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THE DIGITAL PLATO ON ANALOGIES AND DIGITALISM IN COMPUTER-AIDED ARCHITECTURAL DESIGN

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ABSTRACT

In this text, the authors use the maieutic method, a form of literary fiction that treats it as a pedagogical method, between the Ant (Socrates) and the Grasshopper (Sophist), to philosophically analyze the relationship between technology and humanism. The questions raised aim to understand the relationship between the analog and the digital in the theoretical foundation of present-day architectural practices, for instance, Biodigital architecture. The conversation takes an analytical approach to digitalism, approximating the need for mental visualizations with regard to digital ones, in line with the emerging styles in architectural design.

KEYWORDS: Plato; Technology and humanism; Analog vs digital; Biodigital architecture; Digitalism in architecture; Contemporary architectural theory; Antoni Gaudí; Sagrada Familia, Ethics and technology

Grasshopper: [1,2] At first glance, it might seem that recent art movements such as Digital and Biodigital architecture [3-5] are more connected to technology than to humanism. Sometimes it also appears that technology could threaten [6] the survival of classicisms like Greek temples or even avant-garde European art. How do you see the conversation between technology and humanism today? Will paper books in libraries gradually disappear? [7].

Ant: Well… technology is a neutral tool, ethically speaking. That is, misusing it as a way to reduce human qualities could lead to a cultural disaster. However, its proper use as a concrete representation of human values working toward development is a crucial aspect of humane cultural evolution. [8] Not to be underestimated, this provides a better understanding of oneself, offering new opportunities for exploring inner richness [9].

Grasshopper: How exactly could it be an amoral tool?

Look around you or check your cellphone; technology and its rapid media development, for example, have led to various programs, trends, and communication methods (like Facebook) that spread certain cultures worldwide at the expense of smaller, less dominant ones. Not to say this is entirely "bad," but it has caused widespread simplification, or even the erasure, of qualities that once represented specific human values. This is very clear in the definition of present-day humanism, or new humanism, which is more committed to counteracting those depersonalizing effects [10].

Grasshopper: Hmmm… But from how I see it, this form of simplification is actually helping us develop, from the common perspective… but I'm failing to understand how technology may, in some cases, be dangerous?

Ant: If you think about it, comparing present-day lives with those of the twentieth century, technology has become increasingly embedded in the world, tending to intercept human relations at a global scale [11].

Since I've already mentioned Facebook, communication through this platform (and others like WhatsApp or Twitter) has become one of the main ways people connect. Even when we are physically with friends or family, we are still posting, liking, commenting, or messaging on this platform. We live in a highly informative environment [12] that has significantly reduced physical and emotional bonds, qualities that, at least since the last century, have been core human values.

Grasshopper: Are you suggesting that analog methods are more realistic physically than digital ones? In other words, is your explanation about transmutability [13] as a factor influencing the interaction between technology and the humanities?

Ant: Hmmm… That's a tricky question because you're viewing technology from two contrasting perspectives. "Digital," technically, defines the foundation of technology today. However, it's derived from the Latin "digitus," meaning "human finger," which is the simplest form of counting and numerals for humans based on the 10-digit system. [14] As technology has progressed, digital has been simplified for computers to understand: the binary system, a 2-digit system. [15] The binary system is the language that underpins all computers today. Semantically, it is a way of representing the physical world in the digital environment.

So yes, I am referring to transmutability… The evolution of computers has led to digital tools, unlike analog tools like screwdrivers, that operate within this digital environment. These tools, such as Adobe Photoshop, enable us to modify representations of the physical world, which, in turn, alters our understanding of it, creating the potential for misconception [16].

Grasshopper: I want to ask you about the reasoning behind this digital development. If its reductionist nature is responsible for this possibility, then digital means of communication like Facebook, Twitter, etc., would also have been impossible. What is a good explanation for favoring analog over digital?

Ant: As I mentioned, bipolarizing technology could lead to excommunication. This conceptual reductionism of the physical world has, in a sense, hidden certain qualities and, in some cases, completely erased them, sacrificing their ability to be represented in a way computers can understand. Bear with me… When the philosopher Plato developed his "binary" philosophical system—a sensitive world versus an ideal world—he risked dismissing many other realities [17]. However, this competition-based duality shouldn't apply to technological development.

