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# **Art *and* Science:**

## **For a Polarisation of the Space of Research**

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"A poem, a symphony, a painting, a mathematical truth, a new scientific fact, all bear in themselves all the justification that universities, colleges, and institutes of research need or require."

Abraham Flexner

"Who will encourage scientists to leave their laboratories and libraries and go to the theatre, visit art galleries and attend philosophical conferences? "

Paul Feyerabend

**W**e cannot minimise the effects induced by the change in status of art schools and their integration into the larger groups of Universities of Applied Sciences ("Hautes écoles spécialisées", or HES). This shift has been reflected in particular by the disjunction of elements that so far had constituted one indivisible creative act. Research, combined with both artistic production and the training of artists, must now be conceived and conducted for itself, with no

other considerations than the nature, the reliability, and the validity of its operations; contained within an institutional framework that also governs other types of research, it must comply with criteria and procedures that are not specifically associated with the world of art but with the application of a common model of scientificness; research is funded only if it complies with the conditions of a prior expertise and thus requires artists-researchers to explain their approach, to focus less on the realisation and the exhibiting of a work than on the conditions of its genesis, on the consistent and coherent formulation of a project.

This profound change is not without provoking resistance in the world of art, nor without raising doubts that have not yet been cleared up even after ten years of implementation: is artistic creation really compatible with a scientific frame of reference and procedures? Can evaluation be integrated into artistic practice without damage and without art losing its expressive force and originality? If need be, what are the minimum requirements for the artist to benefit from it and accept willingly to engage in a new arrangement?

I shall attempt to formulate and clarify a few postulates that situate this issue in the broader context of the relationship between art and science, which recent developments invite us to reassess. Thus these pages contain a prospective—some may even say utopian—, dimension, and moreover run the risk of shifting the emphasis of some people's reservations, rather than overcoming them. However these pages do not aim at a conclusion; their only objective is to help advance the debate and prolong the conversation.

One final clarification: without being unaware of the diversity of the worlds they refer to, the terms *art* and *science* are used in the singular; this choice was mainly dictated by the circumstances: given the short length of this text, I could not introduce all the nuances normally required for the treatment of such a complex subject. This exterior constraint came in addition to the desire of retaining only essential features and the most general characteristics—the very same ones that continue to distinguish clearly between two areas

of experience and two different ways to formalise them. I leave to the experts—according to their respective disciplines—the task of assessing the degree of relevance of these postulates.

## **Autonomy**

*Artistic research is not scientific research. It is distinguishable from artistic research by the way its purposes and objectives are defined, by the procedures and methods it utilises, by the resources it mobilises, and by the goals it sets for its operations. In this respect, it must be recognised, evaluated, and validated by means of specific criteria.*

The postulate of autonomy in artistic research is without doubt the most generic, and on this account the most fundamental; it must be posited straightaway in order for this practice to maintain a significant link with what constitutes both its original scope and its horizon: art. Recognising this filiation allows artists to venture into other areas without incurring the risk of misrepresentation; it also situates this shift in the continuity of a history built around the question of the place of art in the hierarchy of knowledge. It is worth noting that, for a long time, art was considered inferior. First by the ancient world, that demanded art imitate a mathematical and geometrical order, sole guarantor of the accuracy of its proportions and the harmony of its forms; then by the Christian world that enjoined it to praise the greatness and the perfection of the divine. In those times, the work of the artist could not equal that of the theologian, nor rival that of the philosopher, both fighting over the prerogatives of truth. It was not before the eighteenth century that the effect of this relegation was noticeably lessened. The birth of aesthetics bestowed on art the prestige of science and defined it as an autonomous discipline, possessing rules, a language, and a purpose of its own. Yet the obvious autonomy that was granted to it still remains limited: the vocation of art to make the sensible world palpable and agreeable continues to be detrimental to it, as the hierarchy of knowledge

remains marked by the predominance of the intelligible; its object, as much as the human activity directed towards it, belongs to an intermediary reality located between nature and the mind, between sensuality and rationality. As explained by Immanuel Kant in *Critique of Judgement*, aesthetic judgement reflects how the conscience is affected by the object, unlike scientific judgement, which produces objective knowledge from it.<sup>1</sup>

