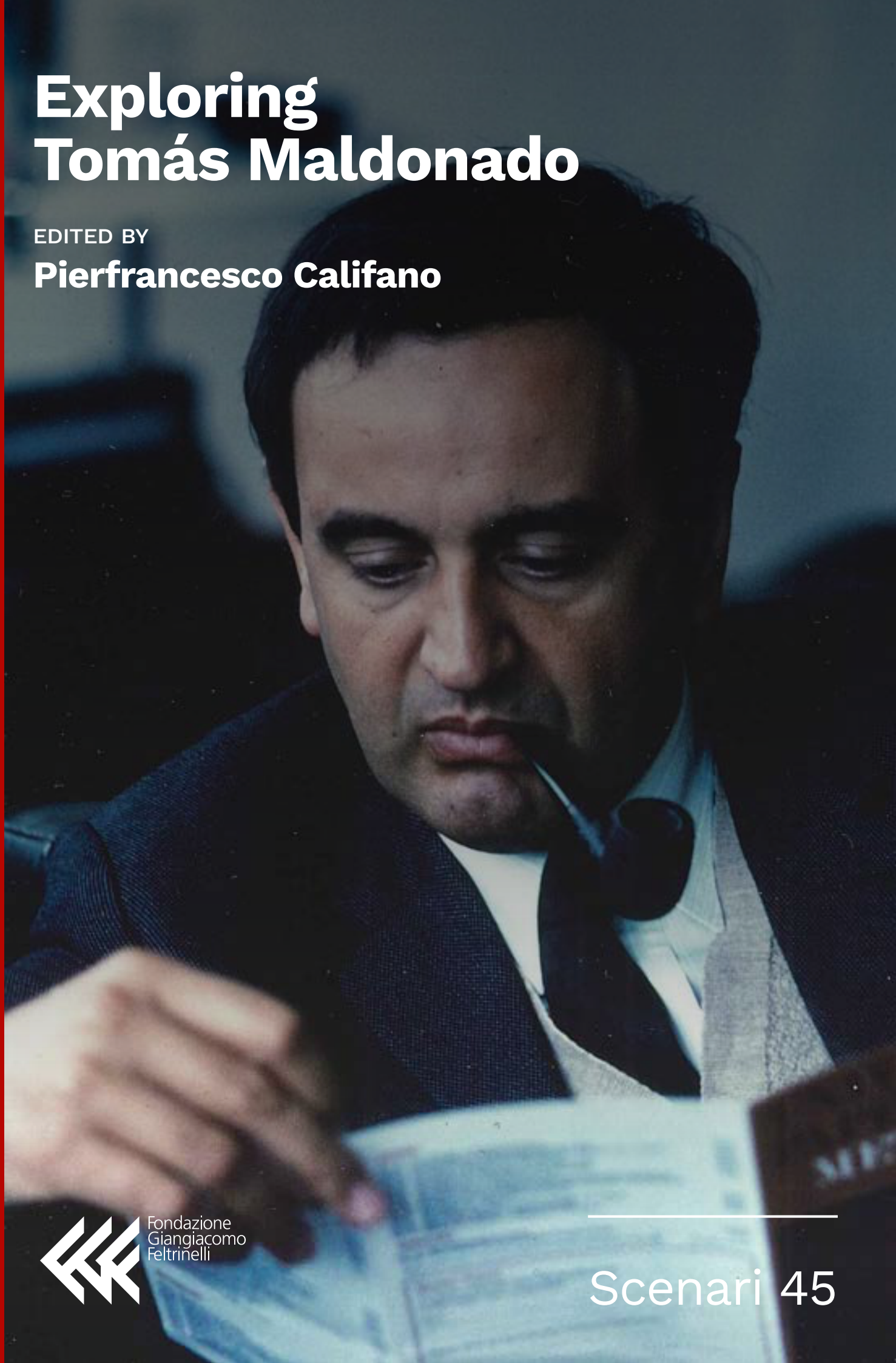
Exploring Tomás Maldonado

EDITED BY

Pierfrancesco Califano



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POLITECNICO MILANO 1863
SCUOLA DEL DESIGN

