

# How can we ensure that scientific and technical progress becomes synonymous with human progress?

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## Résumé

L'article examine comment le progrès scientifique et technique peut devenir effectivement synonyme de progrès humain, au lieu de se retourner contre l'humanité elle-même. L'auteur part du constat que les avancées scientifiques ont conféré à l'être humain une puissance sans précédent, capable de rendre la Terre inhabitable ou de la détruire, comme l'illustre l'arsenal nucléaire. Dès lors, la question centrale devient éthique : comment orienter la science et la technique afin qu'elles servent la vie humaine et le bien commun ? L'auteur soutient que la pratique scientifique, dans son essence, repose déjà sur une éthique de la responsabilité, exprimée méthodologiquement par l'ouverture à l'expérience. Cette option implique de soumettre les hypothèses à l'épreuve des faits, d'accepter la révision des théories et d'éviter l'arbitraire. Une telle posture n'est pas seulement scientifique ; elle constitue aussi une condition du dialogue rationnel et de la vie en société, car elle permet de prendre des décisions plus justes fondées sur des preuves partageables. L'auteur critique les conceptions qui réduisent la nature à un simple objet d'exploitation illimitée, souvent attribuées de manière simpliste à des penseurs comme Descartes, Galilée et Newton. Ainsi, le problème ne réside pas dans la science moderne en elle-même, mais dans la captation de la recherche scientifique par des intérêts politicomilitaires et économicofinanciers, en particulier dans le contexte d'une économie mondiale orientée exclusivement vers le profit. Cette appropriation détourne la science de son instance responsable et empêche que son progrès se transforme en progrès humain. Comme alternative, l'auteur défend un modèle économique et social guidé par l'éthique de la responsabilité, engagé en faveur de la justice sociale, de la préservation de l'environnement et des droits humains, y compris ceux des générations futures. Dans cet horizon, la science doit contribuer à relever des défis planétaires tels que le réchauffement climatique et la perte de la biodiversité. S'inspirant de l'héritage des Lumières et des réflexions de Ferdinand Gonseth, l'article souligne enfin que le savoir scientifique est toujours provisoire et révisable, et qu'il doit être évalué selon son adéquation au réel plutôt que selon une conception absolue de la vérité.

**Mots-clés :** Progrès scientifique et technique; Éthique de la responsabilité; Bien commun; Gouvernance de la science; Durabilité et justice sociale.

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### Abstract

The article examines how scientific and technical progress can truly become synonymous with human progress, rather than turning against humanity itself. The author starts from the observation that scientific advances have given human beings unprecedented power, capable of making the Earth uninhabitable or of destroying it, as exemplified by nuclear arsenals. Consequently, the central question becomes ethical: how can science and technology be guided so that they serve human life and the common good? The author argues that scientific practice, in its very essence, is already grounded in an ethics of responsibility, expressed methodologically through openness to experience. This option entails submitting hypotheses to the test of facts, accepting the revision of theories, and avoiding arbitrariness. Such an attitude is not only scientific; it is also a condition for rational dialogue and social life, since it allows for fairer decisions based on shareable evidence. The author criticizes conceptions that reduce nature to a mere object of unlimited exploitation, often simplistically attributed to thinkers such as Descartes, Galileo, and Newton. Thus, the problem does not lie in modern science itself, but in the capture of scientific research by politico-military and economic-financial interests, especially in the context of a global economy oriented exclusively toward profit. This appropriation diverts science from its responsible instance and prevents its progress from being transformed into human progress. As an alternative, the author advocates an economic and social model guided by an ethics of responsibility, committed to social justice, environmental preservation, and human rights, including those of future generations. Within this horizon, science must contribute to addressing planetary challenges such as climate warming and the loss of biodiversity. Drawing inspiration from the legacy of the Enlightenment and the reflections of Ferdinand Gonseth, the article finally emphasizes that scientific knowledge is always provisional and revisable, and that it should be evaluated according to its adequacy to reality rather than according to an absolute notion of truth.

**Keywords:** Scientific and technical progress; Ethics of responsibility; Common good; Governance of science; Sustainability and social justice.

