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## Utopic and heterotopic bodies: from Philosophy to Science Education

Corpos utópicos e heterotópicos: da Filosofia à Educação em Ciências

Cuerpos utópicos y heterotópicos: de la Filosofía a la Educación en Ciencias

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### Abstract:

This essay aims to discuss the body in science education. For this purpose, we use the concept of the utopic body, establishing a critical perspective of its lack of recognition by subjects as a model of the body imposed by a scientific discourse. As a counterpoint, this study presents the concept of a heterotopic body, as a real and singular body, produced and represented as a practice of resistance, claiming the need of its discussion by science.

**Keywords:** utopic body; heterotopic body; heterotopies; science education.

### Resumo:

Este ensaio aborda a problemática do corpo na Educação em Ciências. Para tanto, toma como exemplo o corpo utópico utilizado na ciência, colocando-o em uma perspectiva crítica a partir do seu não reconhecimento como modelo corporal. Como contraponto, trabalha com a ideia de corpo heterotópico; como corpo real, singular, que se produz e se traduz como prática de resistência, reivindicando a necessidade de sua discussão pela ciência.

**Palavras-Chave:** corpo utópico; corpo heterotópico; educação em ciências.

### Resúmen:

Este ensayo enfoca la problemática del cuerpo en la educación en ciencias. Para tanto, toma el concepto de *cuerpo utópico* utilizado por la ciencia, poniéndolo en una perspectiva crítica a partir de su no reconocimiento como modelo corporal. Como contrapunto, trabaja con la idea de *cuerpo heterotópico*, como cuerpo real, singular, que se produce y se traduce como práctica de

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resistencia. A partir de este concepto se evidencia el potencial de la educación en ciencias para la *estetización de la ciencia*, volviendo a poner en discusión las cuestiones relacionadas al reconocimiento y autodeterminación del otro como pauta para una agenda formativa humanística, comprometida con una *ético-estética de las alteridades* en la ciencia.

**Palabras Clave:** cuerpo utópico; cuerpo heterotópico; educación en ciencias.

### A starting point...

When Michel de Certeau set out to distinguish place from space in his book *The Practice of Everyday Life* (2014), he appealed to the dimension of practice. In Certeau's theory, it is practice that makes place a space. Therefore, it can be said that it is the sum of specific local experiences or events – understood as practical – that come to objectify a certain area, geographically defining its dimensions, making it representatively unique in terms of identity, produced precisely according to the differences materialized by the specificity of practices that occur there.

In this sense, it is clear that the idea of representation – or meaning – is central to the discussion as a determinant for the emergence of spaces. Thus, taking a possible (re)definition as a reference, we can also establish a relationship between space and culture, according to an approach to this concept within Cultural Studies, from the work of Stuart Hall (2016). Culture is understood as a sharing of meanings that determine the production of specific identity characteristics. Moreover, following Hall (2014) and Silva (2014), the emphasis is on difference as original positivity and, therefore, prior to the production of any and all identity affirmations.

In fact, this approach corroborates the notion of place as a potential space, considering an infinite multitude of ever-changing and developing relationships. Space as a place of practice: a place in practice (Certeau, 2014). Following this logic, we may consider the place to be a geographical dimension perceived by the individual, being objective in nature. Thus, space is subjective in nature, because in addition to being perceived, it is represented, (re)defined by the experience and agency between individual and collective subjectivities.

Pierre Bourdieu's sociology, with concepts such as campus and habitus, can contribute to the discussion here (Bourdieu, 1975; 1976; 1991; 1996). By extending the reflection to Bourdieusian theory, campus becomes space, because it is the habitus that binds subjects to it, making them its agents – its practitioners, of a kind of subject/campus dialectic. Thus, in these spaces, while perceiving an externalization of subjects, we see an internalization of the campus through their rules. The habitus creates possibilities for a socialization that can produce – and/or guide the production of – modes of individual and collective subjectivation processes within the campus.

The subjects as agents of the campus, moving in and beyond space, establish different relationships not only with themselves, but with other subjectivities – often competing with one another. Therefore, we observe the creation of sign systems, references, specific modes of representation, producing local cultures with their specificities. The subjects mobilize to explore the place in a constant (re)building of space (Bourdieu, 1975; 1976; 1991; 1996). This corresponds to putting the subject into this place in practice, allowing him to establish modes of ethical-aesthetic (re)definition, since, in addition to his subjective status, he also becomes the object of the same relationships he helped to build.

