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IDEOLOGIES OF NATURE IN A TRANSHUMAN PERSPECTIVE: HERBARIA AND THE INVENTORY GAZE

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Titolo in italiano: Ideologie della natura in prospettiva transumana: gli erbari e lo sguardo inventariale

Abstract: This article aims to reflect on the ideologies that operate within the visual representation of nature. To this purpose, it considers the long–term tradition of herbaria, i.e. books in use since antiquity that contain representations of plants, explanations of their virtues, and harvesting methods. Herbaria is the genre in which an inventory composed by nature is visualised and displayed as grouped into taxa with differential ranks, depending on the ideological discourses of the time, concerning domains, classes, species, proprieties, etc. To embed this taxonomy in these textual artefacts, the representation of nature is conceived and designed as a transparent figuration, even though this vision is culturally codified, being historically, politically, and therefore aesthetically emplaced. After a brief visual survey of the genre, I will focus on the Byzantine *Codex Aniciae Julianae* (5th century) and how its discursive production about the system–nature materialised a peculiar visual ideology. I will later consider some contemporary artworks by Sofia Crespo as automated herbaria that question the visual patterns and expectations of what we inventory as "natural". In both cases, I will point out how representation is understood as an ideological codification, following Umberto Eco's theories, and exploring the dialectics between transparency and opacity from a normative perspective. Finally, thanks to the comparative analysis of these two inventory models, where the collection of natural types shifts from the universe of the referent to the hardware systems with which Artificial Intelligence is fed, it will be possible to account for a shift from a discourse on natural ideologies to a techno–ideology of nature.

Keywords: Artificial Intelligence, Ideology, Nature, Visual Semiotics, Umberto Eco.

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1. Representing the system–nature

Achieving a visual representation capable of being recognised within a socio–cultural environment always implies the mediation of a complex sensory experience through (i) intersubjective knowledge, (ii) shared modelling, and (iii) efficient displaying. The intersection between these three aspects translates, while negotiating and shaping, not only the ways of expressing — in terms of logics of similarity, alteration, and manipulation — but also the ways of seeing (Berger 1972) — in terms of perception, perspectives, and bias. With this in mind, the following pages will deal with a peculiar, long–standing Western representational system: the "system–nature", where the transition from the world of the sensible to the world of signification takes place. A highly codified system of simulations, visualisations, and modelling marks the epistemic boundaries of what is visually understandable and sharable as the physical world divergent from artificial creations. In this regard, the system–nature I am referring to is the result of a scopic regime that codifies, while it validates, strategies of reproduction, techniques of observation (Crary 1990), and forms of displaying information concerning a particular type of the system–nature, as plants are.

The system–nature derives from an ideological vision, i.e. nature–as–inventory, a perspective grounded in the meaningful opposition between nature and culture, on which the field of Western humanities and social sciences was founded (Lévi–Strauss 1949; Geertz 1973). In semiotics, this perspective has also been at the centre of reflections for years. We cannot fail to recall the proposal of Algirdas J. Greimas (1966), who asserted that on the one hand, there is the natural world, composed of a series of interwoven languages and, on the other hand, there is the natural language, with its specific tasks. According to Greimas, thus, there is an inter–semiotic connection between these semiotics that can be translated.

A starting point in the search for that inter–semiotics translation is considering the oppositional dichotomy as the result of an accepted convention: a hiatus that has a "shaping potential" (Lorusso 2017, p. 54), typical of ideological discourse that can be resumed through the following bias: while all living beings have the same biological basis, only humans are endowed with a tendency towards symbolic systems. In light of this opposition, culture stands based on a mythical

detachment from nature as the result of a series of cleavages, such as managing fire, creating languages, and producing artefacts, including, of course, visual artefacts.

Within these pages, therefore, I am interested in a particular cleavage at the basis of visual artefacts representing nature, designed both through a human and artificial agency. In this regard, I will aim to recognise in these artefacts an ideological discourse capable of activating a: "power of normative influence and of identitary attraction" (*ibidem*) in the terms of an inventory gaze. To inquiry this gaze, I will analyse two artefacts that diverge in statutes, one is a scientific artefact while the other is artistic, but they share the interrogation toward the inventory as a model for the translation of the system–nature

During the 14th and 15th centuries, the passage from manual copying to printed and reproducible representations marked a change in visualising and communicating knowledge that converged in a new visual ideology concerning nature and, particularly, plants. In the same manner, the current pervasiveness of automated and artificial representation is also generating a differential normativity on what we intend when referring to nature and naturalness.