## 1. Methodology and Responsible Authority

### a) A relevant question

The question *How can we ensure that scientific and technical progress becomes synonymous with human progress* arises from the fact that advances in science and technology *are worryingly* turning against humanity by giving it such power that it is making the Earth uninhabitable and capable of destroying it through its nuclear arsenal. This question amounts to asking how to ensure that the progress of science and technology does not stand against humanity, but rather becomes synonymous with human progress—that is, progress marked by appropriate conduct, best suited to the situation in which we are engaged. This way of questioning scientific and technological progress echoes a reflection by Albert Einstein who, speaking of the scientific person, said:

Is the time definitely past when their inner freedom, independent thought, and research could enlighten and enrich human life? Have they forgotten their responsibility and dignity because their effort has been confined to intellectual activity? (...) If the contemporary scientific person finds the time and courage to judge the situation and their responsibility calmly and objectively, and acts according to this examination, then the prospects for a reasonable and satisfactory solution to today's excessively dangerous international situation will appear profoundly and radically transformed.<sup>1</sup>

### b) A methodological approach motivated by an ethics of responsibility

By examining the methodology of scientific and technical research practice, we see that this practice is a human activity oriented toward what is appropriate, in other words, toward what is justifiable in light of the test of facts. Its value lies fundamentally in the reliability of the insights and means it provides, thanks to its constant concern to avoid arbitrariness and to achieve what is appropriate. Through the consistency of this methodological concern, which permeates it entirely, the progress of scientific and technical research *refers wholly to a responsible authority* that guarantees its reliability. Under these conditions, does not the progress of science and technology naturally fall within the horizon where human beings strive to assume their existence in a society of responsible individuals, capable of forming community through dialogue aimed at the most equitable decision possible? By focusing our attention on the option of openness to experience, we will see *the reason* that allows us to affirm that the progress of science and technology takes place within the horizon of *an ethics of responsibility*, which underlies the effective capacity to engage in dialogue and to decide as equitably as possible.

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<sup>1</sup> - Einstein, A., 1979, *Comment je vois le monde*, Paris, Champ Flammarion, p. 189.

Openness to experience is the dominant option in the practice of scientific research. From this option arises the requirement of *technicity*, according to which hypotheses must be plausible and experimental setups capable of validating them through failure or success. It also entails *the obligation to revise* any view refuted by the test of reality and to assess the impact of these revisions on the overall progress of ongoing research.

*The reason for this option* stems from the responsible authority, which realizes that if it does not adopt it, it is already overtaken by the evolving reality and deprived of any legitimate arbitration. Outside of this option, consisting of engaging in experience and implementing strategies for such engagement, it becomes impossible to rally around what is appropriate for everyone, because it has successfully passed the test of reality. Consequently, it is easy to see that, both at the level of scientific technicity and common sense, any attempt to dialogue outside the option of openness to experience turns into a dialogue of the deaf, lacking the ability to confront ideas with facts against which persistence is futile. Thus, the option of openness to experience presents itself to human beings *in general* as the condition that truly makes possible the realization of sociability through dialogue. It carries *the meaning of an ethics of responsibility*, in the sense that *it establishes* the framework where each of us lives, deep within our being, *the relationship with the other* with whom we deliberate, decide, and act toward what must be done to achieve the best possible outcome in the situation in which we find ourselves.

Without the option of openness to experience, which is the dominant methodological approach in the practice of scientific research, but also that of anyone concerned with aiming for what is appropriate, human beings lose themselves in the arbitrariness of ideas disconnected from reality. In philosophy, this results in the irreconcilable opposition between systems such as idealism and realism, rationalism and empiricism, spiritualism and materialism, etc. At the level of social life, reason then risks becoming that of the strongest, proclaiming itself the holder of a superior truth, like that of the Party that arrogates the right to impose it and harshly punish anyone who, in one way or another, contests it.

The dominant *methodological approach* in the practice of scientific research is therefore motivated by *an ethics of responsibility*. In this way, if the progress of scientific and technical research is not, *in fact*, synonymous with human progress, *it is because it encounters an obstacle* that diverts it from its methodological orientation in reference to a responsible authority.

But what is human progress? I understand it in the context of the option of openness to experience, and I measure it by what we are capable of doing, collectively and personally, in order to bequeath to future generations a habitable Earth and values that allow it to remain a sustainable place, open to responsible creativity.

Today, as we were yesterday and will be tomorrow, *we are people of an era*. For us, in the 21st century, human progress is measured by our ability to identify the

global challenges we must face and to succeed in inventing the appropriate solutions to overcome them. Isn't it, moreover, *from this perspective of human progress* that we ask ourselves where the technologies of the future are, the ones that must be promoted and advanced?