Thus, the concept of space can be related – beyond the concept of habitus – to Bourdieu's Practical Theory. The subject/campus dialectic that is imposed on habitus involves the production of *doxa*, producing heterodoxies and facing orthodoxies when it comes to observing the ways in which such a relationship is imposed as a philosophy of action (Bourdieu, 1972; 1996). This is an important point to consider when we discuss heterotopies or heterotopic spaces; places that demand us to put in action new/other practices as forms of resistance. In this sense, heterotopies invite us to overcome a pre-established social *doxa*.

In the case of practices, we can say that they come into existence in a certain place, animating it, becoming established as repeated experiences. Thus, within spaces, they assume a unifying, rather than structuring, nature of the dimension of subjective action and thinking, generating modes of existence and specific lifestyles (Bourdieu, 1996). Practices are associated not only with

the notion of habitus, but with the concept of campus as a multiple space, a microcosm of social life. This means that the a set of practices related to the habitus assign an identity to the campus.

Bourdieu refers to campus as a symbolic space constituted of a dimension of the real, where individuals “face a struggle to impose the legitimate principle of vision and division of the natural world and social world” (Bourdieu, 1996, p.83). This implies a constant state of symbolic struggle that emerges from within campus relations as an important element for the structural maintenance of a systemic social organization. The agency of these relations in the confrontation between the environment and its agents characterize specific modes of socialization and, therefore, individuation and subjectivation in the campus, establishing it as a space and, therefore, a locus of the subject in practice. It depends on practice the strategies that coordinates subjectivation processes directed to the agents of the campus.

From this, it is also possible to debate this theme from a Foucauldian perspective. In Michel Foucault’s philosophy, we can look into spaces – microphysics and micropolitics – where power-knowledge relations can be determined (Foucault, 1979; 2006a). There is some complementarity in these concepts that both sociology and philosophy have addressed. If we took the discourse as studied by the French philosopher, the power-knowledge relations established within a campus depends on it understood as social practice.

The campus as a space of symbolic struggle becomes par excellence in a territory of power-knowledge. By referring to the social campus and the power of the relationships that can be established within it – making its structure flow – it allows for the emergence of an approach whose focus lies in discussing the effects of power-knowledge on a social system with its games of truth, which correspond to modes of producing and circulating its truth regimes (Foucault, 1979; 2006a; 2016). Considering this, the discursive production within a campus has the power to produce knowledge taken as truth. This truth, in turn, helps to reinforce mechanisms of discursive production that results, also, in a maintenance – constituting an orthodoxy – of practices.

Therefore, the importance of a practical dimension that constitutes spaces becomes even more evident, because in order for it to exist, there must necessarily be a prior discursive organization that simultaneously constitutes and justifies it. Bourdieu's Practical Theory accounts for the discourse/practice relationship when it proposes a philosophy of action that takes into account the event as a contingency and decision-making as a human behavior related to it. This, in turn, establishes a relationship to a degree with habitus. In this sense, it is understood as that which articulates a generative system of collective socialization. Thus, in any given space, the practice cannot be considered as a whole, but only relatively autonomous (Bourdieu, 1972), because it is subjected to the games of power-knowledge and, therefore, of truth. This heteronomy of the practice is given by its relation with discourse that produces it. In this sense the discourse appear as what defines these practices and, therefore, the collective socialization mechanisms related to the habitus.

In other words, we can say that there is an agency between theory and practice, constituting two dimensions that feed into one another. Thus, the mobilization for action, the setting in motion depends on a certain kind of knowledge that, in a way, determines and regulates this putting into practice. We refer to a level of performativity. This means that discourse is practice and guides other practices, being also constituted and modified in practice. Thus, the notion of discourse in Foucauldian studies becomes even more important for understanding practice as a discursive experience and/or event. For Foucault (2008a), discourse is normative in nature, functioning in terms of regulation. Regularity can be determined as the emergence of a discursive form, understood as a discursive practice (Foucault, 2007).