Justified and fully recognised in its subjective dimension, freed therefore from the external constraints of imitation, art remains a matter of taste, and the beauty that awakens it is a certainly higher pleasure, yet all the same “without concept”. Hegel confirmed this view, granting art a place of importance in history in order to better postulate as ineluctable the moment of its surpassing. The subtle intention behind art, namely to “reveal the truth,” demands its dissolution in religion, which itself is bound to merge into philosophy, the only discipline able to grasp art in the light of the mind.<sup>2</sup> A similar judgement can also be found in the works of Schopenhauer, who acknowledged the profound kinship between art and philosophy, both disciplines providing an answer to man’s fundamental questions, while adding: “all the arts speak only the naive and childish language of perception, not the abstract and serious language of reflection; their answer is therefore a fleeting image: not permanent and general knowledge.”<sup>3</sup> The emancipation of art—full of nuances, always partly disputed—assumed a more affirmative nature at the turn of the twentieth century. A new sensitivity both imposed and crystallised itself in views that combined the pleasurable value traditionally attached to art with a truly original knowledge. As a case in point, Friedrich Nietzsche imparted on art a faculty that escapes philosophical as well as scientific rationality: that of reproducing life, in a transparent way, in the multiplicity of its forms and strengths.

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1 Immanuel Kant, *Kritik der Urteilskraft*, 1790.  
2 Georg Wilhelm Friedrich Hegel, *Vorlesungen über die Ästhetik*, 1835.  
3 Arthur Schopenhauer, *Die Welt als Wille und Vorstellung*, 1819-1819.

Beyond the power of representation traditionally attached to art, Martin Heidegger revealed an even more essential power: that of making the world present, allowing us to see a truth that escapes both the use and the effort of conceptualisation. As for Maurice Merleau-Ponty, he mentions “the relief and depth of the visible,” the “flesh of the world” that is unveiled by the gaze of the artist only.<sup>4</sup> Closer to our time, Gilles Deleuze acknowledged art’s power to make manifest possible futures and to take concrete action on the social forces that might embody them.<sup>5</sup> Thus art could bear witness to a distinct experience of the world, to a knowledge no less genuine than that of science; it could allow us to see and comprehend various phenomena in a different way, encouraging us to create new keys or interpretive methods so as to explain them.

This contradictory debate is far from being over. Our age has replaced the sovereignty of philosophy and theology with the authority of science. It means that the assertion of the autonomy of art, and with it the capacity to produce an equivalent knowledge, comes up against the requirements of a new referential model, which is in many ways just as demanding. Some question the point of a practice that would be first of all the specific, subjective, original, and perceptible experience of an object proven to be singular and wonder how much credence to grant to it compared with an epistemology that gives priority to a general, objective, systematic, methodical, and distanced approach of reality. If doubt and suspicion are expressed in different terms, the same arguments can be applied by the defenders

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- 4 Friedrich Nietzsche, *The Birth of Tragedy*, 1872 (*Die Geburt der Tragödie*); Friedrich Nietzsche, *Twilight of the Idols*, 1888 (*Götzen-Dämmerung*); Martin Heidegger, *Off the Beaten Track*, 1950 (*Holzwege*); Martin Heidegger, “The Question concerning Technology”, 1953 (*Die Frage nach der Technik*); Martin Heidegger, “Science and Meditation”, 1953 (*Wissenschaft und Besinnung*); Maurice Merleau-Ponty, *L’Œil et l’Esprit* (Paris, Gallimard, 1961; *Eye and Mind*, trans. Carleton Dallery in *The Primacy of Perception* (Northwestern University Press, 1964); Maurice Merleau-Ponty, *Phénoménologie de la perception* (Paris, Gallimard, 1945; *Phenomenology of Perception*, trans. Colin Smith, Humanities Press, 1962).
- 5 On this subject, see: Anne Sauvagnargues, *Deleuze et l’art* (Paris, Presses universitaires de France, 2005).

of the arts: the gap is indeed unquestionable, but it does not demand to be filled; while the difference is obvious, it certainly does not indicate a deficiency, a shortfall, or a necessary inferiority...