That said, it is appropriate to denounce a certain conception of science and technology that dates back to Descartes (1596–1650) and reduces nature to a resource to be exploited at will. It relies mainly on the passage from the *Discourse on Method* where it is written:

it is possible to attain knowledge that is useful to life (...) by which, knowing the power and actions of fire, water, air, the stars, the heavens, and all the other bodies that surround us as distinctly as we know the various trades of our artisans, we could employ them in the same way for all the uses to which they are suited, and thus render ourselves as masters and possessors of nature.

This quotation shows that Descartes envisions *a reorientation of science* that connects it to its technical applications. Contrary to the interpretation given by Heidegger (1889–1976) and his followers, this passage from the end of the *Discourse on Method* (sixth part) does not mean that nature is reduced to a resource committed to our disposal. It expresses the wish that science should enable humanity to improve its living conditions. Nature is acknowledged in its greatness and intrinsic value. For Descartes, mastery over nature remains within the limits of the human creature, dependent on Divine Omnipotence.

*The addiction to power* through the expansion of science and technology certainly exists all too much and prevents their progress from being synonymous with human progress. But it does not come from Descartes, nor from Galileo (1564–1642), nor from Newton (1642–1727), nor from other creators of modern science. Where does it come from, infiltrating the realms of scientific and technical research like a worm in the fruit?

### **c) Ensure not to betray the authority responsible for the reliability of knowledge**

Very powerful politico-military-economic groups manage to gain control over scientific and technical research in order to put it at the service of their quest for power. Nowadays, the “*all-market*” *economy* dominates across the five continents, reducing nature to a resource to be exploited and forcing societies to live according to the law of a free market where competition among all prevails for the benefit of a few.

The economy, however, cannot be reduced to a model focused solely on profit at the expense of the environment and social justice. Could it not become, as the etymology of the term *economy* suggests, *the law of the household*, with everything

the household implies *in response to our needs*, from food and security to recognition by the group to which we belong and personal fulfillment?

Nowadays, in a globalized world, is *the law of the household* not called to extend, with the necessary adaptations, across the five continents? By adhering to it, we would promote an economic model in which small and medium-sized enterprises are generally quite good examples, as they can only *prosper sustainably* by having qualified personnel motivated by healthy competition, striving to be the best possible in their sector as it evolves toward the technical objects of the future.

As this model gains ground, the logic of the economy could *interact* with the imperatives of *an ethics of responsibility, which require fair exchanges and lifestyles compatible with the environment*. The *ethics of responsibility* commits us to future generations and, as such, enjoins us to promote, on a global scale, an economic model that, by fostering fundamental research and its technical applications, *gives us the chance to meet the challenge* of climate change and biodiversity loss, as well as to create a less inequitable world.

It is essential to prevent, particularly through profound revisions in the way wealth is produced and distributed, very powerful individuals and groups from seizing the progress of science and technology to turn it into a formidable tool serving an insatiable appetite for wealth and power at the expense of everything else. Insofar as we are convinced that scientific and technical progress *must* and *can* be *synonymous* with human progress, and that if it is not, *it must* become so by overcoming what hinders it through a deep restructuring of the economy, *as well* as of education and training, following the model of the methodological option of openness to experience.

The question of whether scientific and technical progress is synonymous with human progress was already central during the *Enlightenment*. To raise this question and wish to debate it is to acknowledge oneself as an heir of the 18th-century *philosopher*, that ardent defender of the *Enlightenment* that radiated from the scientific and technical progress of the time. Since this heritage mainly involves an invitation to demonstrate critical thinking, we will reduce it to its essential core and discern what should be retained from it in the 21st century.

## 2. The legacy of the *Enlightenment* and its transcendence

In the 18th century, a type of man appeared in the form of the philosopher. He is both a disciple of René Descartes and of John Locke (1632–1704). Like Descartes, he believes in the value *of reason*, and, following Locke, he believes in the value *of experience*.

The philosopher promotes the value of knowledge, of which Newton's theory represents, at the time, *the highest point*. Reason, *by its own means*, when exercised

through a genius of Isaac Newton's caliber, succeeds in constructing the theory of universal gravitation.

