Human dignity affected by environments created through digital tools

A dignidade humana impactada por ambientes criados através de ferramentas digitais

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Abstract

By focusing the discussion on human dignity and built spaces, this article is divided into two parts. In the first one, we present a philosophical analysis of the bases of the method and of digital tools, seeking to show how René Descartes' metaphysical premises have been transformed into tools that submerge individualities and homogenize urban aesthetics. In the second part, we analyze neuroscientific research related to the human capacity to decide. We conclude that the built environment is an active element in the formation of such capacity. In view of this, the use of digital tools to create architectural spaces, without knowledge of their philosophical foundations and limits, may be contributing to mass society, manipulable and potentially diminished in its dignity.

Keywords: dignity; architecture; software; neuroscience; René Descartes

Resumo

Ao centralizar a discussão na dignidade humana e nos espaços construídos, o presente artigo divide-se em duas partes. Na primeira, é feita uma análise filosófica das bases do método e das ferramentas digitais, procurando mostrar como as premissas metafísicas de René Descartes transformaram-se em ferramentas que submergem individualidades e homogeneízam a estética urbana. Na segunda parte, é feita uma análise de pesquisas neurocientíficas relacionadas à capacidade humana de decidir. Conclui-se que o ambiente construído é elemento ativo na formação desta. Diante desse quadro, a utilização de ferramentas digitais para a criação de espaços arquitetônicos, sem o conhecimento dos seus fundamentos filosóficos e de seus limites, pode estar contribuindo para uma sociedade massificada, manipulável e potencialmente diminuída em sua dignidade.

Palavras-chave*: dignidade; arquitetura; softwares; neurociência; René Descartes.*

Introduction

The current concept of human dignity results from a combination of understandings that have developed over the centuries. From the Roman idea of dignity as a unique set of functions that some people had, with the concept serving to differentiate them, to its current format in which human dignity, proclaimed in the Universal Declaration of Human Rights, is associated with universal equality (UN, 1948), the concept of human dignity remains polysemous to this day (Frias and Lopes, 2015). As the word has distinct meanings and scopes, it is important to clarify in which understanding we can state that dignity can be altered by external factors – for example, the built environment.

Among countless discussions, those arising from the Law provide a more direct understanding of the matter. According to Frias and Lopes (ibid., p.660), it is possible to assume that dignity "has three different but interrelated meanings: the definition based on an intrinsic property, the definition based on external conditions (summarized in the idea of existential minimum),[1] and the definition based on acquired properties (especially personal autonomy)". The intrinsic property derives from the religious framework, which results from the Judeo-Christian tradition that provides the human being with a special condition in creation, as humans were allegedly "made in the image and likeness of God" and, due to this, their dignity is innate (ibid.). Dignity associated with external conditions is related to the historical framework, especially the period after the Second World War, and is connected with the State's tasks in promoting dignity and guaranteeing the existence of certain minimum conditions in the human being's standard of living, so that they do not lose dignity (and become undignified). The third meaning of dignity is related to the philosophical framework and associates human dignity with autonomy.

On the one hand, it is evident that, when I state that the built environment affects human dignity, I am not talking about intrinsic dignity, as it results from an evolution of humankind that recognizes human equality without distinctions and without racial hierarchization; such dignity is an inalienable and unalterable human characteristic. On the other hand, concerning the two other dimensions of human dignity presented here, it is possible to perceive that the action of the built spatiality can determine both their improvement and their degradation.

The discussion about dignity associated with external conditions begins with the argument that human dignity can be understood as the reflex of minimum conditions necessary for its existence and their absence can submit certain individuals to "feelings and behaviors beneath what they are capable of, and they are treated as objects or animals" (ibid., p. 661).

Luciano Coutinho brings the discussion to the sphere of the responsibility of the architect and urbanist's craft:

> In an initial reading, we assume that the architectural features are responsible for a type of formation of humankind, not only in the psychological sense, but also in the physiological sense. The reader may consider the latter an exaggeration,

> but suffice to say that a location with an open sewer that obligates its co-inhabitants[2] to step on it on a daily basis will produce rough feet, deformed by fungi. This reading is not prejudiced against needy places nor against its co-inhabitants; rather, it is a cry of revolt against the politics of misery, in which architecture and urbanism projects and plans of public policies still favor, as a rule, only the economically privileged. In the psychological sense, for example, the mere absence of a bridge can segregate a portion of a community in such a way that their view of themselves can be affected and diminished. Many times, a portion [of the community] with this type of segregation characteristic finds its apex of dignity and inclusion inside a religious temple. (Coutinho, 2021, pp. 48-49)

In this analysis, based on the definition of dignity associated with external conditions, Coutinho defends the importance of understanding the conscious assumptions that the planners of urban spatialities need to make, so that it is possible to know exactly what is being tackled as far as cities are concerned. It is not just a matter of organization and optimization of spaces; it is necessary to change the co-inhabitants' dignity, seeking, by means of architecture and urbanism, to promote and amplify their perception of dignity. A point that I hope to demonstrate fully in this article.