Analyzing it is not a matter of considering its isolated utterances, but together within the language. Metaphorically, we can say that language (related to grammar) is a place, and language (as a system of symbols composed of signs), the space, since it is through space that words are put into motion. Language – as a system of symbols, signs and meanings – is the experience of language (grammar), which recalls the space/place relation that was referred. In

this sense, language is the space where words are experienced through language games.

The fact is that discourse is a field of discursive practices guided by the aforementioned forms of knowledge production and circulation of truths as a result of the application of power-knowledge (Ferraro, 2009). When Foucault explores the concept of games of truth, the philosopher does so from an archaeological and a genealogical perspective by attempting to understand the conditions of possibility that allowed for the emergence of specific forms of knowledge that, at a given historical time, can represent the truth, including its forms of production. In other words, it is about understanding the game, the modes and forms of truth production throughout history (Foucault, 2016).

It is based on this that the French philosopher establishes a linearity between power and knowledge. The essence of this relationship is the production of knowledge by power and a subsequent emergence of knowledge that reinforces the effects of this power that produced it (Foucault, 1979). This new relationship breaks from the Baconian statement that knowledge is power, changing the perspective by the agency between power and knowledge, resulting in power-knowledge.

But why are we compelled to discuss power-knowledge? It is a question that we can begin to answer when we realize the multiplicity and distinction of these places of practice. Thus, considering a diversity of spaces, one cannot ignore the potential practices that are implied from this spatial multiplicity. Such practices emerge and are guided by a relational flow of power-knowledge, being placed in specific realities, producing distinct forms of hegemony and resistance in normative, and therefore discursive, contexts.

Within each of these realities, we observe a certain pragmatism linked to subjectivation processes, such as the triangulation expressed by the discourse/environment/subject relationship. Thus, an ethical-aesthetic of the subject in practice is produced by its imbrication with current discursivities. This means putting the subject/knowledge relationship into perspective in a particular *socius*. The result of this is the way subjectivities (re)produce their realities – and themselves – according to an interpretation of the world.

The subject, then, is reaffirmed in Foucault as being the result of power-knowledge relations and, therefore, of a discursive normativity, observed according to the effectiveness of practices for normalizing conducts, or behaviors. It is about analyzing beyond subjective production, its modes of circulation and mobilization in the spaces in which it operates. Consequently, Foucault extends the analysis to governmentality, revealing a spatiality in the *socius* as the *topos* of the government of self and others.

A topological analysis can be contained within the dimension of governmentality for at least two reasons. The first is justified by the ways of conducting conducts by understanding the strategies for the circulation of people and things in a given territory (Foucault, 2008b). In this sense, the term circulation expresses the game of (im)possibilities linked to the multiplicity of relationships that allows for the emergence of certain types of rationale. The reason of State, for example. Based on this, there is an assumption and consolidation of specific forms of government that guide models for understanding, among other things, the subject/knowledge relationship, even a civic one and its specific ways of producing and circulating knowledge and cultures, allowing for a performance of the ethical-aesthetics of/and for subjects.

The second reason concerns the assumption of self-care (*epiméleia beautoû*) and self-knowledge (*gnôthi seautón*), addressed by Foucault in *The Hermeneutics of the Subject* (Foucault, 2006b). Within a given space, the relationships that interfere with the modes of production and circulation of knowledge and truth influence the ways in which subjects lead themselves and also the ways of leading others. Thus, caring and knowing oneself and the other also means assuming an attitude towards the world – an *ethos* – and, therefore, specific practices in specific contexts as well.

The discursive normativity of spaces can be perceived by defining a series of “acceptable” actions and behaviors. This also means excluding certain practices from within them. Bourdieu (2013) points out exclusionary practices as strategies for the structural maintenance of a given campus. Thus, space is also perceived as a colonized place, in the sense that it is taken by subjects who play games of acceptances and prohibitions, guiding the rules of the game

through plausible practices allowed and maintained within a specific campus. Thus, micropolicies are established that indicate the totality of specific practical relations within these spaces, making them distinctive, unique and, therefore, bestowing an identity that allows us to distinguish it from others. Micropolicies become essential defining the operating rules of these spaces.