DOTTORATO DI RICERCA IN DESIGN
POLITECNICO DI MILANO
DIPARTIMENTO DI DESIGN

Summary

Art and Science

Francesco Cantini, Riccardo Fazi, Elisa Matteucci

> Is industrial design an artistic activity? And, if it is, what kind of artistic activity are we facing? And if industrial design is not an artistic activity, then, in what other field of our cultural production can it be placed? Perhaps in the field of science, or in that of technology? Or is it instead a new phenomenon, for which a new reference must be found, independent of art, science, technology, but in relationship with them?
> T. Maldonado, *Disegno e arte – Dialettica di un'alternativa*

In Manifesto invenzionista, Maldonado speaks of an assumed and imminent conclusion of what he defines as the "prehistory of the human spirit". According to the author, this passage is identified as the replacement of a thousand-year-old speculative and idealist aesthetic with a scientific one: from the metaphysics of beauty to the physics of beauty. Years later, Maldonado himself, commenting on the text, will notice the fallacy of this hypothesis by stating that the ancient phantasmagorias of the human spirit kept living (Maldonado, 1946). Therefore, the centrality of scientific thought in Maldonado can be already seen in the "Argentine period", but how do Art and Science intersect? According to the author, there is a relationship of interdependence between these disciplines – which can also be found in contemporary times – that can be read through different lenses. The following text explores Maldonado's theoretical contribution within the debate on the relationship between Art and Science and the possibilities of semantic inversion of these two concepts.

This article analyses these two disciplines by exploring the ways of intersection between the two concepts: how they changed in history starting from the Renaissance, how they evolved during the twentieth century and how they develop in the contemporary using case studies to outline future trajectories and methods of intersection. Particular attention will also be paid to the discipline of design, which has always moved within this binomial.

In recent decades, in fact, design, understood both as a practice and as a design thought, has increasingly intersected its paths with the so-called hard sciences such as physics, chemistry, mathematics, biology, but also with the more fluid and interdisciplinary contemporary sciences: synthetic biology, neuroscience, bioengineering, nanotechnologies (Langella, 2019).

In the complexity of the relationship between Art and Science Maldonado lists, in Reale e virtuale, three possible forms: Art as an object of scientific investigation; Art that makes use of the scientific methods during the formative process of the work; Art that is expressed through the disclosure of some discovery or research in the field of science.

With the concept of Art as an object of scientific investigation, Maldonado refers to the mathematization (which more recently can be seen as a computerization) of aesthetic phenomena. In other words, the claim to develop a scientific aesthetic, sometimes identified with the ambitious program of an "experimental psychology of beauty". The author also gives the example of the practice of restoration as a technical-scientific tool for the attribution and dating of works of Art. In the contemporary this type of interdependence emerges, for example, in the case of Doug Aitken's Sonic Pavilion (2009). The work looks like a building located on the top of a hill, inside which visitors can listen to a continuous live feed of sounds coming from about two hundred meters deep, captured through a complex set of highly sensitive geological microphones that collect the frequencies produced by the movement of the tectonic plates. The interesting aspect is that the data the work collects in its operation provide scientists with a

huge amount of information relating to the movements of the tectonic plates; thus a fertile short-circuit is created between Science and Art, where science appropriates the results of an artistic intuition, aimed at an attempt of "translation" by the artist of signs of a natural macrocosm that otherwise we could not perceive. This kind of operation brings into play that relationship of interdependence between "Art as Science" and "Science as Art" about which Maldonado speaks in Reale e virtuale: Art is used as a Science and at the same time, inverting the terms, Science is used as an Art. However, remembering that also in this case the difference that Maldonado underlines between the meaning given to the research product is maintained: in the case of artistic research, the product (the perceived diffuse sound and the immersive experience produced in the visitor) is the end, while for the scientist the same sound is a means (to understand the "behavior" of the underground layers of earth).

According to Maldonado, the second way the two disciplines intersect is conceiving Art that makes use of the scientific methods during the formative process of the work. A relevant example is in the close relationship between the Renaissance revolution and modern Science. The parameters of the scientific methodology in force between the fourteenth and sixteenth centuries led artists and mathematicians to elaborate precise rules for the representation of reality (Bagni, D'Amore, 2006). Artists such as Leon Battista Alberti and Piero della Francesca also addressed the question of proportions, among others. Throughout the course of the classical age, artists had applied proportions to sculpture and architecture that provided for the choice of precise mathematical relationships. They tried to revive this concept by updating it, in order to re-establish canons of aesthetic perfection and to develop new methodologies for the construction of more harmonious architectural structures.

