourage performing new and challenging tasks, within each person's skill level,
- Promote perceptions of autonomy and choice,
- Inform the user in a scientific and precise manne[85]r.

The participant was also encouraged to follow certain criteria:

- Choose an activity they enjoy,
- Value the playful aspect,
- Value the process (liking, seeking gradual improvement of personal performance) rather than the product (results, interpersonal comparisons),
- Be engaged and challenge themselves at the right level.

Among the icons that can be accessed on the DVD, I would like to present the content of some, with theoretical explanations when necessary:

.Icon: Presentation:

This class is relaxing and, at the same time, encourages you to move your body in a global way. Thus, it strengthens and stretches your muscles, your mind, and your emotions. Enjoy.

[85] I take this moment to quote an important athlete regarding the physical education system in our country: "In general, however, physical education should be taught in schools with scientific foundations so that people know what they are doing. Physical education could take on a different form and aspect to provide an education for life." (Lenk, 2000)

1. During this class, try to feel your entire body. If you want, you can close your eyes to better sense the movement.
2. If you are with other people, do not imitate their movements. Focus on how your own body feels and behaves while following the instructions.
3. Let your body perform the movements in the easiest way possible.
4. If you wish, at any moment during the class, you can move freely, as your body feels the need or desire.
5. If you feel tired during the class, take a short rest and then continue.
6. If you wish, you can stop at any time during the class, but first, click "Finalization."
7. This class can be repeated at any time.
8. If you feel any pain in your joints or elsewhere, do not insist on the movement. Let it go.
9. It is advisable to drink water after this practice, as it helps with detoxifying the body.
10. Do not take this class under the influence of any alcoholic beverages or drugs that affect the functioning of your nervous or motor system. If you have any health issues, consult your doctor before exercising.

. Icon: Preparation:

1. Clear the area of any furniture that you might bump into or hurt yourself on.
2. Do not practice the class on a carpet or any slippery surface.
3. Wear comfortable clothes that allow free movement of your body.
4. Stay barefoot, wear non-slip socks, or shoes that don’t restrict the joints of your feet.
5. Direct your concentration and attention to your own body.

. Icon: Initial Explanation:

This is a bodywork class that suggests both relaxation exercises and muscle strengthening, as well as proposing expressive and individualized activities. Its practice can follow pre-made suggestions or an individualized route, making it suitable for any age, gender, or culture.

The proposal for each of the following moments was based on the experience of these works with many students and myself over several years. It is not the result of a rational planning process, but follows the reasons and logic of the body itself.

Among the numerous objectives, whether premeditated or not, I can write a few lines about each moment. However, these are still incomplete in the face of the richness of this work.

The only true and genuine way to understand this proposal is through its experience in your own body.

The practice is divided into moments, each with a specific objective and particular characteristic. The user has the possibility to access them as a complete class or manipulate them individually to organize them as desired. Explanation of each moment:

.Icon: First Moment:
It was conceived with the aim of:

- directing the user's attention to all parts of their body, even those they don't usually pay much attention to,
- providing an opportunity for them to perceive which areas of their body don't relax when they are at rest,
- reducing muscle tone in areas of greater tension,
- increasing their attention and concentration,
- regularizing their breathing wave,
- balancing their nervous system,
- providing the perception of the unity of the physical/mental/emotional parts of their body,
- balancing their organism,
- allowing the user to perceive their general state in the present moment of this activity,
- providing a moment of introspection,
- preparing the body for the activity of the next moment.

Visual image of this moment in the DVD: It shows a natural environment with photos of different people's body parts engaged in various activities. A written observation says: "Do not imitate the illustrative photos; observe how different people find their personal solutions. And find your own solution."

Auditory image of this moment in the DVD**:** It guides the perception of weight and the area of contact of different body parts with the floor while at rest.

Clarifying the items above, I observe that the work of internal perception can produce a regularization of the body's muscle tone, an awareness of the limits of the three-dimensional body, a regularization of metabolism, a sense of pleasure, and other individual results.

In this perception of internal space, various types of receptors (exteroceptors, proprioceptors, viscероceptors) intervene. These receptors allow us to feel our body (its limits, its interior, and its state of functioning). Thus, "the internal space is the space that the person offers to themselves by listening to their body, with an open mind for memories to come and for muscular tensions that prevent full contact with the ground to leave." (Vaz-Geringer, 2001:49)

Attention should be directed to the breathing wave. "The influence of breathing on body balance is significant, as the mechanisms of breathing and locomotion develop simultaneously." (Todd, 1975:108) For the proper functioning of the diaphragm, which influences the homeostasis of the entire organism, it is ideal to balance the space between the lumbar bones and their respective muscles with the abdominal wall[86], ensuring an appropriate shelter for our organs and a regulated breathing wave.

The balance of the body's tone in rest, i.e., its decrease in the tenser areas[87], helps the knowledge of the body in action, exactly when, after rest, it resumes its movements and, thus, the person perceives the difference that occurs before and after properly guided rest.

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[86] This is the structure that integrates the thorax and the pelvis.

[87] Those parts of the body that, according to the bone architecture of the body, should touch the ground when the body is at rest, but do not, because their muscles do not yield to the force of gravity and continue to contract even when they should rest.

Its ideal movement can be defined as an economical adjustment to be constructed in daily life through the balance of the bones in the joints and their respective movements due to muscle action. This ideal movement harmonizes the four tensions of the skeleton: axial[88], torsion, bending, and sliding[89]. Thus, one can reach a well-being that leads us to the comfort of the pleasant coexistence between our body and our emotional intimacy, which can be called the refuge of our primitive self. “Physically, the person naturally endowed with the sense of refuge hastily goes to herself, covers herself, nestles comfortably, hidden.” (Bachelard, 1994: 91)

I present the following poem as an individual illustration of this situation:

ONE DAY: ELECTRO-DAY-GRAM
*
TREAT MY BODY WITH CARE AND DELICACY.
*
HOW CAN I SAY I LIKED IT WHEN I DIDN'T LIKE IT?
*
LIFE IN THE CITY MAKES ME THINK ABOUT THE FUTURE BECAUSE I DON’T LIKE THE PRESENT.
*
THE BEST THINGS WE DO ARE SIMPLE, SIMPLY.
*
WITH TV AND THE COMPUTER, WE UNLEARN TO THINK ABOUT THE SIMPLE THINGS IN LIFE.
THE OLD EXCUSE: “I DON’T HAVE TIME.”
*
EVERYTHING IS EMPTY.
*
SOMETIMES I GET TIRED OF MY OWN INNER DIALOGUE.
I WISH LIFE WOULD BRING ME SOME FUNDAMENTAL INFORMATION
THAT IMPACTS MY INNER DIALOGUE.
*
EXTERNAL CHANGES, INTERNAL CHANGES.
THEN
INTERNAL CHANGES, EXTERNAL CHANGES.
IT ALL DEPENDS ON THE MOMENT,
THE WILL, AND
THE NEED.
ON WHAT SATISFIES.

---

[88] This type of tension operates along the bones.

[89] These are opposing forces operating on adjacent limbs, causing the parts to slide or the joint connections to break.

.Icon Second Moment:
Its goal is to provide a recovery and renewal of the body's general energy through a brief rest, or even a nap, and a vital stretch, i.e., a high-quality stretch.
In this moment, it is possible to experience how the passive attitude helps restore the body's overall balance. For example, sleep is fundamental for the brain, and dreaming is important for memory. In an interview, a top-quality coach states: "In your training, what's the order of priorities? I divide it into three parts. The quality of sleep is item A. Nutrition is item B. Only then comes physical training. It's pointless to have the third item without the first two." (Cobra; 2001; 8)

The stretch that follows rest is also crucial. "The vital stretch is the stretch done consciously. It is a primitive movement that involves curling, twisting, bending, extending, yawning, sighing, and deep breathing. It allows freedom of movement, creating a deep balance throughout the body in every direction. In fact, it is a vital movement." (Russo, 2001) The stretch also involves slow movement, which makes it easier to perceive each joint angle, the direction and sense of the movement, joint volume, tissue resistance, etc. In other words, it allows for greater contact between the person and their own movement.

A riqueza da vida
Se manifesta pela diversidade
Infinita das texturas

O contato infindável
Com as texturas da vida
É apreensão do significado da vida
Em todos os seus momentos…
Filigranas.

Estar acordada…
Estar aberta…
Estar disponível…
Presente….
Aqui e agora
Com responsabilidade,
respeito,
Com passado
E futuro.

Permitir-se estar dormindo,
Estar fechada,
Em reclusão,
Mas sempre presente
Para as infinitas

Texturas da vida.[90]

The image of this moment is a very calm video, with a soft background sound. Thus, “nothing like silence to suggest the sense of unlimited space. Sounds give color to space, and give it a spatial body. But the absence of sounds leaves the space pure, and in silence, we are dimensioned with the sensation of something vast, deep, and boundless.” (Bachelard; 1994: 43)

.Icon Third Moment:

This moment has the following objectives:

- To increase the flexibility of the joints,
- To enhance the elasticity of tissues,
- To increase the muscle tone of the entire body,
- To guide the body toward broad mobility using the least effort possible,
- To provide knowledge of the three-dimensional space occupied by your body,
- To stimulate creativity for new possibilities of body movement,
- To suggest an experience of bodily freedom,
- To open the possibility for the knowledge of your body's architecture,
- To reveal the infinite forms of mobility of your body,

---

[90] The richness of life
Manifests itself through the infinite
Diversity of textures.

The endless contact
With life’s textures
Is the apprehension of its meaning
In all its moments…
Filigrees.

Being awake…
Being open…
Being available…
Present…
Here and now,
With responsibility,
respect,
With past
And future.

Allowing oneself to sleep,
To be closed,
In retreat,
Yet always present
For the infinite
Textures of life.

- To allow the exploration of the unknown,
- To suggest a curious and enjoyable activity.

It suggests that the person moves freely, exploring different body supports. The visual images show people of various ages, sexes, and physical training levels, illustrating many possibilities that the body offers. The screen reads: "Do not imitate the photos. Explore the movements of your own body. Be creative."
Theoretically, the movement used in this moment is active. This occurs when the person voluntarily decides when, where, and how to make the movement. One of the possible effects could be an increase in muscle tone, muscle stretching, and large amplitude movement. In this DVD, since these movements happen after a moment (1 or 2) that proposes tonic balance, it is possible to eliminate the pressure from excessive muscle use in one part of the body by shifting its use to other muscles that are not being used.

