Scientific Rationality, Disciplinarity, and Interdisciplinarity[1]

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Introduction

In a 2011 article, we showed that there cannot be a theory of interdisciplinarity, although there may be interdisciplinary theories, in the same sense that there cannot be a theory of science, although there may be scientific theories.[2] Looking back on some of the material used in that article, we now question the notion of interdisciplinarity that can take on two polarized meanings. Quite simply, it can connote the scientific activity that consists of grouping knowledge or conjoining analyses. It can also refer to knowledge in which the results of multiple disciplines are integrated while the considerations inherent to any subjectivity are applied.

This article discusses the notion of interdisciplinarity with this dual view as a reference point.

It starts by distinguishing between psyche and science. Then, it shows that however rational philosophy may be, it has ties to the psyche. Third, it underlines how science evolved by detaching itself from philosophy and becoming more specialized. Fourth, it points out how specialization has given rise to concern and even contempt. Fifth, it indicates how the division of knowledge into disciplines generated interdisciplinarity, and sixth, how this interdisciplinarity becomes a need and a project. Seventh, it highlights positions that aim to force interdisciplinarity out of the scientific field and, eighth, it examines these positions.

The purpose of this article is both to emphasize that interdisciplinarity is located in the scientific field and to distinguish this interdisciplinarity from philosophical thinking which is shaped by work from several disciplines.

1. Psyche and Science

In everyday life, the human mind is made of consciousness and unconsciousness, reason and emotion, certainty and belief. On all these levels, it is animated by a multitude of knowledges, sometimes independent, often intertwined. This is true when individuals let their thoughts run, when lovers interconnect, when a parent talks to their child or when friends chat with each other; it is also true when a person prays, when a priest speaks to their faithful, when a politician communicates their message or when a farmer wonders about the future of

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[2] Simon Laflamme, "Recherche interdisciplinaire et réflexion sur l'interdisciplinarité" (Interdisciplinary Research and a Reflection on Interdisciplinarity), *Nouvelles perspectives en sciences sociales*, vol. 7, n° 1, 2011, p. 49-64.

their farm… In all these situations, for every person involved, what is at work is a complex mind, irreducible to scientific reason. In all these situations, any one of them may resort to a scientific proposal, even if it can be isolated as such, but their discourse will only be able to keep to this statement if it is unilateral and maintained in the absence of dialogue. Thinking and communicating in everyday life means activating knowledge of all kinds: proven knowledge, undefined feelings, strong emotions, unconscious memories, as well as beliefs, greetings, values, and customs, all of which are indivisible because the human mind is not well compartmentalized—there are flows even between the conscious and unconscious. If humans can invoke scientific propositions during a conversation or reflection, or if they can reason clearly on specific points, they cannot love, hate, sympathize, suffer, or vote scientifically.

The discourse of the social actor as a social actor, as well as the discourse of the priest or politician, is complex, entangled, and, for this very reason, not scientific discourses.[3] Scientific reason is always limited in relation to the human mind. It is scientific only insofar as it is free of subjectivity and its statements derive their truth from something other than subjectivity.

A subject, an individual, can declare: "This is true because I think it is." In science, such a proposition is inconceivable. A subject can assert one thing and its opposite or experience feelings paradoxically; in science, the paradox is inadmissible. The scientist can observe a paradox, but they cannot provide a contradictory explanation, even of the paradox. A subject can justify action in the name of adhering to a value; in science, there can be no ethically permissible—or revocable—truth. The researcher can ethically orient their practice, but propositional logic or the confirmation of a hypothesis is indefensible if based on moral grounds. If the scientist dares to claim that their proposition is true because they consider it to be so, that their explanation, although contradictory, is correct, or that some reasoning or observation must be accepted in the name of morality, they will immediately be denounced in the polemical field of science. A bomb can be ordered in the name of morality, but its explosive properties are not moral; a vaccine can be ordered in the name of morality, but its preventive or curative properties are not moral. If the bomb explodes or the vaccine cures, it is because they have been manufactured for a specialized, non-subjective reason that has detached itself from the complexity of the human mind. Scientific reason is limited compared to everything that inflames the human psyche. But it is through this limitation that it can be science; it is to this limitation that humans owe their bridges, airplanes, telephones, skyscrapers, bombs, and vaccines. If a scientist worked guided by their entire psyche, they would be unable to test hypotheses or develop equations, and the engineer would be unable to use these scientific products to invent objects. Of course, the ideology of Christianity must have been present for cathedrals to be designed and built, but if these monuments are standing, it is due to the architect's science. Christian ideology is carried by the conscious and unconscious, reason and emotion, certainty and belief; the science of the architect allows

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[3] This is slightly what Jean-Paul Sartre began to intuit when, while moving away from the existential theses *Being and Nothingness (An Essay on Phenomenological Ontology*, Routledge, 2018), he imagined a dialectical, totalising, and synthetic reason, distinct from analytical reason [*Critique de la raison Dialectique* (précédé de *Question de méthode*) tome 1 : Théorie des ensembles pratiques, Paris, Gallimard, coll. « Bibliothèque des idées », 1960].

itself to be guided by this cultural universe, but by extracting from it the psychic dimension that obstructs edification, by shaping the culture according to architectural genius. The science of the architect is animated by subjects, since there is only the subject who thinks; but the architect's subjectivities are constrained to objectification. To think of the architecture of a cathedral is, in the drawing, to have been forced to set aside everything in the psyche that is useless in calculating the size of the pillars or the shape of the arches. The architect may be inspired by his Christianity or, unconsciously, by an unresolved Oedipus complex, but this influence is felt in the patterns drawn only insofar as it is reconfigured by the requirements of a specialization.

The social actor as a social actor has a complex psyche. The social actor as a scientist has a simple but complicated reason. This reason is simple because it is bound to remove countless components of the mind from itself, notably all those that are detrimental to scientific achievement, and it is complicated because it is a manipulation of expert knowledge.

The scientific field is on the lookout for anything asserted within it that is based on the complexity of subjectivities. And as soon as it sees it, it denounces and rejects it. The scientific field evolves all the better as it retreats from the psychic order. For, in the complexity of life, there is little space for the development of the abstractions that science needs to produce theories. The more science evolves on its own, or the less alienated it is from the psyche, the more likely it is to produce scholarly equations or develop probative theories.

2. Psyche and Philosophy

Philosophical writings are closely related to the discourse of the social actor as a social actor. They are a refined expression of what is conceivable in a given society at a given point in its history.[4] Within them is found the complexity of subjectivity: varied knowledge from different fields of thought, as seen in the writings of Plato and Jean-Jacques Rousseau.

2.1. Plato

Let us look at a famous passage from *The Republic* by Plato (427-348 BC):

> SOCRATES: Now if this is correct, our way of thinking about these things should be as follows. We must not think that education really works the way some self-professed educators say it works. For they say that knowledge is not present in the soul and that they somehow put it in there, like sight into blind eyes.
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> GLAUCON: This is exactly what they say.

