RESEARCH ARTICLE

An informational sociobiological explanation of the constitution of the human body [version 1; peer review: 1 approved with reservations]

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Abstract

Background: Pedro Ortiz (1933-2011), in the latest four decades of his life, developed the Informational Sociobiological Theory (IST) in a university teaching context that became the foundation of post-grade studies in neuroscience in Peru. The IST looks for a totality explanation of the phenomena of the universe proposes an explanation of the constitution of the human body. In what consist this explanation of the configuration of the human body?

Methods: A bibliographical qualitative study was conducted starting from primary documental sources. It was considered among the sources, all related to the editorial project Books of Social Psychobiologic (elaborated by Ortiz during the first decade of this age). The results have been presented across a conceptual analysis, narrative and graphic, oriented to expose Ortiz' ideas in relation to the human body's morphology.

Results: The structural architecture of the human body, and in particular in one person; shows five levels of complexity which begins in cells, the intercellular matrix, the neural system, the paleocortical psyche, and neocortical psyche. In this involve explanation, the organs of the body are essentially tissue systems, and are integrated (subsumed) at the neural level (which informationally goes through the plexuses, ganglia, and subcortical nuclei). The two levels of superior complexity to the neural system, are the space of the psychic activity, unconscious and conscious, which is suprastructurally to all bodily structures. Ortiz is settled on a different monism: that guides us to imagine and think that all psychic activity is suprastructural to the body.

Conclusions: There is an original explanation of the human body within the IST. This informational morphology dialogues with the

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knowledge of biology, neurology, anatomy, physiology, embryology, and histology, and is proposed as a structuring element in all the conceptual architecture that represents the IST.

Keywords

Information; Theory; Peru; Neocortex; Paleocortex; neuroscience.

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Introduction

When Pedro Ortiz Cabanillas (1933-2011), in the early 1960s at the Universidad Nacional Mayor de San Marcos (UNMSM), began to plant the seeds that five decades later he called “Informational Sociobiology Theory” (IST), he did it from the position of a physician, specialized in the human nervous system, interested in having a total explanation of the universe.^{1,2} This huge pretension parents the IST with a sort of “philosophy of nature”, or a “scientific macro-theory”. Then, the formulations of the IST constitute a kind of philosophical and programmatic matrix from which different scientific explanations can germinate. In this work, we are going to focus on the IST’s explanations about the constitution of the human body, and consider this question: How does IST explain the constitution of the human body?

Following a biographical route, we know that by late 1993 and early 1994, Ortiz conceived an informational systematic approach. From the development of his own definition of “information”, Ortiz elaborated an epistemic framework that coherently explained the entire extension of nature: the universe (the cosmos), on one side, the planet Earth, and in it, on the other side, living beings (informational systems). Living beings are material systems organized by information.³ On this road, Ortiz proposed a new qualitative definition of “information” which served as basis for the IST since 1994.⁴

In IST, the information is an attribute of the matter (not a part of the human communication); and information is a material structure that organizes all the living beings.^{5,6} In the middle of 1990s, this definition of information crowned almost four decades of clinical experience, academic exploration and teaching. Additionally, a systematic research program (called IST) was opened, which Ortiz conducted between 1994 and 2011. For an organic and critical oncoming of the IST’s approaches, Ortiz implemented at the beginning of this century the neuroscience postgraduate program in Peru (whether at a diplomate, master and doctorate level) at the UNMSM, which, after almost two decades, is currently the only postgraduate program in neuroscience that is valid in Peru.⁷

As a part of this research program, Ortiz published the following books: “The system of personality” (1994), where he exposes a basic and schematical totality of the IST; “Introduction to Clinical Medicine 1” (1996); in this book, he exposes the synthesis and the method to realize a general medical exam; “The development of the personality” (1997), where he sketches out the first links between the IST and education; “The conscious level of the memory” (1998), where Ortiz explains a hypothesis regarding the role of the memory as an attribute of the life; “Introduction to Clinical Medicine 3” (1999), explanations and sustentations to realize an integral neurological exam; “Language and Self-expression” (2002); developing the sociobiological explanation of the language and the vision of the brain as a semiotic system; “Book 1 of Socio Psychobiological” (2004), also called “Introduction to a Human Psychobiology”; “Book 6 of Socio Psychobiological” (2004), called “the Conscious level of the Self-activity”; “Introduction to Clinical Medicine 2” (2006), where Ortiz exposes the sustentations and the method to realize an integral psychological exam; “Social Ethics” (2007), exposition of the proximity of the IST to explain the freedom, justice and solidarity; “Education and development of personality” (2008), where he elaborates on an education-focused proposal”; second edition of “Introduction to Clinical Medicine 2” (2009); second edition of “Book 1 of Socio Psychobiological” (2010); and, finally, a collection of papers written between 1984 and 2011 called “The Informational Explanation” (2011).^{3,8–21}