To achieve this, it is necessary to reflect on the third definition – dignity associated with autonomy – and on its relationship to the use of digital tools in the design process of architecture and urbanism studios. Dignity associated with autonomy has its foundations on the rationalism started by René Descartes and amplified in the 19th century by German philosophy. According to its premises, human beings have dignity because they are capable of giving purposes to themselves, instead of submitting to their instincts. Because humans are able to determine their way of life, they become autonomous; however, so that this capacity is not reduced to the fulfillment of their desires, it is necessary to act according to *reason* and in accordance with duty.

These are the foundations that connect the concepts of dignity, reason and autonomy and, consequently, relate dignity to the capacity for making decisions. Artistic creations in architecture are, among other things, the aesthetic choices that are made in the development of projects, and this is exactly the problem underlying the analysis of dignity and autonomy: understanding that, by associating autonomy with the development of human rationality, the choice is understood as the capacity to rationally process countless alternatives and propose one that results from the best recombination of data. In this understanding, algorithms and processors would be the most capable to make these choices; however, in my view this is a mistake, at least regarding artistic creation. The limits of reason concerning choices related to the artistic creation of architectural spaces that will shelter human beings who will be affected by them emerge, firstly, when we analyze the foundations of rationalistic philosophy and, secondly, when we understand the neuroscientific research on emotions and decision-making.

In light of this, I propose here a discussion on the limits of the use of software programs in the creative process of architecture and urbanism studios, based on the diminution in human dignity associated with external conditions – when humans are submitted to the

massification of spaces and thoughts - and with acquired properties - which, interacting directly with autonomy, affect the human capacity for decision-making and artistic creation. Thus, instead of contributing to the transformation of humankind, they foster the maintenance of manipulation and massification structures.

The limits of the method: the foundations of rationalistic philosophy

The association between autonomy and human rationality was well developed by the philosophers of the 19th century, but its origins date back to the 17th century, with the modern philosophy of René Descartes. The Frenchman was the one who proposed the foundations to the entire methodological thought, grounded on the rationality of the mathematical technique. The foundations support the premise that what defines the human being and determines their capacity for being an end in themselves is their rationality, defined as their capacity for overcoming all their instinctive, emotional or sentimental tendencies by means of the force of logical, clear, and distinct arguments.

I am not questioning, in this article, the importance of autonomy for dignity, as I agree that the former is a fundamental dimension of the latter. What I am trying to argue here is that the failure to understand the scope and limits of what is meant by autonomy, whose definition is grounded on Cartesian philosophy, has been inducing humans to cripple themselves, when they believe that software programs can replace them. The reason for this belief is that the technological efficacy of such tools has become more powerful than that of the human brain in the processing of technical information and strictly rational data combinations. Due to this situation, two distinct phenomena are happening simultaneously: a) the first creative choices for architectural and urbanism projects are no longer being made by humans; it is being performed by software suggestions;[3] and b) with this, human dignity associated with autonomy is being gradually eliminated.

Debating the limits of the utilization of mathematical tools, especially software programs that replace the drawing board, does not involve the demonization of the former and the worship of the latter, as both are equally instrumental. Instead, what I present here is a discussion about the limits of human perception during the process of architectural creation.

The robustness of the pragmatic methodological framework of mathematics (and of its tools) and the need to meet demands and requirements that are also practical hinder the understanding of the artistic components that can inhabit architectural spaces and buildings. Such technical appeal, necessary and intrinsic to architecture, seems to insist in preventing architecture from having a more reflective understanding of the limits of its technicalization. This has been allowing technological tools to mask, distort, and overcome the architectural capacity for participating in the process of artistic creation in a more aesthetic and less technical sense.

One example, but hardly the only one, of this kind of excessive utilization in the creative architectural process can be seen in the use of Midjourney (midjourney.com). This open and free platform proposes to “create”,

by means of recombination, different artistic projects – among them, architectural projects. The commands are words in a certain sequence, which generate, in a few minutes, a new "project". Each generated drawing belongs to its creator, who owns the right to use the image – without any cost. For illustrational purposes, I present below the image that I created using the software, based on the following commands: *church like building with vitrals on top of a mountain, Christian, modern, 8k render, photo realistic, ethereal, architecture* (Figure 1). After the request for reprocessing, the second suggestion came up (Figure 2). The entire process lasted no more than five minutes.

One of the difficulties in understanding the issue of "creative" limits, as the drawing created by the software seems to be innovative, lies in the confusion between innovation and sophisticated collage. I call sophisticated collage the refined combination of ideas already presented to humankind, which can only be "built" by the software because they are based on what already exists and is given in the artistic world. Creation and innovation have another nature, because, besides representing a creative leap – the creation of something that is not placed in the world yet –, they have another objective that is much harder to fulfill:

Figure 1 – Midjourney platform image

Figure 2 – Midjouney platform image reprocessed based on the image of Figure 1

> [The] true artistic expression is that which, positively or negatively, touches the human spirit so deeply that, after we become its creator, we seek to change ourselves, our reality, and even, in a naive and childish feeling, the reality of the world that surrounds us [...]. (Coutinho, 2021, p. 42)

The lack of understanding of what is meant by artistic creation in architecture emerges, paradoxically, in the comprehension of how schools of architecture were formed in the modern period, when the teaching of architecture attempted to become more accessible.