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[4] Michel Foucault names this field of discursive possibilities 'episteme' (*The Order of Things*, Routledge, December 21, 2001).

SOCRATES: However, our present discussion here indicates that this capacity, as well as the instrument that allows us to learn, exists in everyone's soul already. It is as if our eyes were unable to turn from darkness to light without the entire body; in the same way, our instrument of learning, together with the entire soul, must keep turning away from the fleeting appearances of things, until our soul is able to see steadily into the true nature of things and detect the clearest part of it, which we call the good. Is this not true?

GLAUCON: It is.

SOCRATES: So there should be some art of turning around that would consist in finding the easiest and most efficient way of turning to light. This is not the art that gives us the ability to see, because we already have that; instead, it enables us to turn in the right direction and look where we are supposed to. Should there not be such an art?

GLAUCON: Most likely.

SOCRATES: Now the other so-called virtues of the soul come closer to the fine qualities of the body, for even when they are not initially present, they can be developed later by habit and exercise. But it seems that the virtue of wisdom more than anything else is akin to something divine, for it never loses its power, except that this turning around can turn it either into something useful and valuable or into something useless and harmful. Have you never observed a clever crook—how sharp his sight is and how keenly his narrow mind sees the things to which it turns? His eyesight is by no means impaired, but it is forced to serve evil purposes, and the more sharply he sees, the more evil his deeds are.

GLAUCON: Very true.

SOCRATES: But what if the instrument of sight attached to such natures were to be trimmed down in their childhood and severed from, as it were, the leaden weights that have been tied to it from birth? For those weights gravitate towards gluttony and other such sensual pleasures and desires and deflect the vision of these souls downwards. What if their instrument of sight were freed from these weights and turned in the opposite direction to face true realities? Would that same instrument in those same people not see those realities as sharply as they currently see what their eyes are turned to now?

GLAUCON: Most likely.

SOCRATES: But what about the following? Would the following not be likely, or rather certain from what has been said? Consider two categories of people. The first are the uneducated and ignorant of the truth. The others are those who are allowed to remain permanently in training. Neither category can ever become able administrators of the state. Not the former, because they have no single goal in their life, and one must have some end in sight while doing everything that they do, either privately or publicly. Not the latter, because they will not do anything on their own accord, thinking that they are already living far away in the islands of the blessed.

GLAUCON: Very true.

> SOCRATES: In that case, then, if we were the founders of the state, our task would be to compel the best minds to attain that learning which we have previously shown to be the greatest of all, that is, to see the good after they have completed their climb up to the higher regions. However, once they have seen enough upon their ascent, our further task is not to permit them what they are currently allowed to do.

> GLAUCON: And what is that?

> SOCRATES: Why, of course, not to permit them to remain in the upper regions and to refuse to go back down to the prisoners and to participate in their labors and honors, whether they are serious or worthless.

> GLAUCON: But would we not do them wrong by making their life worse while it is possible for them to live better?

> SOCRATES: You don't seem to realize, my friend, that the law is not concerned with the wellbeing of any one class of people in the state by giving them a special status; its aim is the wellbeing of the entire state. One achieves this aim by holding the citizens together by persuasion or compulsion and by making sure they serve the common good and benefit others as much as they can. For these purposes, qualified people are installed throughout the state not so that they could do whatever they want to, but to ensure the cohesion of the state through them. [5]

The text reveals emotional themes. It is noted in the author's discrediting of "clever crook[s]," and their "sharp […] sight" and "narrow mind[s]," in his disdain for "gluttony and other such sensual pleasures and desires," and in his annoyance at "their labors and honors, whether they are serious or worthless" in relation to "prisoners." It can be seen in his affection for "the truth," the "good," and the "wellbeing of the entire state."

The dialogue is also rational. It serves to establish reasoning: Socrates sets out his arguments and Glaucon agrees with what has been said: "[t]his is exactly what they say," "[i]t is," [m]ost likely," "[v]ery true," except for the two lines in which he questions the wise man, indicating that he is following the argument. The excerpt includes a number of coordinating conjunctions (22 "and", 6 "but", 5 "or", 3 "because", 2 "so"), several other linking words such as "if" (5), "as" (9), "then" (1), "while" (2), "however" (2), "until" (1), "whether" (1), and others "than" (1) "what" (9) "which" (3) "that" (20), the latter acting as subordinate conjunctions or relative pronouns. There are segments such as "should be as follows" or "[w]ould the following not be likely, or rather certain from what has been said," which show that the text was written with a concern for logical structuring of thought. Reason also requires observation. Socrates, as written by Plato, uses the analogy of the body to convey his conception of the soul and invites Glaucon to draw on his experiences to make him recognize what crooks are: "[h]ave you never observed."

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[5] Plato, *The Allegory of the Cave* (*Republic*, Book Seven, 514 a-541 b), Translated by Oleg Bychkov: Theology Department, St. Bonaventure University.

In the discourse, there is a manifestation of a conscious process. In it, there are demonstrations which reveal an attention that has been devoted to the sequencing of proposals.

There is also an unconscious element in the discourse. This contribution can be deciphered, for example, on a cultural level, in the spontaneity with which the author situates the good upward and the evil downward, in the emotions that good and evil arouse in him, in the naturalness with which he speaks of the classes of citizens, and in the contradiction that is denoted between the fixity of these classes and the possibility of access to knowledge. The unconscious can also be seen in the imagination deployed in the conception of the author's city, in the impetus that presides over the elaboration of his utopia, and in the extreme assertiveness of his words. Further, this contribution appears in the genius of his writing, in the strength and elegance of a statement such as: "the leaden weights that have been tied to it from birth […] gravitate towards gluttony and other such sensual pleasures and desires…"

Writing reflects beliefs that are confused with certainties: the law's "aim is the wellbeing of the entire state" and it can unite "the citizens together by persuasion or compulsion"; "this capacity, as well as the instrument that allows us to learn, exists in everyone's soul already", if one intervenes from childhood, humans will turn to the good; one can be taught to do good; the mission of "the founders of the state" is "to compel the best minds to attain that [scientific] learning."

