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Social Representations of the human body by Biomedicine students at a Brazilian University[1]

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ABSTRACT

Social Representations are a way in which individuals and groups make sense of and give meaning to their surroundings, explain reality, and justify behaviors. The aim of this study was to understand the social representations of the human body among undergraduate Biomedical students at a university in the state of Rio de Janeiro, Brazil. This qualitative study was based on Social Representations Theory and was conducted using a free word association test with 66 students enrolled in a higher education institution. Data analysis was carried out using co-occurrence analysis and prototypical analysis, with the assistance of the Evocation2003 software. The results reveal a mechanistic social representation of the human body, focused on biological and functional aspects, with the brain as the main cognem that sustains the entire representation.

KEYWORDS: Social Representation. Human body. Anatomy. Biomedicine

Representações Sociais de corpo humano por estudantes de Anatomia de uma universidade brasileira

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RESUMO

As Representações Sociais são uma maneira pela qual os indivíduos e os grupos dão sentido e significado ao seu redor, explicam a realidade e justificam comportamentos. O objetivo deste estudo foi compreender as representações sociais de corpo humano por universitários do curso de Biomedicina de uma universidade do estado do Rio de Janeiro. Trata-se de um estudo qualitativo fundamentado na Teoria das Representações Sociais, realizado por meio de um teste de associação livre de palavras com 66 alunos matriculados em uma instituição de ensino superior. A análise dos dados foi realizada por meio da análise de coocorrência e análise prototípica, com o auxílio do software Evocation2003. Os resultados revelam uma representação social de um corpo humano mecanicista, focado nos aspectos biológicos e funcionais, tendo o cérebro como principal cognema que sustenta toda a representação.

PALAVRAS-CHAVE: Representações Sociais. Corpo humano. Anatomia. Biomedicina.

Representaciones sociales del cuerpo humano por estudiantes de anatomía de una universidad brasileña

Las representaciones sociales son una forma en que individuos y grupos dan sentido y significado a su entorno, explican la realidad y justifican comportamientos. El objetivo de este estudio fue conocer las representaciones sociales sobre el cuerpo humano que tienen los estudiantes de grado de Biomedicina de una universidad del estado de Río de janeiro. Se trata de un estudio cualitativo basado en la Teoría de las Representaciones Sociales, realizado mediante un test de asociación libre de palabras con 66 estudiantes matriculados en una institución de enseñanza superior. Los datos se analizaron mediante análisis de co-ocurrencia y análisis prototípico, con ayuda del software Evocation2003. Los resultados revelan una representación social de un cuerpo humano mecanicista, centrada en aspectos biológicos y funcionales, con el cerebro como cognema principal que sustenta toda la representación.

PALABRAS CLAVE: Representaciones sociales. Cuerpo humano. Anatomía. Biomedicina.

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Introduction

According to Moscovici (1978), Social Representations are like a form of socially constructed knowledge that influences the perception and interpretation of reality. Moscovici argues that Social Representations are a way in which individuals and groups give meaning and significance to their surroundings and, therefore, play a crucial role in organizing perceptions, mediating social interactions and constructing a shared reality (Moscovici, 2015).

The Theory of Social Representations (TSR) has evolved over time, from its origins with Moscovici to more recent advances that address contemporary issues such as the media, collective identities and new forms of communication. The theory remains relevant to understanding how individuals and groups interpret and construct shared social meanings, and is applied in various areas such as health, education, communication and social behavior.

Over time, different authors have made significant contributions, adjusting the focus of the theory to specific aspects, such as cognition, cultural contexts, group interactions and the role of the media, but all have maintained Moscovici's central principle that social representations are fundamental to the construction of social and individual reality.

Denise Jodelet (2001) was one of Moscovici's main disciples and, from 1984 onwards, emphasized that Social Representations play a fundamental role in the construction of individual and collective identity, giving importance to language and cultural contexts in the formation of a system of shared meanings that guides people's actions and behavior, contributing to the construction of a consensual reality.