The basic movement of this moment is the *repousser* [91], which aims to elevate the tone of the part that pushes, aligning the bones while the pushing movement expands throughout the body. I cite the example of walking with the "reposser," considered ideally correct: the foot has two longitudinal arches and one transverse arch to give elasticity to its action, cushioning the transmission of body weight to the ground. The ankle, like the knee, is a hinge-type joint that allows the flexion of the leg bones in one direction (in this case, opposite directions). The hip joint is almost a ball that moves smoothly and fluidly in almost any direction within the acetabulum. This leg structure allows it to function as a pendulum; thus, the effort required to walk[92] is very small if this structure is used correctly, i.e., if it allows the foot to "reposser" (rest) on the ground, transmitting the force to all the bones of the leg and spine.

From this angle, moving consciously in different directions, instead of fixing oneself with force, is the ideal work for bones, muscles, and ligaments, considering that the body is dynamic. To preserve or restore joint function, we must experiment, feel, and explore numerous movement possibilities of the body's joints. This is because movement restores

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91 Push or pressure made with the body against a surface in a specific direction, feeling the reaction in the opposite direction that leads the body to movement.

92 Sitting, lying down, or any other action of the body.

tissue flexibility, stimulates circulation, lubricates the joints, and/or reintegrates all body parts and regions through neurological pathways.

Thus, "every inhabited movement is structuring and regenerating; mechanical movement, on the other hand, is divided and fatiguing." (Vaz-Geringer; 2001; 76) Moving is a way of being in contact with our body, our sensations, our possibilities, our limits, and our tone. It is a way of stimulating our bodily sensitivity, since the sensation[93] of movement is what the brain knows. The brain does not know muscles.

It is important to emphasize that the user does the movement they want, because "we are alone in the origin of all real actions that we are not 'forced' to carry out. And the wonderful thing about easy actions is that they truly place us at the origin of acting." (Bachelard; 1994: 60)

.Icon Fourth Moment:
This moment aims to prepare the body for the reading of movements without straining the eyes or the body's joints. For this, the user is encouraged to perceive that the body segments work together, like the links of a chain. The movement of one implies the movement of the next link, which then passes to the next, and so on. In this case, the eyes are fundamental because they follow the movement of the point of light[94] or the line on the screen. As an expert in the field says: "The movements of the eyes induce a state of relaxation, which can be induced by the reticular formation or by other mechanisms that activate the parasympathetic nervous system." (Shapiro; 2001: 333) She continues: "Eye

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[93] Sensation is different from perception. Sensation is specific when it occurs in the eyes, ears, smell, and taste. It is nonspecific when it appears in touch, pressure, and pain. Specific sensations have their own pathway and go to the cortex: the visual cortex, the temporal cortex (hearing), etc.

Nonspecific sensations go to the thalamus, which is subcortical. The nonspecific and specific sensations transform when they are corticalized and become perception, a process that occurs at the cortical level. Attention focuses on the sensation and facilitates this process. Normally, only 2% of the sensations you have transform into perception.

[94] The point of light is a lantern held by four children. In this regard, I would like to cite a fact that justifies this choice: the organic movement seen without its interpreters, the movement itself. In 1960, the Black Light Theatre of Czechoslovakia presented a dance where only lights placed on the main joints of the dancers' bodies were visible. And when these lights moved, human figures in motion could be constructed. This phenomenon is called *biological motion*. As scientist Gunnar Johansson observed: "It is impressive how much we can construct with so little. Thus, one could see if the dancer was jumping, running, walking, etc. This observation led to many experiments that showed that one can even recognize the person who is moving, if you already know them, through the movement of the points of light."

movements help inhibit stress, but when it is very high, it is the eye movement that is inhibited." (Shapiro; 2001: 33)

Another factor of eye movement is its influence on head movement. The ideal situation occurs when the weight of the head descends along the spine's axis in balance with the thorax and pelvis, with the frontal neck muscles and the abdominal wall firm and the interspinal muscles actively correct. The spine's axis results from the weight and movement of the spine's structures (muscles, ligaments, and bones) designed with four opposite curves, giving the spine strong support. Thus, any change in one of the spine's curves reflects on its entire structure, i.e., if we extend the lumbar curve, the head rises. For more information on the eye and its relationship with the body, see the annex "eyes."

At this point, the user, during their movement, may detect that there is a difference between 'thinking about' and 'feeling.' The boundary between these two behaviors is an invisible thread to the naked eye, but in the work of the body, 'feeling' allows the perception of the body's wholeness, while 'thinking about' does not.

To conclude with Damasio's words: 'Complex organisms placed in complex environments require a large repertoire of knowledge, the ability to choose among many possible responses, the skill to construct complex combinations of responses, and the ability to plan ahead to avoid disadvantageous situations and promote favorable ones.' (Damasio; 1999: 139)

.Fifth Moment Icon:
Through reading the trajectory of movement and other graphical resources offered by Nota-Anna, the user learns to move their body in specific sequences proposed according to their movement theme.

Working with movement by reading its trajectory is an ancient and profound wisdom. For the ancient Greeks, dancing was about drawing in space. For Laban, a scholar of human body language, our awareness of space/shape becomes clear when we perform movements with our eyes closed, concentrating on the paths and the flow of space, i.e., on its trajectory. Thus, the proposal of this fifth moment of a pedagogy of movement combined with new technologies recovers a historical concept of bodily movement.

The movements to be learned have been digitized from sequences executed by historical figures such as famous actors, wrestlers, and also by ordinary people. Therefore, the user's interest may lie in curiosity or executing movements with technical complexity across four levels.

The central goal is to expand the limits of movement and body perception in a way that is easy, pleasant, and simple, so that the user can feel well and complete, always acting within their bodily limits.

The most important aspect is the way of learning a movement without imitating the teacher. This moment suggests moving the body through the stimulus of drawing in space, following a trail in space and moving the body without imitating anyone, opening up the possibility of discovering each person's unique way of moving their body. The person practicing the movement will do so by drawing their line in the air, and after repeating it several times, they create this "object" in the air, which is the movement. Other benefits naturally occur and are discovered over time and with the physical practice of this proposal.

I would like to emphasize that "building movement and building objects are processes that go hand in hand. For example, if four circles light up in sequence during a time interval greater than half a second, you build a square. If they light up with an interval shorter than half a second, you build a continuous line forming a circle. Thus, the resulting object is different." (Hoffmann, 2001, 152-5) With the use of Nota-Anna, the observation of movement is made through its trajectory, which can educate people to see movement in a way different from how they see it today. I believe that the path of movement in the air, being visible, creates a sculpture in the air, an "object" in the air. Thus, the meaning of movement becomes the "object" that the person created in the air. Moments 4 and 5 offer some examples for you to experiment with and discover the beauty of the organic geometry that movement creates in the air.

. Finalization Icon:
This is a moment to assess the immediate effects of the bodywork on the practitioner's

overall state. In doing so, they can recognize how they feel before returning to their daily activities.

The proposed assessment involves recalling the experience and observing its reflections on the physical and mental states, including thoughts and mood. "When a memory is processed, some people experience manifestations of information at a somatic level. Bodily sensations can be linked to emotions felt during processing (e.g., a racing pulse or a contracted stomach). Or the bodily sensation may be one experienced during the event itself (e.g., someone who had their wrists tied may feel pressure in that same joint when recalling the event). Thus, bodily sensations can be a non-specific physical resonance of a dysfunctional cognition." (Shapiro, 2001: 87). Therefore, the finalization moment can reveal to the practitioner that perceiving what they think, imagine, and feel physically constitutes a unified whole.

On the other hand, external world information—including the audiovisual instructions from the DVD—combines to form a single construction of reality for the practitioner, based not only on what is seen but also on what is heard and touched[95].

Thus, after a session, it is essential to recognize how each person constructed their internal/external world throughout the body experience they just engaged in. This construction is entirely personal and unique. As Bachelard states: "Through intimacy, the space of the world and the space of intimacy blend together." (Bachelard, 1994: 203).

The person who engaged in the body practice may characterize their overall state as positive or negative. However, it is worth simply recalling a Chinese proverb: to suffer, to open up, to smile… patience is bitter, but its fruit is sweet.

In physical terms, equipping the practitioner with the ability to allow a decrease in muscle tone in tense areas—guiding the body toward optimized skeletal alignment—can create a profound sense of change. This is because postural imbalance not only leads to energy loss but also diverts energy away from areas that need it toward others that are unnecessary for a given activity. Since the body is a unified system in which each part

[95] It is important to consider that perceptions and sensations are constructions.

depends on the others, muscles act to balance the bones and must remain available and free for action. Their movement follows the principle of action and reaction, ensuring an organized motion that involves various bodily systems (neurological, muscular, respiratory, skeletal, among others).

Therefore, awareness of our movement, weight, and position comes from within the body, not from outside it. In conclusion, recognizing the body's internal state means knowing oneself and opening up to new behaviors that are suitable and appropriate for each moment of daily life.

Poetically:

Listen carefully. Not
to my words, but to the turmoil
that rises within your body when you listen to yourself.
(Bachelard, 1994: 42)

Conclusion

"There can be no understanding between hands and the brain unless the heart acts as mediator." (Fritz Lang, *Metropolis*, Germany, 1926)

Technology is changing our perception of time. And it has never occupied so much space in our lives. The issue is that we have yet to learn how to use it appropriately. Here lies the great paradox: the advancements that were theoretically meant to streamline our tasks and give us more free time have ended up occupying us more and more.

Every new technology must be accepted in one way or another. Avoiding it will only make people more stressed, as they risk being left behind. Consider an executive who doesn't have an email account today—this puts them at a clear disadvantage in the market. The same applies to a company without a website. Technology must be embraced, as it is only going to become a bigger part of our lives. (Rosen, 2000: 11)

New technology moves at an accelerated pace, constantly introducing new products. Currently, the trend is characterized by wireless technology, most notably represented by mobile phones. *"Regarding the future of mobile phones, it is reasonable to say that they will become multifaceted communication tools that people will use to manage both their personal and professional lives."* (Ollila, 2003: 43)

In the business and professional market, it is assumed that corporate users will demand fully wireless and mobile devices that are seamlessly integrated with their company's IT systems. This would allow, for example, a salesperson to send data directly to the company's system, with email as the primary application. In the consumer market, the most striking aspect of mobile phones today is their ability to capture images—an important complement to written messages, as they convey emotions in a way that words alone cannot. Additionally, the cost of sending a photo or a postcard via mobile phone is expected to drop significantly in the next two years.

With the convenience of the internet and the marvels of new technology, everything appears effortless and easily attainable. However, looking beyond the present moment, history—across its social, economic, artistic, and other aspects—shows us that conflict with the environment, including with other people, is a constant and universal element of human nature. Simply put, in everyday life, this conflict translates into the individual "struggling for something." But in the comfort-driven society shaped by new technology, the question arises: struggling for what? A quick glance at popular news already provides some clues—obesity as an epidemic, health issues resulting from a sedentary lifestyle...