Through Socrates' lecture, Plato addresses several scientific fields: law, politics, education, ethics, anatomy, and religion; but he does not use these fields of knowledge scientifically. The intellectual deliberates knowledgeably on a reality with numerous interrelated components. Plato reflects on a composite object but does not distinguish between its elements, and thus does not analytically connect them. He moves from one to the other as if they were part of the same examination, as if they belonged to the same phenomenon. The reflection pertains to an entity whose educational aspect immediately takes part in the anatomical aspect, both of which are attached to the religious aspect, all three of which are integrated with the legal aspect, and so on. It is a semantic network where every object leads directly to others at the same time as they are part of it. This network is made up of the thoughts of social actors, as related to their daily activities, in which the themes interconnect because they are not separated by a systematic operation or by pragmatic constraints. Platonism distances itself from these thoughts on everyday life by imposing a rationalization effort on it, but it remains in a pre-scientific area. Law is not the science of law, politics is not the science of politics, education is not the science of education… All these objects are the dimensions of the same being and they are all enclosed together in an ideal universe. The effort to rationalize envelops them in an ideology. Platonism is fabricated on descriptions whose analogies are a manifestation, but without dissociating itself from prescription. Plato knows what is right and what is wrong, and he knows what the city must be. However intellectual it may be, this mixed universe of description and prescription, then of reason and emotion, then of conscious and unconscious, then of belief and certainty, can only have an idealistic representation of truth. Truth exists within itself: one can face the truth and one can know the truth. This truth is as impalpable as it is impressive. On another level, the notion of truth may hold in a propositional arrangement: "Now the other so-called virtues of the soul come closer to the fine qualities of the body, for even when they are not initially

present, they can be developed later by habit and exercise." Plato's demonstrations may have the strength of logic, but they have the weakness of empirical emptiness. The statement "[education] is not the art that gives us the ability to see [science into the organ of the soul], because we already have that" is logical and follows sensibly from what has been previously said. But it is not empirically based. Nor is it based on the systematic observation of statements such as "the other so-called virtues of the soul come closer to the fine qualities of the body" or "it seems that the virtue of wisdom more than anything else is akin to something divine," even though one may recognize the correctness of their syntax or their connection with the other propositions of the discourse.

The entanglement of the emotional and the rational, the conscious and the unconscious, belief and certainty, even the prescriptive and descriptive, as well as the interweaving of knowledge registers, are necessary for the human psyche. Mutual intelligibility, empathy, compassion, distrust, imagination, development, self-esteem, neurosis, and hope are only conceivable by reference to the complexity of this mind. However, science can only emerge if humans develop the means to escape from this psychic attraction. Science only exists if there are objects of science—however abstract they may be—and, therefore, only if knowledge registers emerge from the existential entanglement in which the psyche holds them. Only then can there be a scientific discipline. To this effect, Platonism is a pre-disciplinary knowledge. There can only be science if the relationship between subjectivity and object is non-subjective, if knowledge of the object is reduced to rationalization. Anything that interferes with this rationalization is likely to raise criticism in the polemical field that is intrinsically part of science. Platonism displays an effort of rationalization, but it also sustains the confusion of discursive registers.

2.2   Jean-Jacques Rousseau

The same analysis could be performed for countless philosophies. For illustrative purposes, consider the following passage by Jean-Jacques Rousseau (1712–1778):

> Man is born free, and everywhere he is in chains. Here's one who thinks he is the master of others, yet he is more enslaved than they are. How did this change come about? I don't know. What can make it legitimate? That's a question that I think I can answer.
> If I took into account nothing but force and what can be done by force, I would say: 'As long as a people is constrained to obey, it does well to obey; as soon as it can shake off the yoke, it does even better to shake it off. If its right to do so is challenged, it can answer that: it gets its liberty back by the same 'right'—namely, force—that took it away in the first place. Any justification for taking it away equally justifies taking it back; and if there was no justification for its being taken away no justification for taking it back is called for.' But the social order isn't to be understood in terms of force; it is a sacred right on which all other rights are based. But it doesn't come from nature, so it must be based on agreements. Before coming to that, though, I have to establish the truth of what I have been saying.
> The most ancient of all societies, and the only natural one, is the society of the family. Yet the children remain attached to the father only for as long as they need him for their preservation; as soon as this need ceases, the natural bond is dissolved. The children, released from the obedience they owed to the father, and the father, released from the care he owed his children,

return equally to independence. If they remain united, this is something they do not naturally but voluntarily, and the family itself is then maintained only by agreement.

This common liberty is an upshot of the nature of man. His first law is to provide for his own preservation, his first cares are those he owes to himself; and as soon as he can think for himself he is the sole judge of the right way to take care of himself, which makes him his own master.

You could call the family the prime model of political societies: the ruler corresponds to the father, and the people to the children; and all of them——·ruler, people, father, children·—— because they were born free and equal don't give up their liberty without getting something in return. The whole difference is that in the family the father's care for his children is repaid by his love for them, whereas in the state the ruler's care for the people under him is repaid not by love for them (which he doesn't have!) but by the pleasure of being in charge.[6]

Rousseau speaks with some emotion of the "sacred right," of the people who "shake off the yoke," who "get [their] liberty back," and yet delivers an eloquent text. This textual organization is an indication of intentional work, although the content suggests signs of a cultural and personal unconscious in the use of the notion of "nature" and the dichotomy of the volunteer and the natural, in the representation of the family or, more generally, in the imaginary. Certainties and beliefs often appear indistinctly in propositions such as, '[m]an is born free, and everywhere he is in chains,' 'the social order […] is a sacred right,' '[t]he most ancient of all societies, and the only natural one, is the society of the family.' From a pre-scientific point of view, the text discusses themes relating to legal sciences, anthropology, political science, sociology, and psychology. The whole oscillates between the prescriptive and the descriptive.

3. Philosophy and Disciplinarity

The philosophical thought of classical Greece, exemplified by an author like Plato, does not recognize the division of knowledge into scientific disciplines. This philosophy is an intensive rationalization of the social actors' psyche; it differs from the psyche by the accentuation of rationalization, it resembles it by the indivisibility it maintains of knowledge registers, by the share of emotion, unconscious, and beliefs that it retains—or does not seek to systematically control—and by the pathways that it creates between the prescriptive and the descriptive. Of course, these days there are still manifestations of this philosophy, of this intellectual competence.

In certain respects, Aristotle's work (384-322 BC) breaks with this pre-disciplinary thinking. In his work, there are studies devoted to biology, logic, physics, politics, cosmology, ethics, and poetics. Thus, there is a disciplinarization of knowledge.

The domination of religious discourse in Europe during the Middle Ages, particularly during the first part of that millennium, hinders the disciplinarization of knowledge. The Christian discourse of the Church groups everything in an integrated ideology affirming that

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[6] Jean-Jacques Rousseau, *The Social Contract*, book 1, chapter 1, Jonathan Bennet (ed.), Early Modern Texts, 2007 [1762].

everything that happens is the manifestation of divine will. To understand the world, it is therefore important to probe the intentions of the Divine. To understand an event is to recognize it as the intention of the Supreme Being. Platonism, which speaks of the world by interweaving the registers of knowledge, which associates certainties with beliefs, which stands close to the psyche, offered a ferment to this theology, and St. Augustine, after Ambrose of Milan, did not fail to make that known.

Guided by this imperious theology, the Middle Ages combined philosophy and theology, and monitored the movements of rationalization that detached themselves from the psyche. The division of knowledge into disciplines was unlikely, as it threatened divine truth as interpreted by the Church.