Ortiz wrote three books about clinical methods titled: “Introduction to Clinical Medicine”, volumes 1, 3, and 2 (following the order of publication): “The Essential Clinical Examination”; “The Integral Neurological Examination”; “The Integral Psychological Examination”. The first one gives guidelines on conducting the clinical medical exam (Ortiz 1996), the second one applies to the realization of the psychological exam (Ortiz 2006, 2009), and the third one focuses on the integral neurological exam (Ortiz 1999).^{8,10,14,17}

This shows that the exploration of the human body has always been one of Ortiz’s main interests. In all these documents, the traditional procedures for exploring the human body are fully redefined, especially in the exploration of neuropsychological aspects.

The effort that Ortiz made to enter into the territory of psychology and neurology is astonishing, creating his own definitions for concepts that are used traditionally such as: consciousness, attention, anxiety, personality, intelligence, temperament, cognitive, affective, volitional, motivation, conduct, unconsciousness, etc.

For example, he does not refer to the “mind” in any moment (the word “mind”, in plain, does not exist in a sociobiological informational dictionary). Ortiz explored the limits of an explanation of the human body’s constitution in the editorial project “Books of Social Psychology” (BSP). Ortiz started the BSP in the late 1990s as a part of a collection of materials for teaching purposes, but developed them through the first decade of the 21st century. In the BSP, Ortiz proposed applying the IST to understand the complex configuration of the human body. This is what Ortiz called “informational sociobiology”.²² The BSP were written for working critically in the classes that Ortiz gave (for example, in the postgraduate neurosciences program at the UNMSM the courses have the same titles as the BSP).

They are not a summary manual like a monograph or narrative review of prior knowledge; the originality of the BSP is that they represent the *work in progress* where Ortiz developed his own conception in terms of cellular biology, histology, embryology, anatomy, physiology, neurology, psychology, and sociology (but in an original, particular, and different form: the IST). Initially there were three BSP, but after more than ten years of work, and at the end of the first decade of the 21st century, Ortiz structured them into seven books. In his lifetime, Ortiz published just Book 1 and Book 6 (both in 2004, and a second edition of the first one in 2010).^{12,13} After his death, Books 2, 3, 4, 5 and 7 remained unfinished and unpublished. Working versions of all the BSP were published, posthumously, in 2017.^{23–25} We aimed to review the totality of these seven BSP and to explore how, sociobiological informationally, the constitution of the human body is explained.

Methods

Study design

This is a qualitative and hermeneutic study, with a focus on the informational sociobiological theory, that takes as an epistemic mark all the concepts exposed in the BSP and explicitly highlights those explanations relating to the constitution of the human body.

Reflexivity

In Peru, since 1961, Pedro Ortiz Cabanillas developed an academic trajectory, a life dedicated, entirely and integrally, to the teaching, research and systematic development of his IST, a denomination that was assumed by himself in the end of his life. Pedro Ortiz died in 2011.

After his death, all of his academic documents (published books and papers, and documents not published) and the hard disc of his personal computer were included as part of the “Pedro Ortiz-Archive” (PO-A). This archive includes physical documents (handwritten, typewritten, or computer printed), produced between 1940 and 2011, and digital documents (presentations and text documents), most of them produced after 2000. The PO-A also includes a series of scattered papers, notes, carts, work notes, study files, drafts, and other academic materials. In 2012, one of the authors (HCP) founded the “Centro de Documentación e Investigación Pedro Ortiz Cabanillas” (CDI-POC). The PO-A is under the care and administration of CDI-POC in Lima, Peru. After almost a decade of work there are some tangible results such as:

- i. The posthumous publication of more than 10 unedited books: “The scientific explanation of the human” (Ortiz, 2013); the second edition of “The system of the personality” with series of documentary annexes (Ortiz, 2016), the seven constituent books of the BSP (Ortiz, 2017, Socio Psychobiological 3 tomes); “Language and Self-expression” (second edition, 2019) and “The conscious level of the memory” (second edition, 2019), “The current problems of education and neuroscience” (Ortiz, 2019), and “Clinical Neuroscience” (Ortiz, 2019).^{22–30}
- ii. The compilation of his short-dispersed oeuvre written between 1984 and 2011 called “Informational explanation” (10 articles in 2011; 49 in the second edition in 2019)^{19,31}; iii. the publication of one biography³²; and iv. the digital opening of the PO-A, together with the support of the UNMSM, through a [website](#) planned to be completed in 2025, the digitization of the entire academic works of Pedro Ortiz Cabanillas.

Documentation and Research Center Pedro Ortiz Cabanillas

Shortly after its opening, the CDI-POC started developing a research program explicitly oriented around the IST. This academic production has explored, in abundance, the cinema phenomena from an informational interpretation.^{33–36} Additionally, there has been realized a series of argumentative revisions in favor of: i. acknowledging the value of Ortiz’s academic oeuvre⁴; ii. revealing the presence of Ortiz in the framework of the history of Peruvian neurology⁷; iii. establishing the dialogue between the IST and the “unsolved problems of neuroscience”³⁷; iv. updating the IST in light of studies in computational neuroscience and neuroimaging³⁸; v. applying the model of the nervous system of the IST to explain the behavior of a character in a contemporary literary work³⁹; and vi. what we want in this research, describing the informational sociobiological explanation of the constitution of the human body.

Recently, the CDI-POC has established, in union with Research Group in Applied Neurosciences “Neuron” (of the Medicine faculty of UNMSM), a space of digital teaching, called “Informational Sociobiological Studies Seminary”. The purpose of this Seminary is to promote the systematic reading of Ortiz’s oeuvres, preparing all those interested in deepening the line of thought that Ortiz devised and designed. The inaugural edition of the Seminary took five months (January to May 2021) and included an entire reading of Book 1 of Social Psychology “Introduction to a Psychobiology of Man”, published by Ortiz in 2010 (on the cusp of his intellectual development), and the entire material of the sessions is duly digitized on [YouTube](#).

In relation to the reading approach (the theory approach), which this research follows according to the Ortiz oeuvres, it is important to note that there are two approaches developed to explain this phenomenon. The first was developed in 1995, as a commentary to “The system of personality” (1994), the first book of Ortiz.³ In this document, Maria Luisa Rivara de Tuesta affirms that, while Ortiz develops his theory, he is constantly playing the role of an “existential phenomenologist philosopher”; in particular, this commentary links Ortiz’s explanation of the human body and the approximation to the same phenomenon (the nature of the body) by the notion expounded by the French philosopher Maurice Merleau-Ponty.

The second approach was proposed by Diego Llontop (considering the Ortiz oeuvres: “The system of personality”, 1994; “Development of personality”, 1997; “The conscious level of the memory” 1998; “Language and self-expression”, 2002; and the Book 1 of Social Psychology “Introduction to a Psychobiology of a Man”, 2004), under a tripartite approach: Hegel (thesis), Mark (antithesis) and Ortiz (synthesis), where Llontop highlighted the material and universal conditions that are expressed in the IST.^{3,5,9,11,12}

Thus, Ortiz is characterized by these two conceptual approaches: as a phenomenologist on one side and as a dialectic materialist on the other side. In both, it is evident that Ortiz formulates the human body explanation’s (in the middles of different concepts) without any theory nor idea about dualism (for example: mind-brain, soul-body, psychology-neurology, sociology-psychology, etc.).

The difference between these two approaches and this research is that we propose a new interpretation. Our approach is founded on a theoretical position that is not looking to put Ortiz in the traditional role of a philosopher, but that tries to use a more philosophical approach to interpret his works (based on the documentation and research of his academic oeuvres). We call this method “informational sociobiological hermeneutics”. This proposal is supported thanks to editorial, research and teaching works that have been taken place over the course of a decade.