But art has made use of scientific methods throughout the ages. We consider, for example, the paradigm of the Baroque which, under the influence of Johannes Kepler's discoveries on the motion of the planets, moves from the use of the circle to that of the ellipse as a ref-

erence figure in architecture; or how recent innovations in biotechnology shift the concept of "object as a built work" to "object as a growth work" (from assembly to growth).

The third and final moment of intersection between Art and Science according to Maldonado is manifested by the Art that is expressed through the disclosure of some discovery or research in the field of science. In addition to the linear perspective, the author brings as an example the relationship between Seurat's pointillism and Chevreul's theory of color but also that one between Dalì's surrealism and Freud's studies on the unconscious. The figure of Leonardo Da Vinci, in this framework, represents from Maldonado's point of view a particular case as it is difficult to define when he is engaged in making "Art as Science" and when "Science as Art". The notes on the behavior of water currents and in particular the observations on the phenomena of turbulence are emblematic. Leonardo is, for Maldonado, the last exponent of a long period in which Art and Science formed a solid unity (Maldonado, 2005).

Figure 1. Leonardo Da Vinci, Studies of Water passing Obstacles and falling, about 1508-9. Public domain. From: http://www.drawingsofleonardo.org/

Trying to trace a trajectory of this analysis, new and surprising correspondences emerge in the contemporary. In fact, the relationship between Art and Science could be extended by expanding the methods of intersection; what happens if, starting from Maldonado's analysis, we try to invert the two words? For example, in the contemporary world, an approach to art that takes science as an object of investigation is increasingly widespread. Similar approach are found in artists such as Tomás Saraceno, Olafur Eliasson or Eduardo Kac (Myers, 2012). If we take for example the works of Tomás Saraceno, and in particular the recent work Aria, we notice how the artist becomes a multifaceted figure, whose creative research combines art, natural and social sciences. Saraceno invites us to change our point of view on reality and to connect with non-human elements such as dust, spiders or plants that become the protagonists of his installations and metaphors of the cosmos (Saraceno, 2020).

Semantically overturning the second point of Maldonado's analysis – therefore: Science that makes use of the artistic methods during the formation process of the theory or model – opens up a more complex scenario that can be interpreted in two ways. The first: Science which, to define a specific model, must use an "aesthetic" glossary. Therefore the mathematical beauty, linked to the concept of proportion, symmetry and synthesis, which meets the consensus of many physicists and mathematicians. With G.H. Hardy: "The forms created by the mathematician, like those created by the painter or poet, must be beautiful; ideas, like colors or words, must be harmoniously linked. Beauty is the fundamental requirement" (Hardy, 1940). The second interpretation highlights a propensity, on the part of a few scientists, to elaborate scientific theories and models by borrowing typical methods of Art. One ancient example could be seen in the Sidereus nuncius, written by Galileo Galilei in 1610, after the telescope observations of the lunar surface enriched with detailed drawings depicting the various phases of the moon. At the beginning of the seventeenth century, that scientific text became very famous; the reason is linked to the fact that it offered a different and radically transgressive representation of reality

towards the Church, which put the work on the index of prohibited books judging it heretical. In that period the artist Lodovico Cardi da Cigoli, inspired by Galileo's drawings, offered a representation of the moon with unprecedented naturalism, in which craters and roughness can be seen, and placed it under the image of the virgin frescoed in the church of Santa Maria Maggiore in Rome. With Maldonado: "The role of the artist would be, to put it briefly, that of transgressor towards the established symbolic order" (Maldonado, 1992). In the contemporary world, the case of Stefano Mancuso is exemplary, a plant neurobiologist with a marked propensity for interdisciplinarity, who studies the interaction between plants and human beings through an artistic installation (Höller, Mancuso, 2018). The goal is elaborating and demonstrating theories starting from the observation of the interaction between man and Art.