There were, nonetheless, achievements that were part of this rationalization movement. One achievement was accredited by the Church, which allowed the construction of cities, bridges and, similarly, of religious enclosures: churches and monasteries. Another was that of war: of defence and attack. There was that of agriculture and farming. Then there were all those that concerned the Church: that of health, for example, because disease is willed by God and doctors must not take His place.

Mathematics preceded or was contemporary with the philosophy of classical Greece. It was used, for example, to calculate areas or to facilitate trade in goods, or it prompted architectural thought; there was even astronomy. Outside Europe, there had been developments in these disciplines, either because they met the pragmatic expectations of a community, or because the social organization allowed the researcher some autonomy.

In Europe, however, the early Middle Ages largely undermined anything that threatened the ecclesiastical interpretation of divine will. Despite the Church's control, however, this period saw a great deal of scientific achievements. For practical reasons, interest was shown in natural phenomena and mathematics, and in the classification of plants and metals. Many studies were carried out in religious environments because, paradoxically, while it was good to respect God's will, it was also good to understand the flow of time or to cure bodily ailments. Moreover, advances in the Arab world aroused the curiosity of a few thinkers who imported impressive knowledge into Europe. All these achievements provided a certain ascendancy to rational activity, so that Augustinian theology had to give way to a less exclusive philosophy. In the late Middle Ages, St. Thomas Aquinas turned his attention to Aristotle and, while attempting to marry faith and reason, somewhat expanded the range of possibilities for rational activity. Philosophers specialized in particular subjects, such as mathematics, astronomy, or natural phenomena, but most of the time remained in the fold of the Church.[7]

During the Renaissance, the move towards the disciplinarization of knowledge was accelerating[8] at the same time as Europe was gaining confidence in rationality.[9] What humans

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[7] Joël Chandelier, Catherine Verna et Nicholas Weill-Parot (dir.), *Science et technique au Moyen Âge (XIIe-XVe siècles)*, Paris, Presses universitaires de Vincennes, coll. "Temps & espaces", 2017

[8] Évelyne Barbin (dir.), *Arts et science à la Renaissance*, Paris, Ellipses, 2007.; Allen G. Debrus, *Man and Nature in the Renaissance*, Cambridge, Cambridge University Press, 1978; Marie Boas Hall, *The Scientific Renaissance, 1450- 1630*, New York, Dover, 1994 [1962].

[9] Michel Foucault shows how this faith in reason is in relation with a reinterpretation of madness (*Madness and Civilization: A History of Insanity in the Age of Reason*. Translated by Howard R. New York: Vintage, 1965).

generated through their rational activity progressively became so apparent that science gained autonomy, managed to distance itself from religious diktats, and knowledge began to be built on knowledge itself rather than strictly on pragmatic considerations. The movement was so clear[10] that in 1637 René Descartes was able to identify four of its characteristics:

> This was why I thought that another method had to be found which retained the advantages of all three but was free from their defects. And just as a great number of laws is often a pretext for wrongdoing, with the result that a state is much better governed when, having only a few, they are strictly observed; so also I came to believe that in the place of the great number of precepts that go to make up logic, the following four would be sufficient for my purposes, provided that I took a firm and unshakeable decision never once to depart from them.
> The first was never to accept anything as true that I did not incontrovertibly know to be so; that is to say, carefully to avoid both prejudice and premature conclusions; and to include nothing in my judgements other than that which presented itself to my mind so clearly and distinctly, that I would have no occasion to doubt it.
> The second was to divide all the difficulties under examination into as many parts as possible, and as many as were required to solve them in the best way.
> The third was to conduct my thoughts in a given order, beginning with the simplest and most easily understood objects, and gradually ascending, as it were step by step, to the knowledge of the most complex; and positing* an order even on those which do not have a natural order of precedence.
> The last was to undertake such complete enumerations and such general surveys that I would be sure to have left nothing out.[11]

The first characteristic indicates that it is up to the researcher to identify the obvious; the researcher is, thus, no longer subject to religious discourse. The second recognizes the importance of separating, dividing, and subdividing the objects of knowledge; it thus endorses a division of the scientific field into disciplines and subdisciplines. The third seeks to base the understanding of complex things on the understanding of the simplest elements, recognizing that the study of the simplest objects does not suffice. The fourth characteristic holds that scientific analysis is constrained to comprehensiveness and that it is not allowed to exclude components for practical reasons.

The division of knowledge into disciplines coincided with a fragmentation of knowledge. In the 18th century, this dispersion was so disquieting that it led to the idea of a work that would capture all of its fragments and establish a principle that would govern their unification. In the "Preliminary Discourse" to *The Encyclopedia*, Jean d'Alembert writes:

> If one reflects somewhat upon the connection that discoveries have with one another, it is readily apparent that the sciences and the arts are mutually supporting, and that consequently there is a chain that binds them together. But, if it is often difficult to reduce each particular

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[10] It is viewed favourably by Matthiæ Martinii (*Idea methodica et brevis encyclopædia*, Ex officina Chriftophori Corvini, 1606) and by Francis Bacon (*The Great Instoration*, Wilder Publications, 2012 [1620]).

[11] René Descartes, *A Discourse on the Method*, Translated by Ian Maclean: Oxford Univesity Press, 2006, [1637].

science or art to a small number of rules or general notions, it is no less difficult to encompass the infinitely varied branches of human knowledge in a truly unified system.

The first step which lies before us in our endeavor is to examine, if we may be permitted to use this term, the genealogy and the filiation of the parts of our knowledge, the causes that brought the various branches of our knowledge into being, and the characteristics that distinguish them. In short, we must go back to the origin and generation of our ideas. Quite aside from the help this examination will give us for the encyclopedic enumeration of the sciences and the arts, it cannot be out of place at the head of a work such as this.[12]

4. Fear of Specialization

In the 18th century, the move towards specialization was clearly in effect and its achievements continued to spread. The encyclopedic compendium had not succeeded in assembling what the sciences produced, nor in asserting the principle of "genealogy" or of a "filiation" "of our knowledge."[13]

4.1. Specialization and General Knowledge

The phenomenon was worrying. It was feared that specialization was detrimental to the acquisition of general knowledge; by focusing too much on one element of the world and by needing to know too much to understand that element, the scholar runs the risk of not being able to acquire knowledge that is useful to the development of the mind or necessary for life in society. Likewise, by demanding too much of the training of these specialists for the good of science, society may contribute to the impoverishment of its citizens' culture. General knowledge should not be neglected in favour of specialization, Giambattista Vico stated in 1725.[14]

4.2. Specialization and Superiority

As it was easier to move away from the psyche in natural sciences and mathematics than in the humanities, and thus give way to hyper-rationalization initiatives, specialization was faster there, and these two vast fields began to distinguish themselves. It became less and less possible for philosophers to speak on issues that had previously been under their area of expertise. Disciplines such as physics, chemistry, and biology formed and detached from the mother of sciences—later followed by disciplines like psychology and sociology.