In other words, Certeau's (2014) approach intersects with the pragmatism of subjectivation processes that challenge *socius* - and therefore *topos* - regarding the mediation between subject and discourse or subject and ways of knowing. In a way, this is what the present essay intends to debate by taking place in practice as a space of subjectivation, observing the specificity of how it works in maintaining or producing other topological identities. This is the challenge.

But what about the school, the body and other heterotopies? After all, this is an essay that sees Education as a place of speech. What relationships can be established to discuss what, in fact, one wishes to address regarding what has been presented so far? The answer to this question is not at all complex, because when we refer to heterotopies as the school or the body, we speak of places converted into spaces, whose practices and forms of subjective production are counter-hegemonic: spaces of resistance par excellence (Foucault, 2013).

The school and body as heterotopies will be explored at the triple interface between Education, Sociology and, invariably, Philosophy. Thus, the aim of this essay is to present heterotopies as places of – and in – practice. In this case, it is a matter of focusing more specifically on body practices, as well as teaching about the body in school, which is justified as an essay in Science Education. The body and school could be considered heterotopies linked to the production of subjectivities as forms of resistance.

### **On the body's place in Education: utopic and heterotopic bodies**

The term heterotopology was proposed by Foucault (2013) to name the study of heterotopies. According to the author, they correspond to other, inconstant spaces, whose forms are varied and are composed of different



societies throughout their histories. Heterotopic spaces produced within different social organizations can even be used as criteria for classifying them, which may, at any given moment, make them disappear by investing in the production of other heterotopies.

Throughout history, sacred places, internment houses, clinics, nursing homes, and barracks have been examples of heterotopies. Schools, theatres, cinemas and gardens – the latter being the oldest of heterotopies – are also limited to the concept, along with museums, libraries, holiday camps and others (Foucault, 2013). The characteristic of heterotopic spaces is the ability to overlap with a real dimension, other spaces that are incompatible. Therefore, we can claim that each heterotopy also has a temporal singularity (Foucault, 2013).

Thus, heterotopies are seen as spaces of social confluence where physical and mental alterities connect simultaneously with their own system of opening and closing. Subjectivities are, as a rule, guided into a heterotopia coercively or when experiencing these spaces in search of purification, in specific rituals. Still, heterotopic spaces undermine current hegemonies, being presented precisely as counter-hegemonic (Foucault, 2013). Thus, they are constituted as loci of resistance in the social structure.

Heterotopies, constituted as social spaces, while allowing for the establishment of proper functioning, undermine a larger hegemonic logic (that of the social macrocosm in which they are located), thus producing a counter-hegemony: heterotopia as resistance. Therefore, while heterotopy is constituted in society, it is still a representation of specific places that are nonetheless thematic.

Foucault also considers counter-spaces to be heterotopies. These, in turn, emerge within real places, having the power to erase, neutralize or purify them. When a child invents something, using his imagination, for example, to make his parents' bed a "swimmable ocean" between the sheets, the sky as he leaps over the mattress springs, or a forest to hide in, he produces a counter-space. The same goes for gardens or when you decide to pitch an "indigenous tent" in the middle of the barn (Foucault, 2013, p.20).

But what is beyond heterotopies? According to Foucault, in addition to the real spaces within which they appear, there are also utopias, spaces that emerge in the imagination, from discourses, dreams and desires that aim to fill the void of human hearts. Humanity delimits the place of utopia, a space without history or a chronology that is nowhere. A utopia is therefore a non-place (Foucault, 2013).

Consequently, in order to discuss heterotopies – in this case, with reference to the relationship between Education (school) and the body – we must do so from this perspective. This means that in order to engage in a heterotopological undertaking, we must not lose sight of utopia. Therefore, when we take the body as a topic – once placed within educational practices – we must consider it in its duality: utopic body and heterotopic body. This means that in order to explore the possibilities of the heterotopic body, invariably, we must consider the existence of a utopic body in opposition to it. It is this process that makes teaching about the body as both topology of the real, heterotopology itself, and virtual or ideal topology, the utopic body topology that considers a body according to hegemonic standards.