On the other hand, Analog comes from Analogy (Analogia in Greek), which in Greek represents the grey scale between black and white (0 and 1 in a binary system). It originally meant proportionality in the mathematical sense and was sometimes translated into Latin as "proportio" [18]. Analogy was then understood as the relation between any two ordered pairs, whether mathematical or not. However, Greek philosophers such as Plato and Aristotle actually used a broader idea of analogy; they saw it as a form of shared abstraction. In other words, different objects might share an idea, pattern, or regularity recognized by a group of people, often

because of similar cultural backgrounds or levels of knowledge. For example, an organization chart of a company is represented as a tree because, by its nature, both (the chart and the tree) take on this specific hierarchical form that is recognizable to the group being presented to [19].

Grasshopper: Alright, I think I understand your point now, but how can we re-clarify misconceptions caused by digitalism?

Ant: Now that's the right question… earlier, I mentioned that the proper use of technology should reflect human values; however, this is symbiotic with the conception of the digital from an analog perspective. What I am trying to tell you here is that "good application" of technology implies its development digitally without compromising those values (within the grey-scale) represented better through the analog.

Grasshopper: So I'm understanding the difference between digital and analog on a metaphysical level [20, 21], but on a practical level, Digitalism has only progressed as a way to represent the physical [22], whether it's a true or altered depiction. What about current styles like Biodigital architecture and its ideas and fabrication? How could these differences help develop more human-centered approaches?

Ant: Technically speaking, digital concepts and fabrication operate on binary ideas and processes, not only in their language but also in their mode of operation, which addresses one object or idea at a time. For example, algorithms (and programs) designed to create a specific project work through a series of steps, each with a particular output based on an input from the previous step. Currently, these techniques produce good results for pavilions, showrooms, or installations; however, their long-term potential as the future of architecture remains uncertain [23,24].

Humanity, on the other hand, involves a more complex set of processes that are not binary but analogical—mainly because we all share abstractions with one another (such as "mankind"), which are mutually symbiotic. This is what Biodigital architecture lacks: the sense of abstractions that are both symbiotic and realistic. That's why Biodigital architectures are useful experiments for museographeization, but, as "compositional, frozen, and perfect realities," they lack any analogy between them.

Grasshopper: Alright, I am starting to understand your point because it seems the digital visualizations on the screens underneath those architectures are also involved. Maybe the recently developing fields of simulation, for materials or climate, for example, are adding more complex layers of abstraction or better yet, analogies, to Biodigital visualizations… does that make sense?

Ant: Hmmm... I see you are making progress, but you also touch on another intriguing topic about deficiencies in Biodigital architecture visualizations. The shift from analog to digital visualization involved fundamental questions, ranging from the role of geometric representations in architecture to the relationship between analyzing and visualizing those geometries in relation to their physical reality, and from the structure and level of their abstractions [25]. This relates to your point about recent developments in simulation, where more layers of information are being added to these visualizations. Although they are binary when analyzed alone, they work similarly as a whole.

On the other hand, these simulations still neglect human values like culture and ethics, even though their main goal is to design Biodigital architecture for humans and their growth. Ultimately, these simulations are also created by binary algorithms that generate representations of what might become real. This raises another question – is it possible to develop more humane architecture through simulations using such algorithmic programs (like Grasshopper3D) that limit the exciting potential of non-Euclidean space? Answering these questions is more about predictions or concerns than about hard facts. Nonetheless, it is true that these algorithmic programs currently operate on binary systems without any understanding of real human values [26,27].

Grasshopper: Since you mentioned Euclidean space, I think of the Italian architect Brunelleschi, who managed to visualize it in two dimensions. In fact, many Renaissance painters simulated 3D space using a geometric vanishing point (sometimes several) on an orthogonal grid that, in some way, divides the space and creates a pictorial atmosphere. I also recall another Italian architect, Alberti, who called it "Perspective," derived from "perspicere" or "to look through." In a way, they were exploring methods to simulate reality through a window.

Ant: Some Italian architects and humanists worked to connect psychophysiology (the link between the human eye and psychological perception) with the field of pictorial representation. In a way, these artists and scientists developed the art of perspective as if it were a computer program to visualize and depict the reality they perceived. Just like today, with digital architecture displayed on a two-dimensional surface—the computer screen—using algorithmic tools like Grasshopper. It's great that you linked these two ideas!