Information processing techniques

For the conceptual framework, we have considered the seven published “Books of Social Psychobiology”. There are the following versions of the Books (with the year that Ortiz last worked on the book): Book 1 (2004, 2010), Book 2 (2009), Book 3 (2009), Book 4 (2010), Book 5 (2009), Book 6 (2010) and Book 7 (2006).^{12,13,23–25} In addition, the authors consulted all the PO-A’s digital documents of the editorial project “Books of Social Psychobiology” (the Books). All the materials related to the editorial project have been checked, in order to verify that there does not exist other Book versions that haven’t been considered previously. Once the Books have been selected, we conducted a slow and careful reading of them in order to delimit the concepts of the theory in general and then establish the integration of them into one interpretive matrix (or total conceptual model). This integration of the theories that Ortiz proposes in the BSP have been carried out following the general interpretative scheme of the IST that Ortiz summarized, in his academic testament, by the form of “five fundamental laws”:²²

1. The universe is ordered in a matter of reflection processes, both entropic or decomposition (whereby it tends to a lesser order) as negentropic or composition (whereby it tends to higher order).
2. The living beings constitute a material system not just organized, but organized based on various kinds of information.
3. The society is the only living supra-individual system that has been organized based on an extra-individual information class that is social by nature.
4. The men are the only living beings that must incorporate this kind of information that organizes the society where they are born and develop, to form their conscious.
5. The conscious activity determines the transformation of the human individuals to social individuals, i.e., in personalities.

Information analysis

The total concept model that is displayed in [Figure 1](#), presents concepts mentioned more frequently in the BSP as bigger than those mentioned less frequently. The blue lines that attach concepts serve to establish the narrative mechanisms that are used within the informational sociobiological explanation. Once the model is established (the informational sociobiological interpretive matrix), we chose only the concepts that make reference to the constitution of the human body, such as at the cellular level, the organs, the systems, the human nervous system, the morphophysiology of the

Figure 1. Total concept map and selected notions.

human body, in general, and in particular, the morphophysiology of the brain. The concepts not chosen (because they don't explicitly work in the human body's constitution) were: the organization of matter, the nature of universe, the philosophical aspects of information, the history of neurosciences, the explanation of living beings (from bacteria to psychism), the evolution of hominids, the birth of humanity, the history of society (from its archaic, ancient and modern periods), the aspects of personal development, the conscious psychic information, the memory, the speech and the language, and some specific psychological aspects. In this way, in this revision are included concepts that have a relationship with the description of the structural activity (constitution) of a person (in line with the scope that the

histological, anatomical and physiological examination could offer). In the total concept model shown in [Figure 1](#), we have highlighted in red the concepts that are included in this present research.

The narrative revision is presented like an informational sociobiological explanation, based on the concepts of the IST. In addition, there are some schematic figures (graphics) that make visually explicit the dynamic flow of the interaction of the concepts in the delimited epistemic framework. Both the narrative revision and the schematic graphics have been realized with the vision to clarify, with a pedagogic affair, keeping in mind an uninitiated reader in the statements of the IST.

Results

The original names of the Books have denoted, since the beginning, a programmatic claim. Thereby, the titles: “Introduction to a Human’s Social Psychobiology” (Book 1), “The Cell Level of the Personal Activity” (Book 2), “The Tissue Level of the Personal Activity” (Book 3), “The Neural Level of the Personal Activity” (Book 4), “The Unconscious Psychic Level of the Personal Activity” (Book 5), “The Conscious Psychic Level of the Personal Activity” (Book 6), and “Develop of the Personal Psychic Activity” (Book 7).^{23–25} In the PO-A, it is found that there are three files in which Ortiz managed his documents related with the Books. These three files, or dispositions, are organized differently, as seen in [Figure 2](#). Disposition 1 and Disposition 2 contain texts documents (and different versions of the Books). Disposition 3 contains images, photographs and conceptual schemes that Ortiz drew up by himself; in the files of Disposition 3, there are no text documents, all the content is essentially images. Beyond the differences between these three dispositions presented, one fact is true: it is possible that, according to Ortiz, there were twelve Books in total. In that case, in addition to the seven Books mentioned above, there would have been: Book 8: “PBS Talk”; Book 9: “PBS Memory”; Book 10: “PBS Clinical Neuroscience”; Book 11: “PBS Education”; and, Book 12: “PBS Ethic” (the names in quotation marks are the names that Ortiz himself gave them, and “PBS” was the acronym that Ortiz used to designate “Social Psychobiology”).