Where is so much comfort leading us? Why move at all? I do not intend to answer these questions, but I would like to highlight another perspective: "We have spent very little time on Earth in geological terms. Even compared to other species that have already disappeared, such as dinosaurs, we cannot claim to have fared better. Dinosaurs lived for 120 million years. The human species has existed for 250,000 years. There is no inherent advantage in the development of intelligence. It is an incredible adaptation, a formidable tool developed by humanity, but it does not guarantee our survival as a species. So far, human intellect has been helpful, but it has no absolute commitment to the survival of humankind or the preservation of life on the planet. In fact, there is evidence that it may be quite the opposite—that the very progress intelligence has produced could be a shortcut to human extinction." (Gould, 2003) Currently, "the progress that intelligence has produced," as Gould puts it, is represented primarily by new technology. It shapes our lives in all aspects, as previously discussed.

In considering technology's role in our society, I adopt an approach that seeks knowledge from within the very framework of today's urban environment, aligning myself with a group of researchers whose perspective is clearly expressed by a colleague:
"To take on this responsibility—not just as artists or theorists—we must also refine our critical sense regarding the innovations that are imposed upon us in the name of a 'better world,' but which inevitably carry commercial and market-driven interests." (Bambozzi, 2002: 66) He goes on: "Such reflections reinforce the conviction that it is indeed necessary to conduct research and create works that can foster an interest in visual learning—works that can illuminate the mechanisms of perception and counteract cognitive stagnation." (Bambozzi, 2002: 66)

It is within this perspective that the duCorpo DVD is positioned, proposing—within the most current non-corporate technology—a use of visual and auditory elements as part of the user's body-mind unity. In this sense, "what informs the gaze is tactile experience, which comes into play with its codes and memory until we visually recognize an object." Merleau-Ponty (Apud, 1957: 22) believed that "vision is palpation through the gaze." The depth of vision implies a sensory density that incorporates "the tactile gaze," also known as the haptic sense (a term that, notably, is absent from dictionaries). This haptic perception combines the sensory modalities of vision and touch, maintaining a

simultaneous relevance between the two. As a sensory mechanism, it enhances our perception of textures, reliefs, and surface qualities. As Langer puts it:
"All thought begins with perception—not necessarily through the eye, but as a fundamental formulation of sensory perception, expressed through sight, hearing, or touch, and generally through all the senses together." (Langer, 1934: 216) Because of these characteristics, a work of art becomes a tactile object for the gaze. *(*Herkenhoff*,* 2002: 314) At this point, I position the duCorpo DVD as a work of art—especially because, as an English researcher states: "At this present moment, in the urgent endeavor to understand the relationship between human cognition and the natural world, art seems to be the best means at our disposal." (Huws, 2000: 40)

Art is inhabited by force. The force of subtlety, of cultivated and refined sensitivity.
This was my choice when I treated the user with delicacy and care, in a non-mechanical way, through the practices I proposed. Because "when faced with powerful certainties, with triumphant perfections, we are left with another, superior weapon: we are left with fragility." (Muncini, 2002)

Another perspective I adopt is that modifying bodily attitudes is a way of modifying mental attitudes, just as changing mental attitudes can alter bodily attitudes. This viewpoint is not always accepted. As Lowen states: "We live in an egotistical or narcissistic culture in which the body is considered an object and the mind, as the superior and controlling power." (Lowen, 1995, 215). However, this social concept is being altered. Personally, I confirm this through my own social experience as a dancer, i.e., "an artist of the body," and as the daughter of an intellectual. On the other hand, current science serves as a basis when it states that "to develop the mind means to develop representations that become conscious as images, giving the organism new ways to adapt to the environment[96] that were not contained in the previous genome[97]." (Damasio, 1995, 229). Adaptation can be translated into new behaviors and ways of acting throughout an individual's life.

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[96] The bones support the weight and are the places where the muscles attach, which, along with the ligaments, facilitate movement. The muscles are arranged in pairs, working together in the phases of activity and rest as antagonists. The nerves receive stimuli from the external world and communicate with the central nervous system. A collection of memories is linked to the external stimuli. And responses are sent from the organism toward the environment, involving nerves and muscles in motion." (Todd, 1975, 248)

[97] "Our hypothesis about the brain's innate information processing system leads us to the concept of a memory network, representing an information system. No one knows how memory truly works, but we can create an image with a series of channels where thoughts, images, emotions, and sensations are stored and interconnected." (Shapiro, 2001, 33)

Among the various stages of life, I observe that longevity includes as a conditioning factor a constant attention to the body and its behavior. As Dr. Mabel Todd, frequently cited in this thesis, says: "A person becomes old when their habits become fixed and unchangeable, preventing the formation of new habits." (Todd, 1975, 290). The notion of constant adaptation to the environment as a fundamental factor for the body's homeostasis and its balance in relation to the environment leads us to the idea of constant mobility within the individual. Thus, "stability in the organism means the possibility of change. Therefore, a certain degree of instability is a necessary condition for the balance of the organism." (Todd, 1975, 262)

Once this notion of balance is established, it becomes necessary to understand its elements, such as the action of time on the organism. One of the main points to observe in today's society is the speed of changes, which represents an element either in favor of or against the general well-being of the person. The speed, translated as fast/slow, is not measurable, but rather an individual impression, i.e., what is fast for one person may be slow for another. Fluency is another element that affects the general well-being of the organism, which can be translated into the sensation of smoothness and elasticity in the body's tissues, allowing them to react to both internal and external changes. Regarding the flow of the organism, I would like to quote Lowen: "People who cannot soften with love are labeled as 'hard-hearted.' But the heart cannot be hard; it must pump blood throughout the body. Rigidity lies in the voluntary muscular system, which envelops the body like armor, similar to that worn by ancient knights." (Lowen, 1995, 111)

In this sense, opening up to change implies the acquisition of self-awareness regarding one's organic functioning at a given moment, meaning taking possession of an instrument that contributes to the organism's homeostasis. In this regard, consciousness is very valuable because it centers knowledge on the individual life of the organism. Today, techniques that encourage a person to connect with themselves, as the duCorpo DVD intends, are invaluable. Always, and especially today, in our society polluted by anxious behavior, I would like to emphasize that:
Há um tempo para semear
E um tempo para colher.
Os grãos da consciência do corpo
Não escapam à esta regra.

Mas antes delas emergirem,

Como faz a semente

Em direção à superfície da terra

Para encontrar a luz,

Ele flui sempre...

...um lapso de tempo (Vaz-Géringer, 2001, 65)[98]

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[98] There is a time to sow
And a time to reap.
The seeds of body consciousness
Do not escape this rule.

But before they emerge,
As the seed does,
Towards the surface of the earth
To find the light,
It always flows...
...a lapse of time.
(Vaz-Géringer, 2001, 65)

Attachments

I include a brief explanation of some fundamental concepts for understanding the universe contained within body awareness practices.

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5.1. Homeostasis

“Homoio, similar, resembling; stasis, standing still. The combination of these words generated the term homeostasis, coined by Walter Cannon in 1926, which in turn was inspired by the concept of the 'fixity of the internal environment' proposed by Claude Bernard in 1878.” (Menna-Barreto: 2004, 105) Since the early 20th century, this concept has played a decisive role, with recent neuroscience[99] research considering homeostasis a key element for the biology of consciousness. Homeostasis refers to the coordinated and automated physiological reactions necessary to maintain the internal stability of a living organism, constituting the body's regulatory mechanisms.

These regulatory mechanisms ensure survival by directing the disposition to excite certain patterns of bodily changes, which can be the state of the body under a specific meaning (hunger, nausea), a recognizable emotion[100] (fear, anger), or even a combination. This excitation can arise from the viscera, the external environment, or a mental state, and can engage a bioregulatory response, an instinctive behavior pattern, and/or a new action[101].

In functional terms, homeostasis depends on neurological and chemical signals. The chemical signals resulting from neurological signals trigger other chemical signals, which can alter the functioning of cells[102] and tissues (including those in the brain) and modify the regulatory circuits that initiated this cycle. Thus, 'the brain and the body are inextricably integrated through objective neural[103] and chemical circuits.

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[99] Neuroscience is the study of nervous systems, from humans to invertebrates. It encompasses a wide range of disciplines, from psychology to chemistry.

[100] The functions of emotion can be reactions to circumstances at the moment to achieve the organism's homeostasis. The triggers of emotion are a type of sensitivity (e.g., a gaze) or a recollection (e.g., remembering the gaze of someone who is not present).

[101] This definition of homeostasis is current. Traditionally, it implies “the notion of a 'closed' system to external influences... Bernard spoke of the relative independence of organisms in relation to their environment, a form of independence ensured within certain limits by the existence of an internal environment capable of buffering extreme variations in the external environment.” *(Menna-Barreto: 2004, 106)*

[102] Each cell plays a role in the functioning of the organism. Cells with the same function form groups known as systems—the muscular, skeletal, nervous, epithelial, and glandular systems—which respond differently to internal and external stimuli.

[103] There are billions of neurons in the brain, organized into local circuits. When they are arranged in parallel layers, they are called the cortex; when they are arranged in non-layered groups, they are called nuclei. Both the cortex and the nuclei are interconnected, forming systems. Gradually, these systems become more complex until they form systems of systems.

For anatomical analysis purposes, the nervous system is divided into the central nervous system (the cerebrum, composed of the right and left hemispheres connected by the corpus callosum, as well as deeper nuclei such as the basal ganglia, the amygdala, the basal forebrain, and the diencephalon, which consists of the thalamus and hypothalamus) and the peripheral

There are two main interconnection routes. The first consists of peripheral nerves and sensors that carry signals from all parts of the body to the brain and from the brain to all parts of the body. The second, less obvious route, is the bloodstream, which transports chemical signals such as hormones, neurotransmitters, and modulators." (Damasio, 1999: 87).

During our development, from childhood to adulthood, the design of the circuits in our brain—which represent our body in its interaction with the environment—depends both on the activities we engage in and on the action of innate bioregulatory circuits.
Innate circuits function as a type of memory or primitive record of circadian rhythms, present in almost all living beings and inherited from the most ancient ancestors of each species. By the 1970s, it was already known that the control of biological rhythms was associated with the *per* (period) genes. Only in recent years have researchers discovered others, such as *tim* (timeless) and *cry* (cryptochrome), which together form what is known as the temporal genome.