### **Utopic and heterotopic bodies: illustrations from Science Education**

When we claim that the heterotopic body – the body of the real – must be opposed to another, utopic body, which inhabits the imagination, one must consider the perspective of standardization, models commonly pursued within educational discourses. In this context, some questions remain: when it comes to discussing the body, which ones should we give voice to? Why does an emphasis on one suppress the possibility of another? Moreover, where is the place for diversity when it comes to approaching the body as an object, in this case, in Science Education?

It is important for us to explain the choice for Science Education. Answering this question abandons any kind of extreme complexity. In Science classes, the body theme tends to be explored in terms of knowledge that

concerns constructing a notion of body and the experience of a body-concept, though limited. This is precisely why we see an important difference related to its approach in Science classes and Physical Education or Art classes (such as theatre, for example) from multiple discursivities.

It is worth noting that, although we have cited art as a possibility for exploring a powerful and resistant body (a heterotopic body), utopic bodies are taken as models of aesthetic representation found in paintings or sculptures. Friedrich Nietzsche (2007), citing the Apollonian as a reference of perfection, beauty, and symmetry, shows us the utopia of bodies in the artistic dimension. In the case of theatre, in turn, performance leads to an expressive art in motion that enables us to potentially explore the body, to experience it from other/multiple powers.

Considering the dynamics that we have observed in school, especially in the discipline of Science, the excess of theoretical classes (lectures) does not contribute significantly to an experience of the body, the living body. Therefore, we can establish a difference in the field of practice, with the body being better and more intensely explored regarding its powers in Physical Education classes or in Theatre with body expression exercises. In the case of the sciences, more specifically Biology, this may be explained in the origin of this science in Natural History, in the transition from the classical to modern episteme, which modified an entire discourse and, therefore, a system of thinking about life (Foucault, 1999a; 2007).

Natural History has a discursive formation organized according to Taxonomy and Systematics. Concerned with naming and classifying living beings into pre-established categories, these actions remained strongly ingrained in an emerging Biology and, by extension, in the construction of the biologist's identity. Based on the work of Georges Cuvier, there was an expansion towards a better understanding of living beings, becoming considered a functional attribute of their structures (Foucault, 1999a). Anatomy expanded to Physiology. Later on, when relationships started to be established between living beings and the environment, Cuvier paved the way towards making Natural Selection possible, as proposed by Charles Darwin and Alfred Russel Wallace.

By exploring the body from the perspective of the concept, science objectifies it by creating a body model based on a discourse of it: the utopic body. The body of science is a body that carries truths and certainties, a body subject to the rules of biological operation and regulation. The binary body of healthy or diseased, male or female, which confuses the biological determination of sex with performativity (sexual identity, expression and orientation) when it comes to discussing the construction of gender identities and sexuality. Science excludes performativity because it tends to move away from ambivalence and from the game of uncertainty about what the body is or can become.

The well-finished normalized body of science was purposely constructed out of the logic of desire, a body without longings. As an object, it must correspond quantitatively and qualitatively to what the methodologies applied to it require. The utopic body of science is the watertight model in the fixed framework of classification elaborated by the biological discourse.

It is important to return to the first volume of the History of Sexuality, entitled *The will to knowledge* (Foucault, 1999b). This reference serves to keep in mind an archaeology of a normalized body, when, in the West, the emergence of a *scientia sexualis* and the pathologizing surrounding sex established the need for a series of truths about the body that came first from the narrative of confession, then, the clinical and, later, Psychoanalysis.

Thus, the body is a form of materialized sexuality that can be corrected according to the logic of its place in medical-legal discourse, as an effect of – or a territory for – exercising biopower and biopolitics (Foucault, 1999b; 2011). In this sense, the need for a utopic body was imposed as a result of the desire to regulate behavior, the government of human life (Foucault, 2008b). The heterotopic body as a form of resistance, which is produced by difference, results in some complexity for exercising governmentality.

What we consider relevant to discuss in this reality is something that is beyond a utopic body, which can be powerful in producing an ethical-aesthetic of and for the body. When it comes to education, it is increasingly necessary to think about ways to educate in line with practices that sharpen the senses, promoting sensitization, in this case, a sensitization of the body. To what

extent can science relax its prescriptive nature, its absolute truths, in order to invest in forms of sensitization, to the detriment of awareness? This latter term has forced colonizing logics of understanding, without stimulating the exercise of criticism and reflexivity of the body, especially when we refer to health education, where we find the debate on sexual education.

