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Hubert Landier
Leonardo da S.G. Martins da Costa
Mariana Thieriot Loisel

For an International

Transdisciplinary Chair

About the Dialogue Between Culture

and Technoscience

Collection: Transdisciplinarity Today

For an International Transdisciplinary Chair About the Dialogue Between Culture and Technoscience

Coordinating Editors:

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COORDINATING EDITORS

Cristina Elena Popa Tache
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For an International Transdisciplinary Chair About the Dialogue Between Culture and Technoscience

Contributions to the Online Symposium „For an international transdisciplinary chair" organized by the International Center for Transdisciplinary Research and Studies (CIRET) on March 21-25, 2024, Paris

Cover description: the cover of this book symbolically suggests a sunrise, a turning point, a paradigm shift, and a transformation of our Western problem-solving framework through the development of consciousness, meaning the development of a dialogue between the emerging culture, represented by the rising sun on the left, and technoscience, depicted by the crane on the right, technology and science applied to the construction of disruptive solutions. The photograph on the cover was taken in Montreal by one of the coordinating editors, Mariana Thieriot Loisel. The idea for this symbolic choice for the cover was conceived by Leonardo da Silva Guimarães Martins da Costa, another coordinating editor.

This year, with profound gratitude and enthusiasm, we mark thirty years since the signing of the Charter of Transdisciplinarity, an essential document that has defined our direction in promoting collaboration and understanding. In this special year, we wish to express our sincere thanks and deep appreciation to the members of the drafting committee, whose vision and dedication made the creation of this fundamental document possible.

Basarab Nicolescu, Edgar Morin, and Lima de Freitas+ were the architects of the Charter. Without their tireless work and commitment to the principles of transdisciplinarity, we would not have this valuable tool to inspire and guide us in the pursuit of integrated and harmonious knowledge.

Over these thirty years, the principles set forth in the Charter of Transdisciplinarity have inspired numerous initiatives and projects. We have succeeded in building bridges between the sciences, the arts, and the humanities, encouraging dialogue and respect for cultural diversity, and cultivating an open and tolerant attitude.

Looking to the future, we remain committed to continuing this journey, expanding the horizons of knowledge and responding with wisdom and responsibility to the new challenges that await us. With confidence in the power of dialogue and transdisciplinary collaboration, we are convinced that we will contribute to creating a better future for all beings.

On the occasion of this anniversary, we invite you to reflect together on the path we have travelled and to celebrate our shared achievements.

ADJURIS – International Academic Publisher announces on this milestone the launch of the "Transdisciplinarity Today" Collection, dedicated to the publication of brilliant works.

Associate professor PhD. Habil. Cătălin-Silviu Săraru
Director of *ADJURIS – International Academic Publisher*

Preface

Our Dream for a Transdisciplinary Chair

Professor **Hubert LANDIER**

Faced with a world permanently at risk of violence, faced with the prospect of unspeakable transformations in the current state of the world, dominant paradigms and academic boundaries tend to lose all relevance. The 'secret of the dawn' (Heidegger) will only be revealed through a complete renewal of our way of conceiving the κόσμος. Such is the raison d'être of the transdisciplinary approach.

Beyond the relatively restricted circle of its initiates around the world and the sometimes impassioned debates it provokes, it is therefore important to make it known outside the academic boundaries that claim to enclose the various fields of human knowledge and action. This is why the editors of this book felt it necessary to promote the creation of a genuine transdisciplinary chair.

Now that its raison d'être had been defined, at least provisionally, the question remained as to what its priorities should be, and what it should consist of. The 18 eminent contributors who took part in an international tele-symposium[1] organized by Dr. Mariana Thieriot Loisel and Eng. Leonado da Silva Guimarães Martin da Costa, with the support of Pr. Dr. Cristina Elena Popa Tache and Pr. Dr. Hubert Landier. The following chapters contain their comments. A word about the panel's composition is in order here.

Firstly, it is an international panel. Nine nationalities, from all parts of the world and the cultural peculiarities they represent, will have been represented, as will be seen in the following pages. These different testimonies, on the other hand, are based on extremely different fields of knowledge: philosophy, education, international law, engineering, humanitarian action, management, theater, entrepreneurship, plastic arts, neurobiology. Through this diversity, the process of creating a transdisciplinary chair will itself have respected the rules of transdisciplinarity.

Let's move on, then, from the contributions of one person or another to what the content of this chair might be. It will probably be easiest to start by stating what it should not be. First, it should not be limited to teaching in one institution, however prestigious, to the exclusion of all others. This would run counter to the project to disseminate transdisciplinary thought, theory and practice, so we could speak of an 'itinerant chair', building on existing structures but refusing to allow itself to be enclosed within them.

It must also be careful not to allow itself to be trapped in an issue that is

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[1] For details about the Online Symposium „For an international transdisciplinary chair" see https://ciret.hypotheses.org/activites/symposiums-colloques#chair.

directly or indirectly dictated by a particular ideology or cultural *ethos*. It must, therefore, escape the particular worldview that the techno-industrial West seeks to impose by the world. Without denying its importance, it will have to remain open to the traditions, knowledge and diversity of perspectives that make up the heritage of humanity in all its gushing and abundance.

It will need to build on what already exists in order to move towards a more global, more 'holistic' understanding of contemporary issues and the transformations in the making, whether in our way of life, in our way of apprehending reality, or in the relationships between human communities and, more broadly, between humanity and the rest of the living world. And so, the transdisciplinary chair will have to be prepared to confront the *doxa* that are just another name for self-righteous conservatism and power relations.

Such a program can only be conceived through dialogue between the points of view, disciplines and cultures that weave the world in its extreme diversity, of which, each for himself, we can only pretend to apprehend a small part, and only that part which can be said and shared. These exchanges should not be confined to academic disciplines but should call on all the testimonies likely to enrich a shared vision of 'a good life in just institutions', open to a future that we cannot pretend to foresee as it will be.

Notre rêve pour une chaire transdisciplinaire

Professeur **Hubert LANDIER**

Face à un monde soumis d'une façon permanente au risque de la violence, placé devant la perspective de transformations indicibles en l'état actuel des choses, les paradigmes dominants et les frontières académiques tendent à perdre toute pertinence. Le « secret de l'aube » (Heidegger) ne se révélera qu'à travers un renouvellement complet de notre façon de concevoir le κόσμος. Telle est la raison d'être de l'approche transdisciplinaire.

Au-delà du cercle relativement restreint de ses initiés de par le monde et des débats parfois passionnés qu'elle suscite, il importe donc de la faire connaître par-delà les frontières académiques qui prétendent enclore les différents champs du savoir et de l'agir humains. Ce qui s'est ainsi imposé aux éditeurs du présent ouvrage, c'était la nécessité de promouvoir la création d'une authentique chaire transdisciplinaire.

Restait à savoir, sa raison d'être ayant été ainsi définie, au moins provisoirement, quelles devaient être ses priorités et en quoi elle devait consister. C'est ce sur quoi se sont exprimés les 18 éminents contributeurs réunis, les 21 et 22 mars derniers, en un télésymposium international organisé par le Dr. Mariana Thieriot Loisel et l'Eng. Leonado da Silva Guimarães Martin da Costa, avec le

concours du Pr. Dr. Cristina Elena Popa Tache et du Pr. Dr. Hubert Landier. Ce sont leurs propos que l'on trouvera rassemblés dans les chapitres qui suivent. Ici, une observation s'impose en ce qui concerne la composition de ce panel.

On aura noté d'abord qu'il s'agit d'un panel international. Neuf nationalités, en provenance de toutes les parties du monde et des particularités culturelles qu'elles représentent, y auront été représentées, que l'on retrouvera dans les pages qui suivent. Ces différents témoignages, d'autre part, se fondent sur des champs du savoir extrêmement différents les uns des autres: philosophie, éducation, droit international, engineering, action humanitaire, management, théâtre, entrepreneuriat, arts plastiques, neurobiologie. Au travers de cette diversité, la démarche en vue de la création d'une chaire transdisciplinaire aura donc respecté elle-même les règles de la transdisciplinarité.

Venons-en donc, au-delà des contributions des un(e)s et des autres, à ce que pourrait-être le contenu de cette chaire. Le plus simple sera probablement d'affirmer d'abord ce qu'elle ne doit pas être. Et donc, elle ne devra pas se limiter à un enseignement enfermé dans une institution, aussi prestigieuse soit-elle, à l'exclusion de toutes les autres. Ce serait là quelque chose de contraire au projet visant à diffuser la pensée et la pratique transdisciplinaires; ainsi pourrait-on parler d'une « chaire itinérante », prenant appui sur les structures existantes mais refusant de s'y laisser enclore.

Elle devra se garder aussi de se laisser enfermer dans une problématique qui lui serait, directement ou indirectement, dictée par une idéologie ou un *ethos* culturel particulier. Il lui faudra, par conséquent, échapper à cette vision du monde particulière que cherche à imposer l'Occident techno-industriel. Sans en contester l'importance, elle devra se tenir ouverte aux traditions, aux savoirs et à la diversité des perspectives qui constituent l'héritage de l'humanité dans son jaillissement et son foisonnement.

Il lui faudra s'appuyer sur l'existant afin de s'acheminer vers une compréhension plus globale, plus « holistique », des enjeux contemporains et des transformations en gestation, que ce soit dans notre mode de vie, dans notre façon d'appréhender le réel, ou encore, dans les rapports entre communautés humaines et plus largement, entre l'humanité et le reste du vivant. Et donc, la chaire transdisciplinaire devra se préparer à affronter les *doxa* qui ne sont qu'un autre nom du conservatisme bien-pensant et des relations de pouvoir.

Un tel programme ne peut se concevoir qu'à travers le dialogue entre les points de vue, les disciplines et les cultures qui tissent le monde dans son extrême diversité dont, chacun pour soi, nous ne pouvons prétendre appréhender qu'une petite partie seulement, et de celle-là seulement qui peut être dite et partagée. Ces échanges ne devront pas se limiter aux disciplines académiques mais en appeler à tous les témoignages susceptibles d'enrichir une vision partagée d'« une vie bonne dans des institutions justes » ouverte sur un avenir que nous ne pouvons prétendre prévoir tel qu'il sera.

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Introduction

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The Modern Age, since the 18th-century Enlightenment or Age of Reason, has promoted advances in technoscience and material quality of life, but a spiral cycle has been created in which the hypertrophy of logic and analysis does not solve the complexity of human phenomena. A more comprehensive understanding of ancient philosophies and traditions has been lost. Understanding has been reduced to knowledge or binary logic, fractioned by narrow analytical and scientific views of reality. Many human sciences borrowed such rationalist models from the hard sciences in a reductionist approach of merely mechanistic or biological-environmental views, which can´t be applied effectively to complex human phenomena. In the 21st century, the Western mainstream paradigms can no longer deal with the level of uncertainties, conflicts, polarization, and ideologization in which the West finds itself, the result of a binary worldview that has its explanations in the Western culture itself, focused on causality, which does not consider the various interactions in dualities, like the subject-object and conscious-unconscious at intertwined levels, as is clear from Jung´s Analytical Psychology and Modern Physics.

In that connection, this book is the result of the Symposium *For an International Transdisciplinary Chair*, organized by the co-editors and promoted by CIRET. This first volume includes part of the Symposium presentations[1].

For those who study transdisciplinarity, it is common to use TD as an acronym for transdisciplinarity as a substantive or transdisciplinary as an adjective.

The origins of a TD framework can be seen in the United States, France, and Brazil.

In the US, especially in Berkeley, Dutch physicist Fritjof Capra developed his Holistic Systems, initially through *The Turning Point* in 1982, an idea of paradigm shift and rising new culture beyond the Western dominant Newtonian and Cartesian view of reality. Not TD yet, but Capra´s systemic paradigm went beyond the binary logic and established a dialogue between ancient traditions/philosophies with Modern Physics[2]. In the same way, David Bohm, himself

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[1] The Symposium videos and program are available at https://ciret.hypotheses. org/activites/symposiums-colloques#chair
[2] Capra Fritjof (1982). *The turning point: science, society, and the rising culture.* Bantam Books, http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_ Point__Science,_Society,_and_the_Rising_Culture__-Bantam(1988).pdf .

professor at Berkeley, began a new way of thinking reality, in dialog with the Indian thinker Krishnamurti[3].

A few years later, the Romanian physicist Barasarab Nicolescu and Brazilian mathematician/educator Ubiratan D'Ambrosio were among the eminent co-signers of the 1986 UNESCO Charter of Venice, which was the starting point for TD worldwide[4].

Nicolescu created a transdisciplinary methodology in the late 1980s, considering ideas such as the logic of the included third or hidden third, besides the fruitful complementarity between disciplinarity and TD. In 1987, Nicolescu founded, in Paris, the International Center for Transdisciplinary Research and Studies – CIRET[5].

In Brazil, D'Ambrosio with the psychologists Pierre Weil and Roberto Crema created the holistic TD approach in the late 1980s. In turn, French Weil and Brazilian Crema established in 1987 the International Holistic University of Peace – UNIPAZ[6].

UNIPAZ created a 481-hour course on Holistic TD called FHB, i.e. Holistic Basic Training. Nowadays with 25 instructors, for any student or professional over 18 years old, those seeking a new way of being in the world, or those interested in the holistic TD approach as a tool for improving personal and professional dimensions. Roberto Crema was responsible for implementing and coordinating its Pilot Group at UNIPAZ in Brasilia from 1989 onwards. So, the FHB has already a 35-year tradition[7].

Also in the US, The ATLAS, Academy of Transdisciplinary Learning & Advanced Studies, founded in 2000, is a non-profit organization by the US Federal Government, providing services to students around the world: i) TD education and research; ii) support social, environmental, economic, and ethical sustainable development throughout the world; and iii) to promote global information exchange through innovative publishing. The ATLAS is also a publisher of TD books free of charge, available at the internet, and there is also a free-access journal for TD articles, the ATLAS-TJES[8].

There are other TD initiatives, such as ARKOS University in Mexico[9] and the Russia School of TD[10]. However, this book cannot cover all of them.

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[3] Bohm, D. & Krishnamurti, J. (1999). *The Limits of Thought: Discussions between J. Krishnamurti and David Bohm*. Routledge, London.

[4] UNESCO (1986). Symposium on Science and the Boundaries of Knowledge: the Prologue of Our Cultural Past, Venice, 1986. Final Signed Report: https://unesdoc.unesco.org/ark:/48223/pf0000068502.

[5] https://ciret.hypotheses.org/.

[6] https://unipazdf.org.br/.

[7] https://unipazdf.org.br/produto/formacao-holistica-de-base/.

[8] The ATLAS free access books: https://theatlas.org/index.php/td-teaching-materials/td-books. The ATLAS-TJES journal: https://www.atlas-tjes.org/.

[9] https://www.ceuarkos.edu.mx/.

[10] McGregor, S. L. T. (2024). Russian school of transdisciplinarity as a metadiscipline. *Universum: Social Sciences, 3* (106), 53–65. https://7universum.com/ru/social/archive/item/17087.

Even with all those initiatives, the TD concepts are still not very clear or under-stood by most of the students/academics. Some may reduce it to the **epistemology of TD**, or even to the **science of TD**. However, TD involves the logic of the In-cluded Third, i.e., the complementarity of opposites. Complementarity is not only a scientific principle coming from Modern Physics but also from ancient tradi-tions/philosophies. So, this dialectical meaning can be seen in the Included Third logic, the Modern Physics wave-particle duality, and the Taoist and the Chinese Traditional Medicine idea of Yin-Yang. Also, beyond the binary logic of true or false, in India Nagarjuna developed the logic of the tetralemma – affirmation/true, negation/false, both, or neither, which was a basis of the Buddhist doctrine, that can be found in Shan and Zen tradition. In the same way of thinking is the Ismaelian philosophy and theosophy. Finally, we can mention Nicolas de Cues and The Star of David in the European Alchemical Tradition. Then, the dialogue between culture and technoscience emerges, as the HPTD-M theory describes in terms of quaternary complementarities, i.e., through many possible interactions in opposites coming from the four epistemic ways, namely philosophy, tradition, art, and technoscience.

TD and holistic view are concepts still not very well understood by some academics, which are unconsciously focused on rational scientific dogmatism. Solving problems on individual, organizational, and civil society levels involves the complexity of human phenomena, which the dominant binary logic of our Western culture cannot cope with.

In this sense, a dialog between culture and technoscience seems to be a reasonable way of dealing with issues that are more complex than the dominant mechanistic approach using the logic of 0 or 1, true or false, right and wrong.

Culture involves the epistemic forms of philosophy, tradition, and art. Technoscience, in turn, is the fruitful dialog between technology and science.

Therefore, science alone cannot solve problems at the psychological and psychosomatic level, i.e. in the personal and collective organizational levels.

In this connection, the cover of this book symbolically proposes dawn, a turning point, a paradigm shift, and a transformation of our conscience through dialogue between the new culture, represented by the rising sun at the left, and technoscience, shown by the crane at the right, involving technology and science in the concrete construction of new solutions.

So, **if the labels coming behind the idea of TD and holistic view re-main uncomfortable for the reader, those can be easily replaced by the con-cept of dialogue between culture and technoscience**, in terms of effective prob-lem-solving framework for the organizations, from the personal to the collective levels.

About the structure of this book: The idea was to start with the authors involved with education and science, a content that is easier for the academics (section 1). Then go to the applied TD in economics and law (section 2), followed by "understanding" as a concept more than "knowing", in dialoque with problem

solving in psychology, management, engineering, and leadership (section 3). Finally, mediation of conflicts (section 4). So, this first volume is divided in:

1. Transdisciplinarity in Education and Science.

2. Applied Transdisciplinarity in Economics and Law.

3. Transdisciplinarity for Individual & Organizational Effective Problem Solving.

4. Beyond Gray Zone: Human Mediation.

References

1. Bohm, D. & Krishnamurti, J. (1999). *The Limits of Thought: Discussions between J. Krishnamurti and David Bohm*. Routledge, London.
2. Capra Fritjof (1982). *The turning point: science, society, and the rising culture.* Bantam Books, http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point__Science,_Society,_and_the_Rising_Culture__-Bantam(1988).pdf
3. McGregor, S. L. T. (2024). *Russian school of transdisciplinarity as a metadiscipline.* Universum: Social Sciences, 3 (106), 53–65. https://7universum.com/ru/social/archive/item/17087.
4. The ATLAS free access books: https://theatlas.org/index.php/td-teaching-materials/td-books. The ATLAS-TJES journal: https://www.atlas-tjes.org/.
5. UNESCO (1986). Symposium on Science and the Boundaries of Knowledge: the Prologue of Our Cultural Past, Venice, 1986. Final Signed Report: https://unesdoc.unesco.org/ark:/48223/pf00000685

TRANSDISCIPLINARITY IN EDUCATION AND SCIENCE

University Path to Open Knowledge to the Complexity of Life Through a Transdisciplinary Chair

"How should I go?
Shall I leave nothing after me on earth?
How should my heart act?
Do we come to live in vain, to sprout on the earth?
Let's at least leave flowers.
Let's at least leave songs!"
(Nezahualcóyotl)

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Abstract: Write the abstract in English first if the original article is in The research takes place in the field of Higher Education and Research-Action. It presents the experience and research results of Centro de Estudios Universitarios Arkos (CEUArkos) of Puerto Vallarta, Jalisco, Mexico, to implement transdisciplinarity in the university as well as some of the processes and learning achieved with such an experience, based on seven major university strategies created for a transdisciplinary and complex education. The contribution is given by the presentation of a real experience in a university and on a global scale in a specific Higher Education Institution: CEU-Arkos, which since the year 2006 has been exploring and experimenting with the members of its community (teachers, students, managers, directors) the ways to guide the transition from disciplinary to transdisciplinary university education in all its educational programs. Those strategies are proposed as a basis to inspire an International Transdisciplinary Chair.

1. Introduction

In the following lines, we make a proposal, for a transdisciplinary (TD) chair, based on the strategies carried out in the last 18 years of the Research-Action Transdisciplinar experiences developed to '*Open Knowledge to Complexity of Life'* at a Mexican university. Strategies that we have built since 2006 until now, on higher education, complexity and transdisciplinarity at *Centro de Estudios Universitarios Arkos* in Puerto Vallarta, Jalisco, Mexico, explaining the processes of auto-eco-reorganization, experienced in this university based on a Research-Action that led us, collectively with various actors from the CEUArkos community (students, teachers, administrators, directors), to the construction of strategies and scenarios aimed at evolving our university practices (of learning, teaching and research) from a disciplinary and fragmenting vision of education towards an integral and transdisciplinary (TD) perspective of education, in all university programs.

The experience is based, epistemologically and theoretically, on the proposals of transdisciplinarity (by Nicolescu), complexity (Morin) and eco-formation (in the sense proposed by Ubiratan D'Ambrosio[1] and Gaston Pineau[2]). It is the product of a problem, experienced by the university actors of CEUArkos, who noticed a fracture between their university practices and the institutional philosophy, with which they feel identified with – a philosophy that postulates a comprehensive-integral view of education of the person. It is, therefore, a theoretical and practical experience, that assumes the characteristics of research action (R-A) and incorporates the reflection and collaboration of the participants at all times during its implementation. We suggest these experiences can inspire a transdisciplinary chair.