When the first schools were created[4] to approach specifically the architecture theme, the education of architects was connected mainly with a technical professional education based on René Descartes' natural and rational philosophy. The education of architects included knowledge of previous concepts that should be absorbed and archived in their personal baggage to enable creation based on something that had already existed as a past model. The assumption was that greatness and perfection were based on the arts that had already been considered masterpieces in Antiquity (Greek and Roman art). Based on these data and on philosophical improvement grounded on rationality, a well-defined concept of creative process in architecture was developed: "[o]nly mathematics can guarantee certitude, while geometry is the basis of all beauty" (Kruft, 1994, p. 129). Due to its proximity to technical perfection, architecture was gradually improved and valued, and started to be practiced according to instrumental and technical precepts.

Since Vitruvius (Vitruvius, 2007), there has been a concern about technique, method, and replicability, and the outset of the association between artistic beauty and geometric harmony also comes from him. This search for a truth that could be applied to the most different areas of human knowledge has been openly absorbed by the schools of architecture since their foundation. The *Academie Royale d'Architecture*, founded by Colbert in 1671 (Kruft, 1994), based all its discussions on the principles derived from philosophy and the natural sciences "in the spirit of Descartes' rationalistic philosophy, the basic principle of all the discussions was reason" (ibid., p. 129). Even when François Blondel submitted the question about "good taste in architecture" to be discussed by the Academy, the provisional conclusion was that "good taste was anything that pleased intelligent people" (ibid., p. 130). That is, the aesthetic question was submitted to the authority of an intelligence associated with philosophical rationalism.

Moving forward in time, we see J. L. Durand (Durand, 1805) publish, in 1805, a compendium of lessons on architecture based predominantly on the rationality and functionality of the constructed building.[5] He defines art as an improved succession of technical applications.

> Architecture is, at the same time, science and art; as science it demands knowledge, as art it demands talent. Talent is but the correct and easy application of knowledge, and such correction and easiness can only be acquired by a continuous exercise, by multiple applications. In science, it is

> possible to know a thing perfectly well after being occupied with it only once, but in art, it is only possible to know how to do something well after doing it a considerable number of times. (Ibid., p. 1)

Durand was a teacher at the Polytechnic School of Paris and, as such, his main concern was the education of new architects. He tried to broaden the discussion about the aesthetic side of architecture but, even so, he associated it with utility: "The objective of architecture cannot be to please, but utility" (ibid., p. 5). Utility is an issue that also lies in the rationality of the observation of economy and layout.

> Layout is in all cases the only thing with which the architect should be occupied, for it is as convenient and economic as it can be. This will lead to the birth of another species of architectural decoration truly made to please us, as it will present the faithful image of our satisfied needs, a satisfaction to which Nature has added the most truthful pleasures. (Ibid., p. 7)

Discussions about the aesthetics of architecture started to orbit the metaphysical and philosophical foundations of Descartes' rationality (Kruft, 1994, pp. 158-159) and, in the middle of the 20th century, the perception about architecture still reflected this reasoning.

One the greatest architects of the 20th century, Le Corbusier (1887-1965) reflects on creation by rational elements. When he traveled across the Mediterranean in 1912, he wrote in his journal about his fascination with some elements that, later, would become registers of his world-renowned architecture. "He was enthusiastic about straight, asphalt roads, about 'the magic of geometry', about houses built on supports ('pilotis'), about the Parthenon, regarding which he praised the mathematical symmetry" (Kruft, 1994, p. 396).

This progression of understandings about architecture is grounded on an important philosophical discussion - the discussion about truth. Philosophy is concerned with the search for knowledge. Due to this, the search for truth, or at least the search for the premises that can prove that a received information is true, becomes a permanent philosophical search.

As the technique (software programs) tends to propose that its truth premises can be applied also to the environment of artistic creation in architecture, the discussion demands the review of the philosophical principles that support it, in search of an explanation for why truth is connected with only one absolute understanding, determined by a type of certainty.

When we deal with research on truth, a question underlies every study: the difference between truth and truth-certainty. The common reasoning, today, is that knowledge of truth automatically brings certainty. The correspondence between truth and certainty prevails, for the most part, because the tools that were developed to measure and quantify the world's phenomena enabled the prediction of events, their repetition, and indicated the constancy and permanence of a supramaterial truth.

However, it is perfectly possible to be certain about a point, but such point does not correspond to the truth.[6] The discussion about planetary movement and Heliocentrism[7] shows the difference between truths and

was, in a certain way, the cause that led René Descartes to propose his philosophy, with the following objectives: liberate scientific research from the censorship of the Catholic Church, allow knowledge about truths to be accessible to all people, and propose a method that ensured that the information corresponded to certainty, and, therefore, to truth. The exercise of devising a different model for truth that goes beyond mathematical correction requires a change in paradigm.

A traditional definition of truth that is still quite accepted today comes from Latin and leads to a technical view: veritas est adaequatio rei et intellectus.[8] This definition assumes adequacy of the object to the intellect; therefore, to reason. In this paradigm, truth is essentially unchangeable, permanent, and separated from materiality; something that is beyond sensory perceptions. Due to its immateriality, the essence of truth can only be achieved through intellective reason, which, in Thomas Aquinas, happens through a theological process, despite his attempts to rationalize medieval philosophy. René Descartes, however, changes, in this principle, the idea that mathematics guides the subject's reason to make his intellect recognize, in the thing, the truth. The conception of truth and of its infallible instrument of apprehension was presented in a reasoned way by Descartes, who changes the theological method of connection between thing and reason mediated by God to a rationalistic method that proposes the connection between thing and reason mediated by the subject (Descartes, 2015). By means of his metaphysical principles, Descartes builds the solid bases of scientific methodology and, with it, the paradigm of truth that has been adopted to this day.