The phenomenological regime of entities that exist by nature is as early as Aristotle's. Each life form, in Aristotelian *Physics*, is characterised by nature, disconnecting the entity from the habitat through an inventory of the organs that enable the performance of essential functions. In the second book of his *Physics*, the philosopher states that nature refers to that principle that produces the development of an entity that contains within itself the source of its movement and rest. The disconnection between habitat and organisms initiates the idea of a system–nature "in which species are disconnected from their particular habitats and stripped of the symbolic meanings that were attached to them so that they can exist solely as complexes of organs and functions that are part of a table of coordinates that encompass the entire known world" (Descola 2005, Engl. Trans. 2013, p. 64) The system–nature shapes nature according to a set of types to model an inventory of different entities into classes because of variations in the characteristics they possess in common with other classes of beings within the same form of life.

In what follows, thus, I will first take into consideration the long–term tradition of the herbaria, a textual genre in use since antiquity

containing inventoried representations of plants and explanations of their medicinal virtues or harvesting methods. Secondly, I will consider the artistic experimentation of Sofia Crespo, visual artist and programmer, in her *Neural Zoo* (2019 — ongoing) and *Artificial Natural History* (2020 — ongoing), two projects where she lets computer vision explore what is socio–culturally accepted as naturalness in extensive collections of data, and put it in dialogue with our visual patterns and expectations of what we recognise as natural. In both cases, we will see how the operation of representation is understood as an ideological codification to explore the normativity and identification of the system–nature.

2. The herbaria: the inventory gaze

Herbaria are manuscripts which, throughout an inventory gaze, contain textual descriptions and visual representations of plants together with a list of their virtues and information on habitats. The first known herbarium is that of Crateus, physician to Mithridates IV Eupator, king of Pontus (120–63 B. C.). Although the original work has been lost, it can be assumed that the images of the plants were probably based on direct observations (Janick 2006). Or, semiotically speaking, through a codification process in which ideologies were expressed using conventional charges of meaning (Eco 1968). This articulation between the socio–cultural process of figurative recognition, and thus interpersonal conventionality, and its general — because cultural — meaning implies an understanding of the semiotic network that lays down the sociocultural discourse on plants as a type in the system–nature. Progressively, this network shapes a figurative density capable of establishing an iconic grammar. In this regard, it is not by chance that Pliny the Elder wrote in his *Naturalis Historia* that it was often impossible to recognise the plants from such herbaria, which — alas — led him to argue the futility of botanical representation (*Nat. Hist.* XXV, 4–8). Another known herbarium from antiquity is that created by Diocles of Carystus, whose investigation would also have influenced Aristotle's naturalistic works, like *De plantis* or *De partibus animalium* (van der Eijk 2000). Nevertheless, the milestone in the history of herbaria is the *Codex Aniciae Julianae*, also known as Vienna Dioscurides, made in 512 A.D. in

the Constantinopolitan area and today preserved in Vienna at the Austrian National Library. The images of this codex have led scholars to hypothesise that the representations were not derived from the direct observation of plants but from textual copies taken from older models or based on other textual descriptions (Anderson 1930).

Subsequently, during the Middle Ages, the representation of the system–nature continued to be derived from ancient models through copies and copies of copies, linking the study of botany to the study of classical authors and the hermeneutic transmission (von Zinnenburg Carroll 2017). Later, with the spread of printed copies, a turning point occurred: the systematic study of the authors of the past was abandoned in favour of research carried out directly on the cultivation of plants that could be reproduced by Gutenbergian technology. The birth of botanical gardens represents the most striking example of this epistemic change, the *horti vivi*, which were founded precisely to allow scholars from the universities of the time to observe and study plants[1] (Fischer, Remmert and Wolschke–Bulmahn 2016).

With the development and affirmation of the botanic episteme, the herbaria modelled a precise form of knowledge, materialised by a figurative typology according to an inventorial gaze. These textual artefacts maintained the representation of a specific technical know–how, a visual modelling, and a simulative language to help experts find information efficiently. The conviction that each herb contained a distinctive characteristic implied the construction of an aesthetic model that refused to change to let the transmission process continue over time. This model consisted of depicting the plants in their entirety, with leaves, flowers, fruits and roots, in a frontal and two–dimensional view and with a symmetrical structure (Collins 2000).