2. The Context of the Research at CEUArkos

As we explained, the research takes place at CEUArkos, located in Puerto Vallarta, Jalisco, Mexico. The institution was founded in 1990 as the first Higher Education Institution in the city and its area of influence (Bandera's Bay). It was founded by educators with many years of experience in the education of young people and adults in the field of popular public education. It is a private institution, with official recognition from the Ministry of Public Education that offers degree programs in the areas of: Tourism Business Administration, Accounting, Law, Communication Sciences, Marketing and a Master degree on Human Rights, Protection and Constitutional Law. Four hundred to five hundred

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[1] See: D'ambrosio, Ubiratan. «Conocimiento y valores humanos» *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 35 (2007) 6–18.
[2] Pineau, Gaston. 'Knowledge: Freeing knowledge! Life, school and action' in: *The Merging of Knowledge. People in poverty and academics thinking together,* edited by Fourth World University Research Group, 215–306. The United States: University Press of America, 2007.

students study there, most of them are working people. The teaching staff has seventy professors who are also distinguished for being practicing professionals in various areas of knowledge. The University has a philosophy related to a social perspective and develops a humanistic educational practice, evidenced by its interest in a comprehensive education of the individual and its philosophy: 'To educate is to form free human beings.' Encouraged by this vision, the university management became interested very early in the transdisciplinary approach.

3. The Reflective Paradigm and the Change from Disciplinarity to Transdisciplinarity Perspective

To build this experience at CEUArkos, we asked ourselves: How can we confront the multiple crises of mondialization through education? Economic, ecological, health crises, symbolic crises, at the same time of rupture and re-encounters between cultures. We consider that the crises (or poly-crises, to use the words of Morin[3], are all linked to a mode of reductive thinking[4] that separates the subject from its environment and tends to reduce reality to only one of its levels[5] – particularly material and mercantile in the contemporary world – . Without a doubt, the damage caused by the disruption of the ecological balance calls for urgent action to reform thinking, and education must contribute to that reform.

In this context, education and '*formateurs*' are ethically called to prepare the reform of thought and to accompany the transformation of the dominant cultural paradigm to an ecologization – greening – of knowledge[6]. But how to do it if, as Morin suggests, in order to reform education, a change in the paradigm of thought is needed and for the change in the paradigm of thought, a change in the paradigm of education is required? … How can we carry out this change of paradigm from education and in the practices of training of trainers/'*formateurs*'? How can we create strategies that allow us to accompany this reform and open knowledge to the complexity of life?

We propose, from – university – education, to search for the paradigmatic step to go from disciplinarity to transdisciplinarity perspective, seeking to operationalize the notions of complex thinking – Morin – , Transdisciplinarity – Nicolescu – and Eco-formation – D'Ambrosio – in order to build the paradigm shift in practices of education, based on the works of Donald Schön[7], Pascal

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[3] Morin, Edgar. *La vía para el futuro de la humanidad.* España: Paidós Estado y sociedad, 297p. 2011.

[4] Morin, Edgar. *Introducción al pensamiento complejo.* España: Editorial Gedisa. 167p. 2005.

[5] Nicolescu, Basarab. 'Transdisciplinariedad: presente, pasado y futuro. 1ª parte.' *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 31 (2006):15–31.

[6] Santos, Boaventura De Sousa. *Decolonizar el saber, reinventar el poder.* Uruguay: Ediciones Trilce, 2010.

[7] Schön, Donald. *The reflective practitioner: how professionals think in action.* England: Ashgate. 374. 2006.

Galvani[8] and Gaston Pineau[9]:

     • Transforming practices, through reflexivity about practices

     • Move from the applied science paradigm to the reflective/reflexive paradigm

     • Move from the 'expert' model to the reflective practitioner model.

For which it is vital: a) the reflexive return to personal experience; b) to develop intercomprehension by putting interpretations of experience into dialogue and c) to cultivate transdisciplinary cross-fertilization of knowledges (*savoirs*).[10]

The above can be done, from the experience of CEUARKOS, through Research-Action processes, creating a *cooperative production of knowledge with university actors* (students, teachers, administrators, directors) of new scenarios and strategies for university education[11] that are respectful of the triangle of life: individual-society-nature, as D'Ambrosio[12] suggested, that encourage a planetary vision and link knowledges to the complexity of life.

It is about building strategies through a joint inquiry with university actors[13], starting with the training of those actors (teachers, managers, directors) in these perspectives (transdisciplinarity, complexity and eco-formation), improving their pedagogical and professional qualification. With them and with the students, we seek to create and experiment transdisciplinary practices and strategies for university education.

4. Strategies for a Transdisciplinary Chair

Based on the experience of CEUArkos (which we will explain in the following lines), we propose seven strategies that can inspire a Transdisciplinary Chair. Those strategies include:

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[8] Galvani, Pascal. 'Methodology' in: *The Merging of Knowledge. People in poverty and academics thinking together,* edited by Fourth World University Research Group, 9–30. The United States: University Press of America, 2007.

[9] Pineau, Gaston. 'Knowledge: Freeing knowledge! Life, school and action' in: *The Merging of Knowledge. People in poverty and academics thinking together,* edited by Fourth World University Research Group, 215–306. The United States: University Press of America, 2007.

[10] Galvani, Pascal. 'Auto-formación, eco-formación y transdisciplinariedad: El diálogo de los saberes con la vida.' In: *Congreso internacional de transdisciplinariedad, complejidad y eco-formación*. 4., Anales, Barranquilla, Colombia: Universidad Simón Bolívar, 93–12, 2012.

[11] Espinosa Martínez, Ana Cecilia and Pascal Galvani (Coord.) *Transdisciplinariedad y formación universitaria: teorías y prácticas emergentes*. México: Centro de Estudios Universitarios Arkos, 2014.

[12] D'ambrosio, Ubiratan. «Conocimiento y valores humanos» *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 35 (2007) 6–18.

[13] Espinosa Martínez, Ana Cecilia. *Abrir los saberes a la complejidad de la vida : nuevas prácticas transdisciplinarias en la universidad*. México: Centro de Estudios Universitarios Arkos, 2014.

4.1. To incorporate as a basic triad of university education: Transdisciplinarity (Nicolescu), Complexity (Morin) and Eco-formation (D'Ambrosio)

As we noted, the theoretical foundation of the research was based on transdisciplinarity and complexity and its implications in higher education. Transdisciplinarity and complexity appear as two current forms of thought that add to the search for an integrative perspective of knowledge and reality in reaction to an atomizing and fragmenting vision of it. Perhaps it is more appropriate to say that these represent two ways of calling the new paradigm of science. The most important theorists are Nicolescu and Morin. The relationship between both theories is unavoidable, since transdisciplinarity conceives complexity as one of its guiding principles. For reasons of space, we will not delve into conceptual questions about these perspectives, we will only frame them in the context of the research we carried out.

Transdisciplinarity. Transdisciplinarity is understood, according to Nicolescu[14], as that which is at the same time between disciplines, across different disciplines and beyond any discipline. It was born to address the need to deal with the unprecedented challenges of the problematized world in which we live and that requires a multi-referential treatment, given that they are complex. Its purpose is the understanding of the world and the articulation of the different areas of knowledge and *savoirs*. It is based on the pillars of complexity, levels of reality and the logic of the included third, which define its methodology and new vision of nature and the human being[15].

Complexity. Complexity (what is woven between) is a perspective animated by a permanent tension between the aspiration for undivided, non-reductionist knowledge and the recognition of the unfinished and incompleteness of all knowledge. For this current, reality is complex, it implies both: the one and the multiple, it is *unitas multiplex*[16]. To address the problems posed by reality, complexity proposes a revolution in thought that allows the advent of complex thinking, capable of associating what is disunited and conceiving the multidimensionality of all anthropo-social reality[17] through the application of seven principles: systemic-organizational, hologrammatic, retroactivity, recursivity, autonomy/dependence, dialogic, the reintroduction of the subject in all knowledge.

Eco-Formation. Although Edgar Morin and Basarab Nicolescu are the

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[14] Nicolescu, Basarab. *La transdisciplinariedad, una nueva visión del mundo. Manifesto.* C.I.R.E.T. Francia: Ediciones Du Rocher, 125p. 1998.

[15] Nicolescu, Basarab. 'Transdisciplinariedad: presente, pasado y futuro. 1ª parte.' *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 31 (2006):15–31.

[16] Morin, Edgar. *Los sietes saberes necesarios para la educación del futuro.* México: UNESCO. 67p. 2001.

[17] Morin, Edgar. *Introducción al pensamiento complejo.* España: Editorial Gedisa. 167p. 2005.

main theorists, more and more researchers immersed in transdisciplinary themes discover in their interests and in their practice relationships with this perspective, among them: Ubiratan D'Ambrosio and Gaston Pineau who make important contributions in relation to the topic of eco-formation. Eco-formation would be, from the perspective of the participants of the Barcelona Transdisciplinarity Congress held in 2007[18], ecological educational action, that is, rooted in the relational dynamics between human beings, society and nature in a way that is sustainable in space and time. It seeks development and inner growth, starting from respect for nature (ecology), taking into consideration others (otherness) and transcending sensible reality.

Thus, for the research experience at CEUArkos we take advantage of the new vision of the world and reality provided by both the transdisciplinary pillars, as well as the principles for complex thinking and the eco-formative vision, which we use to found and co-create. University strategies towards a more comprehensive perspective of education.

These three currents: transdisciplinarity, complexity and eco-formative vision, become then a basic triad for university education (and for an international transdisciplinary chair).

Transdisciplinarity, Complexity and Higher Education. As is known, in the educational field, transdisciplinary and complex perspectives have inspired various university proposals such as those of CIRET-UNESCO-Delors[19] and the Janstch Model[20]. Also noteworthy on a theoretical level is Morin's proposals on *'The 7 knowledges for the education of the future'[21], 'Educating in the planetary era'* and *'About the seven knowledges'[22]*, which synthesize the principles of his theory of complexity. We also have the research of Espinosa and Tamariz[23] on a Transdisciplinary Education Model for the University; and the Reynaga Model[24]

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[18] Congreso Transdisciplinariedad y Eco-formación. Hacia una ciudadanía planetaria. España: Universidad de Barcelona, 2007. Available at: http://encuentros-multidisciplinares.org/Congreso Transdisciplinariedad.pdf.

[19] Nicolescu, Basarab y Camus, Michael. "El proyecto CIRET-UNESCO. Evolución transdisciplinar de la universidad." In: *La transdisciplinariedad, una nueva visión del mundo. Manifesto.* Centro Internacional para la Investigación Transdisciplinaria (CIRET). Francia: Ediciones Du Rocher. 125p. 1997. Available at: http://perso.club-internet.fr/nicol/ciret/.

[20] Jantsch, E. « Hacia la interdisciplinariedad y la transdisciplinariedad en la enseñanza y la innovación » In: A. Leo, G. Berger, A. Briggs y G. Michaud (Coord.), *Interdisciplinariedad: Problemas de la enseñanza y de la investigación en las universidades.* México: Biblioteca de la Educación Superior, ANUIES, 110–143, 1979.

[21] Morin, Edgar. *Los sietes saberes necesarios para la educación del futuro.* México: UNESCO. 67p. 2001.

[22] See: Morin, Edgar. *A propósito de los siete saberes.* Francia: Pleins Feux. 53p. 2000. Also see: Morin, Edgar, Ciurana, R. y Motta, R. *Educar en la era planetaria.* España: Editorial Gedisa, 140p. 2003.

[23] Espinosa Martínez, Ana Cecilia y Claudia Tamariz. '*Un modelo transdisciplinario de educación para la Universidad.*' Master diss., Universidad de Valle de México, 2001.

[24] Reynaga, Rubén. «Una aproximación axiológica de transdisciplina y pensamiento complejo». México: Multiversidad Mundo Real, 2006. Obtained 4/08/2007, from: http://wwwmultiversidad

that summarizes the work of Morin.

At the level of praxis, the research of Pineau[25] on eco-formation and the work of Galvani[26] on auto-formation, inspired by Research-Action-training processes, stand out. In the field of learning and knowledge, the perspectives closest to the transdisciplinary ideal come from the visions of authors such as Piaget[27], Maturana and Varela[28] and Galvani[29], identified with the emerging paradigm. We also have important contributions from Brazilian authors such as Ubiratan D'Ambrosio,[30] Almeida,[31] Moraes,[32] as well as the members of the Group of Complexity Studies-GRECOM (with Almeida and Knobbe[33]), among others.

However, the analysis of the state of the art (from 1979 to date) on transdisciplinarity and education at a higher level, reveals that life experiences in educational institutions and specifically at the university are still very scarce. We have epistemological principles but not yet the steps for implementation. Hence, we considered that one of the main difficulties in putting into practice this more integrative vision of education offered by transdisciplinarity was found in the lack of methodological proposals that would allow the epistemological principles of this perspective to be operationalized in university tasks and that the paradigmatic step in the university had to begin precisely with the transdisciplinary training of the various actors of the educational community in question.

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real.org/.

[25] Pineau, Gaston. 'Knowledge: Freeing knowledge! Life, school and action' in: *The Merging of Knowledge. People in poverty and academics thinking together,* edited by Fourth World University Research Group, 215–306. The United States: University Press of America, 2007.

[26] Galvani, Pascal. 'Methodology' in: *The Merging of Knowledge. People in poverty and academics thinking together,* edited by Fourth World University Research Group, 9–30. The United States: University Press of America, 2007.

[27] Piaget, J. *Biología y conocimiento. Ensayo sobre las relaciones entre las regulaciones orgánicas y los procesos cognoscitivos.* México: Editorial Siglo XXI, 338p. 1980.

[28] See: Maturana, H. y Varela, F. *El árbol del conocimiento. Las bases biológicas del entendimiento humano.* Argentina: Lumen, 172 p. 2003. Also, see: Maturana, H. y Varela, F. *De máquinas y seres vivos: Autopoiesis, la organización de lo vivo.* Chile: Editorial Universitaria, 137 p. 1998.

[29] Galvani, Pascal. 'Los kairos, momentos creadores y niveles de realidad de la autoformación.' in Saturnino de la Torre y Maria-Antonia Pujol. *Educar con otra conciencia: una mirada ecoformadora y creativa de la enseñanza.* (pp. 49–61). España: Davinci Continental, 2009. Available at: http://81.25.120.212/trikypam/davincicontinental.com/datos/web/product info.php?products id= 312.

[30] D'ambrosio, Ubiratan. «Conocimiento y valores humanos» *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 35 (2007) 6–18.

[31] Almeida, Maria Da Conciençâo. 'La complejidad y el vuelo incierto de la mariposa'. *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 47 (2009): 5-20. Available at: https://www.ceuarkos.edu.mx/vision docente/revistas/No.%2047.pdf.

[32] Moraes, Maria Cândida. *Ecologia dos saberes. Complexidade, transdisciplinaridade e educacâo. Novos fundamentos para iluminar Novas práticas educacionais.* Brasil: Editorial Willis Harman House & Porolíbera, 301p. 2008.

[33] Almeida, Maria Conceiâo and Knobbe, Margarida Maria *Ciclos de Metamorfosis. Una experiencia de reforma universitaria.* Brasil: Editora Sulina, GRECOM, 213p. 2003.

4.2. To carry out Research-Action Workshops focused on identifying and experimenting the processes for a more comprehensive/integral education based on a transdisciplinary vision

The need to overcome the fragmentation of knowledge and education at CEUArkos at an institutional level, led us to consider that it was the conception of educational practices and the way in which they are carried out that was at the center (practices underlaying a vision of the world and reality), so building paths on how to operationalize transdisciplinarity and complexity had to occur through a joint inquiry with university actors. To do this, it was essential to start with the training of these actors themselves. Thus, one of the main purposes was to train professors and directors in these perspectives, improving their pedagogical and professional qualifications. With them and with the students, we have sought to create and experiment with transdisciplinary practices and strategies for university education. We carry out this task through Research-Action workshops focused on identifying and experimenting with the processes for a more comprehensive education based on a transdisciplinary vision. It is there that we address how to translate transdisciplinarity and complexity into methodological steps to adapt them to the CEUArkos educational practices (of teaching, learning and research), trying to free them from fragmentation.

The objective is also to embody the new currents by the actors based on reflective Research-Action practices where each one contributes to the conception, construction and evaluation of the paths explored[34], as evolution as important as going from a disciplinary logic to a transdisciplinary approach in the university cannot be developed abruptly and totally, without the participation of the actors and under a scheme of only transmission and not action research, since wanting to understand the new perspectives without experiencing them is an epistemological contradiction.

The workshops focused on identifying and experimenting the processes for a more comprehensive/integral education based on a transdisciplinary vision are inspired by the CIRET-UNESCO[35] proposals, the pillars of transdisciplinarity, the principles of complexity, the works of Pascal Galvani, Gaston Pineau, as well as our own proposal Espinosa-Tamariz[36], born in previous research. The workshops have been running since 2007, and are made up of directors, professors, and students (who volunteer) from the different spheres of

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[34] Nicolescu, Basarab. *La transdisciplinariedad, una nueva visión del mundo. Manifesto.* C.I.R.E.T. Francia: Ediciones Du Rocher, 125p. 1998.

[35] Nicolescu, Basarab y Camus, Michael. "El proyecto CIRET-UNESCO. Evolución transdiscipli-nar de la universidad." In: *La transdisciplinariedad, una nueva visión del mundo. Manifesto.* Centro Internacional para la Investigación Transdisciplinaria (CIRET). Francia: Ediciones Du Rocher. 125p. 1997. Available at: http://perso.club-internet.fr/nicol/ciret/.

[36] See Espinosa Martínez, Ana Cecilia y Claudia Tamariz. '*Un modelo transdisciplinario de edu-cación para la Universidad.*' Master diss., Universidad de Valle de México, 2001.

CEUArkos.

4.3. To encourage a Pedagogy based on Three Levels of Reality of the Person, for university education

The workshops are aimed at participants developing three types of learning linked to three large dimensions or levels of reality of the subject:

a) Theoretical-Epistemic Level: *learning to think*, through research and through the three pillars of transdisciplinarity and the seven principles of complexity, trying to generate complex thinking;

b) Practical Level: *learning to dialogue, distinguish and link* disciplines, assume their limits and complements;

c) Ethical or Existential Level (reintroduction of the sensitive and ethical dimensions*), learning to lear*n about oneself, one's own prejudices, social, historical and personal conditioning of our beliefs and certainties, our inspiration and vocation, affinities, limits and possibilities, but also generate reflections on knowledge and knowledge of knowledge.

These three types of learning, interlinked in turn at three levels of reality of the subject's actions, constitute what we can call the learning and forms of construction of transdisciplinary knowledge for university education that we explore in the CEUArkos Project.

Encouraging a pedagogy based on these three levels of reality of the person should be part of the program for a transdisciplinary chair.

4.4. Create, on the Transdisciplinar-Research-Action workshops, processes of

As we have explained, for the transition to a transdisciplinary vision on the university practices (of learning, teaching and doing research) we created the Transdisciplinar Research-Action Workshops. The processes that have facilitated work in these workshops are processes of:

a) *Awareness and familiarization towards transdisciplinarity and complexity,* because almost none of the members were used to them;

b) *Identification of **questions of research** of interest of the participants;*

c) *Consolidation of the group, through auto-formation and co-formation* processes based on a common problematic that concerns all participants and is co-constructed[37];

d) *Intersubjective dialogue for the opening and reconnection/linking of knowledges and people*;

e) *Exploration, appropriation and deepening of the transdisciplinary*

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[37] Desroche, Henry. «Les auteurs et les acteurs. La recherche coopérative comme recherche-action» *Communautés: Archives de Sciences sociales et de la Coopération et du Développement*, no. 59 (1982): 36–94.

pillars and complex principles: to approach problematics experienced by the actors and to exercise in the *management of the tools of* **complex thinking**, for they became aware that they were not accustomed to thinking complexly;

f) Processes of auto-reflection and reflection on the inter-experience.

The workshop method. We have pointed out, training in the transdisciplinary process should not be carried out under a model of expertise and transmission but under a reflective model. The workshop method consists of starting from specific problems experienced by the participants, which are analyzed collectively in transdisciplinary dialogue groups. This process allows us to re-ligate knowledges and life in inclusion to the relationship of the knowing subject with the object of knowledge. It is an emerging logic where each actor (whether a teacher, student or administrator) must participate in the conception and critical analysis of the experienced processes.

The workshops are constituted by a reflective, dialogic and transdisciplinary exploration of problems experienced by members of the educational community.

Considering that life experience is already transdisciplinary, the option is taken to always start from specific situations and problems (social, environmental, human…), analyzed dialogically between the different authors, according to the following process:

a) Each participant, teacher or student, is invited to present to the group a problem that he/she has observed in his environment and that he/she thinks should be resolved for the new generations.

b) These problems are then addressed by groups of five people from different disciplinary backgrounds.

c) In the sub-groups, each person can pursue their own reflection that will generate personal research. But the dialogic method implies that each participant must build all the stages of the research (problems, data collection and analysis) in dialogue with the various disciplines present in their group, but also with experts in the domains of knowledge relevant to the study, which may be outside the university, such as traditional or artistic, or popular knowledge.

For example, if we try to analyze the problem of development of boutiques for artists on the 'Isla del Río Cuale' – an area that runs through Puerto Vallarta –, it is not enough to question the law, the economy, tourism and communication disciplines; it is also necessary to take into account the representatives of traditional popular knowledge that make this island a fundamental place of local culture.

d) In each presentation of a problem situation, the members of the transdisciplinary workshop are trained to identify the elucidations that the different disciplines can provide but also the blind spots of each discipline. Reflective learning contributes both to the object of knowledge but also to the relationship of the knowing subject with his/her object of knowledge.

e) Dialogue groups are followed by integration, reflective, collective and

individual times.