Rouquette (1994) was another great name in the evolution of TSR. She explored how social representations can be applied to different social groups, and how these representations can be changed or modified over time and

impact on the understanding of social change. Höijer (2011, p. 3) summarizes the concept of Social Representations well by clarifying that:

> are about different types of collective cognitions, common sense or thought systems of societies or groups of people. They are always related to social, cultural and/or symbolic objects, they are representations of something.

Sabourin (2011) broadened Moscovici's understanding by emphasizing the process of social categorization and the role of representations in organizing thought. Jean Claude Abric (1998) proposed that social representations are not just fragments of knowledge, but are structured systems with a central organization (core) and peripheral elements. The core would be made up of the most stable and fundamental representations, while the periphery would be made up of more flexible and influential representations.

Authors such as Alves-Mazzotti (2008), Rateau; Moliner; Guimelli and Abric (2012), Bomfim and Von Czékus (2022), Lima and Gusmão Andrade (2010) reinforce the idea that social representations encompass opinions, values and behaviors that circulate among members of social groups. These elements are disseminated among the individuals who make up these groups, who in turn express their attitudes and principles as part of their collective identity. In addition, common sense can be understood as a form of speech rooted in everyday experiences, oral manifestations and transmissions of popular knowledge, which are based on the affectivities of the subjects who share these connections (Silva-Junior, 2015).

Having said that, what is the aim of identifying the Social Representations of the human body held by health students? We can infer that one of the aims is to verify how cultural and social beliefs about the body affect attitudes towards health, as well as to understand how they

perceive, interpret and interact with their own bodies and the bodies of others.

Furthermore, Social Representations about the human body can be associated with stereotypes and prejudices related to health, illness and physical appearance. In this way, understanding how this knowledge is shared by this social group, even at the beginning of their academic life, will allow teachers of human Anatomy and Physiology to adopt pedagogical strategies that help to deconstruct possible stereotypes, stigma and discrimination possibly anchored in the students' social imaginary.

Recently, research in the field of Social Representations about the human body has revealed a greater concern with the image of the perfect body (Nesbitt *et al.*, 2019; Dilling; Petersen, 2022), socio-cognitive development (Meltzoff; Marshall, 2020), the morphological comparison between robots and humans (Fortunati *et al.*, 2023) and the self-perception of transgender bodies (Falise *et al.*, 2021; Yanita; Suhardijanto, 2021; Porcino *et al.*, 2022). However, there are few studies that seek to identify the shared perceptions and rules of future health professionals regarding the human body.

Thus, verifying possible beliefs, codes of conduct and attitudes that could help identify challenges or gaps in Anatomy students' understanding of their relationship with the human body, perhaps allowing them to direct appropriate educational interventions to promote a more holistic and integrated view of health, are the main goals of this research.

The study of Human Anatomy in Brazil

The subject of Human Anatomy in Brazil is generally offered in the basic cycle of health courses and aims to present the main anatomical structures, with special attention to recognizing anatomical nomenclature and position; planes, axes and concepts about the general construction of the human body.

In the vast majority of educational institutions, anatomy content is learned through the use of unclaimed cadaveric bodies, i.e. those of people who have died and have not been sought out by friends or family, as listed in Law No. 8501 of November 30, 1992 (Brasil, 1992). However, with the advance of technology, new teaching methods have emerged, such as: synthetic anatomical models, digital whiteboards, videos, 3D software, among others, in order to meet the need for cadavers (Boechat *et al.*, 2016).

There is currently strong support from national institutions for the use of synthetic parts in the Human Anatomy course due to the difficulty in donating cadavers (Prohmann *et al.*, 2023), the strong smell of formaldehyde used to preserve the parts (De Souza; Ribeiro; Helou, 2022) and the risk of students developing cancer in the future (Becerra Quispe, 2020; Fontoura *et al.*, 2020).

At the research site, the study of human anatomy for Biomedicine students is offered in synthetic pieces, 4 hours a week and has a summary that recommends the morphofunctional study of the articular, skeletal, muscular, nervous, circulatory, respiratory, digestive, urinary, genital (male and female) and endocrine systems.