Although this is not the place for going into detail about the disciplinary dimension that has made the representation of plants a fundamental discourse for the development of botany, by way of the examples mentioned above, it is possible to affirm that the herbaria represented a normative type of knowledge associated with analytical and combinatorial forms of visualisation. This visualisation manifests itself

1. The first botanical garden to be founded was in Pisa in 1543, and the second was founded in Padua the following year. Moreover, from the late 16th century onwards, methods of natural printing were developed and used in which the matrices were taken from the plant itself and not from iconic translations.

through a diairetic method of definition and classification. An approach where the representation of a theoretical work is made through the visualised anatomy of concepts and accompanied by an illustrative practice based on the disarticulation of elements: the inventory gaze.

Figures 1 and 2. *Kannabis hêmeros* (on the left) and *Mandragora* (on the right), illustrations from the *Codex Aniciae Julianae*. Source: Wikimedia.

From a visual semiotics perspective, it is possible to affirm that, in the discursive productions on nature represented by herbaria, a reflection on the degrees of figuration brings to the core the question of the ideological meaning of the representation. In this regard, by recognising the sub–levels that make up the figurative density in a discursive production, from the "iconic level" where an impression of reality is achieved, going backwards to the "figural level" where a few figurative formants cover the thematisation, while passing through the "figurative level" where the figures of the world appear (Fabbri and Marrone 2001, p. 143), it is possible to affirm that in the figurative herbaria the iconic level returns a transparent effect of reality. Transparency is, in fact, an effect of meaning ascribable to a broader ideological discursive production that shifts from medium to message, from the herbaria to the grammars of the visual representation of the natural to the system–nature itself. In the herbaria, the illustrations understood as icons functioned thanks to the serial format, codes and ways of seeing, which made them accessible to the community of scholars and hence

operative in an intersubjective dimension, necessary for the constitution of cumulative and disciplinary knowledge. At the same time, however, those illustrations present themselves when they represent system–nature.

This last reflection opens up the central question of how to deal semiotically with visual representations to understand their ideological scope. Following the studies of Louis Marin (1989, 1994, 2005), it is possible to say that the meaning of representation is twofold: on the one hand, it entails replacing a present element with an absent one; on the other hand, to re–present it means to exhibit, to present a presence. In other words, we can speak about a transparency that makes it possible to identify the object reproduced by mimesis and an opacity that places us in front of the presented act of this representation. Considering this dual nature of representation, we can explore visual ideologies more deeply.

3. The transparency of system–nature

In this section, I aim to understand the relationships between ideologies and semiotics, between ideological values and expressive sign codes, to probe the complexities that made nature a semantic and figurative oppositive to culture. Following the teachings of Umberto Eco, we will see how the transition from local visual utterances in herbaria to shared and disciplinary utterances in botany is: "defined by two aspects: the de–personalization of statements (and thus their generalisation and absolutization) and their normalisation (namely the acceptance of their validity in the system of knowledge)" (Lorusso 2017, p. 55). According to Eco, being able to identify ideological discourses means being able to trace these two dimensions — the generalisation and the normalisation — which, as far as these pages are concerned, should be sought in the visual enunciative dimension of herbaria.

To represent is always to exhibit something present. In other words, an image not only represents something absent but also "says" that it is an image; it underlines its being a sign. This is how the visual enunciation makes sense for the French semiotician, philosopher and art critic Louis Marin. In his perspective resonate the dialogues with Émile Benveniste's linguistics (1966) and Algirdas Julien Greimas' semiotics

(1966). Moreover, his contributions are nourished by a long tradition relating to the theoretical question of visual codification, from the treaty *De pictura* by Leon Battista Alberti (1435, It. Trans. 2011) to Erwin Panofsky's reflection on the cultural and aesthetic impact of perspective as a symbolic form (1927).

In Marin's proposal, within visual enunciation: "at the cognitive level it becomes apparent and manifest what the transparency of the sign allows to be forgotten or underestimated, the very fact that *any signs present itself when it represents something else*" (Marin 1991, p. 60). Marin distinguishes two dimensions of meaning in representation: the transitive or transparent dimension, where the model represents something, the reflexive or opaque dimension where the representation presents itself as representing something[2]. Within my proposal, this operative pair can also constitute an analytical model for exploring the functioning of ideologies in visual enunciations.

Every representation allows the transparent recognition of an object reproduced by a mimetic logic, meaning a conventional and normative reason and, at the same time, an opacity that permits the recognition of the presentative act of visual utterance: "It is an essential dimension of representation itself. This is the opacity of representation which constitutes the other side of its signifying process" (*ibid.*, p. 60). The representation, whilst representing, becomes opaque, it ceases to elude in its diaphanousness and offers itself to be viewed and captured. Thus, while the image represents something, at the same time, it deploys devices for the presentation of representations through a displaying.