This awareness perspective, in turn, disregards the potential of subjective perception and affection, which ultimately removes the human condition from science, reinforcing the assumptions of the modern scientific paradigm, a binary, neutral science, whose paradigms are founded on universal conditions of scientific laws and theories for the purpose of generalization. The problem of the utopic body in science finds support in this logic: the subject detached from the object, the individual detached from the body. This pattern is followed because it is easy to govern, but how does one govern singularities? How does one design new forms of government that are produced according to a continuous development, in the multiplicity of heterotopic bodies?

Once this division is made, it is maintained by the biological discourse itself. The utopic body prevents the construction of other possible identities, because identity is anchored in the production of differences (Hall, 2014; Silva, 2014). Therefore, an awareness of the body has produced a series of colonized minds that accept certain truths without question, tending to transform, and thus, reduce it to a mere instrument for pursuing a desirable, though depotentialized, existence.

Thus, we are drawn to perceptions between science and anthropology and then, to a series of analogies related to an anthropocentric view of understanding the world. The way we classify, name, or restrict – to any degree – living beings, is related to our interpretations of the world and, therefore, of reality. This would explain, for example, beyond establishing the existence of male or female plants, or comparing gametic cells of other living beings with humans, establishing flagellate gametes as masculine and immobile gametes as feminine. We have reduced forms of life, bodies outside of our own, to a projection of ourselves. And, in a fragile way, we have based ourselves in

science to eliminate this stance that reinforces the effects of a specific, artificial and limited regime of truth empowered by modern science discourse.

This same logic can be seen in the heteronormative social reality regarding a binary understanding, by some, when it comes to referencing, understanding and/or interpreting issues related to the debate on the construction of gender and sexual identities. The male/female biological dichotomy is not sufficient to explain or end the discussion of this issue. In this sense, the problem that is posed within science – and Science Education – is the problem of otherness, recognizing the other, which ultimately leads the discussion to an ethical-aesthetic dimension.

Referring to Biology as a scholarly discipline, we must, first and foremost, highlight its importance as a bioethical and biopolitical foundation. This means that a biological education should contemplate life beyond its *zôé* conception, but from its bios conception. In other words, this should be done regardless of exploring themes related to the organicity and physiology of living beings (or, according to Giorgio Agamben (2010), to a naked life), discussing life in a public sphere, as a form of political inclusion, and addressing issues related to ethics and morals, thus addressing issues related to the individual and the collective. Bios is life in society, the essence of organization for living in the Greek polis.

In other terms it means to say that is impossible to understand heterotopic bodies without approaching the discussion to life and its power expressed by the bios concept, although Science Education, throughout its consolidation and legitimization as a field of action for researchers and teachers, has been reduced to teaching concepts related to the structure of living beings, to *zoé*.

This prevents the opening up of spaces for other types of reflections that can make us question the place of the other, the different, the singularities and, therefore, the forms of resistance – the heterotopies and heterotopic bodies – within the discourse of science. Without a space for sensitization, without an aestheticization of science, how can we produce other debates, other possible realities? In coming together with otherness, we must produce

new/other forms of body comprehension that enhance the reality of Science Education in its respective field of research and teaching.

In the book entitled *Ethics and Education* (2014), Nadja Hermann points out the strangeness that results from confronting the other and the dialectical problem between the self and the other, which implies a difficulty in recognizing otherness. The author emphasizes the ways in which we are attracted, disturbed and summoned to welcome the other and how, in this process, we are surprised to discover the other who lives in us. The question posed by Hermann, which constitutes the interface between ethics and education, is an invitation to analyze the realities of self and the other, questioning the elaboration of universal values and their relationship with the produced singularities. Or, it is a motivation to think about how to educate for a common world, leaving space open to create the other, to forms of resistance and its processes of singularization.

Science teachers do not seem to be concerned with the production of a better understand about difference. In this case, the diversity that is expressed by heterotopia is neglected. This implies the ethical question brought by Hermann (2014) making it seems scientific knowledge has nothing to do with accepting difference or living with diversity. The excessive biologization of life make us less human and easier to be governed. That is why is important to recover the sense of bios. However it is impossible to do so without consider and giving visibility to heterotopies or heterotopic bodies.