Biomedicine in Brazil

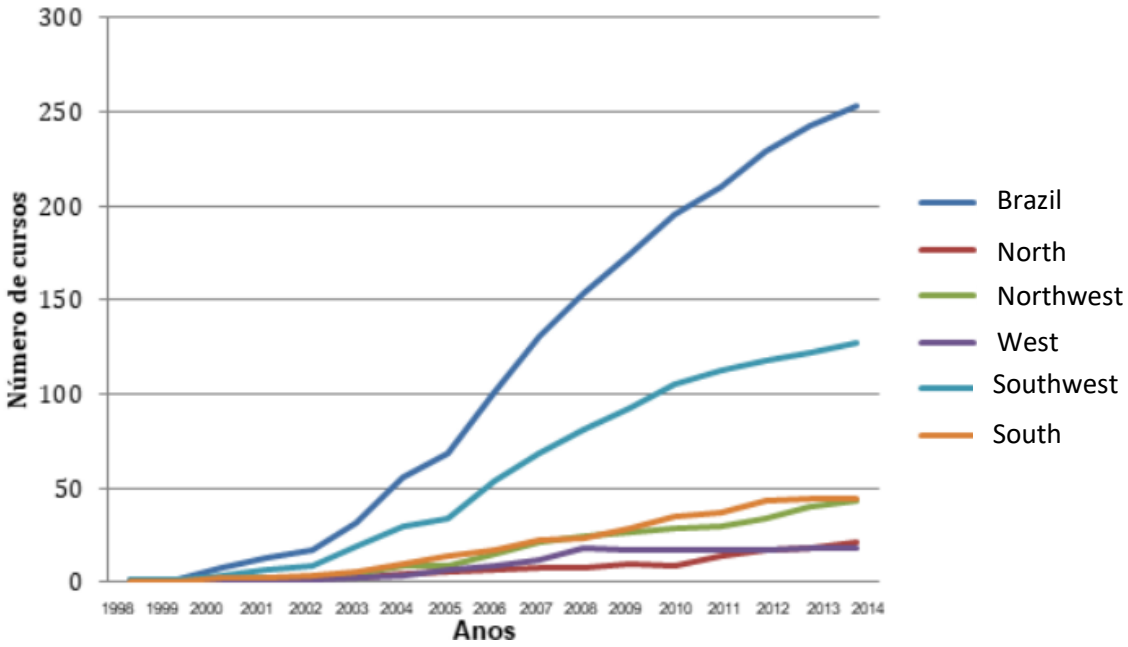
In Brazil, the first Biology class, with a medical modality, was offered by Escola Paulista de Medicina [Medical School of São Paulo] of Universidade Federal de São Paulo [Federal University of São Paulo] in 1966. However, it was only in 1979 that the biomedical profession was regulated by Federal Law 6.684/1979.

According to the aforementioned Law, biomedical professionals are responsible for the following activities: “carry out physical-chemical and microbiological analysis; carry out radiography services; work in

hemotherapy, radiodiagnosis services; plan and carry out scientific research in public and private institutions, in the area of their professional specialty" (Brazil, Art.º- Law 6.684/1979).

According to the survey found in the research by Noronha et al (2018), the Southeast region is the one that offers the most Biomedicine courses (Figure 1). This may be due to the greater number of public and private universities located in this economically favored region.

Figure 1- Evolution of the number of Biomedicine courses in the regions of Brazil over 16 years (1998-2014).



Source: Noronha, et al (2018).

The number of Biomedicine courses on offer in the Southeast has quadrupled compared to the South of Brazil (second in the ranking), which may be related to some intrinsically linked factors, such as: greater demand from young people for the biomedical profession and the greater number of private universities offering the course in the region.

Methodology

The methodological support used for this research is based on Abric's Central Core Theory. In proposing this complementary theory to Moscovici's theory, Abric clarifies that every representation is organized around a Central Core, made up of one or a few elements that will give the representation its meaning (Abric, 1994).

For Abric, the Central Core has three essential functions: (a) a generating function, through which a representation is created and transformed; (b) an organizing function that determines the nature of the links between the elements of a representation and (c) a stabilizing function made up of more stable elements that are resistant to change (Abric, 1998).