This is precisely what occurs in the herbaria: while the illustrations represent the plants, they opaque the ideological discourse that the study of botany and its tradition convey and transmit. At the same time, the paintings employ figurative devices for the presentation of biological *ideality*, like the shaping of an inventory gaze by the symmetry or the biplanar translation of reality and the conventions that rule this visual translatability. These images (like those in Figures 1 and

2. The theoretical paradigm of reference for Marin's studies on representation is the theory of the sign elaborated in Antoine Arnauld *et al.*'s *Port–Royal Logic* (1662, Engl. Trans. 1969). In the treatise, the signifying structure of the sign is defined as representation: the idea represents the thing for the spirit and the sign is the representation of this idea for other spirits. In this sense, the meaning of the sign is this representation of representation. This duplication constitutes each substitution of the things of the world for the signs they signify and, in turn, ensures the possibility of communication.

2 from the *Codex Aniciae Juliana*) signify as iconic signs of nature, operate and make the conditions of enunciation operate: the illustrations present themselves in the act of representing the inventory of nature and its virtues by figuring the enunciative sphere into the utterance. This means that thanks to the opacity of representation it is possible to develop a reflection on the materiality of the visual work and to address the question concerning the specific conditions of the representation, like colours, formats, and displaying.

The *Codex Aniciae Juliana*, for example, as the name suggests, was commissioned by Anicia Juliana, one of the leading figures in the cultural and religious life of the early 6th–century in Constantinople. The commission of the codex was, in this sense, aimed at commemorating her financial support for the construction of a church dedicated to the Virgin Mary built in about 512 AD. This peculiar patronage guaranteed the meta–language of the codex to be aesthetically superlative: gold leaf was used on several pages; in the illustrations, the use of twelve pigments suggests an expensive palette composed of chemical elements such as blue vegetable lacs, cinnabar, charcoal black; earth tones which include green, indigo, lead white, minium, saffron, yellow lead oxide; and gold and silver leaf has also been applied (Ball 2003). Concerning the displaying, the recto/verso juxtaposition instead of the scrolling format text and illustration made the layout accessible and informationally clear, setting a standard for data visualisation. Focusing on the reflexive opacities present in the *Codex Aniciae Juliana*, it can be stated that the volume is illustrated on a par with Biblical works, making visible the ruling power behind the commission. The aesthetics of the volume account for the prestige of the Patron, in this regard the presentation of the information can be considered appropriate for a such lavish display.

An observation of this herbarium leads us to sharpen our gaze on the ideological discourses about the system–nature; in fact, citing Eco it is possible to say that ideology is:

> a message which starts with a factual description, and then tries to justify it theoretically, gradually being accepted by society through a process of overcoding. For a semiotics of codes there is no need to establish how the message comes into existence nor for what political or economic reasons; instead, it is concerned to establish in what sense this new coding can be called "ideological". (Eco 1975, Engl. Trans. 1976, p. 290)

4. Representing nature through automation

This excursus finally brings us to contemporaneity and the artificial visuality that nowadays informs while it gives form to the representation of nature: how does our iconosphere, involved with Artificial Intelligence and automated ways of seeing, redefine representations concerning the system–nature? And in this visual horizon, crossed by artificial agencies, how are we to deal with ideologies? To answer these questions, we can draw an initial common formulation between the idea of nature as an inventory of things and the digital archives that collect the big data with which we feed artificial intelligence. If we consider herbaria as archives, it can be said that these texts share with visual big data a common goal: the collection of information concerning botanic imaginaries. It is, however, the practices and pragmatics of collection that change considerably: if, as we have seen, herbaria made use of hermeneutic values and disciplinary traditions for their ideological discourses, what potential shapes databases?