If we try to apply the same semantic inversion on the last point –Science that is expressed through Art – then we can trace, throughout the twentieth century, a slow and progressive rapprochement of these two disciplines. In fact, an important channel of theoretical investigation emerges. A rapprochement that starts from two scientists, James D. Watson and Francis Crick who at the end of February 1953 published their proposal for the structure of DNA (Watson, 1968), that is the physical form of the biological structure with which the genetic sequences are copied and then reproduced in the daughter cells. To make the complicated structure of DNA immediately understandable and clear, as Watson and Crick were hypothesizing it, it was decided to build three-dimensional models starting from information relating to the molecular dimensions and the bond angles between the molecules that make up the helix. The model that the two scientists had built had to be in agreement with the physical and chemical data that declared the existence of two polynucleotide chains side by side running in opposite directions, that is antiparallel. Without even conducting an experiment to verify their hypothesis first, Watson and Crick built the DNA model. They built in the literal sense of the term: an enormous model made of wire and cardboard: Poor Art at the service of Science.

It is not by chance that the two scientists decided to build a model on a human scale: through the sculpture an experiential bridge between microcosm and man was created immediately and with extreme clarity. A molecule of a few nanometers, observed up to that moment in a two-dimensional way, suddenly acquired body in human space, unconsciously acquiring the status of a minimalist work of Art where the order and repetition of the elements truly reflect that of nature. This is just one of the best-known cases in which Science has worked around a model, or a simplified representation of reality in which particular elements gain importance by graphic or material means.

The tension of Science towards Art also emerges from recent experiences such as the Collide Residency Award. Every year, CERN in Geneva invites artists from all over the world whose practice interacts with the research carried out by CERN itself to apply for periods of residence within the institution's spaces. During the residency, the artists make use of the continuous dialogue with scientists, engineers and the staff of the laboratories to develop research paths in the design or implementation phase characterized by a transdisciplinary approach that brings together artistic and scientific research to help the dissemination and communication of the CERN's research. Tomás Saraceno, Antoni Muntadas and Ryoji Ikeda are just some of the best known artists who participated in the program.

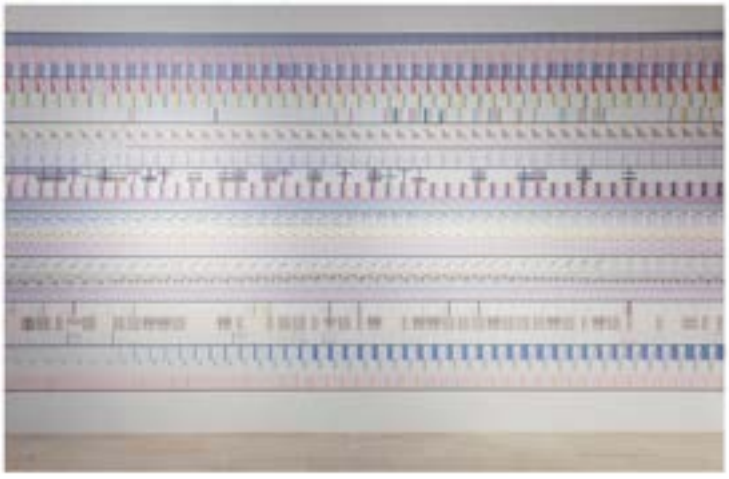

Figure 2. Accurat, The Room of Change, Broken Nature, 2019. ©La Triennale, Milano. Photo by Gianluca Di Ioia.

At the same time, the progressive increase in the production of data and the ever more urgent need to decipher the complexity of reality highlights the need to communicate changes in society and the surrounding environment to an ever wider audience. Data Visualization, for example, makes the world of Data Science accessible and decipherable, creating a narrative that, even through Art, manages to effectively communicate scientific data. In this sense, Data Visualization or Data Art not only provides information on the numerical quantity of data but also on social or more strictly qualitative issues, offering a more humanized reinterpretation of the raw statistical material. Information designer Giorgia Lupi, from studio Accurat, talks about Data Humanism (Lupi, Posavec, 2016), that represents the possibility of attributing to data a more human and less technical value, since data starts from people, describes their behaviors, tells stories or simply makes evident the repercussions of certain actions towards the environment around us. In this sense, the dialogue between Science and Art also takes on a strong social connotation.