The rhythm of biological clocks is closely linked to the rhythms of nature, as all biological systems oscillate, responding to internal or external stimuli and expressing regular fluctuations. "Since the mid-20th century, we have accumulated evidence of the presence and action of mechanisms responsible for a broad spectrum of oscillations, known as biological rhythms. These rhythms are present in all living beings, whether in their most well-known form, the circadian rhythm—clearly articulated with the environmental day/night cycle—or in less understood expressions, such as seasonal rhythms. In both cases, environmental cycles act as synchronizers, dragging along organic oscillators commonly referred to as ‘biological clocks.’" (Menna-Barreto, 2004: 106). For example, the light-dark cycle serves as an important reference for maintaining harmony, signaling times for eating, waking, and sleeping. Even reproduction and social interactions can help adjust the "clock hands" of life. Within this framework, the current challenge is to determine the degree of plasticity of biological and circadian clocks—that is, to what extent they can be stretched or

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nervous system (which consists of a network of nerves connecting the central nervous system to the periphery). The central nervous system connects to the spinal cord through the brainstem, behind which lies the cerebellum.

As a curiosity: we likely carry around 100,000 genes and have more than a trillion synapses in our brain.

compressed without losing their fundamental characteristics. Researcher Mirian David Marques, in an article by Bicudo (apud, 2002: 47), states: "Nature itself operates with organisms as a conductor leads an orchestra; thus, challenging the conductor always results in disharmony, and sometimes, it can be fatal." This means that a significant failure in homeostasis leads to death[104].

"In daily life, to achieve homeostasis, the body often relies on pain and pleasure so that both instinctive and acquired strategies can operate efficiently toward cognition. The mapping of bodily signals can originate from the internal environment and the viscera (interoceptive); from the vestibular system and skeletal muscles (proprioceptive or kinetic); or from fine touch (skin and skin sensors), producing pain or pleasure, which lead to behavioral changes. This is the field of study of neuropsychology, which aims to explain how certain cognitive operations and their components relate to the nervous system and its structures. From this perspective, the key to psychological change is the ability to facilitate appropriate information processing.

To conclude, I would like to mention a description of this process by physician Marise Russo, in which she states that psychological stimulation can trigger a somatic bodily effect through three main pathways:

1. By transmitting signals via the autonomic nervous system. Virtually all emotions can influence the autonomic nervous system. For example, intense agitation increases the excitability of the reticular activating system, enhancing sympathetic activity throughout the body. Thus, widespread sympathetic stimulation of the organs is one of the most common psychosomatic effects. Many emotions, such as excitement, anger, or anxiety, often produce massive sympathetic discharge, leading to a sharp rise in blood pressure, heart palpitations, and chills.

Psychological effects can also stimulate the parasympathetic centers of the hypothalamus. Emotions such as worry, depression, or lethargy—each producing effects opposite to those that excite the sympathetic system—often stimulate the parasympathetic system. However, at times, both systems can be stimulated simultaneously. Fear, for example, can cause extreme sympathetic excitation, resulting in elevated blood pressure, while at the

[104] If the stress exceeds the tissue's resistance capacity, its structure is altered or even destroyed.

same time, parasympathetic stimulation may trigger such intense gastrointestinal activity that a person experiences uncontrollable diarrhea.

2. By transmitting signals to the muscles via the bulbar reticular area. The reticular activating system sends descending signals through the spinal cord, which then reach the muscles directly. Therefore, the same emotions that excite the sympathetic system also increase muscle tone throughout the body. Sometimes, muscle tone becomes so high that it causes tremors, explaining why certain emotions lead to shaking. Conversely, emotions that typically stimulate the parasympathetic system generally reduce the activity of the bulbar reticular formation. As a result, muscle tone drops significantly, leading to muscle asthenia (weakness) in some psychological states.

3. By transmitting psychosomatic effects through the endocrine glands. The nervous system completely or partially controls several endocrine glands. For instance, the sympathetic nervous system regulates the adrenal medulla, while the hypothalamus controls nearly all pituitary gland functions. The hypothalamus exerts control over the anterior pituitary by secreting neurosecretory substances within itself, which are then absorbed by local capillaries and transported through small veins connecting the hypothalamus to the anterior pituitary. There, they stimulate the secretion of various key hormones: growth hormone, corticotropin, thyrotropin, prolactin, and gonadotropins. These hormones, in turn, regulate growth, protein metabolism, overall metabolic intensity, lactation, and most sexual functions. Additionally, the supraoptic nuclei of the hypothalamus regulate the secretion of antidiuretic hormone.

She concludes by stating: ‘Obviously, then, many psychosomatic effects can be mediated by the endocrine glands. For example, psychological effects may overstimulate the hypothalamus, potentially causing hyperthyroidism due to excessive secretion of thyroid hormone, which increases metabolic intensity in all body cells. Similarly, psychological signals may alter the production of sex hormones, thereby causing anovulation, excessive or deficient menstruation, infertility, or other sexual abnormalities.’" (Russo, 2001: 11/12).

5.2. Consciousness [105]

There are numerous studies in this area of investigation, presenting various theories. According to the researchers in the field, 'Consciousness has been an important topic in philosophy, but until recently, only a few neuroscientists worked on this subject. For a brief period in the 1940s and 50s, neuroscience dedicated attention to the study of consciousness. Notable examples include the works of G. Magoun, H. W. Moruzzi, H. Jasper, and W. Penfield. Another pioneer was Benjamin Libet. What is now known as the field of consciousness studies was independently established in the 1980s by philosophers and scientists. Special thanks should go to philosophers Daniel Dennett, Paul and Patricia Churchland, Thomas Nagel, Collin McGinn, and John Searle, and to neuroscientists Gerald Edelman and Francis Crick.' (Damasio, 1999: 336) And further: 'In fact, the neurological study of consciousness, which until the 1970s was an almost untouchable subject, has transformed into a central concern, something that attracts the attention of scientists worldwide. All levels of consciousness are being explored today, from the most elementary perceptual mechanisms (mechanisms that are common to many other animals besides humans) to the higher levels of memory, image formation, and self-reflective consciousness.' (Sacks, 2004: 8)

Currently, there is still no general consensus on consciousness. On the contrary, various definitions exist, which are still in the process of development. According to one researcher in the field, 'We still do not know theoretically and conceptually how the nervous system performs important functions such as motor control, learning, or memory recall... these are genuine puzzles. If neuroscience had progressed on the problems of brain functions as much as molecular biology has progressed in the research of heredity transmission, we would be in a different position. We can only conclude that attention and sensorimotor control are mysteries and that we still do not understand their mechanisms.' (Churchland, 1993: 114) In light of this context, this appendix is not extensive, only presenting notions relevant to the work of body awareness

The acquisition of consciousness presupposes two facts: that the organism[106] engages with an object and that the object modifies the organism[107]. Consciousness then arises

[105] In Portuguese, we have the word 'consciência,' which in English has two meanings: 'consciousness' refers to knowing an object or action attributed to the self; 'conscience' refers to the good and bad to be found in objects or actions." (Damasio, 1999: 27)

when the organism, altered by an object, constructs and displays non-verbal knowledge, and when this knowledge highlights the mental image of the object as the cause of the bodily change.

Mental images are likely the main content of our thoughts, regardless of the sensory[108] modalities through which they are generated, whether engaged with objects or not, or the words or language to which these images correspond. The processes that generate images use rules and strategies embedded in the brain's representational devices and are essential to our thinking, but they are not the content of our thoughts. One could say that mental images are momentary constructions, attempts to replicate previously experienced patterns, whose accuracy depends on the conditions of learning and the recollection of these images. Thus, consciousness generates the knowledge that images exist within the individual who forms them, thereby allowing the connection between two aspects of the survival process: the regulation of self-image and the creation of images.

Therefore, when consciousness is experienced, it becomes fundamental because it introduces new ways to achieve homeostasis, the foundation of survival[109]. A conscious person has advantages over those who have not refined their consciousness because they can establish a link between the universe of the automated biological regulation of their actions and the universe of the imaginary (the realm of planning, formulation, and prediction of the future).

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[106] The term organism conceptualizes the unity of the body and mind in a person.

[107] The practice of any body awareness method makes the above concept very clear.

[108] Sensation: masculine noun. From Latin 'sensatione'. 1. *Physiol*. Impression caused on a receptor organ by a stimulus, and which, via afferent pathways, is conducted to the central nervous system. 2. *Psychol*. Conscious sensory process correlated with a physiological process, providing humans and higher animals with knowledge of the external world. 3. Physical impression in general. 4. Surprise or strong impression due to a rare, unusual event. 5. Moral upheaval; emotion. (Fortuna, 1997)

[109] Regarding the concept of consciousness, for the survival of the organism, there are three basic principles:

- The human mind and the rest of the body form an indissociable unity integrated by biochemical and neuronal circuits.
- The organism interacts with the environment as a whole: body + mind.
- The physiological operations we call the mind derive from the structural and functional set, not from the isolated mind: the mental phenomenon can only be understood in the context of the organism interacting with the environment.

For decades, the concept of Penfield's homunculus[110] was used in the field of human movement as a space for storing both innate and learned movement patterns, shaping a person's body image. However, today, body-movement representation devices have replaced the concept of Penfield's homunculus. “The self is not the infamous homunculus—a tiny person inside our brain perceiving and thinking about the images our brain forms… One could say that the self is the continuous reconstruction of the biological state; it is not a little person, the homunculus, contemplating what happens in our brain, but rather a constant state of neurobiological re-creation.” (Damasio, 1999: 99/100)

Other researchers in this field share this perspective. I will mention two: “Conscious experiences are active creations… Consciousness does not occur before the homunculus or the Cartesian Theater; on the contrary, we are both actors and directors at the same time. Better yet: we are artists improvising.” (Hardcastle, 2000: 51). And Searle, who supports the idea of reentry, in which parallel signals travel back and forth between maps. Thus, while one map outlines the contours of an object, another simultaneously sketches its movements. This communication between maps forms an integrated image of the object, known as "global mapping," eliminating the need for the homunculus concept.

Thus, "the body schema is not limited to the perception of the body; rather, it results from the entire cognitive and affective organization of the individual." (Wapner, 1969: 90). Therefore, for each person, consciousness is unique, constituting a phenomenon of individual and intimate existence. The conscious mind and its properties are real entities, not illusions, and must be investigated as personal, private, subjective experiences, just as they are[111].

In practical terms, consciousness allows an organism—provided its innate reflexes are functioning properly, it has the ability to regulate its metabolism, and it possesses the capacity to learn—to become a mentalized organism, a type of being whose responses are consciously shaped by an interest in its own life. Thus, the organism can consciously remodel certain circuits in response to the changes it undergoes, while others remain stable. These form the foundation upon which notions of internal and external worlds are built. In adulthood, many activities do not occur at the level of consciousness—for example, maintaining an upright posture. On the other

[110] In 1930, Wilder Penfield and his colleagues stimulated the somatosensory cortex with small electric shocks, creating a map of touch sensations known as the Penfield Homunculus.