The fact that reason depends only on its own *theoretical and experimental* resources goes hand in hand with the realization that the lights of reason are the only ones that are appropriate. Outside of them, the human being loses autonomy and must conform to norms imposed from the outside, as in the time when the ecclesiastical authority could punish the scholar who strayed from the teachings of the Church.

### **a) From the dialectic of the theoretical and the experimental to the question of truth**

The essence of the *Enlightenment's* legacy is certainly not the belief that, in its principles, Newton's theory is irreformable and that it refers to God as the Great Clockmaker. It lies in *emphasizing the value of theoretical and experimental knowledge, which, unlike what Newton and the scholars of his time believed, can be revised even in its principles and, therefore, progress not only through the accumulation of knowledge but also through profound transformations*. To clarify the synonymy between scientific progress and human progress in the context of the 21st century, it is necessary to examine the relationship between its theoretical and experimental aspects, which, after the "crisis of foundations" in mathematics and physics at the beginning of the 20th century, was rethought in entirely new ways. By re-examining from the ground up the relationship between theory and experiment in the constitution of knowledge, we reach the core of what defines it and gives it its guarantees of reliability. To get to the heart of this relationship, I refer to the views of the Swiss mathematician-philosopher Ferdinand Gonseth, as presented in his masterwork *Geometry and the Problem of Space*<sup>2</sup>.

1. None of the approaches in the sciences begins from a state in which researchers have perfectly purified information and completely assured methods at their disposal. A scientific approach can only proceed from a certain situation of knowledge, a situation in which researchers rely on prior knowledge and on a certain already established language. This knowledge is guaranteed only within certain limits, and this language is not fixed in an unchanging form. Researchers can therefore never begin their investigations except from a given situation within the current state of knowledge.
2. Their research encounters or brings to light new elements that do not automatically integrate into the initial situation.
3. It sometimes happens that, in order to integrate the new elements, it is necessary to imagine and test a new hypothesis or a set of

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<sup>2</sup> : Gonseth, F., 1945-1955, *La Géométrie et le problème de l'espace*, Neuchâtel, Éditions du Griffon, fascicule VI, p. 583 ff.

new hypotheses, or even a hypothesis or hypotheses that are incompatible with the initial situation.

4. When testing confirms the new hypothesis or the set of new hypotheses, this result reflects back on the initial situation: either by integrating into it and enriching it; or by requiring partial revision; or by forcing a complete change, based on entirely new foundations, and starting a new cycle—from the initial situation to the impact of the successful test upon it.

The transition from the initial situation to the evolved situation is not the result of a logical necessity. It responds to certain requirements of adequacy, or, in other words, to certain requirements of suitability. It involves a moment of mental and technical creation that cannot be confused with a formalizing procedure. Thus, we find ourselves faced with a *schema* comprising four phases: from the initial situation, where new elements emerge that pose a problem, *first phase*, researchers imagine one or several hypotheses and an experimental setup, *second phase*. *Third phase*: testing through the verdict of fact; and *fourth phase*: the impact of the successful test upon the initial situation.

These four phases *mark the rhythm* of the progress of knowledge. They must be understood within the spatio-temporal horizon where *all feedback* is possible at every moment. They form an *appropriate schema* of the actual practice of scientific research. The word schema is understood in the sense that, for example, a road map is a schema. Compared to what it represents, the schema is abstract. It retains only certain aspects and represents them through a system of symbols. It is appropriate only insofar as it corresponds schematically to the reality it represents. Thus, a road map is an appropriate schema insofar as it allows one to plan an itinerary and find one's way along the route. If, by reading and following it correctly, one finds that one reaches one's destination, this proves its suitability.

*The schema of the four phases* on which the researcher relies is not an instance prior to or external to research. Its status is that of being itself a *plausible hypothesis*, which allows it to be tested. It was tested by its author, Ferdinand Gonseth, particularly in two of his works, *Geometry and the Problem of Space* and *The Problem of Time*, but also in his articles on morality, language, and the human sciences in general. Later, members of the Ferdinand Gonseth Association tested it in other fields, such as music<sup>3</sup> and spirituality. Gonseth himself extended it to projects—whether existential, political, technical, or otherwise. One realizes that, *mutatis mutandis*<sup>4</sup>, it applies to all human engagements in experience and is, therefore, the appropriate instrument for the search for suitability, whatever the domain. Through this extensibility, it takes on a philosophical dimension, and we shall call it *the methodological schema for the*

<sup>3</sup> See the two works by Éric Émery on music and the work by Bernard Morel on spirituality.