However, Descartes' original proposal was not to make a philosophy treatise nor to present a new reasoning for western metaphysics: he wanted to find philosophical bases to support his theories for his physics work (Descartes, 2009). Descartes' main work was his theory to explain the world's phenomena, using the method that he developed and, above all, the new tool: analytic geometry, in which void space did not exist.

When Galileo was convicted, Descartes suspended the publication of some works,[9] which were ready, and released the metaphysical foundations that would make his work, as a whole, viable. He wanted to show that his theories were compatible with the doctrines of the Catholic Church and that, after being debated and accepted, they would open space for the introduction of his work.

The meaning of all this to the discussion on the limits of the artistic creation performed by software programs (mathematics) emerges in the observation of the fundamental foundation of Descartes' philosophy: his method was grounded on the existence of continuous space. Therefore, with his method, it would be possible, within a full universe, to explain all things, known and unknown. The only thing one needed to do to achieve this was to decompose events in an orderly way, like links in a chain, until they found a minimum basic unitary structure to, based on it, recompose the phenomena to construct the truth-certainty about that universe.

Such decomposition in search for the minimum unit was a process that resembled moving along a chain, link by link, until one arrives at the unit of an idea (which cannot be doubted because it is evident in itself) and, from it, goes back through logically connected sequences and becomes certain about the truth of the object.

With this explanation of what his method meant, it is possible to understand the need of homogeneity that he places on the world, in the spaces of ideas and, essentially, in his most important mathematical instrument to plan space: the Cartesian Plane. It is constructed by the intersection of two orthogonal lines; the space is homogeneously divided, and the curves will be traced and referenced until a basic universal unit is found on it to quantify the event. Everything connected, without leaps.

Inside Descartes' Cartesian Plane, there is not the possibility of absolute creation, represented by the leap from 0 to 1,[10] so as to pass from the thinking substance to the extended substance in an ontic way. This issue had been decided, to Descartes, within the mystery of the divine creation of man and all things, and would be a matter for theology, not applicable to the method. As the issue of the leap was placed in the sphere of res cogitans, it would not be achievable by the method.

The problem emerges here: artistic intuition, the creative leap that is symbolized by the passage from zero to the unit, was not in the method's jurisdiction. Simply, the method was not developed to act in this sphere.[11] To Descartes, it is not that discoveries and creations would have to be discarded; it is simply that, within the physical world that he theorized, the method would serve to validate, in the truth-certainty, what came to be proposed, having as a point of departure the elements that had already been given and disposed in the world. The "creations" arising from the method, from geometry and from the technical tools that used it (including today's software programs), would not be original in its absolute sense; they would be just "re-creations" based on the recombination enabled by the discoveries of the laws obtained in the method - which could not, according to Descartes, overcome the limits of human rationality.

When Pascal, Leibniz, and later, Newton showed that the space is not continuous, that is, the void exists and Descartes' physics theories were unsustainable, one might think that the validity of the tools that illustrated this hypothesis of the world would also be relativized in its absolute pretensions. However, when experimentation proved the existence of the void and the theory of full space was invalidated, neither the validity of analytic geometry, nor Descartes' scientific method were philosophically revisited.

Nevertheless, this reading deserves greater attention. The method's validity and the certainty of the results that it brings indicate it has validity in extensiveness, but no longer in the absolute of the truth that goes beyond ontic reality. The possibility that supported the character of absolute validity to the truth of the method could no longer be admitted, because homogeneity, an essential condition to the continuity of the connection of the minimum unit, no longer existed, but the relative validity that the method brought to extensiveness remained and progressed in another way.

Based on this relativization, other thinkers made new contributions that gradually progressed to an algebraization of reality, but not in an abrupt way - initially in a smooth progress, to amplify the reach of mathematics, and subsequently, to attempt to overcome its limits (Brunschvicg, 1993). When the robustness of the results of the mathematical instrument became stronger than that of the set of philosophical thoughts that limited mathematics in its intention of absolute truth, it initiated its own journey (ibid.) of intention of an absolute conceptual definition of truth. Thus, mathematics freed itself from the philosophical ties that supported it and started a journey of distortion of its reach, seeking to access areas of human existence that do not belong to reason.

Paradoxically, it is through the development of technologies and research based on the method but conducted by scientists who know its limits that the early moments of artistic creation are now attributed to physiological elements developed by human evolution over thousands of years, which are associated with emotions and feelings. These, together with other essential elements to the survival of primitive living beings, are researched by neuroscience and form what António Damásio calls somatic markers, which determine – before any conscious processing can be performed by the human mind – our decisions.

The limits of reason: the neuroscientific bases of emotions and feelings

One should not endeavor to combat the scientific method, as the history of humankind shows that only the ideas, philosophies, and political thoughts that embraced the advances that human intelligence conquered with great effort remained standing. Therefore, the discussion on artistic creation must be able to deal with technology and overcome it, instead of denying it. It is at this specific point that we realize that the well-conducted scientific search is capable, by its own means, of finding ways to respond to this dilemma, and even points to the limits of reason. Current research in the new scientific frontier, neuroscience, brings an abundance of information on a daily basis about different areas, and I highlight the studies that are being carried out by Dr. António Damásio's team.