In the absence of a clear-cut decision, the relevant bodies in charge of research funding appear to have gradually clarified their position. The authors of the document that introduces the *Multi-Year Programme 2012-2016* of the Swiss National Science Foundation write: "Artistic research conducted in universities of applied sciences is essentially focused on artistic practice. Its reflections are based first on practice, and then generate useful knowledge for practice. This characteristic, together with the heterogeneity of research, clearly distinguishes this field of research from the others."<sup>6</sup> This recognition of the uniqueness of artistic research echoes a study carried out by the Swiss Science and Technology Council whose recommendation was even more unequivocal: "As regards artistic professions, research will be constituted by personal artistic work, not by academically-inspired contributions to artistic theories or to the history of art"<sup>7</sup> The clearly expressed refusal of any kind of confusion or comparison must be acknowledged. The primacy of the gesture, and with it, of the relationship with the sensible, over any theoretical considerations, the highly unusual nature of this primary experience, the extremely diverse motivations that give rise to it, and the equally diverse paths chosen by artists to give it substance: every last one of these characteristics are inherent in the artistic process and cannot be challenged on the grounds of recontextualisation.

To sum it up in a few words: artists can truly find their place in the institutionalised space of research providing that their activity is still art, and that it can besides include within it, on occasion transfer to it, the attributes of a partially conquered autonomy that constantly remains to be reasserted.

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6 Multi-Year Programme 2012-2016, SNSF; the document (in French) can be downloaded at [www.fns.ch](http://www.fns.ch)

7 *La Recherche dans les HES de Suisse*, CSST, February 2010 ; the document can be downloaded at [www.swtr.ch](http://www.swtr.ch)

## Differentiation

Artistic research shares with artistic creation its autonomous, perceptible, and singular character. It is distinguishable from it by a deliberate effort of explicitness and exposition of the process that leads to the production of its objects proper. As such, it primarily interests artists who are not content with a research completely embedded in the production of a work. Besides and more specifically, it also concerns artists who place their practice in areas of exploration that are not specific to art and/or wish to engage in a dialogue with other forms of knowledge or other experiences of the world.

The transfer of the characteristics of art in the field of research—these characteristics depending on vision, attitude, and on methods of realisation—does not mean that the shift of practice has no effect. The production of art in a space not specifically dedicated to it naturally implies a change of perspective, other frames of reference, influences exerted by other systems of meaning: all of these factors are likely to transform this activity. Once the conditions for a fair alliance have been set, it is important to consider whether the entire field of artistic production is concerned by this shift, and if necessary to identify the type of artistic production that is mostly likely to satisfy and be satisfied with such an operation.

If one is to believe Jean Dubuffet, two contradictory ambitions appeal to contemporary artists: “turn one’s back on the public and meet them head on”.<sup>8</sup> As resolute individualists, they take refuge behind the production of a subversive work while moving towards the public at the same time, the work remaining as such only if it is handed down. This tension, which is noted also by Luc Ferry, might explain why contemporary art follows at least two divergent directions: a revolutionary, subjective, and occasionally narcissistic one, focusing on the personality and inner world of artists always seeking transgression and originality; the other is realistic and “objective,”

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8 Jean Dubuffet, *Asphyxiante culture* (Paris, Éditions de Minuit, 1986).

in accordance with the preoccupations of their time, and concerned, like other fields of knowledge, with a sharpened perception and comprehension of the world. The first may tend to subjectivise truth, at the risk of being abstruse or fragmenting meaning, of wearing itself out in “the empty repetition of the gesture of rupture and creation of the new”; the second would place the truth of the work in its ability to present or question reality as much as possible, even if the latter is still preoccupied by the idea of difference. At the risk “of embodying a vision of the world,” of being locked in academicism or lapsing into an excess of consciousness.<sup>9</sup> If current artistic production is still divided out between these two antagonistic positions, it is, partly at least, concerned about its freedom, and the artists that embody it, no less than neo-positivist scientists, are in favour of remaining in the background and advocate disciplinary solitude.