In the case of science, these are pertinent questions, since like any field, the scientific is based on universal conditions. They are the boundaries between science and non-science. However, its structural rigidity cannot be so excessive as to make it inflexible, which would prevent it from modernizing. In this sense, taking Science Education as an extension of science, but in a broader sense regarding individual conduct within aspects related to knowing how to do, as well as knowing how to be through science, we claim that any and all science classes should be taken as an event in order to be able to develop an ethos capable of producing forms of self-recognition and self-determination of the other. This process implies an ethical-aesthetic that is

open to otherness, within science, where the debate about the body is also be placed.

As we know, the heterotopic body as a form of resistance is opposed to the utopic body. However, it is only perceived in the extent of its difference in contrast to the model, with the pattern of a constantly pursued utopic condition. The problem we have observed is that neither science – nor Science Education – has produced possibilities for an ethical-aesthetic discussion. On the contrary, both assume a perspective of aesthetic refusal, pushing the field away from a sensible discussion. This is not about denying heterotopic bodies, but about not talking about them. For example, we could claim there is a desecration of the heterotopic body that does not follow the logic of constructing gender identities and sexuality that biology teaches – and insists on confusing – regarding its emphasis on the biological determination of sex by chromosomes. This creates a confusion that has misled the use of scientific concepts.

Aesthetic refusal is a kind of exclusionary mechanism, according to the term used by Bourdieu. Usually, it is characterized as the non-discursive, the unsaid. How can Biology become a bioethical and biopolitical foundation if it does not fulfill its social role by addressing, within science, pressing contemporary issues? How do we position ourselves in relation to understanding the body in the socio-political and cultural sphere if science abdicates the real meaning of difference or diversity, no longer being a possible topos for the construction of an ethical subject?

Here is a question that appears to be paradoxical. In the case of Biology, the concept of difference is crucial for supporting Darwinism as a whole, that is, all evolution. Without differences, there would be no natural selection. Evolution is a dialectic of life, which takes differences not only as a point of arrival, but also as a point of departure. Diversity is the open-ended synthesis of the evolutionary process (Ferraro, 2019; 020).

However, the space for differences closes when we observe a science that dichotomizes possibilities. Also, as pointed out by Hermann (2014), the confrontation between opposing parts is a metaphysical inheritance: body and soul, reason and unreason, civilization and barbarism. Modern Science insists



on playing the binary game of true and false, or, regarding identities, of being or not being, in their positivity and negativity, respectively. The point is that, while one of these sides is always converted into an idealization, as a positive form, the other, which does not seem to constitute a rational alternative, becomes a negative proposition.

The heterotopic body here is what emerges as a resistance and, therefore, as a difference, which is taken as negativity within scientific discourse, when in fact it is pure positivity. This is because, as we have already noted, it is an identity that is produced from a difference and not the other way around. It is this body that appears as a seemingly unreasonable alternative. Rational for science means determining gender and sexuality by reducing the biological determination of sex to chromosomal identification in a genetic, molecular order. This is what is rational for science, or evidence: a positivity. However, as a mechanism of aesthetic refusal, both science and Science Education refrain from further developing the discussion. It would be necessary to show the differences between the biological determination of sex and the performativity of gender and sexuality involved in the construction of identities.

With this essay, we intended to highlight the necessary role of Science Education committed not only to a purely scientific and conceptual viewpoint, sometimes decontextualized from reality, but also to another view, that contemplates an ethical-aesthetic dimension. Therefore, we understand that the problem of the body should take on a central role in this discussion, because the knowledge of self and the other evokes a desire to learn more. Thus, the obligation of the educational process is fulfilled: education as a possible encounter between alterities, whose purpose is to recall the self and the other, their human conditions and, therefore, their imperfections.

By assuming the heterotopic body as the object of discussion, an approximation between the scientific and philosophical debate becomes viable, with Education as an interface. In other words, it is about expanding the educational possibilities related to Science Education considering the aesthetic field to be essential in the perspective of accumulating a symbolic capital that, in this case, is scientific. Thus, the inability to separate the ethical-aesthetic

dimension from the technical-scientific domain is clear when the desire of Science Education is to enhance the production of a scientifically literate subject.

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