To start, Ortiz defined the society in systematic and informational terms, not like the integration of people but like a supra-individual structure (and material) that involves the people since before their birth. This societal system that involves people is established by all the people that have been creating and accumulating along its history. In this sense, the historical development of society started 70,000 years ago, the moment that the hominization (the course since the hominid to human) progressed to socialization (the passing of the human to person, it means: social being).

In line with all the Books, it is argued that there exists just one society and that the only living beings that are “social” are those that have grown and developed in “society” (or alternatively, because the only one who has a society is one which involves him). From this interpretative paradigm, one is not social because one lives in a group, but because one lives in society. The living beings (the bees, the ants, the elephants, and others) constitute “multi-individual” groupings; they are not social, because social is being in society, and society is “supra-individual”. This society and the persons that are involved constitute a single amalgam that is, at the end, a new form of life (the latest and most complete form of developed

Books (organization 1)	Books (organization 2)	Books (organization 3)
1. Introduccion	1. Introduccion	1.PBS Introduccion
2. Nivel celular	2. Nivel celular	2.PBS Celular
3. Nivel metabolico	3. Nivel metabolico	3.PBS Tisular
4. Nivel funcional	4. Nivel funcional	4.PBS-Funcional
5. Nivel inconsciente	5. Nivel inconsciente	5.PBS Inconsciente
6. Nivel consciente	6. Nivel consciente	6.PBS Conciencia
7. Desarrollo personal	7. Nivel preconscious	7.PBS Desarrollo
Memoria	8. Desarrollo personal	8.PBS Habla
Personalidad		9.PBS Memoria
Psicolinguistica		10. PBS Nc clinica
		11.PBS Educacion
		12.PBS Etica

Figure 2. The Books: three organizations (titles in Spanish).

life on earth, as a part, or region, of the universe). With this understanding, from the beginning, it's clear the intention of the Books is to position an explanation that integrates universe, earth, life, society and people. This can be seen in Figure 3, where the configuration of the human body results in a system of five levels of complexity; not linear but enveloping, where each system that emerges subsumes the preceding levels (the tissue organizational level subsumes the cellular organizational level; the neural organizational level subsumes the tissue organizational level; the unconscious psychic level subsumes the neural organizational level; and finally, the conscious psychic level subsumes the unconscious level). In this way, the human body is energized by determinations that go from the simple to the complex (which in the Books is called epigenetic determination) and from the complex to the simple (which in the Books is called kinetic determination).

Speaking and moving, for example, are the result of kinetic manifestations, while smelling and looking put in motion a series of epigenetic processes. Every person, as complex architecture, is enveloped by society (which is a part of the material universe) and that is the base of the highest level of complexity. This means that the level of the conscious psychic organization (neocortical, or simply: consciousness) is not *conditio sine qua non* but *conditio per quam* of the existence of the society (that, informationally, is the most complex living system ever established on earth).

For the Books, each level of organization of life (cellular, tissue, neural, unconscious psychic and conscious psychic) corresponds to a type of information. For the level of cellular organization is the genetic information (also known as DNA); for the tissue level, the metabolic information (the extracellular matrix); for the neural level, the neural information

Figure 3. Informational morphology of the human body.

(the subcortical nerve networks, that are: the reticular networks, -the plexuses-, ganglion networks -the autonomic nervous system-, and nuclear networks -the medulla and the subcortical brain-); for the unconscious psychic level, the information is the paleocortex (that, specifically, is defined as the paralimbic cortex and the heterotypic cerebral cortex); and for the conscious psychic level, the information is the neocortex (that, specifically, is defined as the association cerebral cortex: anterior temporal, orbitofrontal, parietotemporal-occipital, medial prefrontal and dorsolateral prefrontal). Note that an essential feature in the proposal of the Books is that at no moment does it make reference to the information as a message or content that is processed in the brain, but rather that the information is the brain (as long as material structure). On the other hand, the paleocortex and neocortex definitions are specific and original to the Book's proposal. As seen in Figure 4, the organic systems of the human body can be divided into two systems, the visceral systems and the somatic systems. Within the visceral systems are the endocrine, digestive, respiratory, cardiovascular, urinary and reproductive systems; while within the somatic systems are the immune, muscular skeletal, osteoarticular, fascial and dermal systems. These organic systems, at most, manage to reach two levels of complexity (cellular and tissue) and are shrouded, subsumed, for the neural organization level (in its visceral and somatic divisions, respectively). The visceral neural system includes the ganglion of the autonomic nervous system, and to a series of subcortical nuclei grouped in the spinal cord and subcortical brain, especially located in the medial regions (for example: medial nuclei of the thalamus, nuclei of the hypothalamus, and tonsil nuclei, among others), while the somatic neural system includes essentially nuclei