In his work *Descartes' Error* (Damasio, 2012), Damásio presents the result of research into the human capacity to make decisions. In this work, he presents the concept of somatic markers and argues that they are the first instance of the human capacity to decide. These markers are elements of the human physiological organization that compose our structure much before the existence of any conscious processing capacity. According to

Damásio (ibid.), before his studies, it was believed that the human capacity to choose was exclusively associated with the human capacity to reason, understood as the set that encompasses knowledge, attention, memory, impeccable language, calculation, capacity to perform abstractions and logic exercises (ibid.). However, his research has pointed to an entirely different path. Instead of pointing to reason as the first instance in the determination of what human essence is, the neuroscientist defends that "the reasoning system has evolved as an extension of the automatic emotion system, with emotion playing many roles in the reasoning process" (ibid., p. 16).

Understanding this hypothesis is fundamental to comprehend that the spaces that are being built based on the "creative" suggestions of algorithms represent a risk to human autonomy. In the long run, such spaces can make their co-inhabitants become mass beings, manipulable and with diminished dignity.

Emotions, feelings and somatic markers

To understand what somatic markers are and how they function (ibid.), it is necessary to understand the definitions of emotion and feeling. The fundamental difference regards consciousness of body changes. According to Damásio, emotions are bodily reactions or behaviors and are subdivided into primary and secondary emotions; feelings, in turn, can be originated in emotions or not. Generally speaking, "all emotions generate feelings, but not all feelings originate in emotions" (ibid., p. 138). It is based on this division that we can understand how somatic markers aid decision-making.

Primary emotions are associated with an innate pre-programming of the human species, and some of the most basic ones are anger, fear, joy, sadness, and disgust (ibid., p. 144). These emotions are common to all healthy humans, and it is upon this type that the other emotions can develop. According to the neuroscientist, this first system of emotions was probably developed over the course of evolution and is associated with a set of responses that commands bodily reactions in an extremely efficient way to guarantee the body's survival. However, this primary system of emotions is not sufficient to explain the large variety of emotions triggered in the body, which are called secondary emotions and, unlike the primary ones, occur in a conscious level (ibid.).

According to Damásio (ibid.), this second group of emotions is associated with other processing mechanisms that occur, firstly, in a conscious level and, subsequently, are detected by the limbic system, which, in turn, triggers bodily reactions. Another characteristic of this group of emotions is that, unlike the first one, it has elements and characteristics of acquired knowledge. In a summarized way, Damásio's proposal for the processing of the second group of emotions is the following: initially, deliberate and conscious considerations are made (for example, news about the death of a friend). Based on this information, mental images (non-verbal or verbal) are formed,[12] located in

different sensory cortices in an autonomous way. After these images are formed in a non-conscious level, the networks in the frontal cortex react automatically and involuntarily, and send signals to the limbic system.[13] Here, however, it is important to highlight that the reaction to the images formed by the received information occurs according to how previous experiences were associated with certain emotional responses, that is, the reaction a person will have depends on how they have processed other previous and similar situations (ibid.). Therefore, it is an acquired, not an innate processing that can vary a lot or a little in relation to other people.

This structure of interdependence between emotion processing levels is based on the theory of dynamic monitoring of the body – homeostasis – (ibid.). In it, information on different bodily states and different decisions that must be made for maintenance and survival are all being received and their responses are being altered in real time. The importance of this processing seems to be more evident when we approach how feelings use this processing.

Still according to Damásio (ibid.), feelings can originate in emotions or not. They can be divided into feelings of basic universal emotions (whose origin would be in primary emotions), feelings of subtle universal emotions (whose origin would be in secondary emotions), and background feelings, originated in background body states. The latter would be feelings that correspond "to the body states prevailing between emotions" (ibid., p. 145) and are compared to the very feeling of existing. These background feelings function as a dynamic basis that is relatively stable when the body is in balance. Although this basis is never static, it works with few alterations and allows the body to have clarity (but not consciousness) of its state at each moment. It is against this backdrop that the other types of feelings will manifest themselves, and it is the comparison between the background state and the other states that enables the construction of information that will be processed by the rational and conscious parts (ibid., p. 148). The mechanism through which this processing happens is described by Damásio as a comparison between images (background images and those formed by the processing of emotions); according to him, these images are generated and conserved by distinct neural circuits and remain like this so that there can be a juxtaposition, in which the differences point to the information.

In the research developed by the neuroscientist's team, this processing mechanism that associates emotions, feelings, and cognitive processing was found to happen before the conscious cognitive processing. Research with brain injury patients has enabled to observe how emotions and feelings act in human cognitive and rational processing, especially in relation to decision-making.

Based on the analysis of a patient named Elliot and on the case study of Phineas Gage[14] (ibid.), it was possible to understand that the decision-making process is not related to the exclusively rational human processing: it needs a previous emotional/sentimental processing. This finding led to the somatic markers theory proposed by António Damásio.