This theory also considers the existence of the so-called 'peripheral system', whose function is to allow adaptation to concrete reality, enabling differentiation of content and protecting the Central Core (Sá, 1998), as well as sheltering the differences in perception between the individuals involved in the research, supporting the heterogeneity of the group and accommodating the contradictions brought about by the more immediate context (Alves-mazzotti, 2001; Fonseca, 2016; Gonzaga, 2022). Therefore, the peripheral system accommodates the concepts, perceptions and values that the individual even admits to revising or negotiating.

Data collection

So, on the first day of class, before presenting the subject summary, a Free Word Association Test was administered, which asked 66 (82.5%) of the 80 students enrolled to list the first four words that came to mind about the term 'human body', in a maximum of four minutes.

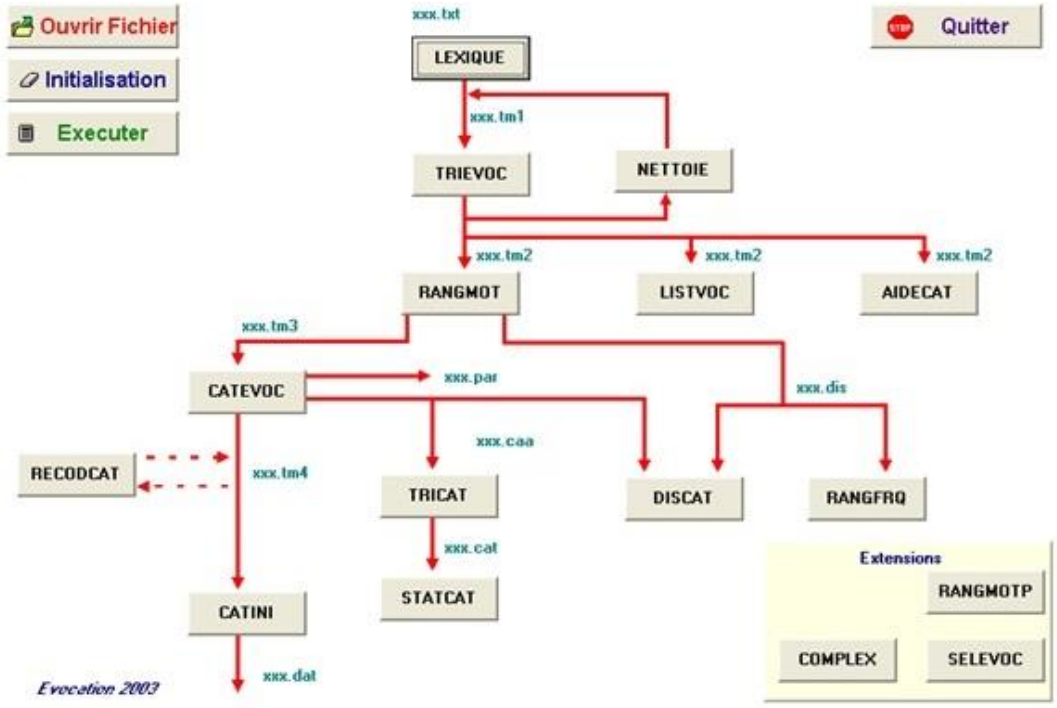
Originally developed by Carl Jung in clinical practice and adapted by Di Giacomo in 1986 in the field of social psychology, the Free Word Association Test has been widely used in research into Social

Representations. In fact, it is a projective technique guided by the hypothesis that the subject's psychological structure becomes palpable through the manifestations of evocations and choices (Abric, 1998).

Data analysis

After the test, the evocations were tabulated in an Excel spreadsheet and analyzed using the *Evocation*2003 software (Ensemble de Programmes Permettant L'Analyse des Évocation (Figure 2).

Figure 2- Initial screen of the *Evocation*2003 program.



Source: Personal file (2023).

Developed by Vergès (2002), this program calculates the statistics related to the evocations produced by the participants, taking into account the frequency of the words mentioned (Average Frequency) and the prevalence in which they are evoked (Average Order of Evocations - OME).