The same is not true for the second category of artists who *deteritorialise* artistic practice and *reterritorialise* it in non-specific spaces where sociological, political, economic, and cultural issues are crystallised.<sup>10</sup> This shift allows them to place their practice at the crossroad of genres and to contribute in a singular way to their rapprochement or their confrontation. Moreover it complies with what is both a priority and an opportunity for institutional research: inter- and trans-disciplinarity.

In other words, if artistic production is in itself a form of research, the conditions of a convergence and of knowledge sharing, set by a framework of institutional research, require differentiation. Contemporary art is too diverse for its manifestations to fit into the

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9 Luc Ferry, *Le Sens du beau. Aux origines de la culture occidentale* (Paris, Le Livre de poche, 2001): 199 and ff. ; *Homo Aestheticus, The Invention of Taste in the Moderne Age*, trans. Robert de Loanza, The University of Chicago Press, 1993).

10 For instance, to quote the artist Christian Boltanski, whose practice covers many “disciplinary” fields (ethics, religion, psychology): “My task consists in asking questions. Unlike many philosophers, I do not believe that I have any answers. I do not ask questions using words, but visual and audible emotions. The great themes are ultimately very few: sex, the beauty of nature, death, the search for God, the uniqueness of each being and their demise...” (“L’artiste a un miroir à la place du visage”, *Philosophie magazine*, 70 (June 2013): 53).



field of a single vision, even if predominant or financially advantageous. A great number of artists reserve the right to experiment freely and without compromise, intentionally place themselves on the fringes of established standards and criteria, cultivate denial of collective rules, indiscriminately wield provocation and transgress common values, claim the right of creating without constraints or obligations, while recognising no influence other than those of the art world and refusing no references other than those borrowed from its tradition. Here, autonomy tends towards sovereignty and is coupled with a radical desire for independence, in particular regarding cultural practices considered alien to its field. Autonomy is no less a concern for other artists; however, they feel it as being closely linked with a desire to fit into the life of the city, to engage in dialogue with its different participants. By shifting the issues of creation outside the traditional field of artistic production and dissemination, they situate their practice in proximity with other disciplines, being convinced of their profound and natural interdependence. This voluntary shift has multiple causes; its seems that the most significant ones are a desire to break with the isolation of art for art's sake, an aspiration to play an integral part in the social debate, and a more or less political resolution to respond to the rapid and profound changes generated by the building up of an open, commercial, multicultural, reticular, globalised society. Institutional research can thus offer up new opportunities to these artists, who share this sensibility.

## Convergence

Artistic research is similar to scientific research insofar as it deliberately strives towards a renewed knowledge and/or experience of reality, and seeks to perceive or reflect on the sensible world in some other ways, to comprehend and use art works and cultural artefacts differently, to question the relationship between man and his fellow men and his environment. As such, its integration into the institutional field of research is justified.

The rapprochement of art and science is unquestionably a topical theme. For some years, there have been countless public and private initiatives for a joint development of artistic creation and scientific research. International symposia and conferences organised by prestigious institutions have gathered together representatives of these different fields, while old quarrels and mutual low esteem, which prevailed for a long time, no longer prevent a pacified dialogue. By way of an example, the French Ministry of National Education, Higher Education, and Research set up a mission in charge of defining joint development strategies involving visual and performing arts, sciences, and technologies. Chaired by the researcher and composer Jean-Claude Risset, the committee reported its findings in 1998. The chapter devoted to artistic transdisciplinarity reads: “In symbiosis with contemporary models that cross scientific and sociological fields, artistic activity must integrate the new genericity of the concepts of time and space, body and ubiquity, materiality and virtuality, stability and chaos, balance and irreversibility. These concepts are transversal to the scientific, philosophical, and artistic fields that have contributed to their emergence. They are also transversal to established artistic disciplines (music, fine arts, cinema, dance, theatre, literature...).” The clear desire to strive for the rapprochement of artistic creation and scientific research resulted in the *Premières Rencontres Internationales “Art, Sciences and Technology”* that took place at the Université de La Rochelle in November 2000, in the presence of artists, cultural players, and specialists in all of the fields