[111] This aspect is deeply respected by body awareness methods.

hand, changes in patterns and habits only take place when attention is directed toward the behavior, considering both the movement of the studied body part and the object involved. This process may become imperceptible to the individual, especially after years of body awareness practice. According to Gerda Alexander, such practice "develops the body and the body image until a more complete awareness and understanding of the body is achieved. It includes not only posture control, weight distribution, muscle tone regulation, and motor functions but also the awareness and regulation of semi-conscious and unconscious processes, such as circulation and the balancing of the autonomic nervous system." (Gainza, 1997: 129)

To conclude, I would like to quote a passage that defines consciousness as a subject of study within a contemporary scientific framework: "My attention shifts from one thing to another—a girl in a red dress passes by, a man walks his funny-looking dog, the sun finally emerges from behind the clouds. These are all events that capture my attention for a moment as they happen. But why, among a thousand possible perceptions, are these the ones I experience? Thoughts, memories, and associations lie behind them. Consciousness is always selective—laden with feelings and meanings that are uniquely ours, shaping our choices and reshaping our perceptions." (Sacks, 2004: 10)

5.3. Bone Structure

Bones serve four main functions:
. Organic function: They produce blood cells[112] in the red marrow and store mineral salts, particularly phosphorus and calcium, making bone a living tissue.
. Protection: They house the brain, spinal cord, and heart, acting as a protective shelter.
. Structural function: Throughout evolution, functional needs have shaped bone structure.
. Support: Bones bear body weight and support the movement organs, i.e., muscles, giving them form. To fulfill this role, the skeleton is structured as a framework of 206 rigid and articulated bones, assisting movement by providing attachment points for muscles and forming a system of levers[113].

To perform these functions, bones take on different shapes: long bones (a shaft or diaphysis with two ends called epiphyses, such as the humerus), short bones (irregularly shaped, like the bones of the carpus and tarsus), flat bones (found where soft tissues need protection, such as in the skull, or where extensive muscle attachment is required, like the ribs), irregular bones (with a unique and distinct shape, such as the vertebrae), and sesamoid bones (small and rounded, enhancing muscle leverage). Bones, with their varied shapes, create three-dimensional spaces, such as the stomach, heart, lung, and abdominal cavities; the cranial space for the brain and sensory organs; small spaces like the vertebral canal for the spinal cord; internal spaces within non-flat bones, such as the femur; and interarticular spaces, including those between vertebrae, knee joints, the small bones of the hands and feet, and the sacroiliac junction. The formal characteristics of these spaces, interwoven with one another, shape the body's architecture, defining its mobility, which, at a detailed level, varies from individual to individual.

In all animals with skeletons—whether fish, reptiles, birds, or mammals—the architectural design follows a similar pattern, with the vertebral column as its core structure. This is why they are called vertebrates. The human skeleton is divided into two main parts: The axial skeleton, which develops from the primitive notochord and includes the spine, skull,

[112] For this, bones have three types of cells: **osteoblasts** (responsible for bone formation), **osteoclasts** (involved in bone resorption), and **osteocytes** (the main cells in mature bones).

[113] It is very important to consider that bone is not rigid, but is structured in trabeculae with spaces between them, implying a certain flexibility. This means that during its use, and especially during its formation and growth, its shape can change depending on the stresses it is subjected to. On the other hand, bone is highly resistant to compression and axial tension.

sternum, and ribs, housing the central nervous system, digestive system, and circulatory, respiratory, urinary, and reproductive systems. The appendicular skeleton, which supports the limbs and consists mainly of two girdles: the scapular and pelvic girdles, to which the arms and legs are attached.

Within the axial skeleton, particularly in the vertebral column, weight is transferred at key junctions: the contact point between the occipital condyles of the skull and the atlas vertebra, between the twelfth thoracic vertebra and the first lumbar vertebra, between the fifth lumbar vertebra and the sacrum, at the sacroiliac joint, and at the acetabulum where the femur articulates.

The weight of the head is transmitted to the trunk through the first three ribs and the vertebral column, assisted by the frontal muscles connected to the neck, the muscles attached to the jaw, and the spinal and interspinal muscles.
The essential structure for supporting body weight and controlling movement is located at the lower lumbar spine and pelvis. This area contains the oldest and most well-established neuromuscular activity patterns and serves as the foundation from which the legs extend.

The larger part, in terms of width and height of the vertebrae, is where the entire weight of the head and trunk is transferred to the pelvis and then to the legs, i.e., in the sacrum[114]. Due to its role in supporting this heavy weight, the sacrum consists of five fused vertebrae with a permanent and fixed curvature.

The pelvis serves three functions: it receives the weight from the head, trunk, and thorax, transmitting it to the legs; it provides movement for the trunk (above) and the legs (below).

The transmission of weight from the head, thorax, and trunk at the level of the sacrum is divided into two directions through the sacroiliac joints, following different paths depending on the person's position. If the person is sitting, the weight passes through the ilium and is directed to the lower point of the ischium, known as the ischial tuberosity. If the person is standing, the weight is transferred from the ilium to the acetabulum, where the femoral heads receive the load and

[114] Sacrum, the name of the bone at the end of the spinal column, means sacred.

transmit it through the femurs to the tibias via the knees[115] and then to the feet through the ankles. All the weight is directed straight to the talus, from where it is distributed among the 25 bones of the foot, arranged in three arches. Thus, in an upright position, the legs support the body's weight—i.e., the weight from the head down to the lumbar region travels through the vertebral bodies and intervertebral discs, then divides in two at the lumbosacral joint, moving obliquely toward each femoral head and continuing down to the feet.

In the appendicular skeleton, the position of the shoulder girdle is similar to a yoke used for carrying two buckets of water or an old-fashioned coat hanger designed for a single jacket, where the arms hang freely from the joint between the scapula and the humerus. This freedom ensures, on the one hand, reduced mobility of the ribcage, providing protection for the heart, lungs, and other organs, while on the other hand, it allows for enormous flexibility in all spatial directions for the arms and hands. An important feature of this structure is the presence of the primary respiratory muscle, the diaphragm, which separates the thoracic cavity from the abdominal cavity. In the body's architecture, there are three ways to support weight: hanging, bracing, or resting. In the skeleton, the head rests on the spine, the arms hang from the shoulder girdle, and the ilium braces itself against the sacrum. In this mobile arrangement, nearly all joints are enclosed in capsules filled with synovial fluid, which serves to lubricate and prevent friction and wear in the joints.
Thus, the composition of the bones gives rise to the joints, which, in addition to determining the type of movement of the bones, also house nerve receptors. These receptors are essential for perceiving posture and movement as a whole, since "it is at the level of the joints, and specifically at the level of the vertebrae, that we find the majority of receptors." (Pluchet, 2003: 24).

The methods of body awareness base their organization on the perception of the skeletal structure, among other factors. Mabel Elsworth Todd, one of the pioneers in this field, stated in 1937: “More attention should be given to the bones… they have more important functions than simply supporting the anatomical structure.” (Todd, 1975: XVIII) The study of bones in body movement is essential for the proper use of the body's architecture, helping to prevent health issues, among other benefits, and enriching the body's movement expression. The types of perception that can be developed include:

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[115] The knee is the largest joint in the body.

· The continuity of the skeletal structure, which is perceived when any modification in a joint space or the position of a bone causes a shift in the entire skeleton, enhancing the sense of unity in the body.

· Postural alignment, where posture is understood as a relationship or alignment between different body parts. As an expert in the field states: “We should speak of an ‘optimal’ posture, in which the various body segments are correctly aligned and a minimal amount of stress is applied to the body’s tissues. This type of posture requires very little muscular activity to maintain because it is essentially balanced.” (Norris, 1998: 11). A postural pattern can be defined as the movement of body parts across specific distances in space, following a precise timing and coordination scheme, with just enough effort to support the body’s weight and/or an external object. A poorly adjusted postural pattern consumes more energy and leads to fatigue in daily activities, such as sitting, using a computer, reading, talking on the phone, and other tasks that require small hand and eye movements, demanding attention. Furthermore, improper posture affects the body’s functioning; for example, any loss of spinal flexibility has consequences on the nervous system.

· The spatial displacement of the bone as the origin of body movement, which promotes great flexibility. When bones move according to their role in the body's architecture, they optimize movement. This perceptual work and understanding of the body's structure is both detailed and enjoyable[116]. Intellectual knowledge alone is not enough; the goal is to comprehend the form of the bone through movement and the lived experience of each individual, involving a concrete kinetic experience.

· Support, which refers to the points of greatest pressure where the bones meet the ground. Identifying the most suitable support areas in different positions helps improve postural alignment and reduces effort in movement, without restricting spontaneous or intentional expression.

Bone awareness is essential, as it can provide a sense of inner security and resilience, considering that bones form the body's support structure. Moreover, they represent the deepest and most central structure, extending inward from the skin in the limbs of the body.

The significance of this awareness can be expressed in the following words:

“The world is large, but in us
It is deep as the sea.” R.M. Rilke

[116] To me, this could be part of the elementary school curriculum, as everyone should have practical knowledge of how the movement of our joints works.

I would add that the perception of bones is a lesson in both aesthetics and functionality: the irregular shape of the bones reveals the beauty of nature's design and the organic. As Waddington states:“The relationship of contiguity is the particular characteristic of biological structures. They are not usually modular in the sense of arranging one or more constant elemental units. Nor do they use a standard system of proportion. The Golden Ratio is not an idea for a biological type. How could it be used in a form that alters the relative proportions of its parts as it grows? On the other hand, biological forms are not chaotic or arbitrary in their mutual relationships; on the contrary, they suggest an order and an organization. I believe that there are principles that apply to the forms of the organs and the parts that compose an animal.” Kepes, G; 1966: 37 This subject is still largely unexplored, but it is not appropriate to delve deeper into it at this moment.

5.4. Movement

Movement is displacement in time/space. In the human body, movements of all its tissues occur constantly, with functions such as maintaining the organism, the functioning of the autonomic or vegetative system, motor capacity for changing position, and the expression of emotions, feelings, sensations, and life itself.

In the context of this thesis, the most studied movement is joint movement, which is the result of a system within the body and its interactions with the environment. The basic joint system consists of rigid links (bones, ligaments, and tendons); synovial joints; muscles; neurons; and sensory receptors, which form a whole where the rigid links are surrounded by muscles over frictionless joints. The activation of muscles, controlled by neurons and monitored by sensory receptors in the nervous system, leads to the production of body movement.

The articular and motor systems[117] need at least two types of information to control movement. They must know where and when they are being disturbed by something that has occurred in their environment. This information is provided by proprioceptors[118], which detect stimuli generated by the body itself, and by exteroceptors[119]. With this information, the basic joint system is capable of organizing a quick response to a disturbance, determining the position of its joints in space, and distinguishing between self-generated or imposed movements.