For the transdisciplinary thesis seminar (created in the Research-Action workshops, as we will see later) the same fundamental method is used by bringing together students from all degrees in a lively course coordinated by a transdisciplinary team of six professors.

4.5. To build Processes of Individual and Collective Production of Knowledge: Creation of Transdisciplinary and Complex courses

We refer to the creation of transdisciplinary and complex courses in all undergraduate, graduate and postgraduate programs of the university, validated by the Ministry of Public Education, with a work dynamic based on dialogic, intersubjectivity and transdisciplinary crossing of knowledges. That is, returns to the TD tithe proposed by Morin[38]: […] give space for an epistemological or transdisciplinary tithe that would preserve 10% of the course, time for a common teaching dedicated to the knowledge of the determinations and presuppositions of knowledge, rationality, scientificness, objectivity, interpretation and the problems of complexity and interdependence between the sciences.

Courses that in our case represent 5% of the university training and that, starting in 2006, became part of the curriculum of all the university's degree programs, which was essential to provide transdisciplinary training, within of the institution, an academic value also of a formal nature.

Transdisciplinary Thesis Seminars. For example, we created: **Transdisciplinary Thesis Seminars**, mixing students from all majors under a vision that allows everyone to appreciate and respect their contributions, based on a dialogue between participants (from different disciplines) to address (social, environmental and human) problems in their theses that emerge from their relationship with the community and the environment in which they are enrolled and to produce individual and collective knowledge about them; knowledge that is created in collaboration and co-participation. We mean that university students approach through study, reflection and research, to problems that *exceed/outside* of the domain of the technical fields of their professions, and return to problems that recognize the richness and complexity of reality, and that demand the linking and re-ligation of disciplinary knowledge.

The seminars are worked with mixed groups of students from different disciplines and are accompanied by a transdisciplinary teaching team (made up of members of the Research-Action workshops) that, based on transdisciplinarity, help students to exercise in a new way of thinking (complex thinking) to address the research work and produce their bachelor's theses. The work dynamic allows us to appreciate and respect the contributions of everyone, based on a dialogue between the participants (from different disciplines) to address problems in their

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[38] Morin, Edgar. *La cabeza bien puesta.* (Argentina: Nueva vision, 2002), 89.

theses that concern them as part of society and the planet. The investigations are rooted in the daily social and environmental problems that the students know and that touch them personally or familiarly. These are no longer abstract or specialized theoretical problems that raise the internal logic of the discipline, but rather problems rooted in life that require the linking of disciplinary knowledge to address, elucidate, understand and treat complex realities. The quality of the involvement and the use of dialogue steps experienced in the transdisciplinary seminar gives a very particular tone to these thesis works. The environmental dimension appears much more frequently and, above all, we find it in all disciplines.[39]

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[39] Within the work carried out by the students we see that the researches addresses not only specific issues of the profession, but also situations that put in the first place the social and community order. Particularly, appears important the treatment of social problems that surround the community (and nearby places) in which students live and also to treat the problems linked to the care of natural and cultural heritage. For example, a thesis refers to the relationship between the indigenous cultural history of the state of Nayarit and the development of alternative tourism (bachelor's degree in accounting – BA – , bachelor's degree on tourism business administration – BTBA). Another work addresses the social and nature implications that arise with large construction projects in the city. We also see emerging works that question the current model of economic and social development of the town, which centers all its dependencies on the tourism system that it is dedicated to serve, despite the fact that this produces great effects on the environment in terms of predation of nature and social disparity. In many cases (from the BTBA, Law, Communication Sciences, BA and Marketing majors) the students build projects to protect natural areas, they make proposals based on sustainability and of ecotourism and community vision. The disparity between the quality of life of visitors versus that of inhabitants linked to the issue of tourism and the problem of the demographic explosion, generated in the area is also contrasted. In addition, social and environmental problems linked to the process of transformation of rural, peasants and ejido areas into urban areas are addressed, as well as their relationship with tourism developers and large investors. We are talking about theses that refer to the legal notions of urban areas and protected natural areas, which question the positive and negative effects of this notion on the use of land and the quality of the environment (Law, BTBA). Other works question the exercise of power, inefficiency and corruption in the political and government system and its links to the problem of drug trafficking and money laundering (Law, BA). Regarding the economic system, we see works that analyze tax evasion as a social problem and its relationship with the so-called tax havens, it is an analysis of the imposition and payment of taxes by declarations and the perverse effects of tax evasion (BA). Some theses address the issue of tax legislation on street commerce from the point of view of its health impact for workers and clients (BA, BTBA). Accounting (BA) researches thus opens up to complex problems such as the retirement crisis, informal commerce, money laundering or even tourism, social precariousness and the possibilities of sustainable development. Another research addresses failure in social readaptation and criminal recidivism, highlighting the stigma that is created around these people and ends up serving as exclusion (Law). Related to the problem of discrimination, works emerge that analyze 'Discrimination against homosexuals', 'The oversexualization of the image of women in tourism workplaces' (BTBA, Law, B.C.S.-Bachelor in Communication Sciences). There are theses that expose the concerns caused by the emigration of professionals to other areas of the country, as well as the problems of unemployment and underemployment for university students (BTBA, BCS, Bachelor in Marketing-BM). The students question in their theses common practices in companies such as staff turnover in hospitality and the social, legal and economic effects at different levels (BTBA), while others study the socio-economic and political impact in Puerto Vallarta of organizations such as the Catholic Church

Starting in 2018, students also socialize the results of their research in **Transdisciplinary Research Colloquia** where they open themselves to the participation not only of other specialists but also of the general public to share their findings.

Transdisciplinary workshops for students. We also created the **courses** named: **Transdisciplinary workshops for students** of all majors.

Derived from the transdisciplinary thesis seminars, the courses called transdisciplinary workshops for students were built, with mixed groups from all degrees. Workshops that, at the same time, support the seminars to address human, social, and environmental problems that affect the community of which the students are part of. The courses share the same pedagogical orientations as the thesis seminar, but seek the appropriation of the principles of complexity, the transdisciplinary vision and its pillars in a more ludic way, through the crossing of the knowledge of experience, artistic knowledge and popular knowledge (without neglecting theoretical knowledge) and that tends to build collective transdisciplinary projects of service to the community guided by the triad: individuals ←→society ←→nature and the *Seven knowledges for the education of the future* of Morin.

For example, the social, environmental and human problems, investigated in the theses and the application of the principles of complexity to them, are addressed in transdisciplinary groups of students through theatrical performances, essays, stories, painting, poetry, music, audiovisual media… Field work is carried out in various areas of the city to revalue experiential knowledge and oral history, through the practice of the life story method. Likewise, projects are generated to address the needs of various social groups, particularly vulnerable (older adults, homeless or orphaned children, people deprived of their liberty, sick people) through workshops, gatherings and activities in which the *Seven knowledges* proposed by Morin are exercised. There are projects for reforestation of the communities in which the students live or for the care of the environment. Some projects work on the construction of traveling libraries. Other projects provide free advisory activities (in their training areas) for the community in public squares. Projects for the rehabilitation of schools in rural areas have taken place. Re-use and recycling workshops have also been carried out, among others. We mean projects that address the challenges of daily actions to care for the triangle of life.

(BCS). The investigations also take up topics such as 'The use of social networks to increase citizen participation', 'Exploitation of workers (minors and older adults) in the workplace of supermarkets', 'Influence of technical of marketing in the sale of medicines, what the advertising media hides' (Law, BA, BM), 'Child sexual exploitation' (BTBA, Law), 'Pedophilia in Puerto Vallarta, links with tourism and the law' (Law, BTBA), 'Limitations on access to information in electoral processes in the town of Sayulita, Nayarit' (BCS), among others.

4.6. Create strategies that link the university with the community such as: Transdisciplinar Round Tables and Transdisciplinary Fairs

During the research, **Transdisciplinar Round Tables** and **Transdisciplinary Fairs** were created as a means to link the university with the community. They constitute an opportunity for transdisciplinary praxis by becoming an experience for intersubjective dialogue and the re-linking of knowledges, given that they take up as their axis, problems what concerns us as human beings, part of a society and an environment, which are discussed in transdisciplinary groups and are held at public spaces. It is an open and liberated public space to share and reflect on social problems in a ludic way. The round tables bring together the entire Arkos community and are open to the public. They are a meeting point for individuals, groups, organizations and institutions that seek to influence the problems of our community and wish to strengthen bonds for collective life. It is also about opening the dialogue to art and non-disciplinary knowledge such as that of experience, of what is lived phenomenologically, and of intersubjective and intercultural understanding[40].

The *Transdisciplinary Fairs* include, in addition to the dialogue tables, simultaneous workshops that aim to raise awareness among participants about the planetary problems that humanity faces, through art and popular culture (poetry workshops, singing, theater, sculpture, Huichol crafts, film forums, photographic exhibitions, painting exhibitions). To date we have held twenty round tables and sixteen Transdisciplinary Fairs inspired by the *Seven knowledges for the education of the future.*[41] The last Fair was called 'Triangle of Life: Individual ←→Society ←→Nature's and it addressed various local and global problems linked to auto-formation, co-formation, and eco-formation.

Create strategies that link the university with the community such as: Transdisciplinar Round Tables and Transdisciplinary Fairs could enrich the activities and program of a Transdisciplinary Chair.

4.7. Diversify research experience, forms and products: Creating calls for the Development of Various Transdisciplinary Research Products

Mobilized by the pandemic, starting in 2021, with the purpose of opening, promoting and diversifying horizontal Transdisciplinar research processes between students and professors at the university, we created calls,

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[40] Galvani, Pascal. 'Los kairos, momentos creadores y niveles de realidad de la autoformación.' In: Saturnino de la Torre y Maria-Antonia Pujol. *Educar con otra conciencia: una mirada ecoformadora y creativa de la enseñanza.* (pp. 49–61). España: Davinci Continental, 2009. Available at: http://81.25.120.212/trikypam/davincicontinental.com/datos/web/product_info.php?   products_id=312.

[41] Morin, Edgar. *Los sietes saberes necesarios para la educación del futuro.* México: UNESCO. 67p. 2001.

open to the educational community for the Development of various TD-Research Products, including scientific dissemination podcast, documentaries, research projects, scientific dissemination video capsules, science with comics, scientific dissemination miniseries, teachers' workbooks. These products had to be framed in the needs of the region of Puerto Vallarta, Jalisco, and Bandera's Bay, Nayarit (area in which CEUArkos is located) along lines such as: History and local identity; Regional development: Social, environmental, health, artistic and human problems of the region; Transdisciplinarity, complexity and eco-formation; Human rights; Gender equality and prevention of violence against women, adolescents and children; Organized civil society, groups, activists, their work; Urban Planning, Real Estate Development and Environment; Tourism and sustainable development; Circular Economy, Humanistic Economies.

From these calls, nineteen research products linked to the TD vision have been developed, those products give prominence to mixed research, research action, applied research and promote collective work between students and research professors; among them the project: 'Society, education, gender and economy. Transdisciplinary studies on Puerto Vallarta, Jalisco'[42], which compiles three researches.

With these research products, four Transdisciplinar Scientific Dissemination Conferences open to the community have been carried out to show the obtained results.

5. Conclusion

We believe the seven strategies explained above could be part of/or inspire the actions of an International Transdisciplinary Chair, which could well be itinerant and fed with the scenarios and Research-Actions put into practice in each country or university.

The above entails encouraging, from the Transdisciplinary Chair[43]:

Go Towards the Auto-Eco-Re-Organization of the University. In the implementation on a transdisciplinary chair, it is important to understand that transdisciplinarity and complexity, more than a comfortable scenario, represent a questioning scenario for people at their different levels of reality, since they lead to the breaking of paradigms. Transdisciplinarity and complexity question habits and customs rooted in our ways of being, acting, thinking, which is why they generate processes of approach/distancing to new currents. It is about understanding that the path to transdisciplinarity is not free of contradictions, it follows not a linear but a **discontinuous process of uncertainty ⬅➡resistance**

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[42] Muñoz, Dalia Berenice y Angélica Martínez Ortega, María José Rolón, Índira Montes. (Coord.) *Sociedad, Educación, Género y economía: Estudios transdisciplinarios sobre Puerto Vallarta, Jalisco*. México: Ediciones de La Noche-CEUArkos, 268p. 2021.

[43] Espinosa Martínez, Ana Cecilia. *Abrir los saberes a la complejidad de la vida : nuevas prácticas transdisciplinarias en la universidad*. México: Centro de Estudios Universitarios Arkos, 2014.

←→**tolerance** ←→**openness** of the actors and their practices.

However, transdisciplinarity in the university is possible as long as it and its members are assumed as an open system, as a learning community that renounces the certainty of having achieved the truth and assumes the notion of constantly regenerating itself.

It involves auto-eco-organizing processes of the relationships between – university – actors and their practices.

A New Concept of Training of Trainers/'Formation of *formateurs'*. For a Transdisciplinary Chair, a new concept of training or trainers is needed. The emerging paradigm permeates institutions such as UNESCO, with the training of trainers appearing to be transcendental, however, it continues to be built under notions of linearity, reductionism, the model of applied science and the separation between subject and object, where the teacher appears as a transmitter of knowledge. In addition to this, schools appear to be subject to economic thinking tending to reduce education to the acquisition of professional skills that the trainer must transfer[44].

It is then necessary to leave the paradigm of transmission, to re-conceive the role of *formateur*/trainer: not only aimed at acquiring knowledge and transmitting it, but also at building knowledge and working under a model that combines at a time research-reflection-in action. *We also refer to transforming training processes, turning training itself into a transdisciplinary and complex practice.*

Work on Transdisciplinary Triads for an Auto-Co-Eco-Formation in University Education. With the research we were able to see a triadic relationship between elements, concepts and processes that, although they appear to be antagonistic, actually nourish each other and support the development of transdisciplinary training. The notion of a triad offers us the possibility of leaving classic binary thinking and incorporating a new logic of contradictory antagonism.

In our experience, the series of triads – open and unfinished – , which guide the strategies for transdisciplinary education, are:

a) *research* ←→ *action* ←→ *reflexivity,*
b) *theory* ←→ *practice* ←→ *ethics,*
c) *learning* ←→ *teaching* ←→ *research,*
d) *crossing of knowledge* ←→ *dialogical and intersubjective dialogue* ←→ *reflexivity,*
e) *academic knowledges* ←→ *artistic* ←→ *popular,*
f) *rationality* ←→ *emotivity* ←→ *corporeality,*
g) *individual* ←→ *society* ←→ *species/auto – formation* ←→ *co-formation* ←→ *eco-formation.*

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[44] Galvani, Pascal. 'Transdisciplinariedad y ecologización de los saberes. 1ª parte.' *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 40, (2008): 4–13.

They represent the transdisciplinary pedagogy of CEUArkos and allow Auto-Co-Eco-formation for an action committed to individual, collective and anthropological metamorphosis. We suggest these triads could be taken into account as a pedagogy for a transdisciplinary chair.

To consider dialogic alternations: disciplinarity/transdisciplinarity; a balance: contents/processes according to the needs of each program/ context. It is key to observe in practice something that we had already elucidated in theory[45]: that disciplinarity and transdisciplinarity must appear, in a dialogic way, in university (education) processes, as cooperating and complementary. Therefore, the alternation between these is presented as necessary. Particularly at the undergraduate level, we observe the importance of the university's education in a discipline, but also leaving spaces to transcend it by living education processes and transdisciplinary collaboration. Likewise, it is important to strike a balance between content and processes, which transdisciplinary education must conceive as elements of a dialectical process.

Transdisciplinary education is more focused on the processes of reflection, dialogue and production of knowledge than on content. *Thus, every training program must assume continuous balance, dialogic dialogue and alternation between disciplinarity-transdisciplinarity/content processes, according to the context and educational objectives.*

To accompany the reform of thought until an ecologization of knowledges and university education. A Transdisciplinary Chair must accompany the reform of thought until an ecologization of knowledges and university education.

With the experience acquired at CEUArkos (still evolving) to move towards a transdisciplinary education, we learned that disciplines apparently foreign to environmental education such as law, accounting, administration, communication or marketing, becomes greening from a transdisciplinary position that puts academic knowledge in dialogue with the knowledge of the social, artistic, popular, and political environment and introduces environmental concern as an ethical dimension in the production of university knowledge. In other words, the transdisciplinary vision tends to ecologize/greening knowledge. 'That is, it puts knowledges in dialogue with those of the environment, while introducing the environment as the major concern of the knowledge and learning produced'[46]. Therefore, the move from a disciplinary paradigm (technical, reductionist simplifying) to a complex and transdisciplinary paradigm implies a critical and self-critical questioning of the different disciplines on environmental imbalances. It invites to open knowledge to the complexity of life.

To update our anthropological reserves and become artisans of the

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[45] Espinosa Martínez, Ana Cecilia y Claudia Tamariz. '*Un modelo transdisciplinario de educación para la Universidad.*' Master diss., Universidad de Valle de México, 2001.
[46] Galvani, Pascal. «Transdisciplinariedad y ecologización de los saberes. 1ª parte» *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 40, (2008): 4.

eighth day. To recognize, from the Transdisciplinary Chair, the call to update our anthropological reserves in the direction of a planetary vision of education and life, to become builders of good dreams and artisans of the eighth day, in the sense of Almeida[47].

The artisan is someone who: transforms matter into a utilitarian, aesthetic or good object for thinking. Reconnect's fragments into an open whole. Manages what surrounds him/her, removes the dead parts and actively interferes in its transformation. Recognizes the distinction, but not the opposition, between imagination and reality, because he/she knows that his/her material work is a product of imagination and dream… The artisan is, above all, someone who knows how to see the world around him/her well; who realizes what needs to be transformed, what is in a state of necrosis and needs regeneration? Patience, boldness, persistence, awareness of imperfection and self-criticism seem to be the tools and materials of the artisan of knowledge, the educator, the builders of good dreams and the artisans of the eighth day of creation, which are all of us.

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The authors declare that she has no conflicts of interest with respect to the research, authorship, and/or publication of this article. Any errors or omissions are her own.

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[47]Almeida, Maria Da Conciençõe. 'La construcción nuestra de cada día.' *Revista Visión Docente Con-Ciencia-CEUArkos*, no. 89 (2021): 5–9. Available at: http://www.ceuarkos.edu.mx/vision_docente/2%20La%20Constr.pdf.

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Transdisciplinary Chair & Human Plasticity

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Abstract: *The creation of an international transdisciplinary chair is essential in a society that is losing its fundamental values and points of reference. The experience accumulated by the international center for transdisciplinary research (CIRET) over the last three decades under the impetus of B. Nicolescu and E. Morin in France is exemplary in this respect. Echoing many transdisciplinary approaches worldwide, it has initiated a reform of thinking that must be pursued and extended without interruption. Here are two examples that are fully in line with this perspective: 1/the initiative of the PSA (Plasticités Sciences Arts) experimental transdisciplinary research group, which has been working since the charter was established (1994) to set up transdisciplinary practices around the concept of plasticity; 2/ the joint proposal by French and Brazilian transdisciplinary structures to create a Transdisciplinary chair at the university (2007) and contemporary works on the plasticity of living systems in line with these pioneering initiatives (2019–2023). The fact that transdisciplinarity has been established in several academic institutions and that some of the major areas of research undertaken by the PSA group, such as the study of posturology in experimental medicine, highlighting essential plastic interfaces in living systems and the study of relationships between art and science, now have powerful ramifications, including institutions, shows us the extent to which plasticity of life and transdisciplinary attitude are complementary. It's a mutation of cultures and consciousness that highlights human plasticity and encourages us to keep moving forward!*

Keywords: *transdisciplinarity, plasticity, living systems, art & science, knowledge.*

1. Introduction

In her statement of intent to relaunch an international transdisciplinary chair within our institutions, habits and customs, Mariana Thieriot Loisel shares her transdisciplinary experience and the work accomplished over the last three decades to break out of silo politics and impose transdisciplinarity as the only viable alternative in a world out of breath and losing its bearings,but above all outlines future paths open to the complexity of human phenomenology while maintaining the transdisciplinary (TD) attitude in its essence.

Under the impetus of key figures such as Piaget, Nicolescu and Morin [1] in France, and of numerous integrative, transversal or transcultural approaches around the world (schools in Zurich and the US, etc.), it has become clear that the reform in thinking engendered by the rise of TD in the wake of Basarab Nicolescu's major works[2] in the continuity of Lupasco's, has spread to creative, educational, scientific and philosophical practices, consolidating the fundamental building blocks laid down in Locarno, then when the Charter of Transdisciplinarity (TD) was drawn up, which I had the honor of co-signing at the 1st World Congress of Transdisciplinarity in Arrabidà (Portugal, 1994)[3].

The epistemological openness created by this first TD World Congress was continued in Vitoria (Brazil, 2005, and most recently in Mexico City (Mexico, 2020–2021) in virtual mode due to Covid. This 3rd world congress[4] was marked by major speeches, strong international participation via ENAH, INAH, Trans-Complexa, CIRET, CETRANS and the UNESCO chair in Florence, and the massive contribution of many of us to symposia, roundtables, and conferences. I led in this context a round-table discussion on the relationships between plasticity & transdisciplinarity with speakers including profs. Frederik Andrès, Mariana Thieriot, Patricia Proust-Labeyrie and Luis Oosterbeek which we will develop further (Sept. 2021). Many examples from different disciplinary fields could enrich this TD corpus and provide avenues of research for the Chair.