The software has 15 programs, six of which were used in this research: i) LEXIQUE which isolates the lexical units in the file; ii) TRIEVOC which sorts the evocations; iii) NETTOIE which eliminates possible typing errors, lexical units and spelling; v) RANGMOTP which provides the frequency and prevalence of words; v) RANGFRQ which organizes the elements that will make up the Central Core and the periphery of the representation in a four-box table and, finally, vi) AIDECAT which organizes the co-occurrence matrix between the words that will make up the centrality of the Identity Representation.

The *corpus* of participants' evocations was subjected to semantic equivalence procedures, thus avoiding divergences and ambiguities in the data analysis (Wachelke; Wolter, 2011).

Co-occurrence analysis examines how words or concepts are associated with each other within social representations. This method helps to understand the relational structure of the elements, i.e. it reveals how individuals articulate ideas and concepts within a SR, showing dominant themes and their interconnections. To this end, the AIDECAT program, present in EVOC, creates a matrix that records how many times two terms appear together in the participants' answers. Next, with the help of C-map tools, the co-occurrences are represented in graphs, where the nodes correspond to the terms and the connections reflect the strength of the associations, showing the semantic network of evocations (Doise, 1990; Vergès, 1992).

After the prototypical analysis, a graphical representation of the co-occurrence of words was constructed which, according to Sá (2002), is based on the strength with which the elements are linked to each other. This methodological approach, which associates the power of salience (frequency and prevalence) with the number of evocations accepted by more than one individual at the same time (co-occurrence), allows for a deeper

understanding of the centrality of a given Social Representation in relation to the representational object.

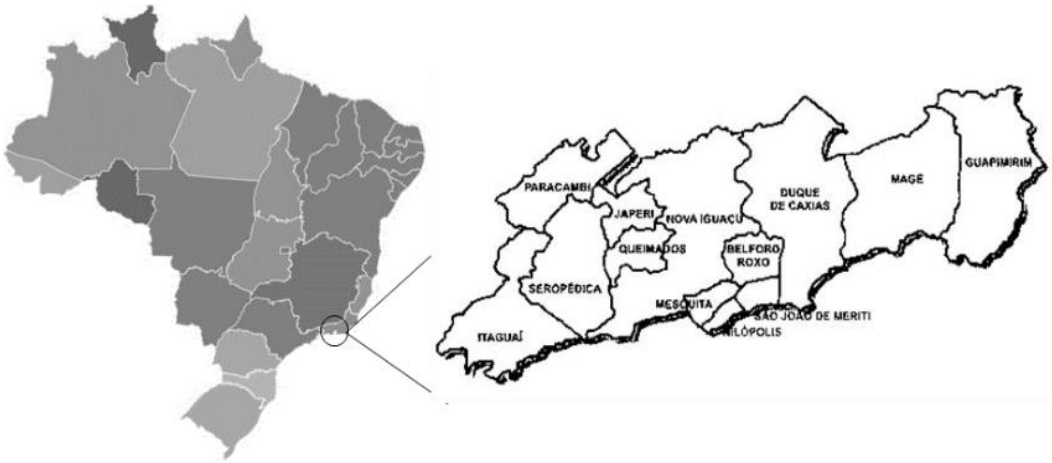
Prototypical analysis identifies the hierarchy and centrality of SR elements (Table 1), while co-occurrence analysis explores the structural relationships between them. Combined, these methods provide a comprehensive understanding of both the structure and dynamics of social representations about the social object.

However, Flick (2009) highlights the importance of considering some important biases that can compromise the analysis, such as: i) the composition of the group of participants, which can influence the results. If the participants are not representative of the social or cultural group under study, the associations identified may not reflect the general social representations; ii) the polysemy of evocations, i.e. some words have multiple meanings, and the analysis of co-occurrences can treat all occurrences of a word as if they were the same, distorting the results and, finally; iii) the strength of the Associations themselves, since the analysis is often based on raw counts, it can disregard the qualitative context of the associations. This can exaggerate or minimize the relevance of certain terms.