Somatic markers are the bodily indications that derive from the "use of feelings generated by secondary emotions" (ibid., p. 163), and are constantly used for decision-making. According to Damásio, these markers function as the first "filters" to evaluate countless alternatives that can be chosen. After this first emotional selection, the rational part can choose among a lower number of alternatives. This function involving feelings and emotions is what characterizes a human being's normal functioning, and research with brain injury patients has shown that it is an essential activity to the exercise of autonomy (ibid.).

Thus, dignity associated with autonomy grounded on the processing capacity of a cold and highly functional rationality – a model of rationality that eliminates emotional and sentimental considerations as suggested by the method and which is the basis of the construction of software programs and algorithms used in different areas – is not a balanced human activity. Rather, it is the mode of functioning of a human being with brain injury.[15] Due to this, although it has importance and even a certain value in the execution of repetitive and mechanized tasks, to the development of artistic creations in which the subjectivity of decisions and choices marks the human being's attempt to overcome their own reality, it is the antithesis of what is sought.

Having addressed rationality and somatic markers, I will now resume the discussion about the last point related to human dignity: dignity associated with external conditions. The relationship of this issue to the discussion of this paper is that somatic markers are developed from secondary emotions and, therefore, are acquired throughout different life experiences, including the physical environment:

> Somatic markers are thus acquired by experience, under the control of an internal preference system and under the influence of an *external set of circumstances* [...]
> The set of *external circumstances* encompasses objects, **the physical environment**, and events in relation to which individuals must act [...]. (Ibid., p. 167; our emphasis)

Thus, the bases that are used in the processing of choices made by humans, those related to their autonomy and dignity, are grounded, among other factors, on the spatiality that shelters them, especially in childhood and adolescence (ibid., p. 168). The determination of this spatiality will bring consequences to the emotional bases that will be stored in the form of mental images and which will make the feelings arising out of these secondary emotions form the first "filters" of their cognitive choices.[16]

The implications of this are too important to be minimized. The spatiality or the environment that human beings inhabit is one of the factors that influence the formation of the emotional structure that will be the basis for the selection mechanisms (somatic markers) that will filter, among countless possible alternatives, those that will be presented to the rational and cognitive part, so that choices about different subjects are made, in an individual and/or collective way. The somatic markers do not make the decisions

and the action of rationality is essential, as it was described above. However, the central point is that the framework of the cognitive information acquired through formal education is part of the second level of decisions, when they were already filtered by the emotional processing developed and stored in the form of somatic markers. Furthermore, according to Damásio, this processing is not static and can be altered throughout life, but its main formation is made by the culture, spatiality, and emotionality of the first period of life.

A constructed spatiality based on suggestions of mathematical algorithms has a direct impact on human dignity. This statement can also be analyzed under the perspective of how the result of buildings constructed within such an excessive rationality affects the emotional development of their co-inhabitants and, thus, affects their dignity associated with external conditions.

Based on Damásio's neuroscientific research dedicated to emotions, other researchers have focused on aesthetics, specifically involving architecture. Alexander Coburn, Oshin Vartanian and Anjan Chatterjee have argued that the architectural aesthetic experience has a significant influence in human life (Coburn, Vartanian and Chatterjee, 2017). According to them, the emotions that are triggered when we look at a beautiful architecture are mediated, to a large extent, by the brain's reward circuit (ibid.), which, according to Damásio's studies (2012), is the first former of mental images (emotions) that will serve as the bases for cognitive development. In this study, the aesthetic qualities of architecture were not evaluated; the focus was the neural effects that subjective evaluations of architectural beauty triggered in the brain. The objective is not to engage in discussions about beauty (although the stimulating research carried out by Semir Zeki (Zeki, 1998) and Tomohiro Ishizu (Ishizu and Zeki, 2011) points to a neural physiological basis common to the human species in the experience of beauty). Rather, I seek to show how the association of images that are formed by secondary emotions, related to survival, is fundamentally influenced by architecture.

According to Coburn, Vartanian and Chatterjee (Coburn, Vartanian and Chatterjee, 2017), the responses of most humans to built spaces interact with acceptance or rejection decisions that are possibly related to years of human evolution and struggle for survival (Vartanian et al., 2013; Coburn A. et al., 2020). For this very reason, the first reactions to an environment are influenced by an automatic and unconscious process (Ulrich, 1983), which enables to infer that there is a direct relationship between the physical configuration of these environments and the way in which we feel and act due to them (Vartanian et al., 2013).

Final remarks

Architecture is considered directly responsible for the construction and formation of the emotional bases that will influence co-inhabitants, individually and collectively. Based on Coutinho's ideas on the matter, it is possible to approach the need to recover the

importance of the aesthetic experience for social development and, regarding this specific aspect, we can reposition architecture on the center of this issue.

> Human rationality is only one form of intelligence in the cosmos. But we can say one thing about our species: we have potential for analyzing ourselves [...]
>
> [T]his possibility of analyzing ourselves enables the human being to seek self-knowledge and makes them be able to think of themselves within a greater whole.
>
> It is at this point that the first great architects sought, besides material comfort, given by the illusion of controlling nature, psychological comfort.
>
> The *sublime intuition* of the *psychai* of our ancestors began to envision new possibilities of reality. Their aesthetic representations [...] could propose, based on a creative conception, certain solutions and modifications to inhabitable spaces and to the psychological life of those who inhabited those spaces.
>
> Thus, architecture played the double role of guarding the human being against bad weather [...] and changing the known reality itself [...]. (Coutinho, 2021, pp. 92-93)

It is necessary to understand what is being problematized when the suggestions of a project are made by the equivalent to a pure rational processing. The problems of building spatialities that derive from decisions made by algorithms, whose bases lie in pure rationality, emerge in two perverse ways that feed each other: the first regards the type of emotional formation and processing of feelings that the people who will live in those environments will have; the second concerns the fact that the architects who make their projects in this way accept to lose creative autonomy.