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117 "The motor system includes all the neurons, where impulses originate that directly or indirectly reach the muscles." (Souza; 1998, 118)

118 The human body contains many types of sensory receptors that can be classified according to their location (exteroceptors, proprioceptors, interoceptors), function (mechanoreceptors, photoreceptors, chemoreceptors, thermoreceptors), and morphology (free receptor endings, encapsulated endings).

119 Proprioceptors include muscle spindles, tendon organs, and joint receptors. Exteroceptors, which detect external stimuli, include the eyes, ears, and skin receptors that respond to temperature, touch, and pain.

One of the functions of proprioception is the maintenance of muscle tone, this slight contraction observed in all muscles, also present in tendons and fascia. Muscle tone is crucial for maintaining posture and support; furthermore, when the tone is appropriate, it allows for less fatigue during actions. The explanation for this light contraction is that the muscle fibers do not contract all at once, but in layers, allowing for less muscular fatigue. A tone imbalance is often accompanied by a neurotic disturbance. (Todd, 1975: 31)

Describing in more detail: among the elements of the basic joint system, we have the joint receptors, which can function as mechanoreceptors and provide this system with the information necessary for controlling movement. There are four types: Ruffini endings, which can be classified as static or dynamic mechanoreceptors, signaling joint position and displacement, angular velocity, and intra-articular pressure; Pacinian corpuscles, which have a low threshold for mechanical overload and apparently detect joint acceleration; Golgi corpuscles or endings, which have a high threshold and monitor tension in the ligaments, especially at the extremes of the range of motion; Free nerve endings, which are widely distributed, constituting a joint system. Thus, joint receptors are capable of providing elements and information about position, displacement, velocity, and acceleration of movement, as well as painful stimuli experienced by the joint.

The cutaneous mechanoreceptors, which provide information exclusively about external events, are: Merkel discs, sensitive to local vertical pressure and unresponsive to lateral skin stretching; Meissner corpuscles, sensitive to constant local pressure, with responses that fade quickly; Ruffini endings, sensitive to skin stretching over a large area; Pacinian corpuscles, the largest skin receptors, which detect quickly changing pressure stimuli. The information from both types of receptors, the cutaneous and the joint receptors, is transmitted to the muscles, which generate body movement through the conversion of chemical energy, initially derived from food, into force.

Except for the muscles of the face, skeletal muscles act through the joints to produce various types of movement in the bones. Didactically, muscles can be divided into three categories: Dynamic muscles, generally found in the limbs, are the large muscles of movement, made up of long muscle fibers with few tonic units that act as protection against large stretches, acting as a brake to the antagonist movement; Tonic muscles, with short fibers, whose phasic units are intended for quick intervention in unpredictable imbalances or sudden falls, serving an antigravitational function to balance weight-bearing joints or support pendular segments; Postural dynamic muscles, mainly located in the trunk and the scapular and pelvic girdles, with a postural, directional activity, preparing the muscle for precise movement aimed at a specific goal.

In movement, there are four phases: the action time, the pause time, the passivity time, and the reverberation time. When movements follow one another, this cycle repeats over

time, always globally, involving the entire body. Thus, there is always the presence of a moment of activity and another of passivity, which can occur simultaneously within the same body or in sequence over time.[120].

Among all types of displacement, postural movement is the most difficult to study. Posture is not bodily immobility, but rather the result of constant muscular action, which, when examined in detail, is a product of antigravitational micromobility maintained by the tonic musculature. Due to its constant contraction, there is a tendency for muscle retraction, which, over time, can cause excessive pressure between the joint surfaces, leading to pain.

Therefore, it is important to know and use the correct bone alignment during movement to produce the least possible stress on the muscles and to make the best use of the joints, since muscle retraction reduces the range of motion in the joints. Muscle imbalances in the form of static muscle retraction cause, on one hand, changes in the arrangement of the bony segments (flattening), which can be observed, for example, in the increase of spinal curves (lordosis, kyphosis) or internal rotation of the knee. On the other hand, it leads to the loss of joint flexibility. If these imbalances become chronic, they are considered tonic muscular fixations. These not only cause joint blockages in movement but also lead to retraction of connective tissues such as the joint capsule, affecting local tissue irrigation (circulation of fluids like arterial and venous blood, as well as lymph), causing capsular adhesion, and reducing the ligaments' tolerance to stress. On the other hand, the absence of movement in a joint leads to bone demineralization and alters the functioning of afferent systems, such as proprioception, which is involved in balance, as well as the central neuro-motor control of movement and posture.

If we wish to expand, preserve, or even restore joint function, we must experiment, feel, and explore all the movement possibilities of the body's joints. Movement restores tissue flexibility, stimulates circulation, lubricates the joints, and/or reintegrates all parts and regions of the body into the whole body.[121].

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[120] This information is fundamental for the work of learning and training movement.

[121] It is essential to understand that for the same muscle, one should not reason about a single function but be aware that each spatial orientation leads to a different movement. In any movement technique, whether gymnastics, body awareness, dance, or another, it is not possible to expect the development of a particular muscle through a single movement, as any movement involves several muscles and affects the whole body. I emphasize that this understanding of muscular use is individual, as each person performs movements in their own personal way.

Thus, movement is life. Absorbing and externalizing is to modify the body so that it can perceive and respond in the best way to the signals from the environment and the body itself. Expressing through movement is to transform the body through the nervous and chemical systems under the control of a cerebral system that responds to the content of a thought related to a specific event or entity, constituting the essence of emotions.[122].

The relationship between emotion and feeling implies that all emotions generate feeling, if the person is awake and alert, but not all feelings generate emotions. On the other hand, feeling has an intimate relationship with the movement of the body: “the essence of feeling is the experience of what your body is doing while certain thoughts are occurring. Therefore, the essence of feeling an emotion is the experience of the changes that occur in juxtaposition with the mental images that initiated the cycle.” (Damasio, 1995: 145)

In summary, the movement of the body's joints can be seen as a set described as follows:
“The articular system can tell us where the skeleton is,
The relationship of one bone to another,
From one set of tendons to another.

The muscular system can tell us the state of tension of the muscles,
The contraction and relaxation of muscle groups.

The vestibular system,
The three semi-circular canals in our inner ear,
Can tell us about our state of balance,
Our states of balance and imbalance,
Through the alignment of our head with the force of gravity.”
(Preston-Dunlop, 1998, 43)

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[122] Morphologically, emotion means "movement outward."

5.5. Skin

The skin, besides being one of the most important sensory organs, is the largest organ of the body, covering it entirely (except for the openings).

The thickness of the skin varies from ½ to 3 mm, being thicker on the dorsal and extensor surfaces than on the ventral and flexor surfaces of the body. It is composed of three layers of tissue: the epidermis, the upper and outermost layer, made up of stratified squamous epithelial cells. This layer consists of five strata: the corneum (horny layer), the lucidum (clear layer), the granulosum (granular layer), the spinosum (prickle cell layer), and the basale (germinal layer). Next comes the dermis, divided into the papillary layer and the reticular layer, where blood vessels, nerves, lymphatic vessels, hair follicles, and sweat glands are found. Deeper still is the hypodermis or subcutaneous tissue, which contains fat (subcutaneous adipose tissue) and connects the dermis to underlying structures. The skin's associated appendages include hair, nails, and sweat glands. Its innervation is controlled by the autonomic nervous system, which induces the contraction of smooth muscle cells in the walls of arterioles, the motor muscles of the hair, and activates the myoepithelial cells of the glands.

According to Damasio, "The organism has a structure and a myriad of components. It has skeletal bones with many parts, connected by joints and moved by muscles; it has numerous organs combined into systems; it has a membrane that defines its boundaries called skin." (Damasio, 1998, 86). Thus, the skin serves as the intermediary between the internal (organic) environment and the external (ambient) environment, playing not only a functional role but also a psychic one.
Based on this concept[123], Didier, author of *The Skin-Ego*, defines eight functions of this organ (in a non-exhaustive list):

1. The skin supports the skeleton and muscles, while the Skin-Ego maintains the psyche.
2. It protects the organism from aggressions, radiation, and excessive stimulation.
3. The skin covers the entire surface of the body, functioning as a container for the individual, serving as a receptacle for a person's sensations, images, and emotions, and as a holder of projective identification. In this sense, the skin is so important that Tiffany

[123] This concept can be unfolded into two general principles: that every psychic function develops with the support of a bodily function, whose operation it transposes to the mental plane; and that while the cortex commands the systems, consciousness integrates the exterior-interior contact with the functioning of the psychic apparatus.

Field, director of the Touch Research Institute at the University of Miami School of Medicine, states that “insufficient touch in the first months of life can have consequences for the rest of a person’s life. In touch-based cultures, adult aggression is low, and the opposite is also true: little touch leads to high adult aggression.” (Swerdlow, 2002, 39).

4. It protects the individuality of each cell through its granulation, color, texture, and odor, individuating the self.
5. It serves as a surface containing pockets and cavities where the sense organs are housed, except for that of touch, delegating to the skin the function of intersensoriality.
6. It supports sexual arousal.
7. It externally stimulates sensorimotor tone, responding to the function of libidinal recharge concerning the individual's psychic functioning.
8. It provides information about the external world (pain, heat, touch, etc.), performing the function of inscribing tactile traces.

Thus,
"It is through the skin that we establish contact with the world.
Bodily contact:
Hitting, slapping, kicking,
Tripping, punching, pinching,
Contrasting with caressing, stroking, hugging,
Enveloping, kissing, penetrating." (Preston-Dunlop, 1998: 84)

And, "It is within the space defined by our skin that life happens.
Despite the thirty spokes
that form a wheel,
it is the empty space between them
that makes it useful.
Despite a house having
a door and a window,
it is the inner space
that makes it useful.
What exists becomes useful
because of what does not exist."