The four-volume conference proceedings currently published are proof of this. Volume IV is co-published as an

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[1] Morin, Edgar. *La Méthode I & II*, Le Seuil, Paris, 2008; Debono, Marc-Williams. *La mémoire de la vie — Edgar Morin and Patrick Curmi*, Editions de l'Attribut, Coll. L'adresse à l'autre, 2017.

[2] Pluri/Inter/Transdisciplinarity, pillars of methodology, levels of reality, third party included, TD Manifesto. See Lupasco's works in the references.

[3] The original declaration of the TD Charter. Translations in several languages on the CIRET website. https://www.tercercongresomundialtransdisciplinariedad.mx/declaracion-de-mexico/ (consulted on 26/06/2023).

[4] Third World Congress of Transdisciplinarity, available here: https://www.tercercongresomundial transdisciplinariedad.mx/en/, accessed on May 6, 2024.

e-book by PSA and CIRET at PlasticitéS Ed.[5] as a special issue of 'Transdisciplinary Encounters' coordinated by Florent Pasquier, Bénédicte Letellier, Mariana Thieriot and me[6]. This close partnership responds to the symposium's call for continuity and teamwork in the future TD Chair. The lessons to be learned from this specific confined transdisciplinary experience as part of our symposium approach are that the TD dynamic instilled upstream has spread and borne fruit whatever the socio-political context.

2. Transversal models and plastic interfaces: a transdisciplinary approach of human plasticity
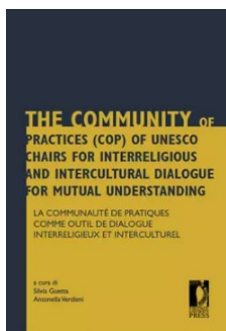
A pioneering initiative in line with our project for an international TD chair was carried out by the CETRANS, the CIRET and PSA in 2007. The proposal we launched with Mariana Thieriot, Paul Ghils, Patrick Loisel and Ubiràtan D'Ambrosio was to create a TD chair at the university. It was the subject of two publications, one in 2007[7] in the transdisciplinary human plasticity journal *Plastir*[8], which since 2005 has published 180 authors in the TD field, and the second in a COP UNESCO book edited by Sylvia Guetta & Antonella Verdiani at PUF Florence in 2011[9]. We mention here particularly Patrick Loisel's first creation of a Chair in Health and TD at Sherbrooke's Faculty of Medicine and Health Sciences, and Paul Ghils's approach to cosmopolitics and transnational/transcultural communication, abundantly documented in *Cosmopolis*[10].

More generally, TD scientific models were introduced in several universities around the world in 2007, taking account of the evolution of their own socio-

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[5] PlasticitéS Editions (PSA website) available here: https://www.plasticites-sciences-arts.org/ editions-plasticites/, accessed on May 9, 2024.

[6] Letellier Bénédicte, Pasquier Florent, Debono Marc-Williams & Thieriot Loisel Mariana, *Adopter un langage transdisciplinaire commun face à la complexité du monde,* Third World Congress of Transdisciplinarity Vol IV, PlasticitéS Ed, 2024. https://www.calameo.com/read/00741761942e31a 28050c.

[7] https://www.plasticites-sciences-arts.org/plastir-number-8-092007/, accessed on May 8, 2024. Debono, Marc-Williams. *Le complexe de Plasticité : état des lieux et immersion*, Plastir, The Transdisciplinary Review of Human Plasticity N° 18, 03/2010; Debono, Marc-Williams. *Plasticité de l'esprit et mondialisation*, COSMOPOLIS 3/4, 2012.

[8] Plastir: The Transdisciplinary Review of Human plasticity available here: https://www.plasticites-sciences-arts.org/revue-plastir/, accessed on May 8, 2024. Plastir English abstracts: https://www. plasticites-sciences-arts.org/plastir/.

[9] Mariana Lacombe Loisel, Marc-Williams Debono, Patrick Loisel, Paul Ghils & Ubiràtan D'Ambrosio, « Recherche scientifique, plasticité et transdisciplinarité perspectives » in The Community of Practices (Cop) of UNESCO Chairs for Interreligious and Intercultural Dialogue for Mutual Understanding", S. Guetta & A. Verdiani Ed. (FUP, Firenze University Press, Italy, 2011).

[10] Cosmopolis, *The review of cosmopolitics* available here: https://www.cosmopolis-rev.org/ editorial-en/editorial-2018-1-2-en, accessed on May 8, 2024.

educative systems and being aware of being prisoners of conceptual or epistemo-
logical cages as stated by the ethnomathematician Ubiràtan D'Ambrosio[11]. As
established with all these authors, the TD experience is built through a common
philosophical reflection aiming to help university researchers and professors to
develop TD models and ethical solutions whatever their discipline. As resumed
by Mariana Thieriot, this chair calls for an effort to establish a philosophical foun-
dation for the human being and 'we need to ask what the aims of this scientific
model are, or its inspiring vision, and what are the means employed by those
who conceptualize it at the university, who draw up the axiological dimension of
the action. In the same way, we will question those who apply it in the field and are
confronted with the paradoxes of philosophical action, of the "praxis" that has
made it possible to create in philosophy what is known as "praxeological models"
aimed at the transfer of knowledge. Do all these models consider human plasticity
and the epistemological consequences of the results of scientific and technological
development? Do they refer to an ethic oriented towards otherness or "thinking
about the other"? Are they truly transcultural? These are just some of the questions
and attitudes that urgently need to be developed in a world beset by exclusion and
lack of discernment.'

Indeed, open systems of knowledge are based on the plasticity of the
brain of a rediscovered humanity, attentive to others and to the totality of the
world, the very opposite of what governs a large part of human relations on the
planet today… Yet endogenous plasticity precisely means this ontological cross-
roads. What's more, it has a universal character described as early as Aristotle, and
later by many philosophers like Goethe, Kant, Heidegger or Hegel… This implies
that the container (the form) and the content (the object) signify or co-determine
each other. Plasticity naturally seals this movement and inscribes it in historicity.
There is no domination of one to the detriment of the other to the detriment of the
other, but reciprocity. The complexion brought about by the formation of plasticity
complexes such as the STP (space- time-plasticity) or NMP (neural-mental-plas-
ticity) complexes is to be understood as a binding or an aggregation. Plasticity is
at this level an exact interface role at the noetic epicenter for the NMP complexes
here and acts therefore as an exact aggregated center serving as a springboard for
the expression of the third. Plasticity is therefore both a ubiquitous fundamental
property of matter, articulating in the form of plasticity complexes two mutually
irreducible dimensions such as matter and form, or experience and consciousness,
and an epistemic concept touching on the ternary in its metaplastic, creative and
transdisciplinary dimension[12] (**Fig. 1 & 2**).

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[11] Ubiràtan d'Ambrosio's contribution to Plastir number 43, 10/2016 available here: https://www.
plasticites-sciences-arts.org/PLASTIR/D'Ambrosio%20P43.pdf, accessed on May 8, 2024.
[12] Marc-Williams Debono, « Le concept de Plasticité, un nouveau paradigme épistémologique »,
DOGMA (2007); « Le complexe de Plasticité : état des lieux et immersion », PLASTIR 18,
03/2010; « Le concept épistémologique de plasticité : évolution et perspectives », DOGMA, Edi-
tion 15, 2021 available here: https://dogma.lu/wp-content/uploads/2021/05/Dogma.-Edition-
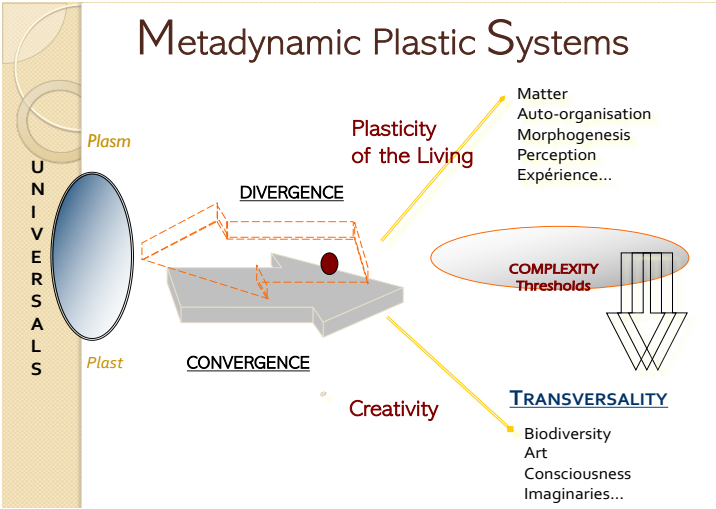
Figure 1: Plasticity of living systems: **metadynamics in evolutionary biology and creative processes.** Detailed in the figures 2a-2b at the level of processes, this diagram shows how plastic interfaces (from universals to plasmic and/or plastic functions) come into play in living systems during evolution (from self- organization to perceptive processes) and in symbolic thought (imaginary, creativity)

15..pdf, accessed May 13, 2024.
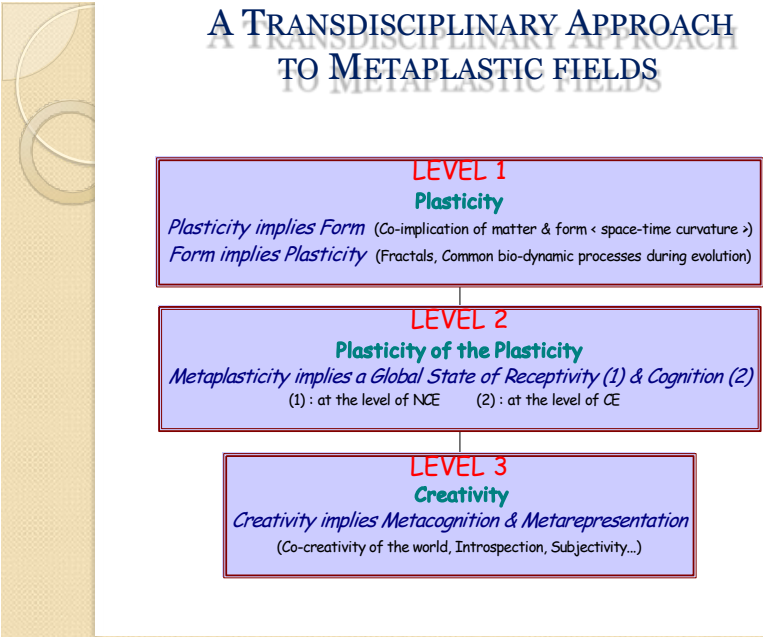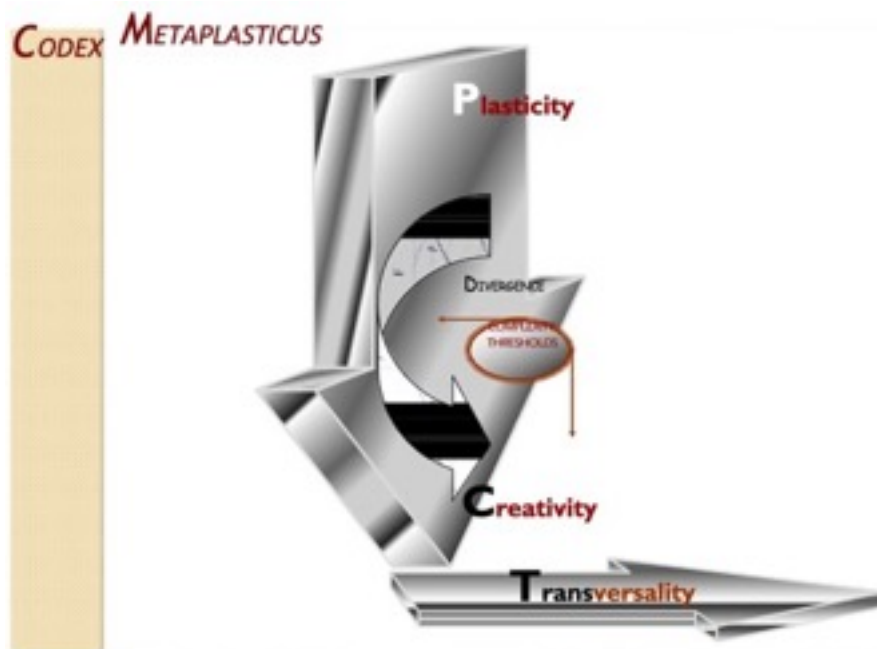
Figure 2: **A transdisciplinary approach of metaplastic fields.** **2a**: The three levels of plasticity. Level 1: primordial matter-form interaction. Level 2: plasticity of the plasticity here described at the cognitive (CE) and non-cognitive (NCE) levels. Level 3: Metacognition and representation states observed during creative tasks. **2b**: *Codex Metaplasticus*. Details of the metaplastic processes showing the PCT (plasticity-creativity- transversality) path necessary to express biodiversity during evolution. It includes major stages in the divergence of kingdoms or the convergence of certain interspecies evolutionary mechanisms across thresholds of complexity. Modified from M.W. Debono (2004), *From perception to consciousness: an epistemic vision of evolutionary processes*', Leonardo, vol. 37: 243–248.

      These dimensions are related to the main steps of the plasticogenesis (**Fig. 3**) where plasticity, ubiquitous by essence, needs to become complex[1] and to form an irreversible binding with their apparently contradictory pairs (space-time, brain-mind, subject-object etc.) to be actualized (otherwise it remains reversible, elastic and passive). As previously described, this active binding results from primary interfacing and reciprocal mixing between incoming (informational, for example) and outgoing (conscious or unconscious filter) flows through a common barrier (the subject's body-mind integrity) defining the ART model (Articulation- Reciprocity-Transversality).

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[1] From complexus in Latin, i.e., complexion or aggregation (and not complexity).

PLASTICOGENETIC PROCESSES & TRANSVERSAL EMERGENCE OF NOETIC SYSTEMS

GENERIC PRINCIPLE	ARTICULATION	RECIPROCITY Semiotics	TRANSVERSALITY Translation
FUNDAMENTAL PROPERTY OF THE MATTER	ACTIVE BINDING DYNAMIC LINK	INFORMATIONAL LEVELS ART MODEL	NOETIC EPICENTER THIRD INCLUDED TIERCEITY, T STATE
PLASTIC INTERFACES	'THE PLASTIC CODE OF LIFE'	ONTOLOGICAL CROSSROADS	IMAGINARIES, MEMORIES META-LANGUAGES INDIVIDUATION
UNFORMED-FORMED MATTER-FORM, PERCEPT-CONCEPT, SUBJECT-OBJECT, BRAIN-MIND…	IRREVERSIBLE PROCESSES INSEPARABILITY	CO-SIGNIFICATION PROCESSES / INHERENCY CO-CONSTRUCTION CO-IMPLICATION CO-EVOLUTION	METADYNAMICS TRANSVERSALITY TRANSDISCIPLINARITY TRANSCULTURALITY
PLASTICITY	PLASTICITY COMPLEXES	METAPLASTICITY	PLASTICITY OF MIND

Figure 3: Plastic interfaces as transversal models. This table shows the main steps of the plastico-genetic process from the formation of plastic interfaces to that of plasticity complexes, including the transversal ART (articulation-Reciprocity-Transversality) model. We can note the setting up of ontological crossroads during the co-signification phase, which precedes the metaplastic stages such as metacognition at the cerebral level or translations from the imaginary axis to the imaginary axis implying a ternarity and the emergence of noetic centers. Table modified & updated, initially published in M.-W. Debono (2013), *Perceptive Levels in Plants: A Transdisciplinary Challenge in Living Organisms Plasticity*, Transdisciplinary Journal of Engineering & Science (TJES), Vol. 4:21 – 40.

Founded by the in-between, the formation of plasticity complexes is essential at the anchor point of irreducible dimensions and may contribute a transition towards the T state. Following the plasticogenesis presented as transversal or TD model in Figure 4, this ternary state responds to the lupascian notion of third included where plasticity plays this key role at natural interfaces mutually co-signifying. It has the potentiality to change the observed level of reality due to its impermanent nature and the metaplastic cycle including feedback loops that could be generated by a jump from one to another level of reality or the development of areas of non-resistance[1]. This transdisciplinary framework shows the

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[1] Nicolescu, Basarab. *Nous, la particule et le Monde*, Le Rocher, 2nd Ed., 2002. Nicolescu, Basarab. *Manifesto of Transdisciplinarity*, Suny Press, 2002; Nicolescu, Basarab. *La transdisciplinarité*, Le Rocher, 1996; Nicolescu, Basarab. "Methodology of transdisciplinarity, levels of reality, logic of the included middle and complexity" in *Transdisciplinarity bridging natural science, social science,*

driving force and catalytic potentiality of plasticity in transversal models like ternarity and raises the question of the origin of the transition from an informed to form and the role played by plasticity in evolutionary processes.

This is what is at stake in the development of the epistemic concept of plasticity[1] and the consequences to be drawn from it in terms of our knowledge of the world in which we live (**Fig. 1 to 3**). The epistemic nature of human plasticity reflects therefore both the interiority of matter and the birth of form cosignifying all the living, the emergence of consciousness and art as the privileged expression of the poetry of existence[2]. As a result, plasticity is an active process that is expressed through different plastic interfaces which, by bonding in the form of plasticity complexes[3], become irreversible, rather than simple system properties such as malleability or elasticity, which are functional and reversible. As was shown in the 1990s, this involves a fundamentally different mechanism in which plasticity plays the role of an included third party within a 1-1 relationship between two dimensions that are irreducible to each other[4].

These plastic interfaces have been precisely described:

1. at the epistemological scale where five levels have been determined: plasticity of the matter, the living, the subject, the mind and metaplasticity[5];

2. in living systems, particularly at the scale of perception-action loops and the cognitive and mesological plasticity of plants[6];

3. at the creative and/or art & science scale showing three steps: plasticity, plasticity of the plasticity and creativity and their metadynamics <plasticity-creativity-transversality>[7].

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humanities and engineering, A. Ertas Ed., Atlas Books, 2011.

[1] Debono, Marc-Williams. « Le concept de plasticité : un nouveau paradigme épistémologique », DOGMA, Revue de philosophie et de Sciences Humaines, 2007; Debono, Marc-Williams. "Le concept épistémologique de plasticité : évolution et perspectives", *DOGMA*, Edition 15, 2021.

[2] Debono, Marc-Williams. "Mesological plasticity as a new model to study plant evolution, interactive ecosystems & self-organized evolutionary processes" in *Self-Organization as a New Paradigm in Evolutionary Biology: From Theory to Applied Cases in the Tree of Life*, A. Dambricourt Malassé Ed., Springer-Nature, Switzerland, Series Ed. R.G. Delisle, Vol. 5 July 2022:253–290.

[3] Debono, Marc-Williams. 'Transdisciplinarity: a new approach to metadynamics and consciousness' in *Transdisciplinarity: Theory & Practice*, B. Nicolescu Ed., Hampton Press Cresskill, New Jersey, USA, 2008.

[4] Debono 1996, 2005 *Debono, Marc-Williams. L'Ère des Plasticiens. De nouveaux hommes de science face à la poésie du monde, Aubin Éditeur, 1996;* Debono, Marc-Williams. "Valeur pédagogique d'une expérience transdisciplinaire de terrain", CIRET Bulletin n°18, 2005.

[5] Debono, Marc-Williams, *op. cit*., , 1996; Debono, Marc-Williams, *op. cit*., 2008; Debono, Marc-Williams. "État des lieux de la plasticité *: Partie I : les interfaces plastiques, Partie II : La plasticité de l'esprit" Implications Philosophiques, March 2 & May 11, 2012.

[6] Debono, Marc-Williams. "Perceptive levels in plants: a transdisciplinary challenge in living organism's plasticity" in *Transdisciplinary, Education, Philosophy & Applications*, B. Nicolescu & A. Ertas Editors, The Atlas Publisher, the USA, 2014; Debono, Marc-Williams. "La plasticité dans les sciences et dans les arts: What is plasticity?", La ChARTreuSE, June 10, 2018.

[7] Debono, Marc-Williams. 'From Perception to Consciousness: An epistemic vision of evolutionary processes,' Leonardo Journal, Vol. 37(3): 243–248. MIT Press, USA, 2004.

We show then how the emergence of transdisciplines is the result of cross-pollination within the creative act[8]. Consequently, whether we are talking about matter and space-time or living matter, which includes synaptic plasticity and all forms of human plasticity, plasticity is the endogenous included a third of the bijective relationship that links these binomials. This is a key point in terms of transversal perception of reality and of transdisciplinary actions that can amplify the innate, non-dual plasticity between matter and mind or brain and consciousness.

Figure 4a – Theoria: The Epistemic Concept of Plasticity. This figure summarizes the four levels of interaction and the three key stages of plasticogenesis from the theoretical point of view. We return to the stages described in Figure 3, but they are clarified by precisely describing the levels of interaction and the epistemic concept of plasticity. Some ontological crossroads such as co-signification and archetypes and typical ternary processes like the Lupasco's T state or trajectivity following mesological activities. Figure slightly modified from a presentation of the author at the 3rd Mondial Congress of Transdisciplinarity (Sept. 2020, virtual mode).

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[8] Debono, Marc-Williams. "Cross-pollination in Art and Science: plasticity of the mind and birth of transcultures*"* in *Handbook of Transdisciplinary: Global Perspectives,* Chap 6, R. J. Lawrence Ed., Edward Elgar Publishing 2023**.**

PLASTICITY : PRAXIS

GDP-PSA TD Research Group

DISCIPLINARITY

Physics (Nonlinear dynamic systems, chaos analysis)
Neurosciences (neural plasticity, balance, posture, movement, cognition)
Paleoanthropology (Human evolution, cranial onto– morphogenetic trajectory, attractors, primary resp. mechanism, links with orthodontics and posturology, etc.)
Mathematics/Statistics (Modeling of the evolutionary process, exp. medicine, fractals)
Epistemology (Phenomenology and postural semantics, global posturological context)
Art & Science (Matter/Mind)

Anthropology
Arts
Astrophysics
Biology
Epistemology

Physical
Genetic
Mathematics
Neurophysiology
Paleoanthropology
Experimental Psychology
Experimental Medicine
Semiotic.........