Research Context

The research was carried out at a Higher Education Institution located in the Baixada Fluminense region, on the outskirts of the municipality of Rio de Janeiro (Figure 2). With around four million inhabitants, Baixada Fluminense is made up of 13 cities geographically formed by flat areas and surrounded by several mountains. Within the state of Rio de Janeiro, the Baixada Fluminense region has the highest number of people who call themselves brown and black (IBGE, 2010).

Figure 3- Distribution of the municipalities that make up the Baixada Fluminense region in the state of Rio de Janeiro, Brazil.



Source: Agência de Notícias das Favelas - ANF, 2018.

The demographic density of this region is the highest in the state of Rio de Janeiro, but the Human Development Index, which considers that the closer to 1 (one) the higher the human development of the municipality, revealed, according to the last census, that all the municipalities in the region obtained an MHDI lower than that of the state of Rio de Janeiro (IBGE, 2010).

Research subjects

Sixty-six (82.5%) of the 80 students enrolled in the Human Anatomy subject of the Biomedicine course took part in this study. The group had an average age of 21.7 years (Standard Deviation= 4.58), of which: 46 (69.7%) female, 44 (66.7%) self-declared black, 51 (77%) reported being single and 28 (42%) declared that they work with a formal contract. The sample is 95% representative with a sampling error of 4.25%, it is heterogeneous and a simple random sample was adopted.

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Analysis and discussion of the results

In response to the inducing term 'human body', the 66 participants produced a total of 264 evocations which, after a rigorous analysis of semantic equivalence, was reduced to 106 evocations, corresponding to approximately two different words per person, thus revealing a very narrow range of meaning.

The result of the prototypical analysis, shown in the table of four houses (Table 1), expresses the content and structure of the representation for the inducing term. In the Central Nucleus, top left quadrant, the terms 'heart', 'brain' and 'eyes' are grouped together, suggesting a reductionist representation of the human body or one focused only on biological and functional aspects.

TABLE 1- Four-box table with the constituent elements of the Central and Peripheral Cores of the Social Representation of the human body by Biomedicine students.

	Frequency	**GREAT POWER OF EVOCATION**			**SMALL FORCE OF EVOCATION**		
High	**f ≥ 10**	**f**		**OME < 3.51**	**f**		**OME ≥ 3.51**
		Heart	18	**3.50**			
		Brain	16	**3.17**	Bones	19	3.89
		Eyes	16	**3.50**			
Low	**f < 10**	Systems	9	2.50	Hair	9	4.25
					Blood	8	4.50

In the table: f is the simple frequency of evocations; the median of the Frequency of Evocations is equal to 10. The average of the Average Order of Evocations (AOE) is 3.51. Evocations with a frequency of less than eight were disregarded. In the table, 'Strength' is associated with prevalence in the evocation, where the word mentioned in the first position has greater strength (equal to one) than the one mentioned in the second position (strength equal to two) and so on. Therefore, the lower the OME value, the greater the evocation strength.
Source: Author, 2023.

This perception of the body may be the result of the specific focus given to the cardiovascular, neurological and sensory systems during university entrance exams in Biology. In Brazil, one of the objectives of the National High School Exam is to be used as an alternative or complementary modality for selecting students who intend to enter Higher Education courses (INEP, 2019).

In relation to the Biology exams, there seems to be a prevalence for content that addresses "the vital functions of living beings and their relationship with the adaptation of these organisms to different environments" (Cestaro; Kleinke; Alle, 2020, p.513).

However, throughout history, the body has been interpreted and attributed various discourses and meanings, often influenced by the rationalist currents of each era. One point in common between these currents is the tendency to disconnect the relationship between human beings and the world around them. In modern times, especially with Descartes' mechanistic philosophy, a view of the body as a machine emerged, standing out from the previous understanding (Freire, 2019), which probably still influences the social representations of the subjects in this sample. This dualistic view, which separates body and soul, was driven by Cartesianism and gave rise to rationalism and empirical scientific experimentation, which sought to explain human behavior from aspects such as anatomy, biology and chemistry (Turner, 2014). This conception of the fragmented and objectified body disregards its subjectivity, denying its concreteness as a being in relation to the world. As a result, the idea arises that having a body is more important than being a body, which implies a dissociation of man from his totality, privileging the notion of a body to be possessed and objectified, to the detriment of the body as a lived experience.