concerned. A similar initiative led to the Creativity 2000 Conference at the University of Ottawa, Canada. The divide between the two cultures, condemned in 1959 by Charles Percy Snow—this “gulf of mutual incomprehension” separating scientists and literary intellectuals—might then be now bridged.<sup>11</sup> The gap between poetic imagination and mathematical reason, between modelisation and creative process, could well be narrowed. After a few decades of disciplinary isolation due to the rigor of scientific positivism as well as to the enclosement of art for art’s sake, the desire to open up to the opposite side may well overcome vague impulses of identitarian closure. We are, perhaps, witnessing either the recurrence of a model of convergence of knowledge and practice, dating back to the Renaissance, or the emergence of a third culture bringing together once competing or hostile disciplines.

If the use of “perhaps” can be interpreted as a legitimate caution—tensions and disagreements are still strong in both camps—the postulate of convergence nonetheless rests on convincing evidence. First, on the side of science: mentioning the procedures developed for the realisation of complex concepts implemented over a long period of time, the researcher Herbert A. Simon draws a parallel with the “process of cyclical interaction between painter and canvas in which current goals lead to new applications of paint, while the gradually changing pattern suggests new goals.”<sup>12</sup> When discussing the requirements for the development of a real intelligence of complexity, Jean-Louis Le Moigne refers to the image of both hands that draw while drawing one another, in a retroactive loop that guarantees their own execution. If one wishes to comprehend a complex phenomenon, reducing it to a formal reproducible model is not enough, one must also take into account what can be emphasised by individuality and irreversibility. Two hands may then be needed and, with them, two joint actions: that of the analyst, which cuts up, divides and

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11 Charles Percy Snow, *The Two Cultures* (Cambridge University Press, 1961).

12 Herbert A. Simon, *The Sciences of the Artificial* (Cambridge, MIT Press, 1969).

establishes a model with mathematical symbols; and that “of the painter or the explorer,” which links, connects, nuances, brings closer, multiplies, a hand belonging to “the artist that no other artist will identically replace.”<sup>13</sup>

The opening of the dominant model of science to art is not limited to allusive, metaphorical, or illustrative forms. In May 1981 at the American Academy of Arts and Sciences, Herbert A. Simon proposed to highlight their profound kinship.<sup>14</sup> With this aim in mind, he began by categorically contradicting those who based the divide of the two cultures on the specialisation of the two cerebral hemispheres and attempted to justify the noncomprehension of scientists and artists with an argument both anatomical and functional. The association of “holistic” or “intuitive” thought with the right hemisphere and of “analytic” or “logical” thought with the left hemisphere is based on a “romantic view,” insofar as it is not supported by any empirical evidence. Studies, particularly on brain damage, tend to prove the contrary, with the brain demonstrating a remarkable flexibility. Basing his judgement on research in the field of cognitive psychology, Simon shows that in all the fields where intelligence and creativity are expressed jointly—creativity being no less present in science than reflexivity in artistic practice—, thought processes are based on common ground. Whether it be mathematical formalism, ordinary language, musical language, or pictorial language, different modes of knowledge and insights are structured on common acts of intuition and analysis, re-cognition, and selective research.

In support of his argument, Simon described in particular an experiment conducted in the field of musical composition. The researcher Walter Reitman recorded the comments uttered by a professional musician at the very moment when he was composing a fugue,

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13 Jean-Louis Le Moigne, *L'Intelligence de la complexité a et à deux mains : celle qui tient le pinceau et celle qui tient le ciseau*, <http://www.intelligence-complexite.org/fileadmin/docs/edi22.pdf>  
14 Herbert A. Simon, “Unity of the Arts and Sciences: The Psychology of Thought and Discovery”, *Bulletin of the American Academy of Arts and Sciences*, 35/6 (March 1982): 26-53.