PAIR TRAINING, WORKSHOPS TD, MODELING, INCENTIVE CONFERENCES

GDP PROJECTS

The principle of complexity
The meaning/interaction couple
Temporospatial coding of growth
The meaning/interaction pair: Temporospatial coding of growth:
Evolutionary dynamics project
Thought as Matter
The chaotic moment in psychotherapy
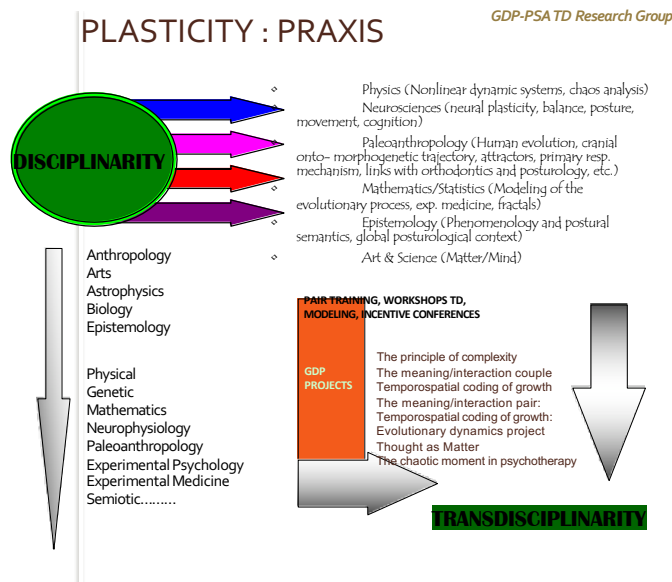
TRANSDISCIPLINARITY

Figure 4b – Praxis: Experimental TD Groups at GDP/PSA. This table shows the implementation of experimental transdisciplinary working groups, according to the researchers' starting disciplines and the pairs to be formed to put transdisciplinarity into practice in the field. The following figures show the setting up of TD groups by affinity. The gradual implementation of the projects will be spread over 2 to 4 years in the productive phase within the GDP and will continue in PSA and through the formation of ancillary structures for several years and up to the present day for certain projects as mentioned in the text. Data slightly modified from a presentation of the author at the Third Mondial Congress of TD (Sept 2021, virtual mode).

3. Results

Our own experience as an experimental transdisciplinary network of researchers working on the mechanisms of evolution at all scales of organization has been to set a TD course from the outset, using such transversal models not fragmenting reality. This was done within the GDP (Groupe des Plasticiens), which preceded the birth of PSA (Plasticités Sciences Arts)[9] endorsed, in addition to Basarab Nicolescu and Edgar Morin, by Pierre Karli, Rémy Chauvin, Gilbert Durand, René Thom, Pierre Bergé and Olivier Costa de Beauregard. Various lessons were learnt about the pedagogical value of this TD experience reported in

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[9] GDP Board available here: https://www.plasticites-sciences-arts.org/701/, accessed on March 23, 2024. « La transdisciplinarité expérimentale », Round Table organized by the GDP, Médicis Art-Science & European Space (Palais de la découverte, Paris, June-September 1997). GDP's Projects & Conferences available here: https://www.plasticites-sciences-arts.org/les-projets-du-gdp/ and here: https://www.plasticites-sciences-arts.org/les-conferences-du-groupe-des-plasticien s, accessed on May 8, 2024.

the CIRET bulletin[10,11], its richness, and the concrete implementation of TD projects, workshops and incentive-based conferences over four years. Some involving several laboratories or doctoral works and being too ambitious, others on the contrary like the CEOPS[12] work on posture and non-linear dynamic systems by osteopaths and different medical disciplines, others having TD approaches to model theories of evolution mathematically, the plasticity of the language or studying matter and mind relations with art-science approaches (**Fig. 4 to 6**).

Main Experimental Transdisciplinary Projects of the GDP

The principle of complexity
Basic pair: Eric Bois/Anne Dambricourt
Keywords: contingency, parallel between cosmological and biological evolution.
Disciplines: Mathematics/Astrophysics/Paleontology.

The meaning/interaction pair
Basic pair: Michel de Heaulme/Medecine Doctors
Keywords: conceptual dictionary, generic properties, linguistics.
Disciplines: Computer Science/Medicine/Systemics/Philosophy.

Temporospatial coding of growth
Basic pair: Roger Buis/Pierre Bergé
Keywords: chaos, morphogenesis, growth prediction.
Disciplines: Plant biology, Experimental physics.

Evolutionary dynamics project
Anne Malassé, Eliane Colomb, M.W. Debono, G-E. Séralini.
Keywords: fossil DNA, harmonic attractor, hominization, phylogenesis
Disciplines: Molecular biology/Paleontology/Astrophysics/Modeling/Electrophysiology

Thought as material: plastic in all its forms
Basic pair: Patricia Proust Labeyrie/M.W. debono
Keywords: interaction, environment, cognition.
Disciplines: Plastic Arts, Psychophysics, Ecology, Transculture.

The Chaotic Moment in psychotherapy
Pierre Bergé, Jacqueline Dubois, Pierre Lecoy, J.F. Sallustrau, Michel Lemistre
Keywords: chaos, family therapy, synchronicity
Disciplines: Physics, Experimental Psychology, Neurobiology.

Figure 5: PSA-GDP Experimental TD Research Group. Here are listed the TD projects validated by the GDP (prior to the creation of PSA (Plasticités Sciences Arts) in 2000. They were carried out by researchers using different methods and resources (laboratories, external research projects, interdisciplinary groups, doctoral students, part of work in progress, modelling, projects carried out in situ, original creations, established groups seeking the TD opening offered by the GDP, individual researchers, etc.) during the 4 years mentioned above. Other projects not mentioned were born, developed and/or continued within PSA (see text and next figures for relevant and/or recent expansions of our TD activities).

These results were pursued on a discontinuous basis, depending on the commitment and free time of everyone. Nevertheless, they have created a sense of emulation and a unifying field of exploration around the concept of plasticity

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[10] Debono, Marc-Williams, *op. cit.*, 2005.
[11] « Valeur pédagogique d'une expérience transdisciplinaire de terrain », Transdisciplinary Encounters, CIRET Bull. n° 18 March 2005, available here : http://ciret-transdisciplinarity.org/ bulletin/b18c17.php, accessed on March 23, 2024.
[12] The CEOPS was the Study Center for Osteopathy, Posturology and related Sciences (Nice, France).

that has never waned. Several of the pairs formed as part of the GDP have continued their work, either individually or collectively, through publications and/or in situ experiments. For example, the evolutionary dynamics project crossing mathematics and paleoanthropology has led to advances in this field. Art-science TD approaches like those initiated at GDP (**Fig. 6, 7**) and continued at various academic or public events[13] are now being echoed in French and European structures such as cultural collectives producing biennials (The Science of Art, CC91[14]: **Fig. 8**) and the Transversal of Arts Sciences Networks or TRAS (**Fig. 9**)[15], while the experimental medicine projects listed below, which had sufficiently solid foundations, continue to develop within institutional or transdisciplinary frameworks via the FREHOPS (posturology, medicine, paleoanthropology)[16].

In the same way, as stated in the description of our transversal models using plasticity as vectors, several recent works and publications were done in the field of mesological plasticity of living systems with a TD methodology avoiding formalism and establishing lines of research adopting synergistic and plastic attitudes. It's the case for the study of plant intelligence where a discipline, botany, was totally refunded in the field of recent discoveries in the field of signalization and behaviors showing the ability of plants to sense, communicate, memorize, learn, elaborate defense strategy or have elaborate interspecies relations. The botanical scientific community, which is already interdisciplinary, is piling up discoveries in genetics, integrative biology, electrophysiology, functional imaging, anatomo-histology etc., but above all behavioral science, which is a great novelty in this field.

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[13] Debono, Marc-Williams. **"**Le concept de plasticité : une approche transversale des savoirs"*,* Lecture given during the plenary session of the Haut Conseil de l'Education artistique et Culturelle (HCEAC, Paris) about "Transversality & new humanities", at the Institut national de l'histoire de l'art (INHA), Paris, December 2011; Debono, Marc-Williams. "*Transdisciplinarity in Art & Science: opening up the knowledge*", IKT Symposium, Brussels, May 2016; Debono, Marc-Williams. "Electrome & Cognition Modes in Plants: A Transdisciplinary Approach to the Eco-Sensitiveness of the World" in Conducting Transdisciplinary Research, Atlas Publishing, the USA, 2021.
[14] Collective Culture 91/Art & Science Center available here: https://www.collectifculture91.com/pas_presentation/, accessed on May 8, 2024.
[15] Transversal of Arts Sciences Networks (TRAS) available here: https://www.reseau-tras.eu, accessed on May 8, 2024.
[16] Federation for Research into Human Evolution, Osteopathy and Posture in the Service of Health (FREHOPS) available here: https://www.frehops.org/, accessed on May 8, 2024.

THE GDP CONFERENCES (GROUPE DES PLASTICIENS)

Amphitheater of the Institute of Human Paleontology of Paris (1994-1998)

INTRODUCTION TO METAPLASTICITY
Marc-Williams Debono, Neurobiologist, President of the GDP

ORIGINS OF THE HUMAN SKULL: GROWTH PREDICTIONS & CONCEPT OF HARMONIC ATTRACTOR
IN THE PATH OF HOMINIZATION Anne Dambricourt-Malassé, Paleoanthropologist IPH, CNRS

FROM COHERENCE TO CONTINGENCY
Eric Bois, Astrophysicist at the Côte d'Azur Observatory

STRUCTURE OF A GROWTH PROCESS
Roger Buis, Professor Emeritus at E.N.S.A. Toulouse

THE EVOLUTION OF MATTER, FROM THE BIRTH OF THE UNIVERSE TO DNA
Gilles-Eric Séralini, University Professor of Molecular Biology

THE USE OF NONLINEAR DYNAMIC SYSTEMS THEORY FOR THERAPEUTIC ANALYSIS IN SYSTEMIC
FAMILY THERAPY
Pierre Magny-Lecoy, Jean-Claude Bouley, Jean-François Sallustrau, Group of Psychiatrists &
Psychologists, "System F" Group of the Nemours Hospital Center. Michel Lemistre, Physicist at ONERA.

THOUGHT AS A MATERIAL: PLASTIC IN ALL ITS STATES
Patricia Proust-Labeyrie, Professor of Visual Arts at the University of Bordeaux II & MW Debono,
Neuroscientist

RESEARCH FOR A MEANS OF DETECTING AN ORGANIZATIONAL FIELD ASSOCIATED WITH SPACE-
TIME-FRACTALITY REFERENCES
Thiebault Moulin, Engineer at E.N.S.T.A., director of the SYSTEMA group

IS TRANSVERSALITY A UNIVERSAL PROPERTY OF NATURAL PROCESSES?
René Thom, Mathematician, Professor at I.H.E.S., Fields Medal

CRITICAL ASPECTS OF DARWINISM
Rémy Chauvin, zoologist, honorary professor at the Sor

WHERE DOES THE PLASTICITY OF LANGUAGE COME FROM?
Michel de Heaulme, professor of medical informatics at the Pitié Salpétrière University Hospital

STUDY OF FASCIAE AND POSTURAL MORPHOTYPES: AN EXAMPLE OF TRANSDISCIPLINARITY
Yann Pointhière, osteopath, Pascal Cyprien, podiatrist Co-founders of the Nice Experimental Medicine Group

GENETIC AND NON-GENETIC VARIABILITY STRATEGIES

THE BRAIN OF THE HUMAN "TRINITY"
Pierre Karli, Professor Emeritus of the Louis Pasteur University of Strasbourg

APPLICATION OF NONLINEAR DYNAMICS TO THE STUDY OF THE CYTOSKELETON
Ezio Insinna, Clinical psychologist

THINKING WITHOUT LANGUAGE
Dominique Laplane, Neurologist at Salpétrière Hospital

THE PRODUCTIONS OF MEANING, THEIR NEUROSEMANTIC ANALYSIS IN THE EXPRESSION OF NATURAL
PHENOMENA AND MODES OF REASONING
Khaled Ait Hamou, Professor of Semantics

More information on the PSA Website: http://www.plasticites-sciences-arts.org

Figure 6: The GDP Conferences. Linked to the experimental TD groups, the GDP conferences were incentive-based in the sense that their aim was not to present a subject as is usually the case but had the clear objective of uniting the researchers present around a transdisciplinary theme in the

making. They were followed by brainstorming or thinktank and rich exchanges around the perspectives raised by the speaker and above all a common concern about the realization of the TD project and its implementation in the field. Memorable sessions took place in this dynamic like those presented by the Prof. René Thom on the transversality of natural processes, by Prof Laplane thinking without language, by the paleoanthropologist Anne Dambricourt-Malassé and the astrophysicist Eric Bois on growth predictions in human evolution or even on the use of non-linear dynamic systems by the group System F team and the physicist Michel Lemistre from ONERA.

Figure 7: GDP Art & Science Exploration: This figure shows various actions in the field of art and science led by the GDP or PSA, such as an exhibition about feelings in art and science near Paris (2000), a concert conference on the relationships between music and the brain led by the composer Frédéric Rossille, general secretary of PSA in 2000 and a series of GDP workshops, exhibitions and round tables presented with the European Space & Medicis Art-Science at the Palais de la Découverte in Paris (1997).

Figure 8: Different themes addressed during the biennial 'The Science of Art' (Paris South). Following a call for thematic projects, the CC91 (Collectif Culture 91) forms since 2000 art and

science pairs to create original works that are produced in several towns, universities, museum, media libraries and cultural centers in the Ile-de-France region. The art & science pole of the Essonne department acting through the CC91 has three missions: 1. support all scientific and transdisciplinary activities of the collective and the art-science network in Essonne and Ile-de-France (biennial, training of art-science pairs, debates, TD conferences and publications); 2. ensure a monitoring, resource and action mission in the art-science field on a territorial (Ile de France) and national/European level via the Transversal of Arts and Sciences Networks (TRAS) in France (see below one of its last TD event in Paris).
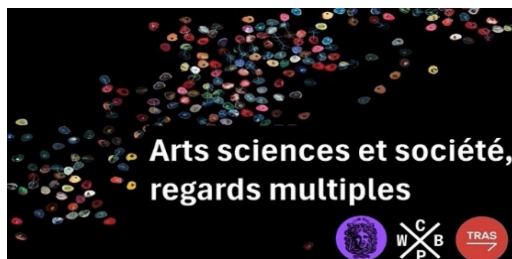

Figure 9: Arts Sciences & Society: multiple viewpoints Major initiative of our cultural structures, this area was the subject of a recent study day organized by TRAS at the Centre Wallonie Bruxelles in Paris. Many academic structures like the Diagonale or the Research-creation scene of the ENS (Ecole Normale Supérieure) of the University of Paris-Saclay are main actors of this area. From TRAS website, you can find a lot of other TD initiatives like the setting up a national survey of arts and science players supported by French ministries (see text and notes).


The study of plant electronic plastic interfaces[1] and the cognitive nature of plants are no longer just a hypothesis[2]. As part of a vast scientific movement around plant signaling and behavior initiated by several academies[3], it opens new avenues of work in this area, but what I want to show here is that the paradigm shift induced by this transversal model of 'plant neurobiology' have mobilized TD researchers from all sides including philosophers, ecologists, anthropologists, forest engineers, sociologists, but also farmers, lawyers, architects, landscapers, writers and artists.

[1] Debono, Marc Williams & Gustavo Maia Souza, *Plants as electronic plastic interfaces: A mesological approach*, Progress in Biophysics and Molecular Biology vol. 146(Suppl. 1), Sepember 2019, p. 123-133, DOI:10.1016/j.pbiomolbio.2019.02.007.

[2] Debono, Marc-Williams**.** "*Art & Science: une intelligence sensible*", Rencontres LASER, Cité Internationale des Arts, Paris, Septembre 23, 2021; Debono, Marc-Williams. Plasticité du vivant et exoformes in *De la science à l'art: un imaginaire extraterrestre,* ISTE OpenScience, Ltd. London, UK, 2022: 1-4.

[3] Brenner, E.D, Stahlberg R., Mancuso, S. Vivanco J., Baluška F., Van Volkenburgh E., Plant neurobiology: an integrated view of plant signaling, Trends in Plant Science, Vol. 11, 8: 413- 419, 2006.

This vast field of study includes controversies and discussions of a semantic nature, but above all unparalleled emulation and many interdisciplinary discoveries about the communication capacities of plants. PhDs on plant philosophy and a lot of TD works around eco-sensitivity have also seen the light of day in this context.
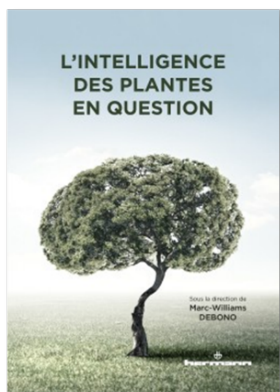
Caught in this current through my earlier scientific discoveries on the plant electrome and as an actor in the art-science field, I was involved very closely, hence the publication of my latest general public book: '*L'intelligence des plantes en question*'[4] which gives voice to scientists like Jacques Tassin or Luciano Boi, philosophers like Emanuele Coccia, Claudia Zatta or Michael Marder and artists like Yann Toma or Anaïs Lelièvre. A transdisciplinary publication perfectly illustrating how a transversal model based on the plasticity of life can bring together a heterogeneous panel of researchers who would never have crossed paths or questioned each other without this common vision and the ramifications that it generates at all levels

4. Discussion

Have a perspective in which the interactivity of code systems can be expressed[5] is fundamental, as suggested at Arràbida[6]. This calls for the adoption of transdisciplinary plastic attitudes constantly linking monodisciplinary architectures and their generic and/or ontological contents. The methodology I propose is to cross these disciplinary fields, taking the trouble to identify the *ontological crossroads* or areas of overlap that characterize them. The emergence of a common meaning will be the experimental proof of the effectiveness of the face-to-face relationship between human plasticity and the adoption of a transdisciplinary, transcultural attitude. These are typically transversal models, capable of transcending duality and discipline boundaries, specifically in higher education[7], because they articulate contradictory pairs by projecting them across disciplines that philosophers, artists and scientists (from hard sciences and humanities) will be able to explore in radically different ways. Otherness as the driving force of evolution, as is demonstrated in the living world by plants and biodiversity.

All these initiatives form an integral part of the transdisciplinary body we

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[4] Debono, Marc-Williams. *L'intelligence des plantes en question*, Hermann, Paris, 2020.
[5] Marc-Williams Debono, « The plastic code of life » Proc. of the 1st Mondial Congress of Transdisciplinarity, (Hugin Ed. Lisbon, Portugal, 1999).
[6] Debono, Marc-Williams. 'The Plastic Code of Life' in *Transdisciplinarity*, Acts of the 1st Int. Congress of transdisciplinarity, Hugin Ed., 1999.
[7] Leslie Schwartzman, « Transcending Disciplinary Boundaries: A Proposed Theoretical Foundation for Threshold Concepts », in Threshold Concepts and Transformational Learning (Sense Publishers, Boston, Rotterdam, Taipei: Jan H.F. Meyer, Ray Land, Caroline Baillie Eds. 2010) 21–44.

plan to develop within this new international TD Chair, and open avenues of research in this perspective. What we can learn from these experiences and compare them with the TD approaches of everyone – whatever the discipline – is that, despite the obstacles and hindrances specific to institutions and cultures – particularly Western ones – the TD dynamic is alive and well! Now more than ever, it is expressing itself in cross-cutting fields such as humanist ecology, the commons, the return of the sensitive, the consequences of the Anthropocene, artistic and cultural education, ecoanxiety, transpersonal psychology, AIs and the research-creation process, against a backdrop of ongoing defragmentation of knowledge and know- how.[8] With this in mind, we must highlight the presence of the recent creation in France of several art-science-society TD masters and PhD programs at university (PSL[9], Paris Saclay[10]) and of an Art & Science chair (Polytechnique School-EnsAD and Carasso Foundation)[11]. Moreover, numerous territorial cultural centers like the CC91[12] near Paris (**Fig. 9**) are supported by the roll-out of French and European structures like the TRAS (**Fig. 10**) which has done surveys carried out upon players in this cross-disciplinary field that are supported by the French ministries of research, culture, national education and ecological transition. This is a clear indication of the awareness and transdisciplinary work accomplished through the cross- pollination of the art-science field[13].

One of the objectives of our Chair could be to initiate or pursue the transformation of these essays – palpable products of a TD experience expressed through a common work – into other cross-disciplinary fields. It's a question of working together on the transdisciplinary body in all its forms, taking advantage of the mutation of human cultures[14] and the TD issues at stake in each of our

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[8] Transdisciplinarity and the evolution of knowledge: foundations and practices. Acfas congress with the contribution of Florent Pasquier, available here: https://www.acfas.ca/evenements/ congres/programme/90/600/658/c, accessed on May, 3, 2024.

[9] PhD SACRE: https://psl.eu/en/news/sacre-phd-program-invites-candidates-invent-their-own-research-methods.