Agency within machine–learning technologies, and even more in deep–learning, is the result of data collection without human supervision: "taking data in masses without critiquing its origin, motivation, platform, and potential impact results in minimally supervised data collection" (Jo and Gerbu 2020, p. 308). It could be said, then, that we are witnessing a paradigmatic shift from an idea of representation powered by shared knowledge understood as software to that of shared but unsupervised knowledge understood as hardware. It is a transition not without ideological overtones included in the meta–language. Today, in fact, representation:

> is increasingly used to refer to structured informational systems that bear substantial resemblance to the representations discussed in neuroscience, particularly within the study of deep artificial neural networks, known as "deep learning" … but the goal in representation learning is not a lossless transformation … Instead, the structure of the information is changed in service of some task. (Poldrack 2020, p. 1312)

Let us then consider what might be called two artificial herbaria where the inventories of things become the data with which the technologies are fed. *Artificial Natural History* (2020 — ongoing) and *Neural Zoo* (2019 — ongoing) are two generative artistic projects by Sofia Crespo

that represent the system–nature as remodelled by the agencies of Artificial Intelligence, specifically by neural networks and deep learning. These projects pose questions not only about the transparency or the opacity of the representational system of the natural world but also about the role that machine learning and computer vision could play in the techno–ideologies that structure the system–nature.

Looking closer at the works that compose Crespo's *Artificial Natural History*, it is possible to recognize an amalgamation of natural elements that portray at best an optical illusion, at worst a monstrous mutation. The representations both celebrate and play transparently with the seemingly endless diversity of the natural world. It is still possible to recognize an inventory of things, but there is a simultaneous perception that those elements do not belong to any arrangement of reality to which our experience has access. The visuality becomes the opaque strategy with which to reflect on the epistemic limits of what we recognise as natural. Like a third–millennium platypus (Eco 1997), Crespo's work invites us to rethink the epistemic boundaries that make the discourse on nature a techno–ideological one. Composing her own datasets of thousands of non–naturalistic images, she trains the deep–learning system to model images based on that visual limit. This means that she is not visualizing a botanical reference archived in some database, but creating a new visual modelling *imaginarium*.

Figures 3 and 4. Illustrations from *Artificial Natural History* by Sofia Crespo. Courtesy of the artist.

On the other hand, the idea behind *Neural Zoo* is to extract opaque patterns that visually resemble the natural world while simultaneously not hiding the fact that they are artificial, but making visible a certain idea of a reflexive quality of naturalness. It seems that there is a fundamental question that surrounds this project: how can we avoid naturalness being a purely human ideology, rather than one that offers a possibility for a non–human, or maybe it would be better to say transhuman, discourse? And in this sense, what future discourses could we produce on nature? Will we be able to rewrite or overcome the oppositional dichotomy between nature and culture?

Figures 5 and 6. Illustrations from *Artificial Natural History* by Sofia Crespo. Courtesy of the artist.

A new ideology arises, where the shaping potential also deals with the agencies that Artificial Intelligence guarantees as a normative and pervasive technology. This techno–ideology corresponds exactly to the capability of AI to reveal situations that are generally hidden from our intellect, making us aware of the lack of reciprocity that exists between human and artificial vision. A lack, however, that can also be thought of based on intellectual and creative potentiality. In this regard, artworks such as those of Sofia Crespo open up the unintelligible black boxes of automated technologies, making accessible the ideologies that feed the hardware. By working directly on the datasets with which deep–learning systems are fed, Crespo's work allows us to make visible

and thus accessible, and therefore transferable, the epistemologies by which the large collections of visual data a system–nature that does not derive from an original detachment from culture but a trans–naturalism that shapes an enactive environment.

5. Conclusions: towards an ideological collaboration

Throughout human history, the visual representation of nature has always been an ideological and challenging operation of meaning. Ideological because it shapes an intersubjective idea of what nature is, while making normative a situated and partial knowledge; challenging because it always substitutes a non–present element of nature that has to be recognized despite its absence. Furthermore, there is another ideological nuance, strictly concerned with the disciplinary field of semiotics, for which the representation of nature is always mediated by a meaningful experience. According to this perspective, the meaning–effect between representation and nature poses a very delicate problem of translatability where the mediation between perception and signification is at the core of a discursive production. The question is, in this regard, understanding how the mediation from phenomenology to semiotics takes place from the world of the sensible to that of signification, and which ideologies mediate this passage towards the production of a visual discourse on nature.

The radical transformation we are witnessing today in the visual iconosphere, still ideological and challenging, concerns the visual representation of nature through Artificial Intelligence and deep learning techniques. The medium seems now to be capable of codifying observation, reproduction, and inscription despite human intentionality, or maybe it is better to affirm in ideological collaboration with human intentionality. Perhaps it is precisely from this idea of collaboration between humans and Artificial Intelligence that the foundations can be laid to go beyond the ideological distinction between nature and culture. This would be a hybrid and collaborative perspective with which to give rise to new forms that allow us to recognise other modes of identification between humankind and the environment arising from the formation of trans–natural cultures.

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