Grasshopper: It appears that two-dimensional representation has always been visual. Even when those artists developed analog techniques to visualize the real world — not to mention capturing reality — unlike architects, who envisioned concepts that had yet to exist — they only managed to activate the optical sense in humans.

Ant: You might be right, but aside from the Italians' optical discoveries that further developed in Western Europe [28], much earlier in Eastern regions like Russia, artists created a different kind of pictorial surfaces or screens that are more visually similar to our algorithmic representations. They were called "Icons," which means "essential images."

Grasshopper: So, I assume they simplified certain ideas or qualities, but how did their way of simplifying align with the human values we're trying to restore? What I'm really asking is – What other senses did they engage in humans?

Ant: In a way, they did simplify certain ideas. Icons originated from illuminated manuscripts of the Middle Ages. Russian artists started visualizing literary stories and turning them into picture-based ones. In doing so, they created a sense of space continuity between visualizing space and experiencing time. Instead of using the Brunelleschian mathematical perspective rules, which captured a single moment in time [29], they painted on a golden, abstract background with countless vanishing points, giving the space infinite dimensions [30]. This touched on one of the most fundamental social and cultural activities—storytelling. They successfully transformed a single image into a visual story that narrated events and resonated emotionally and morally with the viewer. All of this was achieved with techniques that, at the time, were considered the most advanced in art. If you think about it, it was their way of invoking the human sense of time and emotions.

Grasshopper: That's interesting... So, you're suggesting that certain cultural constructs could indirectly trigger other senses in humans. However, as I understand it, most techniques (or technologies) still primarily focus on visual aspects of reality.

Ant: Well, in the proper understanding of humanities, there is always a unity between the visual and the other senses of perception, but it's not always the case. You see, the mental image that a person has or develops when admiring those works plays a huge role in activating non-visual senses. About mental images, let me tell you about the Russian writers Dostoievsky, Chekhov, and Tolstoy, who wrote novels that envisioned reality through the five senses, not just through sight. Their texts included dozens of different characters, as in The Brothers Karamazov or The Idiot by Fyodor Dostoevsky. Reading those books takes you on a journey through the minds of each of them, their points of view, and their thoughts. While reading, you also get a mental glimpse of different scenes, even the smells and atmosphere of their surroundings. These works are not limited to the three Euclidean dimensions but demonstrate many more perspectives of the same mental image, much like traditional icons.

Grasshopper: Alright, so you said that amoral digital visualizations of geometries in architecture could threaten certain important anthropological values…

Ant: Yes.

Grasshopper: Setting that aside, you also mentioned that, for now, digital fabrication techniques are effective for small-scale projects, but their long-term effectiveness remains uncertain.

Ant: Mmmm...Yes.

Grasshopper: How about medieval European cathedrals? Even though they were designed and built entirely through analog methods, they still followed a series of patterns based on mathematical principles. In fact, these cathedrals were conceived as fractal structures in which every formal shape was used at multiple scales [31]. Doesn't that provide a solid basis for using algorithmic techniques analogically?

Ant: Mmmm… Good point. I see how you envisioned their analog techniques digitally, even though I would argue that their techniques focused more on executing humanistic ideas rather than designing them from scratch. If followed today, the 21st century could mark the rebirth of a new technological humanism, as seen in the work currently happening at Barcelona's Sagrada Familia.

Grasshopper: At the Sagrada Familia?

Ant: Yes. Gaudí deeply embraced the ideals of Medieval humanism and revived them during a time when the Industrial Revolution had mechanized people's lives. Unfortunately, he died in 1926, and his studio was destroyed during the 1936 events, leading to the loss of all his drawings and models. As a result, the project continued using restored models, his colleagues' memories, photographs, and reproduced plans that were preserved [32]**.** Today, construction is still ongoing, although it has been completed using the most advanced digital visualization and fabrication techniques.

Grasshopper: Interesting… so, they are essentially using digital techniques to carry out a project that was originally designed in an analog, or more human, way.

Ant: Certainly, and this highlights the potential for creating a new archaeology for the future [33], as all of this contributed to maintaining the continuity of what Gaudí called "my experimental method," combining theory and practice, scientific research and craftsmanship. Following his legacy, even today, every part of the Temple of the Holy Family is a product of the workshop, a research center that, despite using the latest technological tools, remains deeply rooted in the genuinely Gaudian geometric modulation — a human-centered, in a sense, system of work.

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