Figure 4. Relationship between the universe, society and the constitution of the human body.

in the spinal cord and subcortical brain, specially located in the lateral regions (for example: lateral nuclei of the thalamus and nuclei of the base, among others). The nuclei of the visceral neural system constitute the “visceral neural axis” (and, in effect, there would be two axes, left and right) while the nuclei of the somatic neural system constitute the “somatic neural axis” (also two axes, left and right).

As one knows from any text in neuroanatomy, the neural axes cross from one side to the other side of the body, integrating both hemi bodies into a single synthetic reality (this cross of the neural axes is not shown in Figure 4, but is important nonetheless). In the same way, when Ortiz says “conscious” (neocortical) and “unconscious” (paleocortical), these terms have been understood within the same informational explanation that is presented in the Books and not with the view of traditional definitions that have long been established in psychology, neurology or psychiatry. For Ortiz, the IST, and in

Figure 5. Two visions of the constitution of the human body (seen from inside and seen from outside).

the Books in particular, the conscious is not the capacity of the people to realize something, and the unconscious is not the Freudian unconscious, but rather it is all much simpler: the unconscious is the paleocortex, and conscious is the neocortex.

Finally, and as [Figure 5](#) exposes, the IST can explain the configuration of human body, and its morphology, as seen from these two perspectives. From the outside to the inside (lower section of [Figure 4](#)), it means: if one as an observer is located in the universe and in society and goes to the human body from the cellular, tissue, neural, unconscious and conscious levels (epigenetically, knowing that each level of complexity kinetically determines the preceding levels). In this perspective, as demonstrated in the lower section of [Figure 5](#), the maximum level of the human body complexity (neocortex) is found in the “innermost” circle of the human body. However, as the upper section of [Figure 5](#) demonstrates, if an observer is located at the interior of himself, from this perspective, the previous “innermost” is not entirely exact, so there is not an “inside place”. Instead, the maximum level of complexity of the human body (neocortex) does, in reality, involve all the preceding levels of complexity. In this sense, the conscious activity would be an emergent and enveloping activated structure to all concrete reality of the human body. In simple words: our thoughts, our feelings, all our memories (when we remember them) are not in the brain but in all the constitution of the human body. Like that, the morphology that the Books propose is not the sum of different parts of corporeality, but the integration of these different parts into an enveloping system of complexity, determined from the bottom up (epigenetically) and from top down (kinetically) at five levels of structured organization (genetic, tissue, neural, psychic and social information).

Discussion

In light of these results, it's clear that the academic effort of Pedro Ortiz Cabanillas in creating the IST includes an original explanation of the human body constitution. Depending on this explanation, the human body is constituted as a concatenation of envelope systems, that go from the cells (first level of complexity) to the neocortical brain (fifth level of complexity), and is organized from an epigenetic determination (from cells to neocortex) and from a kinetic determination (from neocortex to cells).

Traditionally, the constitution of the human body is explained as follows: the cells are grouped in tissues, tissues grouped in organs, and organs grouped in systems; and within the systems, there is the nervous system which involves, by definition, all the rest of organs and systems.^{40–43} In this way (which is not fully explained), all the systems of the body are integrated in just one individual; and therefore to this individual there are properties and characteristics that are not applicable to their parts. This supposes that the nervous system is behind the integration of all corporal systems that constitutes a single human individual, but it is unclear how this nervous system reaches such an amazing feat. In addition, the neocortex is generally described, in the traditional sciences, as referring to almost the entire human cerebral cortex.^{44,45} In contrast, the IST is positioned as an alternative explanation. In the IST, for example, the neocortex makes explicit reference to brain areas of association; similarly, the heterotopic cortex can be considered a neocortex for the traditional vision but not for the informational explanation developed by Ortiz (that instead defines it as paleocortex).