(Lao Tse, 570–490 B.C.)[124]

[124] Mais! Supplement, Folha de São Paulo, February 16, 2003

5.6. Olho

According to Professor Hassan Saba, "seeing" is a physiological function of the eye, assuming that anyone sees any image perfectly as long as they have normal and parallel eyes. "Perception" is a function performed by the brain. While seeing gives an inverted image, the brain places it in the correct position, i.e., the optic nerves that emerge from the eyeball cross inside the head, below the turkish saddle and pituitary gland, and their branches go to the lateral geniculate body, which hosts the optic and auditory centers, where the image is inverted to the real position: this is perception. "Looking" is more creative and involves the individual and personal interpretation of the image. In this instance, the nature of visual intelligence is found, which constructs—and does so according to principles. Without exception, everything that is seen is constructed: colors, shadows, textures, movements, forms, visual objects, and entire scenes. As Hoffman says: “Vision is not a matter of passive perception, it is an active construction process... the main difference is that scientific construction is conscious, while that of visual intelligence is mostly unconscious... Our visual intelligence interacts richly, and in some cases even precedes or guides, our rational and emotional intelligence. Understanding our visual intelligence is understanding ourselves." (Hoffman, 1998, xii). He continues: “Visual intelligence occupies almost half of the cerebral cortex. It is usually closely linked to our emotional and rational intelligence. It constructs and elaborates the visual reality in which we move and live. The emotional and rational intelligences use this construction as the base material for their constructions. The emotional world in which we live is, just like the visual world, the product of a personal construction.” (Hoffman, 1998, 202). For this author, the reach of visual intelligence is broad and profound: “We are complex beings with many facets: visual, auditory, gustatory, motor, emotional, rational, and others. Understanding each of these facets and their interaction is a critical understanding of who we are as human beings, leading to our development as human beings and of our environment. If the percentage of the cortex is a measure, visual intelligence is the greatest facet of who we are as a species, and its understanding is the key to knowing how we will be in the future." (Hoffman, 1998, 202).

Within this panorama, the correct position of the eye and its harmonious functioning, according to its morphological characteristics and within the body/mind unity, implies a seeing, perceiving, and looking with good quality.

Physiologically, the Primary Position of Gaze (PPG) is defined when the person does not move their body or eyeball and, in this fixed position, can gaze at a 30-degree lateral angle with focus, whether for near or far objects. When the image is outside this angle, the eye must move. For this, it has muscles: the superior rectus, which acts to look upward; the inferior rectus, which acts to look downward; the medial rectus, which moves the gaze laterally toward the nasal region; and the lateral rectus, which moves the gaze laterally in the opposite direction, toward the temporal region. Diagonal movements are made with the inferior and superior oblique muscles. The combination of the movements of these muscles, called nystagmus movements, allows the gaze to sweep across space in any direction. For example, to look at a close object such as the keys or the screen of a cellphone, the person uses their medial muscles to focus the gaze on a nearby point. Note that the eye muscles are subject to the same laws as other muscles in the body, so prolonged use of one type of gaze causes fatigue, leading to headaches among other symptoms.

The noble part of the eye consists of the central region of vision, called the macula, and the optic nerve, located inside the eyeball. The macula, which contains cones (responsible for color vision) and rods (responsible for shape vision), is characterized by 100% vision and avascularity, i.e., it has no veins and is nourished by imbibition. Any problem in this region, initially detected by blurred and undefined vision, implies a permanent loss of vision; caused, for example, by high blood pressure or diabetes. The region that the macula covers with 100% vision is within 30 degrees, called the central field, corresponding to the field covered by the PPG. Outside this angle, the peripheral retina acts, characterizing peripheral vision and the peripheral field, which corresponds to a 180-degree lateral angle with the body fixed, without the movement of the eyeball or any other part.

When an object moves outside the central field of vision, for perfect vision, the eyeball must be moved. If the object continues to move, the head should follow with rotation[125], and if necessary, the shoulder girdle, hip, hip joints, ankles, and/or, finally, the feet should rotate, depending on the amplitude of the movement of the observed object.

[125] The eye and the head muscles are adjusted simultaneously through the labyrinthine mechanism. Any small change in the plane of the head is registered by the labyrinth sense, and this information is instantly transferred via the cerebellum to the eye muscles, so that the eyeball adjusts appropriately to the new level of vision.

On the other hand, the mechanism for spatial registration of the movement of an object presupposes a temporal dimension. From this angle, neurologist Oliver Sacks states, “After excluding any other cause of discontinuity (intermittent lighting, eye movements, etc.), they conclude that the visual system processes information ‘in sequential episodes,’ at a speed of 3 to 20 of these episodes per second. Normally, these sequential images are perceived as a continuous perceptual flow.” (Sacks, 2004, 7) Thus, “under normal conditions, vision is continuous, without interruptions, and offers no indication of the processes it depends on. It needs to be decomposed, experimentally or in neurological disorders, to reveal its elements. It is especially the decomposed vision (oscillating, perseverating, or temporally tangled images under certain conditions of severe migraines or certain intoxications) that gives credibility to the idea that consciousness is composed of distinct moments.” (Sacks, 2004, 9)

The movement of the eyes, leading to bodily mobility in time and space, is the factor that guides a baby’s first body movements and has an impact on the quality of adult mobility. According to Chomsky, “The innate rules of vision are a genetically determined part of the child’s cognitive structure. Without them, the child could not reinvent vision, and the adult could not see. With the universal innate[126] rules of vision, we can construct worlds of great subtlety, beauty, and practical value.” (Hoffman, 1998, 15) Thus, the phrase “what we see” can be used in two ways. It can mean how the object appears to the person, or how the person visually experiences the object. Thus, one can visually experience chairs, books, cars, etc.

On one hand, the eye stimulates the movement of the body, and on the other, it can limit it. When someone has to work for long periods within the central field, this does not require any movement of the spine, forcing the body to remain static and contracted, as in the case of working for hours in front of a computer terminal, potentially leading to physical immobility and joint stiffness. This is one of the issues addressed in this work.

The extent of the eye’s influence on the homeostatic behavior of the organism expands with each research: “If beauty is in the eye of the beholder, the regulation of the biological

[126] The rules are the key for a person to construct everything they experience through touch, even constructions that are illusions. It is interesting to observe that during embryological formation, an intimate interrelation between the eyes and body movement is defined. Initially, three layers form: endoderm, mesoderm, and ectoderm. These three layers close to form a tube that creates the paravertebral canal. This canal gives rise to the spinal muscles, which, together with the muscles of the jaw and eyes, compose the paravertebral structure.

clock is more democratic: it is in the eyes of even those who are blind. A recent study has shown that the organ of vision has another function besides seeing, and it operates even when the individual cannot see a hand in front of their nose. In recent years, the notion has crystallized that light detection by the eye, in addition to allowing vision, actually helps regulate the so-called circadian clock, the rhythm in which the organism works, in tune with day and night." (Nogueira, 2003)

References

Aires, MM. (1980). *Fisiologia Básica* (2nd ed.). Editora Guanabara Koogan.

Alexander, G. (1991). *Eutonia*. Editora Martins Fontes.

Alexander, G. (1991). *Eutonia – Um caminho para a percepção corporal*. Editora Martins Fontes.

Anzier, D. (1989). *O eu-pele*. Casa do Psicólogo.

Argyle, M. (1988). *Bodily communication* (2nd ed.). International Universities Press.

Arnheim, R. (1971). *Arte y percepción visual*. Editorial Universitária de Buenos Aires.

Arnheim, R. (2000). Editorial. *Leonardo - Journal of the International Society for the Arts, Sciences and Technology, 33*(3), 168.

Bachelard, G. (1994). *The poetics of space*. Beacon Press.

Badler, N. (1982). *Human body models and animation*. *IEEE Computer Graphics & Applications*. University of Pennsylvania.

Bambozzi, L. (2002). *Media art, interfaces e interatividade*. Catálogo da exposição *Intimidades*, Paço das Artes da Universidade de São Paulo.

Bateson, G. (1979). *Mind and nature – A necessary unit*. Fontana Paperbacks.

Bayle, L. (1991). *Transcender la technologie*. *Art Press Spécial, Art Press*(12).

Beraldi, F. (2000, março). *Entrevista*. Revista *e, SESC SP*(8), 7.

Bicudo, F. (2002, julho). *Sob o jugo de Cronos*. *Revista FAPESP*(77).

Bracht, V. (1997). *Sociologia crítica do esporte: Uma introdução*. UFES Centro de Educação Física e Desportos.

Germain, B. C. (1992). *Anatomia para o movimento*. Editora Manole.

Cardinali, D. P. (1997). *Manual de neurofisiologia* (7th ed.)Universidad de Buenos Aires.

Calvert, T. W., & Chapman, J. (1982, novembro). *Aspects of the kinematic simulation of human movement*. *IEEE Computer Graphics & Applications*. Simon Fraser University.

Canton, K. (1994). *E o príncipe dançou... O conto de fadas, da tradição oral à dança contemporânea*. Editora Ática S. A.

Chalmers, D. J. (1993). *Ontology, the hard problem of experience, free will and agency*. In *Toward a Science of Consciousness II*. The MIT Press.

Churchland, P. S. (1993). *Brainshy: Nonneural theories of conscious experience*. In *Toward a Science of Consciousness II*. The MIT Press.

Cobra, N. (2001, abril 5). *Entrevista*. *Folha de São Paulo, caderno Equilíbrio*, 8.

Cobra, N. (2002, outubro). *Separação corpo mente*. *Revista Viva*, 12.

Cordeiro, A. (1998). *Nota-Anna: Uma notação eletrônica dos movimentos humanos baseada no método Laban*. Editora Annablume/FAPESP.

Cordeiro, W. (1971). *Arteônica*. Editora Universidade de São Paulo.

Crandall, B. C. (Ed.). (1996). *Nanotechnology – Molecular speculations on global abundance*. MIT Press.

D.P.M. (1994, janeiro). *An endearing animation*. *Computer Graphics World*, A PennWell Publication, 46.

Da redação. (1998, dezembro). *Dilema do tempo livre*. *Revista e, SESC São Paulo*(5), 12.

Da redação. (2000, março). *Beleza fabricada*. *Revista e, SESC São Paulo*(8), 6.

Damasio, A. (1995). *Descartes' error: Emotion, reason, and the human brain*. An Avon Book.

Damasio, A. (1999). *The feeling of what happens: Body and emotion in the making of consciousness*. A Harvest Book Harcourt, Inc.

Darwin, C. (1965). *The expression of the emotions in man and animals*. The University of Chicago Press.

Davis, F. (1989). *A comunicação não verbal*. Summus Editorial.

Dennett, D. C. (1993). *The myth of double transduction*. In *Towards a Science of Consciousness*. The MIT Press.

Digelman, D. (1989). *La eutonia de Gerda Alexander*. Edit. Paidós.

Dooley, M. (1982, novembro). *Anthropometric modeling programs – A survey*. *IEEE Computer Graphics & Applications*. Rockwell International.

Eco, U. (1991). *Obra aberta* (8ª ed.). Editora Perspectiva.

Feldenkrais, M. (1997). *Consciência pelo movimento*. Editorial Summus.

Feldenkrais, M. (1979). *Body and mature behavior*. International University Press Inc.

Feldenkrais, M. (1979). *Caso Nora – Consciência corporal como fator terapêutico*. Summus Editorial.

Feldenkrais, M. (1984). *Vida e movimento*. Summus Editorial.

Fortuna, F. (1997, novembro 23). *Indivíduo sensacional*. *Caderno Mais!, Folha São Paulo*.