Given the success of these sciences, some tended to disparage the humanities, which Vico invites people not to do by highlighting the importance of the two approaches.[15]

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[12] Jean d'Alembert, "Preliminary Discourse," Translated by Richard N. Schwab and Walter E. Rex: *The Encyclopedia of Diderot & d'Alembert Collaborative Translation Project,* Michigan Publishing, University of Michigan Library, 2009.

[13] But encyclopedism remains justifiable, according to Jean-Hugues Barthélémy ("Encyclopédisme et théorie de l'interdisciplinarité," *La revue Hermès*, no 67, 2013, p. 165-170).

[14] Giambattista Vico, *The New Science*, Translated by Jason Taylor and Robert C. Miner: Yale University Press, 2020.

[15] *Ibid.*

4.3. Specialization and Inferiority

But not everyone admires "scientific men," the "philosophical laborers," as Friedrich Nietzsche called them in 1886:

> Let us look more closely: what is the scientific man? In the first place, he is an ignoble type of person with the virtues that an ignoble type will have: this type is not dominant, authoritative, or self-sufficient. He is industrious, he is patiently lined up in an orderly array, he is regular and moderate in his abilities and needs…[16]

Nietzsche disdains even the qualities that scientists claim:

> This illness has the prettiest fancy-dress clothes and liar's outfits. And most of what presents itself in the shop windows these days as "objectivity," for instance, or "scientificity," "l'art pour l'art," or "pure, will-less knowing," is only dressed-up skepticism and paralysis of the will… [17]

This impudence is based on the feeling of practicing a real philosophy:

> I am going to insist that people finally stop mistaking philosophical laborers and scientific men in general for philosophers […] In the course of his education, the genuine philosopher might have been required to stand on each of the steps where his servants, the philosophical scientific laborers, have come to a stop,—have had to come to a stop. Perhaps the philosopher has had to be a critic and a skeptic and a dogmatist and historian and, moreover, a poet and collector and traveler and guesser of riddles and moralist and seer and "free spirit" and practically everything, in order to run through the range of human values and value feelings and be able to gaze with many eyes and consciences from the heights into every distance, from the depths up to every height, from the corner onto every expanse. But all these are only preconditions for his task: the task itself has another will,—it calls for him to create values […] But true philosophers are commanders and legislators […] Their "knowing" is creating, their creating is a legislating, their will to truth is—will to power. [18]

 The text has the merit of being clear; science produces objective truths, as a result of low-class work. Philosophical truth is self-affirming, and as such is superior to the truth of "philosophical laborers."
 In 1930, José Ortega y Gasset did not go as far as Nietzsche—who declared that truth determined by the self was superior to that of science—but he unequivocally made a disparaging judgement on scientists, those "men astoundingly mediocre":

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[16]Friedrich Nietzsche, *Beyond Good and Evil*, Translated by Judith Norman: Cambridge University Press, 2002 [1886], p. 96-106.
[17] *Ibid.*, p. 101.
[18] *Ibid.*, p. 105-106.

Specialisation commences precisely at a period which gives to civilized man the title "encyclopaedic." The XIXth Century starts on its course under the direction of beings who lived "encyclopaedically," though their production has already some tinge of specialism. In the following generation, the balance is upset and specialism begins to dislodge integral culture from the individual scientist. When by 1890 a third generation assumes intellectual command in Europe we meet with a type of scientist unparalleled in history. He is one who, out of all that has to be known in order to be a man of judgment, is only acquainted with one science, and even of that one only knows the small corner in which he is an active investigator. He even proclaims it as a virtue that he takes no cognisance of what lies outside the narrow territory specially cultivated by himself, and gives the name of "dilettantism" to any curiosity for the general scheme of knowledge.

What happens is that, enclosed within the narrow limits of his visual field, he does actually succeed in discovering new facts and advancing the progress of the science which he hardly knows, and incidentally the encyclopedia of thought of which he is conscientiously ignorant. How has such a thing been possible, how is it still possible? For it is necessary to insist upon this extraordinary but undeniable fact: experimental science has progressed thanks in great part to the work of men astoundingly mediocre, and even less than mediocre. That is to say, modern science, the root and symbol of our actual civilisation, finds a place for—the intellectually commonplace man and allows him to work therein with success. The reason of this lies in what is at the same time the great advantage and the gravest peril of the new science, and of the civilisation directed and represented by it, namely, mechanisation. A fair amount of the things that have to be done in physics or in biology is mechanical work of the mind which can be done by anyone, or almost anyone. [19]

Scientific work can be done "by anyone,"; it is a "mechanical work of the mind." In these condescending words, Ortega, like Nietzche, understands scientific thought is not that of a complex subjectivity, but of a mastery of desubjectivating analytical tools.

5. Disciplinarity and Interdisciplinarity

As fields of specialization were being developed, the analytical domain of philosophy narrowed. During the 20th century, philosophy retained its expertise in logic, epistemology, and ethics, but most importantly, it continued to be the privileged place of intellectual syntheses within which scientific information, usually from other fields, was combined. Despite being highly rational, it did not leave the psychological domain. The philosophy of synthesis consists of social actors who reflect on their era from the realm between the prescriptive and the descriptive and who insist on rationality, but without cutting themselves off from the world of emotion, values, culture, and the self. The philosophy of synthesis is, like Platonism, pre-disciplinary in that it precedes the disciplinarization of knowledge, but not in that it is of a lower level than disciplinarized knowledge. It coexists with this specialized knowledge because it alone can navigate this intellectual sphere without having to move away from the psyche. Nevertheless, to base its syntheses on truths that do not depend on subjectivity, it requires the achievements of this specialized knowledge. It can be said that this philosophy is para-disciplinary, in the sense that it evolves alongside disciplinarity, or

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[19] José Ortega y Gasset, *Revolt of the Masses*, W.W. Norton & Company, 1932, p. 78.

even that it is non-disciplinary as, unlike other disciplines, it cannot be formed by ensuring that its propositions are desubjectivated.

In the 20th century there were many disciplines and the work carried out was uncoordinated, often even within a single discipline. The work followed the imaginations of scientists—who raised questions on the basis of results their research had already generated—or responded to varying requests from companies.

In this process, developments are often parallel, even compartmentalized. Yet, while this fragmentation is useful for producing in-depth knowledge on defined subjects, it is detrimental to the understanding of objects and phenomena as they come together. Further, some themes call for the merging of disciplines: neuropsychology, biochemistry, biophysics, or psychosociology. However, while these combinations are useful in gathering expert knowledge, they do not prevent the production of specialized knowledge.

There are few objects or phenomena that exist solely within themselves. Most objects are connected to other objects and the majority of phenomena occur in relation to other phenomena. This empirical evidence leads one to imagine the principle of interdisciplinarity. Descartes himself understood that the rule of divisibility was so important that it must lead to the rule of reconstruction.