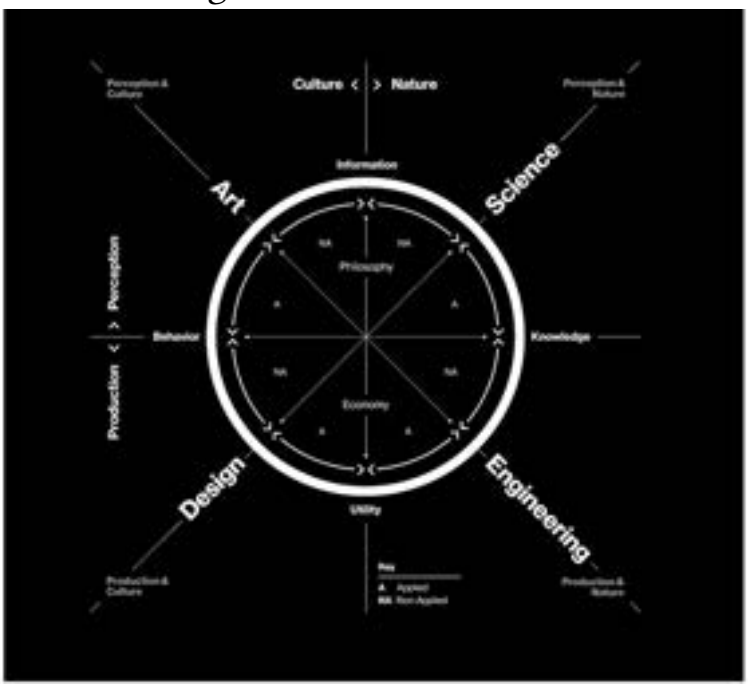

Figure 3. Neri Oxman, Krebs Cycle of Creativity, from Age of Entanglement. Journal of Design and Science. (2016) From: https://doi.org/10.21428/7e0583ad Attribution 4.0 International (CC BY 4.0).

An interesting case of science expressed through art can be identified in the strong theoretical contribution offered by Neri Oxman, Israeli-American designer and professor at MIT. If we take for example the Aguahoja or Silk Pavillion projects, these artifacts do not have a precise function, nor do want to communicate a specific message, they are above all demonstrations of a process, of a scientific innovation or of a program. Trying to trace a trajectory for the disciplines of the project it emerges therefore that the terms Art and Science intersect in ever different ways. In particular, with regard to future scenarios, the contribution of Oxman and the Mediated Matter Group - MIT recurs, which through the framework Krebs Cycle of Creativity provides a redefinition of Art and Science, inserting the disciplines of the project in a cycle where the concepts of nature and culture enter into osmosis and the domains of Art, Science, Engineering and Design enter into a continuous bond characterized by the constant exchange of what is defined CreATP or Intellectual Energy (Oxman, Antonelli, 2020).

In Krebs Cycle of Creativity, Oxman wants to demonstrate that Science converts information into knowledge; engineering – partially overlapping the Maldonadian concept of technique – transforms knowledge into utility; design transforms utility into behavior, bringing it into the cultural context; Art takes that context and questions the perception of the world in which Science will then develop new paradigms.

The rapprochement between Art and Science is also highlighted by some recent exhibition itineraries proposed by important institutions such as the Palazzo delle Esposizioni in Rome, the Museum of Modern Art in New York, the Triennale Milano and La Biennale di Venezia. "Three stations for Art-Science", proposed by Palazzo delle Esposizioni, is a large project developed through three exhibitions representing three different points of view: the historical one, the artistic one and that of contemporary scientific research. The goal is to demonstrate that knowledge can no longer be based on certainties or disciplinary separations, but can instead find space in the dimension of research

which is the dynamic, uncertain and free place where Science and Art meet.

The 23rd International Exhibition in Milan, curated by astrophysicist Ersilia Vaudo Scarpetta, with the name "Unknown Unknowns, An Introduction to Mysteries" will investigate, through an interdisciplinary path, what we still "don't know we don't know" in various fields: from evolution of the cities to the oceans, from genetics to astrophysics. An experience that will involve scientists, designers, artists, playwrights and musicians, giving the opportunity to overturn our idea of the world.

In 1964, in Disegno e arte – Dialettica di un'alternativa Maldonado argues that industrial design is a new phenomenon, in relation to Science and Technology, and, as such, extremely difficult to define. The examples cited above suggest a progressive realignment between artistic and scientific speculations, reinforcing this theory. It therefore remains to be asked whether it is necessary, to assist this process, to educate new "hybrid" figures between aesthetics and epistemology, bringing a theoretical advancement into the relatively young evolutionary tree of Design.

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