i.e. at the time of its creation. Agreeing to behave like a “reflective practitioner,” the artist thus reveals what is most of the time hidden by the “vague” categories of intuition, inspiration, or sudden thought: the creation of new structures formed from the different re-arrangement of familiar materials—the tonalities, rhythmic patterns, the standard diachronic and chromatic scales—, a re-arrangement rendered possible by processes not essentially different from those performed by thought in other fields. Simon’s views concur with those of the historian of visual representation Martin Kemp, who does not hesitate to claim that the image of a molecule produced by a computer is as relevant as the work of Michelangelo. For this author, who was trained in natural sciences and art history and who contributes regularly to the scientific journal *Nature*, the kinship of art and science is unquestionable; determining which of these fields influences the other is not as important as recognising the “structural intuition” upon which they are based—the numerous and complex processes that underlie our apprehension of the visible world and that combine perception, reflection, analysis, and imagination.<sup>15</sup>

Even if many art historians eager to preserve the sphere of independence of artistic creation have tried to minimise this phenomenon, there is a close correlation between the advent of a new age of science and that of a new age of art. If we are to believe Martin Kemp, there is nothing singular about this correlation, which reveals a deep affinity that never wavered from the Renaissance to the nineteenth century. The art historian highlights three significant moments where scientific theory and artistic creation have combined: Brunelleschi’s invention of linear perspective, whose evolution and perfecting can be followed in the work of Giotto, Masaccio, Piero della Francesca or Leonardo da Vinci; research on the anatomy of the human eye and the construction of machines inspired by the mechanisms of vision—pantograph, *camera obscura*, camera—;

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15 François-René Martin, “The Science of Art (Martin Kemp – 1990)”, and Francesco Panese, “Kemp (Martin)”, *Encyclopaedia Universalis*.

Isaac Newton's theory of the prism and colour divisionism that can be traced in the paintings of William Turner and Georges Seurat. According to Kemp, modelling and pictorial forms pertain to a similar constructed knowledge of vision, and represent two different but equally meaningful figurations of the world.<sup>16</sup>

The twentieth century is part of the same dynamics. The birth of a geometry postulating the existence of a fourth dimension is in itself the source of a radical break with tradition, and what, up to this point, has been the base of a naturalistic representation of the world, namely *perspective*, proves groundless, an "obsolete illusion". From then on, the new measure of space involves accounting not only for what is seen but also for a part of the unseen, an imperceptible difference that the artist cannot approach without engaging in new artistic experiments. The imagination frees itself from the simplistic yoke of three-dimensional perspective and, with it, from the arbitrary constraints of representation and figuration. In its essence, reality is different, mysterious, and elusive. The new field of exploration that opens up occupies not only avant-garde artists but also, in many respects, the participants in postmodernism. As Jean-François Lyotard puts it, it is now a question of "showing that there is something we can conceive of that can neither be seen nor shown," and of alluding "to the unrepresentable through visible presentations."<sup>17</sup>

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- 16 Martin Kemp, *The Science of Art. The Optical Themes in Western Art from Brunelleschi to Seurat* (New Haven-London, Yale University Press, 1990). In his book *Galileo as a Critic of the Arts* (The Hague, Martinus Nijhoff, 1954), Erwin Panofsky describes the close correlation between the scientific thought of the astronomer and his aesthetics judgements.
- 17 Jean-François Lyotard, *The Postmodern explained: Correspondence, 1982-1985*, Julian Pefanis and Morgan Thomas, eds., trans. Don Barry (Minneapolis: University of Minnesota Press, 1993). Experiments and research activities conducted at the crossroads of art and science are so numerous and varied that it is impossible to describe them all. Nevertheless, by way of example, it may prove enlightening to browse the website of the artists-in-labs programme: [www.artistsinlabs.ch](http://www.artistsinlabs.ch)

## Polarisation

Applying a unique set of rules of enunciation and of validation criteria is the main obstacle to an integration of the arts in the institutional framework of research. In order to avoid extreme (and also exclusive) solutions of assimilation or separation, it is important to conceive of a new model likely to hold together two distinct fields without confusing them. The configuration of a new space derives its legitimacy from the fact that both scientists and artists recognise the utility of venturing into the “opponent’s” territory. The fact that both also experiment on this shift makes it possible to substitute the distribution of different attitudes (also available on the condition that the researcher “changes sides”), to mere disciplinary sharing (on one side the characteristics of scientific research, on the other those of artistic research). As a result, in concrete terms and whatever aspect is taken into account (questions, hypotheses, the state of the arts, objectives, methods, schedule, outputs) research presents two faces and consists of two contrasted and equivalent sides.