In the middle of the 20th century, driven by scientific activity itself and the awareness of the interconnectedness of what was studied by various sciences, many thinkers called for interdisciplinarity. In 1970, the Organisation for Economic Co-operation and Development (OECD) and the Centre for Educational Research and Innovation (CERI), part of the OECD, organized a "Seminar on Interdisciplinarity in Universities," alongside the French Ministry of National Education.[20] During this seminar, Jean Piaget proposed what would become the authoritative typology. By emphasizing the potentially "mutually enriching" effect of the sciences, Piaget distinguished between multidisciplinarity, interdisciplinarity, and transdisciplinarity. Multidisciplinarity occurs when the disciplines borrow information from one another, but without undergoing a transformation; interdisciplinarity occurs when the exchanges between disciplines are reciprocal and contribute to "mutual enrichment"; transdisciplinarity occurs when the disciplines involved lose their respective boundaries.[21]

6. Need for Interdisciplinarity

Interdisciplinarity becomes a need and a project.[22] A need because achievements in one discipline have consequences on what is produced in another; because it is beneficial to

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[20] The seminar was held at the then-University of Nice, in France, from September 7 to 12, 1970. The report was published in 1972.

[21] Jean Piaget, "The epistemology of interdisciplinary relationships," in OECD (dir.), Interdisciplinarity: Problems of Teaching and Research in Universities, Washington, DC: OECD, 1972, p. 131-144.

[22] Julien Boelaert et al., "The Vicissitudes of Interdisciplinarity. Genèses and the French Social Sciences (1990-2014)," *Genèses*, nos 100-101, 2015, p. 20-49.; Patrick Charaudeau, "Pour une interdisciplinarité 'focalisée' dans les sciences humaines et sociales," *Communication questions*, no 17, 2010, p. 195-222, https://questionsdecommunication.revues.org/385.; Steven J. Cook et al.,"Diverse Perspectives on Interdisciplinarity from Members of the College of the Royal Society of Canada," *Facets*, vol. 5, no 1, 2020, p. 138-165.; Robert Frodeman, "The Future of Interdisciplinarity," in Robert Frodeman, Julie Thompson Klein and Roberto Carlos Dos Santos Pacheco (dir.), *Oxford Handbook of Interdisciplinarity*, Oxford, Oxford University Press, 2nd edition, 2017, p. 3-8.

borrow advances from one field to better understand what is examined in another; because the modelling that combines disciplines allows for a better understanding of phenomena; because, by overly refining the objects of study, one loses sight of the context in which they interact. A project because it seems to many that the world is better explained by reconciling knowledge; that the inseparability of the objects that make up empiricism requires an interdisciplinary approach.

This need is revealed by experts who are portrayed at the crossroads of disciplines: mathematical physics, sociolinguistics, biogeochemistry, neuroeconomics, and astrochemistry, and it is manifested in the creation of fields such as environmental studies, women's studies, cognitive sciences, and health sciences.[23] The project is carried out through the creation of programs, such as the one Max Horkheimer set up in the 1930s when he became Director of the Institute for Social Research in Frankfurt. His program's goal was to gather experts from the social sciences and humanities to conduct empirical research that would advance the critique of capitalism[24] and it was active in the interdisciplinarity funds of organizations including the Natural Sciences and Engineering Research Council of Canada[25] and the Social Sciences and Humanities Research Council of Canada.[26] It takes form in the work of Edgar Morin, who, to facilitate interdisciplinary analysis, suggested a series of principles, including those of organization, hologrammatics, feedback loops, recursive loops, and dialogic.[27]

7. Interdisciplinarity without Science

Since the 1970s, the term "interdisciplinarity" has been known—but the concept has varied.[28]

For some, like Michel Camus, science is so fundamentally associated with monodisciplinarity and the study of physical objects that transdisciplinarity is inconceivable in the field. Transdisciplinarity has no place in the scientific field; it is useful for calming existential fears or for responding to humanistic questions in the field of human sciences,

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[23] Institute of Medicine, *Facilitating Interdisciplinary Research*, Washington (DC), The National Academies Press, 2005, https://doi.org/10.17226/11153 ; Séverine Louvel, "Ce que l'interdisciplinarité fait aux disciplines. Une enquête sur la nanomédecine en France et en Californie," *Revue française de sociologie*, vol. 56, no. 1, 2015, pp. 75-103.

[24] See, for example, Paul-Laurent Assoun, *L'École de Francfort*, Paris, Presses universitaires de France, coll. "Que sais-je," 2001.; Manfred G. Gangl et Jacques Levrat,"Le programme interdisciplinaire de l'Institut de recherches sociales sous la direction de Max Horkheimer," *Archives de philosophie*, vol. 49, no 2, 1986, p. 205-223.

[25] https://www.nserc-crsng.gc.ca/nserc-crsng/policies-politiques/prepinterdiscip-prepinterdiscip_fra.asp.

[26] The SSHRC established a committee to evaluate applications for this type of funding: https://www.sshrc-crsh.gc.ca/funding-financement/programs-programmes/insight_grants-subventions_savoir-fra.aspx.

[27] Edgar Morin summarized these concepts in "La pensée complexe, une pensée qui se pense," chapter 4, in Edgar Morin and Jean-Louis Le Moigne, *L'intelligence de la complexité*, Paris, L'Harmattan, coll. « Cognition & formation », 1999, p. 247-267.

[28] Harvey J. Graff, *Undisciplining Knowledge. Interdisciplinarity in the Twenty- First Century*, Baltimore, Johns Hopkins University Press, 2015; Dorte Madsen, "Epistemological or Political? Unpacking Ambiguities in the Field of Interdisciplinarity Studies," *Minerva*, no 56, 2018, p. 453-477.

provided that "all human sciences are […] less science than art [;] as in the case of poetry, philosophy, psychology, psychoanalysis, and multiples forms of artistic creation."[29]

For others, like Michael Finkenthal, a consequence of disciplinarian thinking is a combination of concepts due to quantitative operations. To create interdisciplinarian thinking, room must be made for qualitative logic to which religious and rational beliefs can be added; a "teleology." Thus, it becomes possible to go beyond disciplinarian thinking and bring forth a vision of the world.[30]

For others still, like Julie Thompson Klein, interdisciplinarity is synonymous with the humanities and culture. The humanities being literature, folklore, language studies, philosophy, music, painting, and religious studies. Culture being intellectual, spiritual, aesthetic, and lifestyle developments, as well as the practices related to intellectual and artistic activities. Culture appears in literature, paintings, sculptures, music, theatre, and cinema. Interdisciplinarity replaces unity and universality with plurality and heterogeneity and substitutes synthesis and holism with interrogation and intervention.[31]