<sup>4</sup> Latin expression meaning this: what had to be changed having been changed.

*search for suitability*<sup>5</sup>.

With these clarifications made, we can now move to the heart of the question concerning the relationship between the theoretical and the experimental in contemporary scientific research.

Through the methodological schema of the four phases, we see that, in scientific research, the *theoretical* aspect, the hypothesis, and the *experimental* aspect, the testing of the hypothesis, form *a double framework*. The theoretical rests on no ultimate foundation. It is the schema of a reality grasped from a certain situation and which, in that situation, is liable to confirm or invalidate it.

The relationship between the theoretical and the experimental *is a schematic correspondence*, by definition, subject to revision. It is *dialectical* in this sense, and only in this sense, that it is entirely under the pressure of experience, which is reflected in researchers' constant concern to remain effectively engaged with reality in the making and to equip themselves with the means to verify it through new tests of their hypotheses, while remaining open to the possibility of having to revise them as facts require. It may happen that everything must be reworked within a new horizon of knowledge in schematic correspondence with a new horizon of reality, as was the case in the transition from classical physics to Relativity or with the advent of quantum mechanics.

The question of the relationship between the theoretical and the experimental is, in other words, the question of *truth*, which appears to us as *the schematic correspondence between a horizon of knowledge and a horizon of reality*. The traditional notion of truth as full *adequacy* of the statement to reality is thus profoundly revised. We do not reach or measure reality as it is in itself, but *as it is present to us on the horizon*, which may be that of common sense, that of the particle physicist, or that of the astrophysicist...

*The fundamental value* of knowledge lies in its schematic and revisable correspondence to the horizon of reality, in other words, in what we call its suitability rather than *its truth*. The notion of truth evokes too much the idea of something definitive and unalterable.

Without this characteristic of suitability, knowledge could neither free us from prejudices nor possess its emancipatory value, which places us *in a position to think and decide for ourselves, in short, to be a responsible agent for our entire life*.

## **b) The relevance of suitability (idonéism) for the scientific community and for all of us**

The scientific community can claim *its scientificity* only insofar as it feels bound by *the duty* to meet the methodological requirements of scientific and technical research, notably by emphasizing *solidarity among disciplines*. Highlighting solidarity among

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<sup>5</sup> It is important never to forget that, first and foremost, this schema makes explicit the rhythm of scientific research and that, from there, it extends, with adjustments, to all human activities.

disciplines is the *sine qua non* condition for interdisciplinary dialogue and for the ability to address multifaceted problems, such as those posed by climate change and biodiversity loss. It is also the condition without which the specialist, as Albert Einstein says, «loses the sense of grand architectures and becomes a blind worker in an immense whole. »<sup>6</sup> In the context of this quotation, Einstein recalls the role played by Arnold Berliner, who had created a journal intended for scholars, and he writes on this subject: «They (the scholars) want to know and understand the evolution of problems, methods, and results in order to form their own judgment. »<sup>7</sup>

In *this ideal configuration* toward which it should strive, the scientific community, present on all five continents, could be *proposed worldwide* as a *model* for building society within the horizon of values opened by the value of knowledge. Within the axiological horizon of their community, researchers engage in dialogue and make joint decisions concerning, for example, the choice of a hypothesis or an experimental setup. Their community, think, for instance, of CERN or the GIEC, *self-determines* with a common goal: advancing knowledge. In this sense, the scientific community, *when it meets its methodological requirements, is a model of a society of free and responsible individuals who choose to live together by dialoguing and cooperating in a spirit of healthy emulation*. Sharing a common goal, its members discuss the best means to achieve it and decide how to cooperate in implementing them.

Isn't this a model that would be particularly suitable for our era, faced with planetary challenges? To meet them, it is indeed essential that, throughout the world, human beings can, thanks to the society in which they live and their personal efforts, become *responsible agents* who, with the help of science and technology, adopt appropriate attitudes and behaviors.