With regard to the elements with low frequency and little evocation power, which make up the External Peripheral Core (lower right quadrant - Table 1) of the representation, we identified that 'hair' and 'blood' are the

elements that express the pressures fortuitously imposed by the students' reality. In this sense, the inclusion of 'hair' in the SR of the human body seems to have an aesthetic bias, possibly a concern with appearance and hair health. While the inclusion of 'blood' can be associated with the detection and diagnosis of diseases through laboratory tests.

Given this data, the importance of dealing with corporeality is essential in the classroom, both as a theoretical topic to be discussed and as a stance to be adopted by health professionals and teachers. In this context, we realize that this attitude should be reflected mainly in a pedagogical experience that is aligned with the various possibilities that the creative expression of the body offers in the process of training individuals, focused on the human being, the meaning of their existence, their history and their culture (Gonçalves-Silva, 2016; Freire, 2019).

In the lower left quadrant of Table 1 is the word that is evoked most readily, but not as often. This periphery usually reveals the existence of a subgroup because it has a different representation from the main group. However, this small group seems to conceive of the human body as an integrated and interdependent system, going against a reductionist view and a non-mechanistic view of the human body. However, the dichotomous view of mind and body remains.

Once the Central and Peripheral cores of the Representation have been identified, we move on to investigate the associative power of the elements that make it up. Associative power refers to the ability of central cognemes to co-occur with other cognemes in the representation. Since confirming their centrality gives strength and ownership to the connotations of each social group (Flament, 1981; Vergès, 2002).

Thus, we identified that 'eyes' lost their centrality, giving way to 'bones' and 'brain' seems to sustain the social thinking of the human body by Biomedicine students (Figure 3).

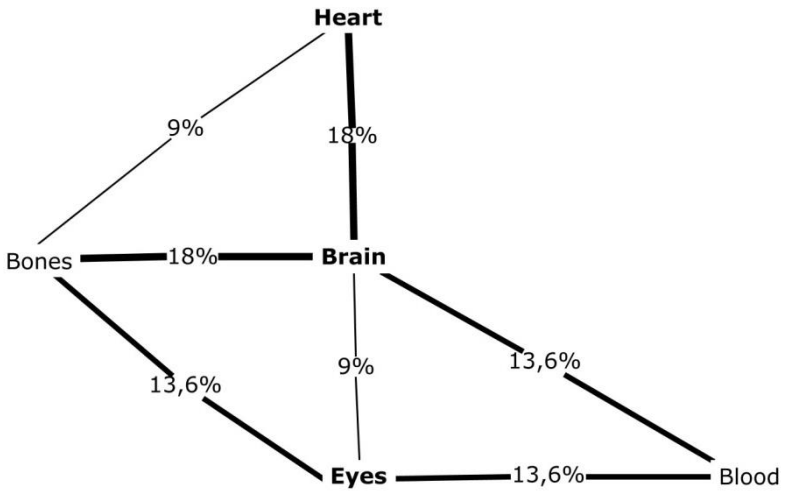
It is possible that the dissemination of the brain as the center of the nervous system closely linked to cognition, emotion and behavior (Jung et al., 2019), its relationship with neurological diseases and their treatments (Ahmad et al., 2021), as well as progress in brain imaging and mapping technology (Lecoq; Boehringer; Grewe, 2023) may have led to its rise as a privileged organ in students' social representations of the human body (Lisboa; Zorzanelli, 2014).

According to Ortega (2008), the predominance of the scientific view has profound repercussions in the area of health, especially with regard to the anatomical tradition, which reconstructs the body based on the model of the corpse. This body, now objectified and fragmented, is analyzed using new visualization techniques, where vision takes on the role of guaranteeing objectivity and precision. In this context, the history of visualizing the body reveals a distancing from the other senses, with vision becoming the predominant sense, to the detriment of the others. This visual focus creates a model of mechanical objectivity, which in turn results in a loss of human sensitivity.