The bases to the first problematic situation are presented in the explanation of how spatialities compose the system of somatic markers. By inhabiting spaces designed by purely rational decisions, these people tend to acquire a certain homogeneity of sensory perceptions and, depending on the premises employed in the development of the software codes, such perceptions can be used to reduce characteristics of differentiation and identity. In a highly consumerist and individualistic society, the conception of spaces adequate to a conformist emotional formatting and to the maintenance of the systems in force contributes to the maintenance of the structures, not to transformation. The fact that the bases of choices are predominantly formed in childhood and adolescence prevent the co-inhabitants from seeking alternatives that are different from those structured since their bases, or impose a high emotional cost on those who decide to do it. In the long run, the people who will play the roles of designers and decision-makers will be, in a way, fed by the spatialities that helped to form their somatic markers and will tend to eliminate, in an unconscious way, the alternatives that seem to disagree with the cultural and social patterns in which they find security and satisfaction.

The second problematic situation, deriving from the acceptance of software suggestions, is more complicated and interacts explicitly with what is understood as artistic creation. The human process of creative choice is intricate and uses both the emotional bases

and the cognitive frameworks developed throughout life. It is possible to imagine the creative process as a complex and singular process of choices, but not of random choices. What is characterized by creative choices is based on the selection of relationships between elements that, although known by all, seem to have no relationship to each other. The artist and the inventor are those that have developed a singular ability of choosing elements that, although distant to each other, reveal intricate and evident causality relationships that transform the way of seeing the world; but these choices do not happen simply in a logical way, nor are they methodologically connected. The nuclear physicist Leo Szilard[17] observed that logic and analytical ability are necessary attributes, but they are not sufficient for creative work.[18] Albergaria (2022) delves into the discussion of artistic creation and subconscious in the Freudian perspective and explains that the artist's framework of memories enables the latent idea – that is in the subconscious – to have a "material" to manifest itself in the conscious level. According to her, the ideas are in transition in our psyche (ibid.), and the passage of the material that is in the subconscious to the conscious level only happens because

> "the first [idea] occurs in some material that remains unknown, while the last [...] is, in addition, placed in connection with verbal representations" (apud Freud, 1923/2011, pp. 23-24). Verbal representations are the residues of memories, that is, mnemonic traces, anything [...] that desires to become conscious, or was conscious before, or should associate with something that was also conscious. (Ibid., p. 103)

The perception of the distance between sophisticated software collages like those used in the Midjourney platform and the emergence of the new idea appears in Albergaria's reasoning. The memories of humankind's images, projects and drawings would be the means, the raw material necessary for the manifestation of the new, which is originally unknown and can only manifest itself by means of stored images; but the creative leap has a more complex basis that has an emotional background, an issue that I have discussed in more detail before, when I argued that the creative leap has close ties with emotion (Afonso, 2019).

Thus, it is evident that the perceptions between creative connections only emerge in a transformative way to those who are cognitively prepared, and have highly developed knowledge and techniques, to allow the fusion between intuition and reason; however, without emotional processing, these connections are practically impossible. Choices made in the strictly rational sphere, as it was shown above, become infinite random combinations without truly innovative relationships. To achieve innovation, a previous emotional processing is necessary, performed by different stratifications of somatic markers, which are developed throughout countless emotional experiences that have become feelings. This is the point where creative processes happen.

By renouncing the initial creative process in their projects, architects and urbanists abdicate their personal abilities of choosing and seeking connections that can express innovations in their creations. At the same time, they accept that such spaces carry mass

information, and allow their co-inhabitants to become manipulable and potentially diminished in their dignity. This is the greatest impact of accepting software suggestions: the deliberate choice of abdicating the human capacity for developing emotional and cognitive abilities in search of new links and relationships that allow great human transformations aiming at a more dignified society.

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Notes

(1) "The existential minimum is a set of minimum performances without which it is possible to state that the individual is in a situation of indignity" (Frias and Lopes, 2015, p. 663).

(2) The term co-inhabitant reflects the idea that the inhabitants of a space do not just inhabit it passively, nor use it as impermeable beings; the term reflects the awareness – which needs to be improved – that when we inhabit and co-exist in spaces, we are all agents of their transformation and are transformed by them. Cf. Coutinho (2021).

(3) Architecture students and professionals usually report that they choose not to use certain ideas (drawings, among others) in projects because they do not know how to insert them in the software programs. In addition, they frequently report that they accept to use, for the outset of the project, the point of departure, models available in databases. By accepting to give up their drawings and adhering more easily to the "suggestions" available in software databases, they submit themselves to pre-established and standardizing choices. A very good example of this thesis is the software midjourney.com, whose tutorial for architects can be watched at: https://youtu.be/KxIrqNNw5y4.