How can this model be disseminated, if not through the education of children and the training of young people, as well as adults who must adapt to new situations? Certainly, but education and training must follow a pedagogical approach based on the methodological schema of the search for suitability, for this is the *sine qua non* condition for adopting the societal model represented by the scientific community when it fulfills all its methodological requirements and thus respects all dimensions of its responsibility. These responsibilities cannot be limited to guaranteeing the reliability of its processes and results, because responsibility is fundamentally a summons to answer for our actions in relation to human beings, whose rights we must always respect, starting with those enshrined in the Charter of Human Rights. Since scientific and technical research refers throughout its methodology to a responsible instance, it is, by its methodological stance, positioned in relation to human beings and their rights. Therefore, if researchers confine themselves to feeling responsible only for providing reliable knowledge, they set *an arbitrary limit* where only what is technically possible interests them—even if it violates human rights, as was the case

<sup>6</sup> Einstein, A., 1979, *Comment je vois le monde*, Paris, Champ Flammarion, pp. 36-37.

<sup>7</sup> Einstein, A., 1979, *Comment je vois le monde*, Paris, Champ Flammarion, pp. 36-37.

with the construction of the atomic bomb, whose destructive power was suffered by the inhabitants of Hiroshima and Nagasaki.

The question of the ethics of responsibility, in symbiosis with the methodology of the search for suitability, should be at the heart of the training of researchers and the decisions of the scientific community, but also of education and school learning at the primary and secondary levels. It should also be raised and debated by citizens who must deliberate and decide on the common good and the means to achieve it.

### **3. By way of conclusion: the relationship between scientific research and philosophy according to Ferdinand Gonseth**

I will conclude my reflections by recalling *the inalienable function* that Ferdinand Gonseth attributed to philosophy, whose destiny is united with that of scientific and technical research, that is, to philosophy that fully accepts to play its role. This role is clearly stated at the end of the work *Metaphysics and the Opening to Experience*, whose message, dating back to the mid-1950s, remains fully relevant today.

Everyone has understood that, in already powerful hands, science is the means to an even greater power, a power multiplied to excess. (...) Immense resources are committed to it. One might have believed that humanity had, for centuries, entered a scientific era under the sign of Truth: the truth is that the scientific era, the era of technical conquests arising from scientific research, has only just begun, and it bears, masking the sign of Truth, that of Violence. Must we think that violence will inevitably prevail? To admit this would be to surrender to a new form of nihilism. (...) What seems certain is that, on both sides of borders, societies will undergo internal transformation. (...) A scientific elite will emerge, increasingly numerous. (...) A collective mentality will form, a generalized intellectual and moral climate. (...) And philosophy? In what role can it maintain itself? I do not wish to see philosophy as the more or less outdated intellectual game it sometimes appears to be; I want to see it instead in its inalienable function, which is to promote the highest values that a society offers, that a civilization can embody.<sup>8</sup>

A philosophy that fully accepts its function «that of *constantly uncovering the values to be promoted*»<sup>9</sup>, has no other destiny than

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<sup>8</sup> Gonseth, F., 1973, *La métaphysique et l'ouverture à l'expérience*, Lausanne, L'Âge d'Homme, pp. 290-291.

<sup>9</sup> Gonseth, F., 1973, *La métaphysique et l'ouverture à l'expérience*, Lausanne, L'Âge d'Homme. It is I who emphasize in bold.

to bind itself to science, not to be its servant, but to remain always its equal. Not to follow it in everything, but to accompany it everywhere, to measure itself against it everywhere, and never to yield the ground entirely. No one can foresee the twists and turns of this dialogue, where each would fight for others by fighting for themselves.<sup>10</sup>

One may, however, hope that philosophy would find some strength there, and science some wisdom». <sup>11</sup>

### Bibliography

- Einstein, A., 1979, *Comment je vois le monde*, Paris, Champ Flammarion.
- Gonseth, F., 1945/1955, *La Géométrie et le problème de l'espace*, Neuchâtel, Éditions du Griffon.
- Gonseth, F., 1964, *Le problème du temps*, Neuchâtel, Éditions du Griffon.
- Gonseth, F., 1973, *La métaphysique et l'ouverture à l'expérience*, Lausanne, L'Âge d'Homme.
- Émery, É., 1961, *La gamme et le langage musical*, Paris, Presses Universitaires de France.
- Émery, É., 1998, *Temps et musique*, Lausanne, L'Âge d'Homme.
- Morel, B., 1976, *L'autre et l'intime*, Lausanne, L'Âge d'Homme.

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<sup>10</sup> Gonseth, F., 1973, *La métaphysique et l'ouverture à l'expérience*, Lausanne, L'Âge d'Homme.