[10] Université Paris Saclay available here: https://www.universite-paris-saclay.fr/en/education/ master/culture-patrimoine-et-mediation/m1-evenementiel-mediation-des-arts-et-des-sciences, accessed on May 3, 2024.

[11] Chaire Art & Science (Ecole Polytechnique, EnSAD, Fondation Carasso, available here: https:// chaire-arts-sciences.org/?lang=en, accessed on April 20, 2022.

[12] Collective Culture 91. Art & Science Center available here: https://www.collectifculture 91.com/ pas_presentation/, accessed on May 3, 2023.

[13] Marc-Williams Debono, « Cross-pollination in Art and Science: plasticity of the mind and birth of transcultures » in Transdisciplinary: global perspectives, Handbook of Transdisciplinary: Global Perspectives edited by Roderick J. Lawrence (Edward Elgar Publishing 2023).

[14] Mariana Thieriot Loisel, Les Mutations Humaines, Preface by M.-W. Debono (Amalthée Ed. 2016); Thieriot Loisel Mariana, Debono Marc-Williams, PLoisel Patrick, Ghils Paul et D'Ambrosio. Ubiràtan, *Recherche scientifique, plasticité et transdisciplinarité: une chaire transdisciplinaire possible dans les universités* in La communauté de pratiques comme outil de dialogue interreligieux et interculturel", COP UNESCO, S. Guetta & A. Verdiani Ed., FUP/ Firenze University Press (Italy), Chap. 6.2 :115–119, 2011; Thieriot Loisel Mariana and Debono Marc-Williams. "Pathologie des énergies et plasticité du soi" in Tome IV of the *Acts of the 3rd Mondial Congress*

praxis. What's important is the sharing of knowledge and the adoption of a common language, even a common imaginary, that doesn't fall into the trap of epistemological cages so well described by the Ubiràtan d'Ambrosio! Ethics and dialogical philosophical foundations of human consciousness[15] to be applied before they are translated into sometimes irremediable acts…

5. Conclusion

The TD initiatives that we have been able to carry out in the past within the framework of TD actions or world congresses of which CIRET is a spearhead and at the same time in our TR research network at PSA is today rewarded by the deployment of TD worldwide. We briefly show here the role that our contribution may have had on the plasticity of living systems and the epistemology of the concept of plasticity, both in the form and the working methodology of the GDP, as well as in the substance (subjects of study and field actions undertaken by the actors of the different fields of TD research) that we explored. Our great satisfaction, shared with the members of CIRET who regularly contribute to our work and publications, is to note, as we have shown with different examples, that not only are these ramifications alive today, but that they are developing in sectors affecting both the hard sciences and the humanities, without forgetting the key role of contemporary art in the development of otherness and a porosity essential to the depth of the expression of a lived transdisciplinarity.

The lessons to be learned from this transdisciplinary experience as part of our symposium objective to launch an international TD Chair are that the TD dynamic instilled upstream has therefore spread and borne fruit. We are therefore ready to promote the educational, ethical and transdisciplinary values of our corpus without disassociating knowledge from people's experiences. I invite consequently all the organizations, research groups, associations and TD researchers who are the linchpins of the transdisciplinary body that we all form together, to set up an ontological crossroads that would encourage the emergence of human plasticity and would overcome disciplinary taboos. But it is also at the level of everyone that this web takes shape, a need to unlearn, a keen awareness of one's relationship to others and to the world.

Acknowledgment and conflicts of interest

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Learning to Change Our World View Creating Symbionic Collective Transdisciplinary Wisdom in the Metacrisis

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Abstract: *Deep transdisciplinary learning is essential to responding to the current collapse of human societies and ecosystems and to building a more sustainable, just future for all living creatures. Our modern civilizations, which are built around ideas of never-ending technoscientific progress and neoliberal values of market fundamentalism, and individualism, are destroying planetary health. Fundamental shifts in ethics and thinking about our relationships to nature and each other are needed to prevent our species from joining the human accelerated Sixth Extinction. Lifelong learning based on emotionally powerful and joyful experiences needs to focus on the complexly interconnected issues that constitute the social, political, economic, and ecological-based metacrisis. Universities need to transform through supporting the boundary exploration and future-orientated nature of transdisciplinary scholarship. Intergenerational teams embedded in the community congregated around tables rather than solo professors occupying chairs may be a creative vehicle for organizational transformation. Experiences with transdisciplinary programs at Case Western Reserve University, University of Oxford, Brown University, and Johns Hopkins University will be described that demonstrate a diversity of responses to the challenges of academic reorganization in the metacrisis, but also showcase common border spanning activities and commitment to innovative and socially transformative, transdisciplinary scholarship.*

Keywords: *transdisciplinarity, professorship, future, wisdom, symbionic, learning, intergenerational.*

1. Introduction

Throughout history humans have increasingly congregated in larger groups driven by agricultural, industrial, and other technological innovations. Our civilizations have become increasingly urbanized and, in the process, have contributed to ecosystem failures by, for example, destroying forests and aquatic systems[1]. Collective learning has been essential to culture change and social transformation and has historically enhanced our abilities to access so-called natural resources, like fossil fuels. However, modernity and its inadequately regulated and growth-oriented economies are not sustainable[2]. To adapt and change our behaviors as a species we not only need new knowledge but also relearn old wisdoms from Indigenous peoples[3].

Today we have exceeded planetary boundaries and damaged, probably irreversibly, many of the support systems upon which life depends. Modern civilizations based on unregulated markets, personal greed, and conceptions of unlimited progress and development are unsustainable. They are the root causes of income inequity and social injustice[4].

Today we need to wise up to the limits of our knowledge and unlearn many habits that are deeply ingrained in our modern repertoire of behaviors, like consumerism and materialism. Understanding how we learn and unlearn will be critical for our survival in the human-caused sixth extinction in which all species including our own are threatened. Unlearning some of our current destructive attitudes and behaviors will be the foundation of a limit-respecting wisdom. The geologists of the world have recently rejected the idea that we are entering a new geological epoch called the Anthropocene, but we are still in an anthropogenic event where humans are increasingly dominating (and destroying) ecosystems.

We learn best together so that enhancing our abilities to learn will be based not only on individual actions but also how we organize learning. So-called higher education, such as colleges and universities, has dominated our sense of

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[1] Jeremy Lent, *The Patterning Instinct: A Cultural History of Humanity's Search for Meaning*, Amherst, New York, Prometheus Books, 2017, p. 53; Jeremy Lent, *The Web of Meaning: Integrating Science and Traditional Wisdom to Find Our Place in the Universe,* Burlington, Ontario, Society Publishers, 2021, p. 51; Jem Bendell, *Breaking Together – a freedom loving response to collapse*, London, Good Works, 2023, p. 42.

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[3] Darcia Narvaez and Wahinkpe Topa, *Restoring Kinship World Views: Indigenous voices introduce 28 precepts for rebalancing life on Planet Earth*, Berkeley: North Atlantic, 2022, p. 64.

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the ultimate nature and goals of learning. The PhD degree is viewed as the epitome of learning. Although ostensibly a label for someone who embraces 'love of wisdom', the degree has increasingly been associated with narrow expertise in specific disciplines. New ways of thinking about learning that emphasize depth and generality are necessary to address the current complex predicament the world faces. Our challenges do not neatly fit into the boxes into which university training places us (often with a goal of producing human widgets to support corporate capitalism). The words polycrisis and metacrisis signal the complexities of the interconnected 'problems' we are facing, but they are beyond even the label 'wicked problems' because the so-called solution spaces to these crises extend over different disciplines and fields of endeavor. The ecological crisis is complexly linked to social injustice, political instability, and economic concerns. Polycrisis implies a crisis with multiple components, Metacrisis suggests a level of criticality that is emergent requiring more fundamental shift in world view to address than the prefix 'poly'. As the Chinese concept and ideograph of 'crisis' suggest, however, crisis includes both danger and opportunity[5].

Educational systems have become co-opted by approaches that emphasize data-driven, scientific evidence (without skeptical appraisal) and economic values. They are based on models of learning that are primarily rational and content driven. Powerful learning cannot occur without human emotions and a grander sense of meaning and purpose. A love of learning is central to being a curious biological creature that has the capability of adapting individually and collectively to changes in the environment. Humans have excelled at their ability to learn together but also often lost the joy that should be associated with learning deeply about other human beings, other living creatures, and the natural systems to which we belong. Learning is more about process than about content. How you learn is as important as what you learn, because it is the basis of learning in the future. A new spirit of learning is emerging in societies that are rejecting materialism as a foundation for living a good life. In our post-secular era learning itself is increasingly being viewed as an enchanting, magical activity, full of joy and play, not just seriousness and work[6].

2. Nature of Learning

Learning involves a change in the state of the organism in response to information from the environment or an internal reflection upon and reorganization of knowledge already available to the organism. Learning can be viewed as a cycle of activities in which experience leads to reflection which in turn leads to a changed state which causes new behaviors to emerge which then allow new

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[5] Jeremy Lent, *op. cit.*, 2021, p. 51.
[6] Nicholas Brennecke, Farah Almhana, Peter Pesch, and Peter Whitehouse, Wising Up: Designing a Course for the Future: A Report on a New Transdisciplinary and Intergenerational Course *Journal of Intergenerational Relationships* (2020): 465–469.

learning to occur and so on. Learning experiences can occur in classrooms and through existing ways we teach formally, but they also occur as part of life activities, which may not be labeled as educational. It is hard for humans not to learn; it is difficult to say I am not going to learn from a specific experience. It is also hard for humans to unlearn because learning gets incorporated into habits of mind and body which often occurred automatically without conscious awareness. Culture represents shared habits of collective behavior that are also difficult to resist.

Learning with purpose can enhance the likelihood of meaningful change. Are you motivated to help yourself and others through service learning? If you add in enjoyment to goal directedness, then education becomes emotionally charged and hence likely to be deeper and more enduring. Learning should be based on ethical values that reflect just relationships between humans and other living creatures[7].

Learning from and with others who have had different life experiences can be particularly transformative as one can learn vicariously from the lessons learned by others. Intergenerational learning can be particularly powerful because new and old eyes at different points in the life journey (for example, pre-career or post-career) often see the world differently based on different experiences[8]). Mentoring is a form of mutual commitment in a relationship that can be life changing for both parties. Technology can create both deep and superficial learning opportunities. Virtual reality, transmedia and now so-called artificial intelligence are all transforming learning. Combining human and computer information processing can create powerful cooperative symbionic wisdom[9].

Transdisciplinary is a concept that challenges existing ways of learning in the intellectual boxes we call disciplines[10]. Before the divisions and specializations of the sciences and humanities, emerged intellectual endeavors were less structured into narrow categories. Broader endeavors, such as natural philosophy and natural history, once thrived. Alexander von Humboldt was an example of a polymath who explored the world with his scientific instruments as well as his narrative, artistic, and cultural skills. His five-volume treatise entitled *Cosmos* represented an effort to unify his findings into a grand vision[11]. He sought what

[7] Van Potter and Peter Whitehouse, 'Deep and Global Bioethics for a Livable Third Millennium,' *The Scientist* 12: (1998) no. 1:9; Cheryl Macpherson (ed.) *Bioethical Insights into Values and Policy: Climate change and health,* New York, Springer, 2016, p. 75.
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[9] Peter Whitehouse, 'Symbionic Wisdom: weaving the fabric of the future' in Artificial Intelligence and Human Mediation eds. Martins da Costa Leonardo da Silva Guimarães and Loisel Mariana Theiriot, The *Atlas*, 2024, p. 17.
[10] Basarab Nicolescu, *op. cit.*, 2008, p. 60.
[11] Peter Whitehouse, *op. cit.*, 2023, p. 203.

has been called consilience, a unity of knowledge. Modern science has not only been segmented into individual categories, but also strongly influenced by the dominant economic models which emphasize intellectual property and instrumental value and profit from research. Science has become a larger-than-life source of faith in modern society, where it is sometimes claimed to be the only important ways of knowing. Scientism is a religious zeal for science that ironically can impair criticality and skepticism which is fundamental to science. Under this cultural influence, science and scientists can become instruments for corporate domination of value systems and the pressure to publish (or perish) led to major problems with the replication and veracity of scientific findings. Indigenous ways of knowing, for example, emphasizing kinship with each other and other living creatures and celebrating the power of stories to center our cultural and cosmological understanding offer world views that challenge the limited reductionism views of many contemporary perspectives[12]. Increasingly the arts are being seen as a powerful player in the transformation of modern culture, a role they have played for eons[13].

3. Future of Universities

In some ways universities represent the epitome of learning organizations. Often well-endowed by alumnae and supported by government and corporations, universities have been enduring structures on the landscape of modernity based on ideas from the much celebrated, but perhaps overly rational, Western Enlightenment. The roles of universities have been increasingly challenged from many different political, economic, and social perspectives[14]. Neoliberalism has come to influence universities just as it has many other social institutions, like health care. The power of administrators has increased, as the rights and responsibilities of the faculty diminished. Universities are being pushed to graduate productive workers as much as thoughtful citizens. The opportunities for universities to provide social spaces for critical and diverse discussion of contemporary issues are being challenged. Academic freedom is under threat.

Many are looking for alternative forms for adult education and lifelong learning. Alternative models for less rigidly structured universities have been proposed and tested[15]. For-profit models have in general yielded poor educational outcomes. A variety of online models continue to explore higher learning with broader missions, often focusing on the climate crisis, social injustice, and others

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[12] Darcia Narvaez and Wahinkpe Topa, *op. cit.*, 2022, p. 72.

[13] Peter Whitehouse, 'Transdisciplinarity at the boundaries: exploring a sylvan metaphor for health,' *The Atlas* 10 (2019): 39–45.

[14] Marcus Ford, *Beyond the Modern University: Toward a Constructive Postmodern University,* Westport, Connecticut: Praeger, 2002, p. 64; David J. Staley, *Alternative* Universities*: Speculative Design for Innovation in Higher Education,* Baltimore, Johns Hopkins University Press, 2019, p. 53.

[15] David J. Staley, *op. cit.*, 2019, p. 54.

too often neglected issues.

4. Transdisciplinary Professorship/Fellowship

Transdisciplinarity emphasizes going between categories to go beyond to create actionable knowledge. Hence it is potentially transgressive in celebrating the borders among disciplines rather than the disciplines themselves. Interdisciplinary leaves the basic disciplinary structures unchallenged. Boundaries (just as in ecotones between ecosystems) are seen as creative spaces for the evolution of new ways of thinking and valuing. Transdisciplinarity comes in different forms. The less radical Zurich school focuses on science and engineering and problem solving. The Paris School (CIRET- International Center for Transdisciplinary Research[16]) entertains the poetic and artistic side of transdisciplinarity, as well as proposing new epistemological methodologies, such as identifying in-between spaces called the hidden third. One book by the founder of the Paris School, Basarab Nicolescu, titled *Theorical Poems*, points to this effort at broad, domain spanning thinking[17].

But we must be careful of placing transdisciplinarity in university structures using old forms. Is a transdisciplinary chair (professorship) the way to go? Here I propose a transdisciplinary table, not a chair, in which a group of people of different disciplines and ages would act as a diverse but unified team to explore concepts and propose actions. Engagement with the local and global community would be essential. Museums could well be important partners. Nature centers, botanical gardens, arboretums, and farms could be incorporated as relationships to nature and the climate crisis should be one consistent focus of the activities of the transdisciplinary table. Developing plans to disseminate shared learnings through innovative, more than typical academic means, like journal publications, would be part of the plan. Different forms of narrative perhaps using a variety of transmedia approaches would be encouraged. Groups might compete for time limited but stable endowed resources from the central administration of the university. Innovation would be a theme encouraging playfulness and risk taking.

5. Examples of Transdisciplinarity in action (or not)

Case Western Reserve University. The concept of transdisciplinarity has emerged in different places at my home university, Case Western Reserve University, but without a consistent focus over time. For example, theoretically all federally funded National Cancer Institute-designated cancer centers (including the one of Case) are supposed to include transdisciplinary programs. But how that commitment is clearly differentiated from interdisciplinarity efforts is not clear.

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[16] https://ciret-transdisciplinarity.org/index_en.php, accessed May 25th, 2024.
[17] Basarab Nicolescu, *op. cit.*, 2014, p. 71.

The Department of Cognitive Science in the College of Arts and Sciences[18] was founded on transdisciplinarity principles. Through this department I have organized international meetings on transdisciplinarity including a program on the future of universities for the 2021 international CIRET meeting. I have also taught courses on intergenerational wisdom focusing on learning from the historical and physical attributes of the campus itself and with elders and youth collaborating on imagining and designing the future. The concept of scale in our work is captured in our emphasis on glocality – thinking and acting both globally and locally. Our work in health includes both planetary health and earth systems science perspectives, as well as bioregional work on our own watersheds and their ecosystems and human histories, including Indigenous perspectives.

University of Oxford. During my several fellowships at Oxford, I discussed the idea of transdisciplinarity in many different contexts. Probably the most prominent organizational unit in which I participated that qualifies in my mind as transdisciplinary is the Oxford Martin School[19]. Its emphasis on addressing complex global problems, involving environment, economics, biodiversity, food, plastics, etc. fit with transdisciplinary approaches. The school is populated with academics from different backgrounds, including Oxford faculty and students, as well as many visiting researchers. However, in conversation with leadership, the complex language and methodologies associated with transdisciplinarity did not encourage its use as a word and concept. So unlike Case which considered the concept but did little to promote it, the Oxford Martin School did a lot but did not use the concept.

Two programs that use the term transdisciplinary in describing their conceptual frameworks and practices have attracted my attention because they are at universities from which I have graduated and interacted with over my entire academic career: Brown University (A.B. 1971) and Johns Hopkins University (MD-PhD 1976-77). I am studying how they organize themselves within their specific academic environments, how they engage the community in addressing the environmental and social challenges that our species faces, and how they put the concept of transdisciplinarity to work.

Brown University. Brown University's Institute at Brown for Environment and Society[20] (IBES)was founded in 2014 to advance 'durable, scalable, and equitable solutions to the complex climate, sustainability and environmental challenges of the 21st century'. The director reports to the provost signaling its pan-university engagement. They use the terms interdisciplinary and transdisciplinary on their web site and in their 2023–2028 strategic plan[21]. But they do call out the importance of transdisciplinary scholarship in this paragraph from their

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[18] https://case.edu/artsci/cognitivescience/about/mission, accessed May 25th, 2024.
[19] https://www.oxfordmartin.ox.ac.uk/, accessed May 25th, 2024.
[20] https://ibes.brown.edu/, accessed May 25th, 2024.
[21] https://ibes.brown.edu/sp.home, accessed May 25th, 2024.

plan: *What is transdisciplinary scholarship?* The IBES Strategic Plan makes repeated reference to 'transdisciplinary' learning and research, whereby knowledge and approaches from different academic disciplines and different sectors are combined to advance solutions to the most complex challenges, in close partnership with stakeholders. 'Transdisciplinarity today is characterized by its focus on "wicked problems" that need creative solutions, its reliance on stakeholder involvement, and engaged, socially responsible science' IBES aims to harness the transformative potential of transdisciplinary research and education in accelerating its impact over the next five years and beyond.

    Johns Hopkins University. Johns Hopkins University's Institute for Planetary Health[22] was founded in 2024 so it is early in its organizational life. Its emphasis is to make Hopkins a global leader in addressing, 'the global health and humanitarian dimensions of the Earth crisis'. The Hopkins Institute is linked to the Planetary Health Alliance (PHA)[23], a group of 420 member organizations in 70 countries that was established in 2015. The word transdisciplinary (or transdisciplinarity) only appears once of the web site of the Hopkins Institute, but 17 times in the new report from the PHA called Growing Green Hearts. Although transdisciplinary is not specifically defined, it is characterized by cross boundaries, communities, action projects in the service of addressing complex interrelated challenges: transdisciplinary research typically involves a synthesis of knowledge from various disciplines, often with the aim of addressing real-world challenges that cannot be adequately tackled within the confines of any single discipline. This approach recognises the interconnectedness of different domains of knowledge and seeks to foster interdisciplinary dialogue and cooperation to tackle complex issues more effectively. From Planetary Health: Roadmap and Action Plan[24].

6. Conclusions

    Transdisciplinary thinking and valuing can drive innovation in lifelong learning. It must be based on a clear commitment to address both large- and small-scale aspects of the metacrisis. Intergenerational teams should be the basis of pedagogical efforts based on the metaphor of creating tables rather than individually occupied professorial chairs. Commitment to support these kinds of transdisciplinary programs should be high level and deeply rooted.

Acknowledgment and conflicts of interest

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[22] https://planetaryhealth.jhu.edu/, accessed May 25th, 2024.
[23] https://planetaryhealthalliance.org/, accessed May 25th, 2024.
[24] https://www.planetaryhealthalliance.org/roadmap, p. 41, accessed May 25th, 2024.

in our research is deeply appreciated. Any errors or omissions are my own.

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II. Links to organizational web sites

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2. Case Western Reserve University, College of Arts and Sciences, Department of Cognitive Science - https://case.edu/artsci/cognitivescience/about/mission.
3. Oxford Martin School, University of Oxford - https://www.oxfordmartin.ox.ac.uk/.
4. Institute at Brown University for Environment and Society - IBES Homepage - https://ibes.brown.edu/.
5. Institute for Planetary Health - https://planetaryhealth.jhu.edu/.
6. Planetary Health Alliance - https://planetaryhealthalliance.org/.