Fetter, W. A. (1982, novembro). *A progression of human figures simulated by computer graphics*. *IEEE Computer Graphics & Applications*. Southern Illinois Research Institute.
Fraisse, P., & Piaget, J. (1973). *La percepción*. Editorial Paidós.

Freire, P. (1999). *Pedagogia da autonomia – Saberes necessários à prática educativa* (11ª ed.). Editora Paz e Terra.

Gainza, V. H. de. (1997). *Conversas com Gerda Alexander – Vida e pensamento da criadora da Eutonia*. Editora Summus.

Gayeshi, D. M. (Ed.). (1993). *Multimedia for learning – Development/application/evaluation*. Educational Technology Publications.

Geringer, O. V. (2001). *Quand le corps sera conte...* Cahiers Bleue, Librarie Bleue.

Glass, et al. (1979). *Cognition*. Readings Mass: Addison-Wesley.

Gould, S. J. (2003, setembro). *Entrevista*. *Revista Veja*.

Guimarães, M. T. B. (1990). *Novos caminhos no processo educacional para alunos de graduação em psicologia: O método Feldenkrais* (Dissertação de mestrado). Pontifícia Universidade Católica, São Paulo.

Hall, E. T. (1969). *The silent language* (4th ed.). A Fawcett Premier Book. (Original work published 1959).

Hanrahan, S. (2000). *An exploration of how objectivity is practiced in art*. *Leonardo, 33*(4), 267–274. MIT Press.

Hardcastle, V. G. (2001). *Hard things made hard*. *Journal of Consciousness Studies, 7*(4).

Herkenhoff, P. (2002, dezembro). *La mono y el guante*. Catálogo da exposição *Heterotopías*, Museo Nacional de Arte Reina Sofia.

Humphrey, N. (2000). *In reply*. *Journal of Consciousness Studies, 7*(4), 98–112.

Hutchinson, A. (1967, janeiro). *A reply*. *Dance Magazine*.

Huws, U. (2000). *Nature, technology and art: The emergence of a new relationship? Leonardo, 33*(1), 33–40.

Jacob, M. D., Francone, C. A., & Lossow, W. (1990). *Anatomia e fisiologia humana* (5ª ed.). Editora Guanabara.

Jacobson, L. (Ed.). (1972). *Cyberarts – Exploring art & technology*. Miller Freeman Inc.

Johnson, G. (1989). *The machinery of mind*. Microsoft Press.

Kehl, M. R. (2002, junho 30). *Com que corpo eu vou? Caderno Mais!, Folha de São Paulo*.

Kepes, G. (1966). *Module proportion symmetry rhythm*. George Braziller.

Kosko, B. (1993). *Fuzzy thinking – The new science of fuzzy logic*. Hyperion.

Kyuma, K., Lange, E., Ohta, J., Hermanns, A., Banish, B., & Oita, M. (1994, novembro). *Artificial retinas – Fast, versatile image processors*. *Nature, 372*.

Laban, R., & Lawrence, F. C. (1974). *Effort – Economy of human movement*. MacDonald & Evans Ltd.

Laban, R. (1960). *The mastery of movement*. MacDonald & Evans Ltd.

Laban, R. (1966). *Choreutics*. MacDonald & Evans Ltd.

Laban, R. (1984). *A vision of dynamic space*. The Farmer Press.

Langer, S. (1943). *Philosophy in a new key*. Pelican Books.

Lee-Manoel, C. L. (2002, maio). *O corpo em movimento gerando autoconhecimento*. In *Corpo prazer e movimento*. SESC São Paulo.

Lenk, M. (2000, março). *Entrevista*. *Revista e*, SESC SP, 9, 7.

Lévy, P. (1998, agosto 16). *Revolução virtual*. *Caderno Mais!, Folha de São Paulo*.

Lévy, P. (1994). *As tecnologias da inteligência – O futuro do pensamento na era da informática* (1ª ed.). Editora 34.

Lichty, P. (2000). *The cybernetics of performance and new media art*. *Leonardo, 33*(5), 351–354. The MIT Press.

Littlejohn, S. (1980). *Fundamentos teóricos da comunicação humana*. Zahar Editores.

Lowen, A. (1995). *Medo da vida – Caminhos da realização pessoal pela vitória sobre o medo*. Summus Editorial.

Machado, A. (1993). *Máquina e imaginário – O desafio das poéticas tecnológicas*. EDUSP.

Machado, E. (2003). *Novos horizontes*. *Revista e*, SESC São Paulo, 10(11).

Mahowald, M., & Mead, C. (1991, maio). *The silicon retina*. *Scientific American*.

Matos, J.-M. (1991). *Mouvements virtuels*. *Les N.T. et les Corps, Art Press*, 12, 131–134.

Mello, C. (2002). *Na rede*. www.cubobranco.com.br.

Menna-Barreto, L. (2004, set-out). *Homeostasia – Uma revisão necessária? Neurociências – Revista multidisciplinar das ciências do cérebro, 1*(2).

Menosky, J. (1982). *Registrando para o futuro*. *Revista Diálogo*, transcrito da *Revista Science 82*, 61.

Merikle, P., & Daneman, M. (1999). *Conscious x unconscious perception*. In *The New Cognitive Neurosciences* (2ª ed.). A Bradford Book/MIT Press.

Merleau-Ponty, M. (1957). *Fenomenologia de la percepción*. Fondo de Cultura Económica.

Minsky, M. (1991). *La fusion prochaine de l'art, de la science et de la psychologie*. *Les N. T. dans les N. T., Art Press*, 12.

Minsky, M. (1991). *Society of mind*. Simon & Schuster.

Monteiro, M. (1998). *Noverre - Cartas sobre a dança*. EDUSP/FAPESP.

Morin, D. (1999, outubro). *Entrevista*. *Revista e*, SESC São Paulo, 6(40).

Muncini, M. A. (2002, junho 2). *O niilismo como resistência*. *Caderno Mais!, Folha de São Paulo*.

Musso, P. (1991). *L'art de l'ordinanthrope*. *Les N.T. et les Territoires de la Culture, Art Press*, 12.

Nogueira, S. (2003, julho 1). *O olho tem dupla função*. *Folha de São Paulo*.

Nogueira, S. (2003, maio 29). *Jogar videogame amplia a habilidade visual*. *Folha de São Paulo*.

Norris, C. M. (1998). *Treinamento abdominal*. Editora Manole Ltda.

Noll, M. (1967). *Choreography and computers*. *Dance Magazine*.

Ollila, J. (2003). *Os filhos devem ajudar na conta*. *Revista Veja – Natal Digital*, 43.

Pikler, E. (1985). *Moverse en libertad – Desarrollo de la motricidad global*. Narcea S.A. de Ediciones.

Pluchet, R. (2003). *Une nouvelle médecine*. *Alternative Santé – L'Impatient*, 298.

Popper, F. (1993). *L'art à l'âge électronique*. Ed. Hazan.

Popper, F. (1985). *Art, action et participation: L'artiste et la créativité aujourd'hui* (2ª ed.). Editions Klincksieck.

Possani, C. (2003). *Novas diretrizes*. *Revista e*, SESC São Paulo, 41.

Prado, G. (1994). *As redes artístico-telemáticas*. *Revista Imagens*, Editora da UNICAMP, 3.

Preston-Dunlop, V. (1998). *Looking at dances – A choreological perspective on choreography*. Verve Publishing.

Queiroz, M. J. A. (2001). *A eutonia no desbloqueio articular* (Monografia para o Curso de Formação Profissional em Eutonia).

Ressler, S. P. (1978). *Bojangles II – A system for the description and analysis of body movement* (Thesis, Rutgers College, New Brunswick).

Rifkin, J. (1998). *Entropy: A new world view*. Phantam.

Robatto, L. (1994). *Dança em processo – A linguagem do indizível*. Centro Editorial e Didático, Universidade Federal da Bahia.

Robertson, B. (1993). *Easy motion*. *Computer Graphics World*.

Rosen, L. (2000). *Entrevista*. *Revista Veja*, 11.

Russo, M. (2001). *A teoria da eutonia* (Monografia para o Curso de Formação Profissional em Eutonia).

Sacks, O. (2004). *A torrente da consciência*. *Caderno Mais*, Folha de São Paulo.

Scavazza, B. (2003). *Novos horizontes*. *Revista e*, SESC São Paulo.

Schlemer, O. (1971). *Man*. A Bauhaus Book, Lund Humphries.

Schilder, P. (1989). *Imagen y apariencia del cuerpo humano*. Paidós.

Searle, J. (1999). *O mistério da consciência* (1ª ed., p. 28). Editora Paz e Terra.

Searle, J. (1999). *Response: The mind-body problem*. In *John Searle and His Critics* (p. 143). Blackwell.

Shapiro, F. (2001). *Eye movement desensitization and reprocessing*. The Guilford Press.

Soares, C. L. (2002, maio). *Cultura de movimento*. In *Corpo Prazer e Movimento*. SESC São Paulo.

Souza, R. R. (1998). *Anatomia essencial*. Editora Pleiade.

Stanislavsky, C. (1991). *A preparação do ator* (10ª ed.). Editora Civilização Brasileira.

Steil, A. (2003). *Novos horizontes*. *Revista e*, SESC São Paulo, ano 10, n. 11.

Swerdlow, J. L. (2002, novembro). *Unmasking S*. *National Geographic Magazine*, 39.

Tahan, M. (2002). *O homem que calculava*. Editora Record.

Tapscott, D. (1998). *Growing up digital – The rise of the net generation*. McGraw-Hill.

Todd, M. E. (1975). *The thinking body*. Dance Horizons.

Toben, B., & Wolf, F. A. (1982). *Espaço, tempo e além*. Editora Cultrix.

Varela, F. (1993). *A science of consciousness as if experience mattered*. In *Toward a Science of Consciousness II*. The MIT Press.

Varela, F. J., & Shear, J. (1999). *The view from within – First approaches to the study of consciousness*. Imprint Academic.

Wallon, H. (1995). *As origens do caráter na criança*. Editora Nova Alexandria.

Wapner, S., Werner, H., & outros. (1969). *El percepto del cuerpo* (1ª ed.). Editorial Paidós.

Watzlawick, P., Beavin, J., & Jackson, D. D. (1993). *Pragmática da comunicação humana* (9ª ed.). Editora Cultrix.

Weissberg, J.-L. (1991). *Telepresence, naissance d'un nouveau milieu d'expérience*. *Les N.T. dans les N. T., Art Press*, 12, 169–172.

Weitz, S. (1994). *Non-verbal communication – Readings with commentary*. Oxford University Press.

Wilmert, K. D. (1992, novembro). *Visualizing human body motion simulation*. *IEEE Computer Graphics & Applications*, Clarkson College of Technology.