This distancing can be observed not only in the sciences, but also in education. Studies on the human body tend to fragment the senses, treating them as isolated and distinct functions, such as sight, hearing, smell, touch and taste. This methodical approach is reflected in education, where the segmented body is emphasized, crystallizing in teaching-learning processes and reinforcing a fragmented approach to body experience, both among students and teachers (Daolio, 1995; Bombassaro;Vaz, 2009; Silva et.al., 2011; Silva-Junior, 2015).

The subjective experience of the body needs to be considered, and the data suggests that there is a pressing need to present or reinforce this approach with students in both Basic and Higher Education, especially in the health areas.

FIGURE 4 - Co-occurrence Analysis of the Social Representation of the inductive term 'human body' among Anatomy students.



In the Figure, the strength of co-occurrence is identified by the thickness of the edges.
Source: Author, 2023.

The presence of the cogneme 'bones' at the center of the representation may be related to the history of human anatomy itself, which began with the dissection and display of cadaver bones. It is also important to note that the tradition of human dissection and the study of bones played a fundamental role in the development of Anatomy as a Science.

It would be extremely revealing if these students came to understand the body as a perceptual totality, which encompasses not only the senses, but also interconnected emotions and feelings, reflecting on the world and manifesting our essence. The results suggest and studies on the body corroborate (Jana, 1995; Garcia, 2005; Ribeiro, 2005; Lüdorf, 2009; Santiago, 2012, Silva-Junior, 2015) that there have been few changes in the conceptions and social representations of the body over the academic trajectory. Thus, the data points to the need for a change in approach, which adopts a more holistic perspective and rejects the mechanistic and causal approach that has historically subjugated the body.

The theory of social representations understands that a social reality is created only when the new or unfamiliar is incorporated into consensual universes, at which point the processes by which it becomes familiar, loses its novelty and becomes socially recognized and real. (Jodelet, 2001).

Considerations

Although it is a case study and therefore cannot be generalized, this work reveals the social thinking of a group of anatomy students at a Brazilian university, which leads us to reflect on teaching strategies that break with the reductionist and mechanistic view they have of the human body.

In the 21st century, we can't continue with the same Anatomy teaching model adopted by Hippocrates in the 4th century BC, by Galen in the 2nd century AD or in the Middle Ages with Leonardo da Vinci. Their great contribution is recognized, but the moment is urgent due to the need to consider not only the biological aspects, but also the psychological and social factors that influence the concept of the human body, emphasizing the interconnection of different aspects that make up a complete organism.

Considering the totality of the human being, including their emotions and social relationships, from a critical education that challenges the mechanistic view of the human body among health students, could be the first step. Adopting a multidimensional approach, involving critical reflection, the development of empathy, the teaching of integrative practices and the use of social representations to promote change, could be a way of reframing the concept of the body.

In a pragmatic way, encourage interdisciplinary discussions, incorporating themes from the humanities and social sciences, such as psychology, sociology and anthropology, so that students understand that the body is not just a machine, but an organism embedded in cultural, social

and emotional contexts; promote reflection on professional practices by encouraging students to analyze how the view of the body influences clinical practice, considering issues such as the emotional impact of patients and the interdependence between body and mind. Encourage research into how representations of the body are culturally constructed and how these influences can be applied to health practice, broadening students' perspectives and leading them to question reductionist views of the human body and their dichotomous body-mind view.

These resources are crucial to promoting a more humanized and less mechanistic approach to the human body in the context of health and, in this way, contributing to the training of professionals who are better equipped to deal with the complexity of patients, respecting both the physical, emotional and social aspects of the human being.

Finally, this essay does not exhaust the list of activities that we need to do in order to innovate and move towards a broader and more integrative approach to teaching anatomy, which incorporates multidisciplinary perspectives, promotes critical reflection and encourages an understanding of the human body in its entirety, taking into account both the biological aspects and the psychosocial and cultural aspects that permeate it. How academic training can shape the representations of future health professionals.

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