For others again, like Jacques Hamel, science seeks to "reduce complexity," it is only thus that it can approach the objects that it subjects to its analyses. This objective is contrary to that of interdisciplinarity, which has a "broad view" and aims to "merge different disciplines." Consequently, because it failed to find its true right in science, and because science corresponds to knowledge by object and by concept, interdisciplinarity, understood as an interpretation of knowledge, finds its lustre beyond scientific disciplines themselves, by wanting to link knowledge produced under different forms; like science and art.[32]

For the authors of the *Charter of Transdisciplinarity*,[33] disciplinarity is responsible for a multitude of great misfortunes that are listed in the preamble:

> Whereas, the present proliferation of academic and non-academic disciplines is leading to an exponential increase of knowledge which makes a global view of the human being impossible;

> Whereas, only a form of intelligence capable of grasping the cosmic dimension of the present conflicts is able to confront the complexity of our world and the present challenge of the spiritual and material self-destruction of the human species;

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[29] Michel Camus, "The Paradigm of Transpoetry," Translated by Joseph E. Brenner: *Transversales Science/Culture,* n°44, March-April 1997. The text is from a lecture given in 1995 during the "Art in Science and Science in Art," Symposium, which took place in São Paulo during the International Theatre Festival. It was initially published in the *International Center For Transdisciplinary Research (ICTR), 1996,* http://ciret-transdisciplinarity.org/bulletin/b7et8c7.php.

[30] Michael Finkenthal, *Interdisciplinarity. Toward the Definition of a Metadiscipline?*, New York, Peter Lang, 2001.

[31] Julie Thompson Klein, *Interdisciplinarity. History, Theory, and Practice*, Detroit, Wayne State University Press, 1990.

[32] Jacques Hamel, "L'interdisciplinarité, manière de faire ou de dire la science?" *EspacesTemps.net*, 2013, https://www.espacestemps.net/ articles/linterdisciplinarite-maniere-de-faire-ou-de-dire-la-science/.

[33] The Charter was adopted during the First World Congress of Transdisciplinarity which took place in Portugal, during *Convento da Arrábida*, from November 2 to 6, 1994. The editorial board was composed of Lima de Freitas, Edgar Morin, and Basarab Nicolescu. It is available on the International Center For Transdisciplinary Research (ICTR) website: https://ciret-transdisciplinarity.org/chart.php.

Whereas, life on earth is seriously threatened by the triumph of a techno-science that obeys only the terrible logic of productivity for productivity's sake;

Whereas, the present rupture between increasingly quantitative knowledge and increasingly impoverished inner identity is leading to the rise of a new brand of obscurantism with incalculable social and personal consequences;

Whereas, an historically unprecedented growth of knowledge is increasing the inequality between those who have and those who do not, thus engendering increasing inequality within and between the different nations of our planet;

Whereas, at the same time, hope is the counterpart of all the [aforementioned] challenges, a hope that this extraordinary development of knowledge could eventually lead to an evolution not unlike the development of primates into human beings;

Therefore, in consideration of all the above, the participants of the First World Congress of Transdisciplinarity […] have adopted the present Charter, which comprises the fundamental principles of the community of transdisciplinary researchers, and constitutes a personal moral commitment, without any legal or institutional constraint, on the part of everyone who signs this *Charter*.

Following this preamble, 15 articles are proposed, but they are not truly linked to what precedes, largely setting aside disastrous rhetoric. Here are the first six articles:

Article 1: Any attempt to reduce the human being by formally defining what a human being is and subjecting the human being to reductive analyses within a framework of formal structures, no matter what they are, is incompatible with the transdisciplinary vision.

Article 2: The recognition of the existence of different levels of reality governed by different types of logic is inherent in the transdisciplinary attitude. Any attempt to reduce reality to a single level governed by a single form of logic does not lie within the scope of transdisciplinarity.

Article 3: Transdisciplinarity complements disciplinary approaches. It occasions the emergence of new data and new interactions from out of the encounter between disciplines. It offers us a new vision of nature and reality. Transdisciplinarity does not strive for mastery of several disciplines but aims to open all disciplines to that which they share and to that which lies beyond them.

Article 4: The keystone of transdisciplinarity is the semantic and practical unification of the meanings that *traverse* and *lay beyond* different disciplines. It presupposes an open-minded rationality by re-examining the concepts of "definition" and "objectivity." An excess of formalism, rigidity of definitions and a claim to total objectivity, entailing the exclusion of the subject, can only have a life-negating effect.

Article 5: The transdisciplinary vision is resolutely open insofar as it goes beyond the field of the exact sciences and demands their dialogue and their reconciliation with the humanities and the social sciences, as well as with art, literature, poetry and spiritual experience.

Article 6: In comparison with interdisciplinarity and multidisciplinarity, transdisciplinarity is multireferential and multidimensional. While taking account of the various approaches to time and history, transdisciplinarity does not exclude a transhistorical horizon.
[…]

8. Science and Philosophy

The disciplinarization of knowledge was inevitable[34], as an objective analysis of the world was required both for pragmatic purposes and for answering the questions posed by the scientific imagination. This hyper-rationalist approach could not have taken place in the framework of its philosophical counterpart, where thought is very closely linked to the psyche. Yet, disciplinarity requires interdisciplinarity. While an object of study may need to be subdivided to be understood and analytical modes in turn specialized to be adapted to these objects, this does not diminish the need to compile the results of this work and to equip oneself with modellings that promote their combined interpretation. It is even conceivable that this interdisciplinarity may give rise to a new disciplinarity. Thus, disciplinarity and interdisciplinarity must coexist: disciplinarity is inevitable, but calls to interdisciplinarity; interdisciplinarity is tied to disciplinarity and can give way to a new disciplinarity. It is somewhat in this spirit that Peter Weingart wrote "interdisciplinarity and specialization are parallel. They are mutually reinforcing strategies, and, thus, complementary descriptions of the process of knowledge production."[35]

But interdisciplinarity is still a science. It is the means by which science decompartmentalizes its knowledge and creates new models of analysis at the intersection of various disciplines. According to Piaget's taxonomy, this work is multidisciplinary if it is only borrowed, interdisciplinary if its exchanges contribute to modifying disciplines, and transdisciplinary if original disciplines fuse into a new issue, a new disciplinarity. But whatever the type of interdisciplinarity, analysis remains in the scientific field.

The recognition of the need for interdisciplinarity and the difference between the forms it can take has led to the idea of a kind of higher, transcendent knowledge, capable of overcoming obstacles related to disciplinarity and bringing science into the existential order and the sociopolitical world.

When this idea is based on a classification as naive as Michel Camus', in which poetry and psychology are identical and all that is human science is radically opposed to the sciences of "physis," there is not even interdisciplinarity; only transdisciplinarity. This transdisciplinarity is expelled from the scientific field and corresponds to the subjective

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[34] Jerry A. Jacobs, "The Need for Disciplines," in Robert Frodeman, Julie Thompson Klein, and Roberto Carlos Dos Santos Pacheco (dir.), *Oxford Handbook of Interdisciplinarity*, Oxford, Oxford University Press, 2nd edition, 2017, p. 35-39.
[35] Peter Weingart, "Interdisciplinarity: The Paradoxical Discourse," chapter 2, in Peter Weingart and Nico Stehr (dir.), *Practising Interdisciplinarity*, Toronto, Buffalo, London, University of Toronto Press, 2000, p. 40.

introspection intended to calm existential anxieties or take ethical responsibility for the world.