(4) According to Kruft, the Académie Royale d'Architecture, created in 1671 in France, was the first institution to practice the teaching of architecture in a systematic fashion; thus, it was the predecessor of architecture schools. (Kruft, 1994, p. 128).

(5) According to Kruft, the different editions and translations of Précis de leçons d'architecture (Durand, 1805) made it the most significant architecture treatise from the first half of the 19th century (Kruft, 1994, p. 273).

(6) Regarding any sentence, there are always at least three possibilities: it can be true; it can be false; or it can be untrue, which is not the same of being false. An untrue sentence can contain elements that have correspondence with the sensitive and rational perception of the observed phenomenon or object, but the understanding of what is seen can be distorted by the relationship between the observer and what is observed, between subject and object (Afonso, 2019, p. 27).

(7) Claudius Ptolemy's model for explaining planetary movement was complex, but it allowed to predict the planets' position correctly. The attempt to adjust the calculated model to what was observed, added to the need to support the philosophical structure that maintained the Earth at the center of the cosmos, caused an interesting phenomenon: when divergences between what was expected and what was observed emerged, mathematical adjustments were made to the calculation of the orbits of deferents or epicycles. As a result, what was known was that the model calculated the planets' position correctly in different periods of the year. Although the model succeeded in predicting the planets' position with accuracy and certainty, it did not express truths about them. The difference between truth and truth-certainty is that the latter is grounded on mathematical predictability and, therefore, is restricted to rationality. The former, in turn, encompasses what is beyond rationality, even beyond the human capacity of perception.

(8) "truth is the adequacy of the thing and of the intellect." (Tomás, *De veritate*. Art. 1); translated by Roberto Busa (Aquino, 2007, p. 315).

(9) Descartes was deeply shaken by Galileo's conviction, as he was a friend of the Pope, but not even the pontiff could overcome the court of the Holy Inquisition. Descartes' research was very close to Galileo's. For this reason, he realized that, to be able to present it, first he would need to construct philosophical foundations to free science form the Church. This was the proposal of the method and of his first work *Discourse on the method*. That is why it was written in French (and not in Latin) and distributed to the public (not to scholars). Descartes sought the democratization and freedom of knowledge (Afonso, 2019).

(10) The origin of the Cartesian Plane is, to Descartes, the letter "O" of *origine* (origin in French). The point 0 (zero) on its origin was a subsequent interpretative extrapolation.

(11) In a letter to Mersenne, Descartes explains that the discussion about beauty cannot be defined in unique and universal terms: "You ask whether there's a discoverable essence of beauty. That's the same as your earlier question as to why one sound is more pleasing than another, except that the word 'beauty' seems most at home with the sense of sight. But in general 'beautiful' and 'pleasing' each signify merely a relation between our judgement and an object; and because men's judgements are so various, t*here can't be any definite standard of beauty or pleasingness*" (Descartes, 2018, p. 13; our emphasis).

(12) Mental images are defined as the set of perception images and evoked images that Damásio addresses in chapter 5 of his work: "In short: images are based directly on those neural representations, and only those, which are organized topographically and which occur in early sensory cortices" (Damasio, 2012, p. 103).

(13) "The limbic system is involved in instinctive behaviors, deep-seated emotions, and basic impulses such as sex, anger, pleasure, and survival. It forms a link between centers of higher consciousness, in the cerebral cortex, and the brainstem, which regulates the body's systems." Information available at: http://bio-neuro-psicologia.usuarios.rdc.puc-rio.br/sistema-l%C3%ADmbico.html. Access on October 12, 2022.

(14) Phineas Gage was a man that lost part of his brain in an accident. Although he did not lose any of his motor, cognitive, memory or abstract reasoning functions, he could no longer make decisions nor social choices. Elliot is a patient with the same symptoms, acquired after surgery to remove a brain tumor. Cf. Introduction and Part 1 of "Descartes' Error". (Damasio, 2012).

(15) "What the experience with patients like Elliot suggests is that the cold strategy defended by Kant, among others, has much more to do with the way in which patients with prefrontal lesions make their decisions than with the way in which normal people make decisions." (Damasio, 2012, p. 162)

(16) Another important aspect of spatiality in the formation of somatic markers and, consequently, their impact on human dignity regards precarious spatialities, like slums and shanties, and what they impose on their dwellers. This deep and pertinent discussion points to the importance of the formation of somatic markers in built environments, in the absence of any type of planning or use of reason. This reveals the complexity of human nature, which has and must use its rationality to develop and guarantee dignity and, at the same time, must be on guard against rationalism due to the excessive use of reason, which ends up compromising human autonomy. Concerning this matter, see the article "*Cortiços: a humilhação e a subalternidade*" (Kowarick, 2014), as well as the discussion promoted by Coutinho (2021), specifically in chapter 6.

(17) "The creative scientist has much in common with the artist and the poet. Logical thinking and analytical ability are necessary attributes for a scientist, but they are far from sufficient for creative work. Those insights in science that have led to a breakthrough were not logically derived from preexisting knowledge: The creative processes on which the progress of science is based operate on the level of the subconscious" (Lanouette, 2013, p. 27).

(18) The complexity of non-quantitative elements in the process of artistic creation involves other factors, like the subconscious. To understand how these elements contribute to the process of architectural creation, see the work of Albergaria (2022).

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