Transculturality in Teaching and Learning about and with Nature Towards a Transdisciplinary Pedagogical Paradigm

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Abstract: *This article investigates the integration of transcultural and transdisciplinary approaches in environmental education, aiming to overcome the limitations of conventional teaching and learning methods. The central research question is: How is the concept of nature interpreted and integrated by transdisciplinary thinkers, and what are the pedagogical implications of this integration? The methodology employed includes an extensive bibliographic review of transdisciplinary scholars and reflection on personal educational experiences in philosophies such as Yoga and Vedanta. The review and reflections sought to challenge reductionist views of nature and promote a multidimensional perspective that embraces philosophical, linguistic, and historical dimensions to address contemporary environmental crises. The conclusions of the article emphasize the transformative potential of adopting transdisciplinary and transcultural frameworks in environmental education. These frameworks not only enrich the educational process but also enhance the ability to address contemporary environmental issues. The importance of a dialogue between scientific knowledge and traditional wisdom is highlighted, demonstrating how this synthesis can enrich our understanding of current environmental dilemmas and stimulate new human-nature relationships. The study proposes a pedagogical paradigm that values cultural diversity in the educational process about and with the natural environment, encouraging the exploration and application of these methodologies in various educational settings. This suggests a paradigmatic shift in environmental education towards a more inclusive practice that integrates theoretical knowledge bodies and values practical and experiential engagement with the environment, crucial for cultivating deep environmental awareness and forming engaged individuals.*

1. Introduction

This work aspires to contribute to the ongoing discussions regarding the establishment of a transdisciplinary chair. By integrating the philosophical underpinnings of Nicolescu and Merleau-Ponty with the conceptual insights of transculturality and the Complexity, we aim to delineate pathways for a transdisciplinary pedagogical paradigm. This paradigm seeks to bridge disciplinary boundaries, fostering a comprehensive and interconnected understanding of nature that aligns with the evolving needs of education in a globalized world. In doing so, we envision laying the foundation for a transformative and integrative approach to teaching and learning about and with nature.

For that, the present text goes into the profound implications of transculturality in the realm of teaching and learning about and with nature. Drawing inspiration from Basarab Nicolescu's work 'Science, Meaning, and Evolution' from 1995[1]. Nicolescu's call for a paradigm shifts towards a novel philosophy of nature, facilitated by Transdisciplinarity, which serves as a catalyst for our theoretical movement here.

Merleau-Ponty's[2] nuanced examination of the concept of nature, with a focus on etymology and historical evolution, establishes a foundational framework. This exploration provides crucial insights into the intricate layers inherent in the discourse surrounding nature, offering philosophical lens through which to approach the subject. As well as the reflections on the nature of nature in Edgar Morin's work on method[3], evidenced in his epistemology of complexity, these are important points of reference for our debate.

Central to our discussion is the conceptualization of transculturality, as elucidated by some authors of Transdisciplinary studies. Transculturality, in this context, is understood as a dynamic interplay of cultural influences that transcend conventional boundaries, building perspectives on the human-nature relationship. This conceptualization serves as a theoretical cornerstone for redefining pedagogical approaches to nature, emphasizing inclusivity and cultural sensitivity.

Embedded within the fundamental tenets of Environmental Education,

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[1] Nicolescu, Basarab. (1995). *Ciência, sentido e evolução: a cosmologia de Jacob Boheme*. São Paulo: Attar.

[2] Merleau-Ponty, Maurice. (2022). *A natureza: curso do Collège de France*. São Paulo: editora WMF.

[3] Morin, Edgar. (2016). *O método 1: a natureza da natureza*. Porto Alegre: Sulina.

our discourse underscores the paramount importance of fostering dialogue between diverse cultures. This dialogue not only enriches our understanding of nature but also paves the way for the coexistence of varying cultural perspectives. The dialogues of Eastern and Western knowledges, as well as the dialogue of tradition and scientific inquiry, emerges as pivotal facets of this transcultural purpose.

2. Methodological Aspects

During the presentation 'Transculturality in Teaching and Learning About Nature' at the Symposium[4] for an International Transdisciplinary Chair in March 2024 promoted by Ciret (Centre International de Recherches et Études Transdisciplinaires), I explored the fundamental question: What is the concept of nature, and how is it addressed by transdisciplinary authors? This inquiry set the stage for discussing the integration of transdisciplinary and transcultural approaches in environmental education. The methodology combined with an extensive bibliographic review focused on scholars associated with Transdisciplinary fields and insights from my personal educational experiences in Yoga and Vedanta Philosophy. The objective was to challenge reductionist views and advocate for a multidimensional perspective that incorporates philosophical, linguistic, and historical dimensions to effectively address the environmental crises of our time.

It is argued that transdisciplinarity could expand our understanding of nature, offering new ways to engage with environmental challenges. By weaving together scholarly research and practical teaching experiences, the presentation demonstrated how transcultural dialogues could act as powerful mediators in education. This discussion emphasized the significance of transculturality as a key concept for realizing and enhancing a transdisciplinary pedagogy, enriching both the teaching process and learning outcomes. Throughout these reflections, we realized the essential need to articulate that teaching and learning about nature involves not only theoretical discourse about nature but also direct engagement with nature itself. That is why the preposition 'with' is added in the title.

In conclusion, the session highlighted the transformative potential of adopting transdisciplinary and transcultural frameworks in environmental education. It called upon educators and researchers to embrace these approaches, thereby enriching our educational practices and enhancing our ability to address contemporary environmental issues. This approach encourages further exploration and application of these methodologies across various educational settings,

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[4] The International Symposium was idealized by Drª Mariana Thieriot Loisel and Eng. Leonardo da Silva Guimarães Martins da Costa and organized by Drª Mariana Thieriot Loisel and Eng. Leonardo da Silva Guimarães Martins da Costa, Prof. Drª. Cristina Popa Tache and Prof. Dr. Hubert Landier. The presentations are available at: https://vimeo.com/user163621619 (first part) https://vimeo.com/user163621619 (second part) and https://vimeo.com/user163621619 (third part).

stressing the importance of transculturality in developing effective transdisciplinary pedagogies and underscoring that true environmental education transcends the classroom to involve interactive experiences with the natural world.

3. Nature as a Foundational Pedagogical Force in Environmental Education

The 'Atlas of the Wonders of Nature,'[5] a Portuguese translation of the Spanish edition titled 'Worlds of Nature,' exemplifies a common portrayal in literature and atlases concerning the natural world. This material, adorned with photos, maps, and descriptions, presents an array of stunning landscapes from diverse locations such as Mont Blanc, the sands of the Sahara, the Nile River, the Dead Sea, Lake Baikal, the Kashmir Valley and many others. The predominant visual narrative in this atlas is one where the natural landscapes are depicted devoid of human presence, focusing solely on the scenic aspects of nature without any indication of human interaction. On the rare occasions where human figures are included, they are typically portrayed as adventurers or pioneers, underscoring their roles in exploring or studying these regions. This representation perpetuates an idealized view of nature, which, while visually appealing, subtly reinforces the notion that these landscapes exist in isolation from human societies, thereby legitimizing a conceptual separation between nature and humanity.

As an Environmental Educator and researcher in this area, I often find myself returning to this seemingly simple question about what nature is and whether we can confine it to a single definition. Conceptualizing a term can often be a reductive process in the sense of limiting the horizons of understanding of the concept being studied. However, concurrently, conceptualization can serve us to understand that the fields of knowledge are not isolated in their islands of operation and require healthy cooperation among them for their own advancement. This is the case with the concept of nature that we investigate here, sometimes in the field of language, sometimes in philosophy and history. But this also happens with the understanding of what Environmental Education is or what its field of study proposes, as it is a field in motion and that trans-disciplinary engages with many other fields of knowledge in order to investigate and confront the policrises.

We can say that we take Environmental Education as part of a broader educational process, imbued with the qualification of the environment in its educational process. In work with collaborators Amorim and Calloni, we previously wrote:

Environmental Education is nothing more than education itself but imbued with the difficult task of thinking beyond the strict sense of education in-

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[5] Martinez, Juan María; Lucía, Ángel. (1995). Atlas do extraordinário. *Prodígios da natureza*. Volume 1. Madrid: Ediciones del Prado.

tended for schooling. It involves a concern with human formation in a more comprehensive understanding horizon. This includes emerging themes, such as the maintenance of the entire complex network of life and interspecies relationships on Earth; this under the form of the revision of the current world and through the critical exercise of reinventing it from an ethical perspective[6].

The task of the environmental educator is, therefore, of great complexity because it requires numerous articulations between different fields of knowledge, in addition to the pressing need to reflect critically with and within the temporal dynamics of contemporaneity. Among these is the emergence of new statutes in the relationship between human beings and nature, distinct from those that made man an insatiable exploiter of its resources and its own vitality. Therefore, our need here, to go beyond a divided view between human beings and nature.

Understanding the intricacies of the concept of nature is like the exercise proposed by the epistemology of complexity, 'the nature of nature' as Edgar Morin deepens in his method. In his approach, Morin[7] explains to us a circular relationship between physics, biology, and anthroposociology. This relationship means that a science of the human being presupposes a science of nature, which in turn, presupposes a science of the human being. With this aim, Morin recovers the idea of *physis* from the ancient Greeks, which is closely related to the idea of nature, as etymologically there is a correspondence between the two words, of that which sprouts and that which is born.

In this sense, we find in the book 'Nature' by Merleau-Ponty[8], a vigorous work that can serve as guidance for our searches about the concept of nature. He addresses the complex relationship between human beings and the natural world through a phenomenological perspective. There appears the idea that nature is not just an external object to be examined and controlled, but an experience intrinsically connected to our existence and perception. He challenges the traditional Cartesian separation between subject and object, suggesting that our understanding of the natural world is mediated by our bodily and sensory experience. The philosopher proposes a vision in which nature is a dynamic field of forces, and our interaction with it is fundamental to the formation of our consciousness and identity.

At the beginning of his work, Merleau-Ponty (2022) refers to the etymological origin of the word 'nature', which derives from a verb in Greek that alludes to the plant and that in the Latin form comes from *nascor*, to be born, to live. 'Nature is what has a meaning, without that meaning having been placed by thought. It is the self-production of a meaning.' He continues further by saying that 'Nature is an enigmatic object, an object that is not entirely an object; it is

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[6] Amorim, Filipi; Pinheiro, Samuel; Calloni, Humberto. (2019). Uma ressonância do tempo: os desafios contemporâneos da Educação Ambiental. In: *Revista Pesquisa em Educação Ambiental.* vol. 14 n.1, p. 49, https://doi.org/10.18675/2177-580X.vol14.n1.p48-57.

[7] Morin, Edgar, *op. cit. (2016)*, p. 31.

[8] Merleau-Ponty, Maurice, *op. cit. (2022),* p. 3.

not entirely in front of us. It is our soil, not what is in front, but what sustains us'[9].

The passage that says 'Nature has a meaning, but without that meaning having been placed by thought,' left me somewhat uncomfortable. It's as if though in the end, is not part of nature, or that the elaboration originating from thought contaminants what is nature. In terms of the origin of the term and in its philosophical readings, perhaps this idea applies. But, in my view, it is necessary to introduce other elements into this philosophical effort, such as language, history, and cultures in the understandings of how we are made by nature and how by it we are also made.

Merleau-Ponty himself will throughout his work dissect the different readings of nature throughout history and across different projects of thought, such as conceptions from the ancient Greeks, humanist, romantic, modern proposals, and others. It is as if we had seen nature distribute itself in different orders, such as the physical, the vital, and the human. And despite this distinction, the philosopher realizes that these orders appear on the same perceptual horizon and set himself the task of integrating these orders.

In the pursuit of understanding the different natures, other authors throughout a history of philosophy, will deal with at least two visions. In the transdisciplinary approach, opened and deepened by the contributions of Basarab Nicolescu, he rehabilitates the contributions of Jabob Boheme, a German Renaissance thinker. With this dialogue, Nicolescu performs an important movement for the opening of modern science, by making an approximation between contemporary scientific thought and traditional symbolic thought, between contributions from Tradition and Science.

In 'Science, Meaning, and Evolution,' a 1995 work by Basarab Nicolescu, we find a reference to the writings of a cosmology explained by Boehme and at a certain moment the conception of the dual nature of Nature. A Nature, which could be demarcated with a capital N that some authors of tradition currents would put as a divine Nature and another, with a lowercase n, a creaturely nature. This dialogue between Tradition and Science will lead Nicolescu to the understanding of the levels of reality, a fundamental axiom of the constitution of Transdisciplinarity. It is as if a Nature with a capital N referred to the interaction between all levels of reality.

This is one of the fundamental ontological axioms of Transdisciplinarity: 'There are, in Nature and society and in our knowledge of Nature and society, different levels of Reality of the Object and, correspondingly, different levels of Reality of the Subject'[10]. This opening of knowledge, evidenced by Transdisciplinarity, provokes a new vision of nature and reality. This movement also leads to a new Philosophy of Nature, still to be constructed and which is emerging in

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[9] Ibid, p. 4.
[10] Nicolescu, Basarab. (2010). Methodology of Transdisciplinarity – Levels of Reality, Logic of the Included Middle and Complexity. *Transdisciplinary Journal of Engineering & Science*, *1*. https://doi.org/10.22545/2010/0009.

our times as a possible 're-enchantment of the world through the study of the human being and the study of the Universe'[11].

Given this, a new vision of nature and a philosophy of nature, we find in the author Susannah Hays the 2016 work titled 'Nature as Discourse: A Co-Evolutionary Systems Approach to Art and Environmental Design', in which she, starting from the openness provoked by transdisciplinarity, addresses nature as discourse within the context of a co-evolutionary system that interlinks art and environmental design. This concept suggests that nature is not just a set of physical entities and biological processes, but also a discursive entity that can be understood, represented, and influenced through cultural, artistic, and design practices.

The 'discourse' about nature involves the way we talk about it, the values we assign to it, and how these perceptions shape our interactions and interventions in the natural world. The idea is that by recognizing nature as part of cultural discourse and by applying principles of co-evolutionary design, we can create environments that support both biodiversity and human culture in an integrated and sustainable manner. Hays (2016) argues that our relationship with nature is mediated by our understanding and representation of it, and that art and design play crucial roles in shaping these representations and, by extension, in how we design and interact with the natural world.

It is also Susannah Hays (2016) who recalls Basarab Nicolescu's views on a transdisciplinary nature. According to her, drawing from Nicolescu's concepts, when he explains reality and the levels of reality, he brings into the discussion about nature. With this, we have at least three distinctions of nature:

1. Objective Nature, which is connected with the natural properties of the transdisciplinary Object; objective Nature is subject to subjective objectivity. This objectivity is subject to the extent that the levels of Reality are linked to levels of perception.

2. Subjective Nature, which is connected with the natural properties of the transdisciplinary Subject; subjective Nature is subject to objective subjectivity. This subjectivity is objective to the extent that the levels of perception are connected with levels of Reality. Nevertheless, the emphasis here is on subjectivity, to the extent that the methodology employed is that of the ancient science of being, which is present in the traditions and religions of the world.

3. Trans-Nature, which is connected with a similarity in nature – a veritable communion – that exists between the transdisciplinary Object and the transdisciplinary Subject. Trans-Nature concerns the domain of the sacred and corresponds to the 'veil', which is the zone of non-resistance. It cannot be approached without considering the other two aspects of Nature[12].

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[11] Nicolescu, Basarab. *op. cit. (1995).*
[12] Hays, Susannah. (2016). Nature as Discourse: A Co-Evolutionary Systems Approach to Art and Environmental Design. *Dissertation in interdisciplinary studies at University of California*, Berkeley: Springer, p. 19.

As we go further into understanding the concept of nature, from its etymological roots through various philosophical approaches to the recent formulations in Transdisciplinarity, we observe an opening to a triadic view of nature. Trans-nature is connected to both objective and subjective nature, aiming to move beyond a dichotomized view of nature. Together, these categories reflect a sophisticated framework that sees nature not just as a physical entity to be studied or managed, but as an integral part of human experience and consciousness, interwoven with our perceptual, cognitive, and spiritual lives. This framework could significantly enrich our approaches to environmental issues, education, and policy by promoting a more comprehensive, integrated understanding of nature that respects both its physical and metaphysical dimensions.

4. Transcultural movements for understanding nature

Taking this perspective of the need to open up the concept of nature through language, cultures, history, and philosophy, as discussed in the previous section, it seems that transculturality is an important key that needs to be preserved for the realization of teaching and learning about and with nature that takes into account the diversity of worldviews, as well as for its re-enchantment.

The transcultural designate the opening of all cultures to that which cuts through them and transcends them[13]. In this sense, a transdisciplinary chair like the one we are striving to deepen in these discussions should open up to transcultural dialogue about how various cultures, traditions, arts, and symbolic thoughts have interpreted nature and how they relate to it. As Michel Cazenave[14] (2011) says, it is precisely beyond the multicultural that the notion of the transcultural presents itself, in the way that men through all epiphanies in search of the question of why we are on this earth.

This assertion will correspond significantly with the contemporary debate on a search for the decoloniality of knowledge, in the sense that it is not just the knowledge of European hegemony of a certain understanding of nature that should be studied in reference and research centers. Furthermore, this knowledge, founded on a divided vision of human and nature, has corroborated a perspective of exploitation of natural resources. The fragmentary vision to some extent has strengthened and still strengthens the discourse that man is given the right to deplete the vitality of ecosystems.

The first of the cultural dialogues about a human-nature relationship that transdisciplinarity incites us to reflect on is the non-hegemony of the West in this respect. Indeed, beyond the illusions of geographical separations pertaining to the

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[13] Nicolescu, Basarab. (2014). *From Modernity to Cosmodernity: Science, Culture, and Spirituality*. State University of New York Press. Kindle editions.
[14] Cazenave, Michel. (2011). La place et la fonction du transculturel dans le monde contemporaine. In: Nicolescu, Basarab; Stavinschi, Magda. *Transdisciplinary studies: Science, Spirituality, Society*. Bucharest: Curtea Veche.

nomenclature of West and East, these separations also operate political, cultural, and paradigmatic divisions between these parts, such as the separation of body and mind, inner and outer, individualism and collectivism, and many others.

The dialogue between East and West, as studied in the dissertation on Vedanta philosophy and its implications for environmental education[15], unveils profound questions about the relationship of human beings with nature. This cultural and philosophical exchange allows for a reevaluation of traditional Western perspectives, often centered on dualism and the exploitation of nature, contrasting them with Eastern views that emphasize intrinsic harmony and interdependence between humans and the environment. This meeting of ideas proposes a critical reflection on the need for a new paradigm in environmental education, one that incorporates silences of self-observation as elements in the search for a deeper and more respectful connection with the natural world.

By adopting a transdisciplinary approach that intertwines concepts of being and silence from Vedanta philosophy and Yoga, that work of Pinheiro (2017) suggested that understanding nature is not limited to external interaction but involves an introspective dive that recognizes nature as an integral part of one's own being. This challenges the predominant Western view of a separation between subject and object, proposing instead a non-dualistic view that dissolves the barriers between the self and the other. This expanded understanding, mediated by environmental education, has the potential to foster an ethic of solidarity and planetary reintegration, recognizing all forms of life as extensions of our own existence, thus redefining our responsibilities and interactions with the surrounding environment.

We risk repeating romanticized conceptions of nature when seeking an idealization of a mystical and distant cultural East, which would extend to the East as an epistemological stance of what is not based on a fragmented orientation of nature. The goal is not to repeat epistemological and paradigmatic cloisters of the past but to propose new interactions, understandings, and discourses on nature and the non-duality relationship with nature from the transcultural dialogue between East and West.

This dialogue of what is transcultural does not need to travel far territorially but can begin from our primal places, from the primeval local knowledge, from the indigenous communities whose knowledge has been underestimated by conventional history. These are the knowledges of enslaved peoples, of indigenous peoples, of diverse peasant communities that have resisted and safeguarded ancestral knowledge about their ways of life with relations to and with nature that transcend the utilitarianism of profit at any cost.

In this context, we recall the contributions of Ailton Krenak (2020), a Brazilian environmentalist and indigenous leader who speaks from a perspective

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[15] Pinheiro, Samuel Lopes. (2017). *O Silêncio e o Ser na Filosofia Vedanta: um diálogo Oriente-Ocidente para pensar a relação humano-natureza em Educação Ambiental*. Rio Grande -RS: dissertação de mestrado PPGEA/ FURG.

that life is not for the utility of the market and capital, but that life is for enjoyment. The wonder of existence should be the experience of enjoying life. For him, everything is nature, the entire cosmos is nature, and his worldview does not conceive of anything that is not nature.

What they call nature should be our body's interaction with its surroundings, where we know where what we eat comes from and where the air we breathe out goes. Beyond the idea of 'I am nature', the awareness of being alive should run through us so that we are able to feel that the river, the forest, the wind, the clouds are our mirror in life[16].

Another contribution in this regard comes from Célia Xacriabá, an indigenous female leader in Brazil who believes that 'to be human, one must learn to be nature' (2022). For her, it is through diversity that the country's culture is expressed.

When we take care of the territory and the land, we are also taking care of the sky. Living on the earth is interconnected with what happens in this other place: the sky. I say that the sky, for us indigenous people, is like a huge headdress covering the head of humanity. And how do we also take care of this giant headdress that guides our thoughts, that directs our thinking?[17]

A metaphor of the connection between earth and sky, between the internal and external. It also prompts a mental ecology, of caring for the thoughts that ultimately also manifest a relationship with the entire earth. All these visions or cosmovisions elucidated by Krenak earlier and Xacriabá above are an act of reverence for transcultural dialogue that which crosses and transcends cultures.