An additional sign of a factual nature bears witness to the rapprochement of art and science: for a long time kept apart by a mutual incomprehension or indifference, these two worlds now must share the same space of research. Besides, this alliance is coupled with the incentive to create bonds, to cross disciplinary borders, to endeavour to jointly study objects or themes that might prove mutually beneficial. This process can be seen as a provisional recognition of the capacity of the arts to also produce high-standard research, and the efforts to make the existing structures flexible and thus facilitate their integration.<sup>18</sup> Yet it cannot be ignored that this alliance has taken place under the predominant, if not exclusive, aegis of science.<sup>19</sup> Science has indeed provided the framework of reference and defined the criteria of enunciation, selection, and evaluation of

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18 A new category of research called “use-inspired basic research” has been created by the Swiss National Science Foundation.

19 Since 2011, the artistic field has been integral to the department of Humanities and Social Sciences of the Swiss National Science Foundation.

projects. In this context, how is it possible to comply with the postulate of the autonomy of art stated above? With this postulate, qualified of course by that of convergence, it is nevertheless necessary to take into account a difference, an insurmountable gap. In short, how can art be integrated into the field of research, if this very field is only incidentally affected by its presence and remains nonetheless scientific by nature? Objecting to this inevitably non-egalitarian relationship and refusing to occupy a marginal or inferior position, some voices have been raised to demand the creation of a space for artistic research. This option would certainly have the advantage of clarity; it has nonetheless the disadvantage of resituating the protagonists at an appropriate distance, of reviving the antagonism of the opposing parties, albeit to a lesser degree, while at the same time art continues to explore other avenues. Thus it would not be the postulate of autonomy that would be placed in jeopardy, but that of convergence which, in some ways, is denied.

A third way remains to be explored. As things stand, it is still hypothetical and entails considering the research space as a polarised space, enriched and galvanised by the alliance and the strains of different, even contrasted, attitudes likely, in any case, to influence or complement each other. This paradigm shift involves a restriction of the prerogatives of science and a partial loss of its sovereignty, but aren't this restriction and loss already a current reality? How many scientists recognise the relative or sector-based nature of their approach, the insufficiency of their tools of analysis, and the imperfection of the methods they use?

Faced with the complexity of reality and requested to describe human or natural phenomena that escape prediction or laboratory protocols, some do not hesitate to borrow from other languages: the astrophysicist Hubert Reeves speaks of "creative drive," the chemist Jean-Marie Lehn of the "aesthetics of molecular structure," and the neurobiologist Jean-Didier Vincent of "workshops producing imagination," while the Nobel Laureate chemist Ilya Prigogine calls for a



“poetic attention to nature.”<sup>20</sup> Moreover, it has to be noted that many great scientific discoveries have been the products of chance, outside the field of realisation of science, like departures from, or breaches of, these rules. They do not result from a rigorously planned process but from chance, an unforeseen turn of events, a mistake, an accident, a distraction, or are due to a researcher’s whim or stubbornness in pursuing a seemingly vain track, despite the disapproval of their community of peers.<sup>21</sup>

The same is true for the art world since, in a symmetrical way, it does not hesitate to venture on the other side. As we have seen, some artists are inspired, consciously or unconsciously, by a representation of the world forged by science: they borrow elements from scientific knowledge, similarly explore the same field, while acknowledging their debt or filiation. The shift is particularly evident when projects are conducted by theorists, critics, or art historians trained in academic research; they easily adapt to the rules and constraints imposed on them by the models of science, making, at the most, a few adjustments as required by a particular field of study.