When this idea reduces science to monodisciplinarity, as Michael Finkenthal's does, there is no interdisciplinarity except in a non-scientific world guided by beliefs and apt to endow the mind with a vision of the world.

When science is confined in unity and universality, as with Julie Thompson Klein, interdisciplinarity cannot arise except in a cultural or artistic framework.

When, as with Jacques Hamel, science is defined by reduction and interdisciplinarity by combination, the two are opposed and the latter can only occur beyond the disciplines in a space where it is possible to try joining science and art.

When science is held responsible for the ills of humanity, the amalgamation of a transdisciplinary mind, whose mission is to ensure scientific work with moral considerations, becomes conceivable.

In this whole discussion, what is sought is metaphysics; thinking that can unite the human experience with rational knowledge and combining knowledge into ethically motivated intelligence. This pursuit is understandable as it stems from the awareness that science is incapable of doing so itself. Nevertheless, it is founded on misconceptions. Multidisciplinarity, interdisciplinarity, and even transdisciplinarity are still scientific practices and, once science is involved, it is forced to deviate from the subjective world of moral anxieties and preoccupations. Mental balance or the torments of the mind can guide scientific endeavours, but they cannot take part in it; pacifist or egalitarian aspirations can govern scientific research, but the moment the research begins, it cannot become one with these aspirations. There can be no redeeming interdisciplinarity or transdisciplinarity unless it is understood that any departure from monodisciplinarity relates to the psyche.

The possibility of scientific operationalization makes up the expanse between the analytical process and psychological considerations, making science poor in comparison to the complexity of the human mind. It further allows science to inform the human mind of objective notions and to contribute to the production of what is necessary for human life.

Artistic creation can build on scientific achievements, intellectually or materially, but it can never be reduced to scientific statement. Truth is found in an artistic work when the individual exposed to it recognizes something from their own experience or when the work provokes real emotions. Ultimately, this is unlike scientific truth; a scientific discovery can give rise to excitement or fear, but its truth, quite simply, comes from the verification of a hypothesis or the logical arrangement of an argument.

Artistic discovery is not scientific discovery.

The dream of a highly reflexive synthetic knowledge, nourished by a multitude of scientific information and undissociated from the psyche, can only be realized in the field of philosophy. But scholarship is not interdisciplinarity and however scientifically informed the experience may be, it is cut off from science by the complexity of what drives it psychically. This synthetic knowledge is found, in the 20th century, in the masterful works of Husserl, Bergson, Heidegger, Horkheimer, Gadamer, Adorno, Sartre, Levinas, Beauvoir, Merleau-Ponty, Ricoeur, Rawls, Morin, Castoriadis, Deleuze, Habermas, Baudrillard, Derrida, Taylor, Gilligan, Honneth, Butler…

9. Conclusion

For human beings, living in society means reasoning and feeling, being consciously and unconsciously, believing and knowing; it means internalizing a wealth of knowledge while knowing how to learn. No science can develop in such a complex, open or uncontrolled framework.

Philosophy arises from this psychological context but adds a highly rational function to it. This addition has the effect of promoting reflections on life, but while keeping them within the psychological framework of the lived experience and that which is understood and felt. Philosophy, meanwhile, is not a science, precisely because it does not lose sight of the psyche. Yet, science cannot produce results unless they are desubjectivated, as there is no admissible truth where subjectivity occurs. Science carries critical tools concerned with identifying statements and arguments that do not fall under systematic observation or logic. It can only satisfy pragmatic questions or establish credible propositions in this analytic environment. Slowly during the Middle Ages and quickly from the Renaissance onwards, the scientific world abandoned philosophy and subdivided itself into disciplines. It created specialized analytical tools, broke the empirical experience down into parts, and created models that lead to the separability of the observable and the separation of objects soliciting adapted models. This disciplinarization of science progressively called for interdisciplinarity to gather what was separated and to better understand what is hardly separable. Disciplinarity and interdisciplinarity came to operate together, with the same rigour.

Knowledge dispersal that is dependent on the specialization of thought, alongside the specialization whose desubjectivation becomes evident, together reveal a fragmented world of knowledge and achievements, some of which are morally unacceptable, to many observers. In certain circles, people dream of an interdisciplinarity that gathers this scattered knowledge and expresses the wealth of the human experience. But science and subjectivity are contradictory—the more subjectivity, the less possibility for science. Science is made possible by human subjects, so long as they submit to its methods, logic, and polemic, which in turn make statements and observations irrelevant to subjectivity. Artistic creations are not subject to the tyranny of science and as such are not limited by it. Unscientific, they are carriers of truth for the psyche and do not engage with the disciplinarization of thought.

Human beings need the thoughts that are in immediate contact with the psyche, like those produced in artistic fields. They also need science, just as science itself requires the dual process of disciplinarization and interdisciplinarization. They further need scientific knowledge that is rationally collected and interpreted in proximity to the psyche; but then it no longer entails scientific interdisciplinarity, but philosophy. There can be interdisciplinarity, in every sense, in the arts, like when the artist combines different art forms, but this hybridization is not analytic interdisciplinarity, which is ineffective in the world of aesthetic creation. Within scientific contexts, interdisciplinarity is condemned to either evolving on the fringe of the artistic mind and philosophical rationality, or to avoiding its influence, except in brief instances. If it can be guided by art and philosophy, it is to quickly submit itself to the requirements of scientific desubjectivation.

Pushing interdisciplinarity outside the scientific field means recognizing that there exists a domain, one of the human mind, where a wealth of knowledge meets and where it is

impossible for all propositions to meet the requirements of the scientific field. This domain is that of the psyche and, on an intellectual level, it is that of philosophy and art. But interdisciplinarity is always of science. Whether a linguist borrows an analytic tool from the physicist or the two create a model that solves a joint problem or that reveals a new object of study, interdisciplinarity is synonymous with science.

The word *discipline* resonates outside the scientific field. Its use is not reserved for science, but the scientific field is indeed set up into disciplines and, in this form, a notion of interdisciplinarity was conceived to resolve the scientific problems that occur at the intersection of disciplines. But science does not comprise all human knowledge. The human psyche is composed of a great deal of knowledge that stems from that which was realized in the scientific world, but which inhabits the psyche in a paradisciplinary way. The recognition of this richness of the human mind gave way to the belief that interdisciplinarity had nothing to do with science, that it is essentially related to the psyche. We arrive at this conclusion by concealing the interdisciplinary tendencies of science and by exporting, in our interpretation of human psychology, the category of disciplinary thought that bears little relation to it.

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