Ortiz's explanation allows us to consider what science poses as the human body, weighting all the scientific explanations with the purpose of avoiding scientific excesses or, worse, positions and hypotheses with no evidence. This can play an important role in the current morphology discussion about what is the better evidence to help understand the human body.^{46,47} Perhaps one of the most subtle aspects, potentially applicable to the informational explanation, is its consideration as a matrix that interprets or explains, in other forms, the actual scientific knowledge. For example, it recognizes that cadaver dissection plays an important role in the training of a doctor,^{48–51} hence in a complementary way we can note that the informational explanation of the human body reinforces the passage from comprehension of the corpse to the living human being (patient), above all the neuropsychological limits. This complementary nature of the informational morphology with the traditional morphology would redound to the students' understandings, especially in contexts of the search for effective pedagogies that integrate the ways of teaching⁵² and the contents, i.e., the conceptual architecture.

Regarding the suggestions that these Books could be twelve, and not seven, it remains pending the detail and clarification according to the purposes followed by those who enter into informational studies. Ten years after his death, Pedro Ortiz's ideas begin to germinate, expanding horizons and perspectives.

The limitations of this research can be grouped into:

- i. Methodological, by the nature of the qualitative approach (without precedents in the study of Ortiz's oeuvre), and informational sociobiological hermeneutical (an original method that is proposed, for the first time, in this work); so, this research does not have a pre-existing specific background that explores its topic of interest. Clearly, this is one of the aspects more urgent in the development of the informationals sociobiological studies:

to create a critical mass of knowledge, dialogist and opening, that allows discussions about the directions of developing of the IST.⁵³

- ii. At time of writing, Ortiz's oeuvre is only known by a small academic group; this is as limiting as it is an opportunity, as the evidence of the birth of a different conceptual paradigm requires additional research and testing, so this provides future researchers a direction but has little research thus far.
- iii. One of our main limitations was the selection of concepts and the organization of them to capture the place that our research topic inhabits in the IST. **Figure 1** shows a method to understand the IST and its total comprehension of the phenomena that has been helpful for the conceptual mapping of the structure of the human body.

Conclusions

We demonstrate that the IST, developed by Pedro Ortiz, is a feasible theory to use when talking about an original and alternative way to explain the organization and constitution of the human body; an “informational morphology” which creates dialogue between the knowledges of the biology, neurology, anatomy, physiology, embryology, histology, and others. This “own conception” of the configuration of the human body is entirely dependent of the knowledges of the IST, and his comprehension makes sense only within the IST. This means that the informational morphology cannot be explained except throughout the definitions and concepts of the IST. Ortiz dedicated more than the last decade of his life to writing the Books, and shows the radical structuring importance of the “informational explanation of the human body” within the framework of the architecture of thought that is the IST. In synthesis: there is an original explanation of the constitution of the human body, and the Informational Sociobiological Theory makes it intelligible (that is, seen with *logos* and not with *eyes*).

Data availability

Underlying data

The Books considered in the theoretical framework are duly published by the editorial funds of the Universidad de Ciencias y Humanidades and the Universidad Nacional Mayor de San Marcos in Peru. They are currently available only in their original language (Spanish), and can be found in the references. The global presentation of the IST to the non-Spanish reader is one of the pending commands that should be resolved in the present decade. All of Ortiz's remaining materials are part of the PO-A, and they are carefully overseen by the CDI-POC. To access all this documentary heritage for research purposes, you can submit a request through www.pedroortizcabanillas.com.

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This is an interesting paper focusing on a theory which aims to explain the dynamics of the human body at what looks like a philosophical, rather than strictly scientific, level. I propose that the Authors should make this point clear in the manuscript. Indeed, it looks like they refer to a conception of the human brain which is quite "old-fashioned". They should state this within the limitations. Moreover, the manuscript should undergo proofreading by an English native speaker, since there are some phrasings that can be significantly improved.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

No source data required

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Clinical Neuropsychology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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