I wish to insist on this: the idea is not to create a space in which characteristics specific to scientific research would be located on one side and those specific to artistic research on the other, but rather to actually frame” a third space distributing different attitudes, available to both scientists and artists as long as they accept to shift (from one field to the other). This concept is obviously dynamic: it does

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20 Ilya Prigogine and Isabelle Stengers, “Les Deux cultures”, *La Nouvelle revue française*, 316 (May 1979): 42-54 and 317 (June 1979): 41-48. See also: Hubert Reeves, *Malicorne. Earthly Reflections of an Astrophysicist*, trans. Donald Winkler, Stoddart, 1993; Jean-Marie Lehn, “Chimie et création. Science, art et industrie”, *Le Débat*, 18/1 (1982): 46-61; Jean-Didier Vincent, *The Biology of Emotions*, trans. John Hughes, Blackwell, 1990.

21 On this subject, see: Danièle Bourcier and Pek Van Andel, eds, *La Sérendipité. Le hasard heureux*, Paris, Hermann, 2011; or: François Lavie, “La surprise du découvreur. Hasard, contingence et sérendipité dans le processus de découverte scientifique”, *SociologieS*, 2013 (<http://sociologies.revues.org/4493>). Paul Feyerabend reminds us that “some of the most beautiful modern theories were in the beginning incoherent, without empirical foundation and contradicting facts considered fundamental at the time of their creation.” (“*Science as Art*”, 1984).

not only determine equivalent positions in terms of relevance and validity, but also implies a necessary movement, a change in the scope of experience. The fact that eminent scientists use metaphors, as seen above, is not reprehensible in itself, since resorting to rhetoric compensates for the difficulty of grasping a complex material on the side of the concept. Benefiting from the effects of sense generated by the trope is a legitimate, creative, and innovation-driven operation, provided that its suggestive, or argumentative, value is not confused with any power of demonstration.<sup>22</sup> In the same way, an artist has the right to borrow notions or wording from science, yet provided that a reason for their use and to prove that this new use alters neither their meaning nor their extension.<sup>23</sup>

Therefore, adopting a dual-entry research model would have the great advantage of making room for what takes shape and is given meaning by other means than those of observation and experimentation, for what is enunciated through other languages than those of discourse and reason. The artists who cultivate the resources of intuition, analogy, paradox, ellipsis, metonymy, or free association would be acknowledged as such, and consequently encouraged to be actively involved in research; while the scientists who wish to do so would be free to change scope, to link up without mistaking one for the other those faculties that Paul Valéry already found at play in the work of the ancients, and that Leonardo da Vinci and Galileo happily combined: the “spirit of finesse” and the “spirit of geometry.”<sup>24</sup>

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- 22 The first biologists who coined the phrase *genetic programme* did not fail to explain that this image was borrowed from computer science and chosen for its heuristic value, not for the purposes of explanation. From this point of view, the tendency to think that the key to all human phenomena has to do with heredity reveals a misuse of language, which results in confusing fields of knowledge that should be distinguished from one another. On this subject, see: Jean-Claude Guillebaud, *Le Principe d’humanité* (Paris, Le Seuil, 2001): 233-248.
- 23 The misuse of concepts borrowed from physics and mathematics by some French philosophers was denounced by Jean Bricmont and Alan Sokal in their book: *Intellectual Impostures* (London, Profile books, 1998). See also: Jacques Bouveresse, *Prodiges et vertiges de l’analogie. De l’abus des belles-lettres dans la pensée* (Paris, Éditions Raison d’agir, 1999).
- 24 Paul Valéry, *Introduction to the Method of Leonardo da Vinci*, trans. Thomas McGreevy (London, John Rodke, 1929).

If we are to believe Abraham Flexner, great discoverers such as Pasteur, Koch, Ehrlich, or Einstein were also “great artists” whose curiosity pushed them to the fringes of the knowledge of their time; not in any way restrained by the lack of comprehension of their contemporaries, they persevered in research judged to be whimsical, absurd and, at the moment of its realisation, utterly useless.<sup>25</sup> At a time when research is increasingly subject to the constraints of immediate efficiency and profitability, this reminder is probably not devoid of interest.

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25 “These great artists—for such are scientists and bacteriologists—disseminated the spirit which prevailed in laboratories in which they were simply following the line of their own natural curiosity” (Abraham Flexner, “The Usefulness of Useless Knowledge”, *Harpers*, 179 (June/November 1939).