This does not mean that from now on we should adopt the worldviews of native peoples or diverse traditions as our own. Michel Cazenave has an interesting position in this regard that interests us in this discussion, which I would call a position of epistemological humility, in the sense of recognizing other relationships with nature. Michel Cazenave (2011) says that he can intellectually conceive of certain inner realities, a certain notion of the sacred that appears in various cultures, but yet they have not formed part of his lived experience. The order of intellectual explanation and experience are not the same, which is why there is a need to respect the many experiences and to be open to transcultural dialog. This is because experience can corroborate the enrichment of the intellectual elaboration of concepts, and the exercise of dialogic reflection can, in turn, also enrich us with the experience of transcultural dialogue.

The advocacy for cultural diversity is less about insisting on an idealized version of what people and communities should be, and more about appreciating and deepening our understanding of their true essence and character. Through Agusti Nicolau Coll[18] collaborations on this theme in his book of 2002, it was

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[16] Krenak, Ailton. (2020). *A vida não é útil*. São Paulo: Companhia das Letras.

[17] Xacriabá, Célia. (2022). Só sabe ser humano quem sabe ser natureza. In: De Lima, Martha Batista (organizer). *Oboré: quando a terra fala*. São Paulo: Tumiak Produções, Instituto Arapoty, p. 18.

[18] Coll, Agustí Nicolau. (2002). *Propostas para uma diversidade cultural intercultural na era da*

acknowledged that this form of diversity highlights the reality that no single paradigm is capable of fully explaining the entirety of human experience; each culture is a unique expression of humanity's vast and varied journey through space and time. This same idea is also mention with other words in the chart of Transdisciplinarity in article 10: 'No single culture is privileged over any other culture. The transdisciplinary approach is inherently transcultural.'

5. Towards a Pedagogical Transdisciplinary Paradigm

In the first part of the text, we have delved into the concept of nature across various fields of knowledge, opening up this term to transdisciplinary understandings. We then explored transculturality as a key to mediating between diverse views of nature. Continuing with the examples we have discussed, we now open this section on the need for a transdisciplinary pedagogy. That is because education is a privileged space for strengthening the transdisciplinary approach that we have been working so far.

The endeavor to implement educational practices with complex orientations can be understood as an effort towards developing a humanizing and anti-hegemonic education. In this context, hegemony is not defined by the majority but by the prevalence of a logic that emphasizes efficiency at all costs. Thus, as mentioned in Pinheiro[19] (2022), a complex educational approach challenges the extreme speed imposed by the market, prioritizing the integral development of individuals, which requires a significant investment in quality time, maturation, constancy, and rhythm.

In consonance what is said by Pinheiro (2022), the educational practice in a complex and transdisciplinary context often includes valuing both rationality and affectivity, and considers both quantitative and qualitative dimensions. This requires an ongoing effort to explore the multidimensionality of the human being. Such a challenge proposes a critical revision of the prevailing educational conventions, which are typically generic and instrumental in formal learning environments, focused on technical training aimed at meeting market demands, neglecting the extensive potential for realization and autonomy of individuals.

When considering the transdisciplinary understanding of the concept of nature, seen as a trans-nature that spans across various levels of reality for both the subject and the object, there arises a need to reinforce a transdisciplinary pedagogy able in doing so. This pedagogy would promote a transcultural dialogue about and with nature to foster such integration. It is not accurate to claim that a single pedagogical approach can achieve this aim. However, there exist pedagogies characterized by their complexity that embrace transdisciplinary propositions. These methodologies facilitate the process of learning and teaching as a form of

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globalização. São Paulo: Instituto Pólis.
[19] Pinheiro, Samuel Lopes. (2022). *Caminhos transdisciplinares para um autoconhecimento emergente em Educação Ambiental*. Rio Grande-RS: tese de doutorado PPGEA/FURG.

collective discovery, promoting horizontal and reciprocal interactions between teachers and students in their engagements with and about nature.

The approaches of ecoformation[20], stands out as an example of transdisciplinary pedagogical practices and as a heuristic potential for the development of these aspects of interconnection among the individuals with oneself, with others, and with their environments. The work of ecoformation is taken as an example that extends into the practice of environmental education, characterized by a deeply ingrained transcultural dialogue. This is evident in accounts of such practices where narratives from Native People from North America contribute to the efforts of educating oneself with nature. One of the prominent objectives in the ateliers of ecoformation is the opportunity to 'explore the transition from a culturally ethnocentric view to a transcultural openness, in anticipation of the emergence of a terrestrial identity'[21].

The ecoformative approach also extends as a transdisciplinary pedagogical example to many other practices that aim to learn from ancestral knowledge, various spiritualities, indigenous peoples, and worldviews that are detached from a utilitarian view of nature or a human-nature division. In previous studies on Yoga and Vedanta Philosophy, ecoformation also served as a formative influence on pedagogical practices about concepts as self-knowledge and self-formation. In which extends the discussion of the knowledge of oneself[22], that simultaneously encompasses knowledge with others and with the environment.

The authors Pinheiro, Pasquier and Regnier[23] address nature as an essential but frequently forgotten 'third part' in human formation. Traditionally, education and personal development have focused primarily on two domains: the psychological/individual and the social/societal. Nature, as the third domain, offers a crucial dimension for the comprehensive development of the other two, yet it is often neglected in traditional educational approaches.

To effectively incorporate nature into human formation, the authors propose pedagogical paths that include transdisciplinary teaching methods and direct experiences with the environment. They emphasize the importance of educational programs that take students out of traditional classrooms and into direct contact with natural environments. This contact is not just for the scientific study of ecology but also for developing an emotional and ethical relationship with the natural world.

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[20] Galvani, Pascal. (2020). *Autoformation et connaissance de soi: un méthode de recherche-formation expérientielle*. Lyon : Chronique sociale.

[21] Galvani, Pascal. (2023) Trois pistes d'exploration de l'écoformation : retour sur un trajet de recherche. *Éducation relative à l'environnement* [Online], Volume 18-1.

[22] Pinheiro, Samuel Lopes, *op. cit. (2022)*, p. 15.

[23] Pinheiro, Samuel Lopes ; Pasquier, Florent ; Régnier, Jean-Claude. (2023). La Nature, « troisième part » trop souvent oubliée dans la construction d'un être humain. *Biennale Internationale de l'Éducation, de la Formation et des Pratiques Professionnelles » Se construire avec et dans le monde : part d'autrui, part de soi »*, Association Biennale Internationale de l'Éducation, de la Formation et des Pratiques Professionnelles ; Institut Catholique de Paris — ICP; UNESCO.

These pedagogical approaches not only expand academic and scientific understanding of nature but also promote awareness of sustainability, interdependence, and the need to act responsibly and ethically towards the environment. This is seen as essential not only for the health and well-being of individuals but also for the future of the planet.

6. Conclusion

This article engaged in investigating the interface between environmental education and transdisciplinary and transcultural approaches, based on the research question that asks how the concept of nature is interpreted and integrated by transdisciplinary thinkers. The analysis delved into a comprehensive bibliographic review, complemented by reflections derived from educational practices anchored in the philosophies of Yoga and Vedanta, to challenge reductionist perspectives of nature and promote a pedagogical paradigm that values cultural diversity in the educational process about and with the natural environment.

The discourse proceeded with a critique of the limitations of conventional disciplinary approaches, proposing a holistic and integrative view that transcends disciplinary and cultural boundaries for a more robust understanding of nature. The article emphasized the need for a dialogue between scientific knowledge and traditional wisdoms, demonstrating how this synthesis can enrich our understanding of contemporary environmental dilemmas and stimulate new human-nature relationships.

The expected outcomes of this study include the instigation of a paradigmatic change in environmental education towards a more inclusive practice, which not only integrates various bodies of theoretical knowledge but also values practical and experiential engagement with the environment. This change is seen as crucial for cultivating deep environmental awareness and the formation of individuals open to addressing socio-ecological crises.

However, the research faces significant barriers, including the complexity of implementing such educational strategies in the daily practices of education that genuinely amalgamate transdisciplinary and transcultural knowledge. Obstacles such as resistance to the openness of knowledge and even the training of educators to facilitate these complex dialogues represent persistent challenges. Additionally, the practical applicability of these pedagogical paradigms faces limitations inherent in the dynamics of educational systems that often prioritize quantitative approaches and immediate results at the expense of more reflective and integrative educational processes.

Despite these limitations, the study provides valuable directions for future research and pedagogical implementations. It encourages the advancement of research in transdisciplinary and transcultural environmental education, aiming to overcome the identified challenges and promote an education that respects and integrates various perspectives on nature. Such an approach will not only

enrich the educational experience but also strengthen ethical interaction in human-nature relationships.

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APPLIED TRANSDISCIPLINARITY IN ECONOMICS AND LAW

Economics of Care and Meaningfulness
for an International Transdisciplinary Chair

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Abstract: The term 'care' was introduced into societal debates in the early 1980s with the writings of Carol Gilligan, Janet Finch and Dulcie Groves, and later Joan Tronto. The notion of care associates an individual and moral disposition (taking an interest in others) with an idea of activity (helping, taking care of others) mobilizing the individual, collective and institutional levels. Such behavior lies outside the paradigm of economics based on the logic of homo oeconomicus. In line with what anthropologists are telling us today, it goes beyond the pursuit of individual interest and calls on the logic of giving and the community dimension of the human being. The economy of care and meaning thus integrates two dimensions that conventional economics ignores. On the one hand, the idea of gift and gratuity, and on the other, the consideration of the common good. The economy of care and meaning, beyond its economic dimension, thus calls, in a transdisciplinary perspective, on other academic fields: sociology, anthropology and political science.

1. The origins and evolution of the CARE economy

It was with the publication of her book, 'In a different voice', in 1982,

that American psychologist Carol Gilligan introduced the term CARE into societal and political debates, thereby becoming the catalyst for debates on this issue[1]. For Carol Gilligan, care 'is defined by a fundamental concern for the well-being of others, and centers moral development on attention to responsibility and the nature of human relationships'. Gilligan has highlighted the existence of a different moral voice, that is, a different way of resolving moral dilemmas, based not on the criteria of law and impartiality as in the ethics of justice, but on relational and contextual criteria.

In 1983, Janet Finch and Dulcie Groves[2] asserted that care constitutes: 'a combination of feelings, affections and responsibilities accompanied by actions that provide for the needs or well-being of an individual in a face-to-face interaction'. And finally, in 1993, Joan Tronto defined care as 'a generic activity that includes everything we do to maintain, perpetuate and repair our "world", so that we can live in it as well as possible'.

This is the definition we wish to adopt, and the importance of transdisciplinarity in this context. For Joan Tronto, there are four moments in care, to which correspond four specific moral qualities: 'attention (corresponding to caring about), responsibility (corresponding to taking care of), competence (corresponding to care to give), receptivity (corresponding to care receiving)'. Both Philippe Svandra and Agata Zielinski use this classification and add to it as follows: Caring about would be both recognizing the existence of a need and the need to respond to it ('attention/concern for others'), then taking care of would be taking charge of this identified need by arranging to respond to it in interaction with others (care giving) and finally care receiving would correspond to the adequacy of the response to the beneficiary ('the fact of taking care of someone or something'). Here we are at the heart of an interdisciplinary approach.

Transdisciplinarity, a term coined by Jean Piaget in 1970, must be mobilized in this case, not because it's a new buzzword, but because it's a necessity imposed by advances in our knowledge of the complexity of human phenomena. The notions of multi/pluridisciplinarity, interdisciplinarity and transdisciplinarity are the result of a single movement aimed at linking different disciplines, and has appeared successively in the recent history of science and care practices. Here, I'd like to draw on the definition given by physicist Bassarab Nicolescu (1996): transdisciplinarity can be defined as that which is at once between disciplines, across different disciplines and beyond any discipline. Its purpose is 'The understanding of the present world, one of whose imperatives is the unity of knowledge'.

This definition is echoed in the University's Transdisciplinary Evolution project of the Centre International de Recherches et d'Etudes Transdisciplinaires

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[1] Noël-Huraux, Elisabeth. 'Care: a professional concept with human limits?' *Nursing Research*, vol. 122, no. 3, 2015, pp. 7–17.
[2] British sociologists, who in 1983 published a collective work entitled A Labour of Love: Women, Work and Caring.

(CIRET) in collaboration with UNESCO, which proposes a transdisciplinary method based on 'three pillars': addressing several levels of reality at once, adopting the logic of the inclusive third, and apprehending complexity.

To make the link with the notion of transdisciplinarity, we can observe the presence of two indispensable dimensions:

1. an individual, perceptive disposition (paying attention, being concerned about…), which would be the combination of cognitive mobilization and a disposition to be there for others, 'being in a subjective state of feeling concerned by something'. So, it's both an attitude and a moral disposition (care about, for). It would be a state.

2. an idea of activity, or even work, oriented towards the human needs necessary for the life of others (caring for, taking care of, helping and accompanying others), 'providing a concrete response to the needs of others'. We speak of 'collective' care activity and work (take care).

The notion of care therefore covers different levels: individual, relational, collective and institutional. It can be understood in terms of relationships, actors, practices and systems. Care has both a private dimension (in the sense of private life) and a public dimension; it is both a desire and a responsibility, and takes the form of paid or unpaid practices, dispensed informally or formally, which leads us to approach it either from the angle of social ties, and in particular family ties, or in terms of institutional analysis, or even the sociology of professions, to take account of the professionalization of care tasks'.

It should also be noted that the terms Cure and Care have a common origin. Their assignment to separate registers was determined by the progress of therapeutic results, which in the twentieth century were based on scientific medicine founded on the basic sciences. In 'A quel soin se fier ?', edited by Claire Marin and Frédéric Worms, it is recalled that Winnicott, in 1970, invented a dual notion to qualify the philosophy of the medical relationship: care-cure. Winnicott regretted that care had disappeared in favor of a cure, believing that our care systems were organized around technical solutions rather than relationships. The practice of cure always tends to make care disappear. For him, it's a question of considering that cure professionals must also be able to weave care relationships.

2. In this way, they can be part of a meaningful process

The thinking of 18th and 19th century classical economists such as Adam Smith, David Ricardo and John Stuart Mill are based on two central assumptions about human behavior: the assumption of rationality and the existence of selfish preferences.

Rationality implies that the individual evaluates and chooses actions that best satisfy his preferences. The egoism hypothesis reflects the fact that individuals' preferences are amoral, in the sense that they do not care about the gains or behaviors of others as long as these have no impact on their level of well-being.

Modern economic science was thus formed by separating man's behavior in economic life from the moral approach, and by considering that man's motivations in his economic decisions are essentially hedonistic and utilitarian in nature. Market relationships are not generally governed by love of neighbor. Adam Smith, for example, advised us not to rely too much on the sympathy of the baker or the butcher to feed us, but rather on their best interests.

The freedom that is supposed to be linked to this concept of individualism is first and foremost individual freedom, and collective freedoms are designed to guarantee this. It is in this context that the individual, assumed to be rational and free in his choices, will try to maximize what is personally useful to him. This is the basis of the logic of homo oeconomicus.

But this founding anthropology is by no means universal. Pascal Descola, for example, shows how the relationship between human and non-human, living and non-living, varies according to whether we live in a totemistic, animistic, dualistic or universalist society. And so, we must remember that homo oeconomicus is a specifically Western construct that has barely existed for more than two centuries, and that its prodigious worldwide success should not obscure the fact that it is only a point of view limited in time and space.

Other worldviews are also worthy of consideration. Take, for example, the Ubuntu philosophy that inspires many people on the African continent. Its definition is: 'A person is only a person through other people.' As Desmond Tutu, Archbishop of Cape Town and Nobel Peace Prize winner, put it: 'My humanity is intertwined, inextricably linked with yours.' And he added: 'those who are ubuntu take care to walk in the world recognizing the infinite value of all those with whom they come into contact'[3]. It is this human interaction that gives meaning.

Indeed, this philosophy represents the exact opposite of the Cartesian cogito ('I think; therefore I am') and Western individualism. The individual cannot be thought of in isolation, independently of what surrounds him: human and non-human. And so, to reach the best of himself, he must be as concerned with the other as with himself. Note that this is not an ethical principle, like Kant's famous Golden Rule ('don't do to others what you wouldn't want done to you'), but an ontological principle relating to the very reality of what it is to be human as a member of a community associating other forms of living beings with human beings. As a result, such a philosophy tends to ruin the dominant economic theory insofar as, to the individualistic utilitarianism of homo oeconomicus.

The Economy of Care and Sense substitute interdependence between the members of a community, whose 'good life' is the foundation of its own 'good life'. It is therefore a philosophy that incorporates a transdisciplinary approach and is in line with the principles of care, in that it replaces the search for immediate utility with a focus on individual interest, with a search for the benefits that

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[3] Ngomane, Mungi, *Ubuntu: Je suis car tu es*, Paris, Harper Collins, 2022. Mungi Ngomane is Desmond Tutu's granddaughter. She is actively involved in promoting the Ubuntu philosophy.

will accrue to the human community, directly and indirectly involved in the activity of the company or organization.

The implicit anthropology on which economic theory is based thus tends to modify its epistemological status. At the outset, it was based on a supposedly universal model, as conceived by eighteenth-century philosophers: the individual seeks his or her own interests, and should be given the freedom to do so. Obstacles, such as customs barriers, which merely protect rents at the expense of greater collective efficiency, such as might result from individual initiative, should be removed. This paradigm, which today appears to have nothing to do with universal human behavior, is therefore an ideological principle that tends to perpetuate itself independently of its relationship to reality. As a result, developments in economic thought, insofar as they continue to be based on this initial predicate, have ceased to have a descriptive character, which is the object of science, and have taken on a prescriptive character. It is no longer a question of describing 'what is', but 'what must be', or should be.

Of course, many economists are well aware of the need to escape from this dominant worldview, as it has inspired both liberal and Marxist thought. The resulting deconstruction shows its limited character in relation to the scope of possible human behavior. Human relationships are not limited to material exchanges, and material exchanges themselves are not limited to acts of buying and selling on a market. They are part of a much broader vision of the relationships between human beings, their fellow creatures and the environment, living and non-living, in which they live. And the Western conception of these relationships, as it has managed to impose it through the liberal 'globalization' of recent decades, must be seen as one of the possible modalities of the relationship that human beings have with the world. This is what the Ubuntu philosophy shows, and what the philosophy of care takes up.

As a result, in the light of the economics of Care and Meaning, the dominant economic theory needs to be profoundly rethought with a view to integrating two dimensions that it seems to ignore: the gift and the treatment of the commons:

1. As Marcel Mauss's work on the potlatch shows, beyond self-interested exchanges from the individual, exchanges can take place within the framework of the logic of gift-giving and gift-exchange. In other words, a human society can be structured not by the economic logic of exchange based on immediate utilitarianism, but by the logic of human relationships based on the giving and exchange of gifts between members of the same community or between members of different communities. It is this dimension of social relations, which goes beyond classic economic logic, that needs to be taken into account to legitimize what is commonly referred to as the 'social and solidarity economy'. The SSE therefore lies beyond the scope of mainstream economic thinking, which has itself come to dominate our institutional and legal systems.

2. Mainstream economic thinking is based on an individualistic approach: the individual seeks to maximize the utility he or she can derive from the goods at his or her disposal, for example by investing them in a collective that will itself become a 'legal person', i.e. an entity that will conventionally be considered in the same way as a flesh-and-blood individual. It leaves aside entirely everything that lies beyond the individual good, or is not considered a value because it is taken for granted. Such as air, water or the beauty of landscapes. Faced with the scarcity of such goods, which everyone enjoys free of charge, solidarity is non-existent, with everyone walled in by their own interests. Yet this is a presupposition that is belied by certain behaviors. In the Japanese village community, for example, water from the river is distributed and directed in turn to the various rice fields, after debate between the members of the community, with a view to maximizing its potential use, even if this is to the detriment of the personal interests of individual rice growers. The same applies to the tontines organized by small Chinese traders. Solidarity, even when obliged, takes precedence over individual interest, and it's worth noting that such distribution takes place without any regulatory decision emanating from a higher authority. It's a behaviour that goes without saying, just as it goes without saying for the French farmer to defend his wheat field against any external 'aggression'. The SSE must therefore be seen in the context of the commons as defined by the Danish economist Elinor Ostrom, beyond the model of the homo oeconomicus deaf to anything beyond his immediate interest.

3. Conclusion

In conclusion, the Economy of Care and Meaning expresses, in this spirit of going beyond classical economic theory, a philosophical approach based on solicitude, concern for the other or attention to the other, this other being a human being, a non-human living being or the planet as a whole. It was born in opposition to moral theories inherited from economic analysis, which are based on two central assumptions about human behaviour: the assumption of rationality and the existence of selfish preferences. As we have seen, these founding assumptions lie at the heart of the thinking of classical economists such as Adam Smith, David Ricardo, John Stuart Mill and later Leon Walras, Stanley Jevons and Vilfredo Pareto, and have made it possible to construct the figure of Homo oeconomicus.

We know that this reductionist vision is being challenged, sometimes by the neoclassicals themselves, but above all by economists from the behavioral economics school or the experimental school. As the dictator's game and all its associated works show, under the pen of many behavioral economists, the figure of Homo oeconomicus has become more human, his egoism perhaps less stubborn, his preferences less intangible, his logic less implacable. Experimental results have shown that behavior observed in the laboratory does not correspond to the predictions of academic theory. Even so, the paradigm expressed by homo

oeconomicus has not been completely called into question.

It is through the economics of care that this paradigm is most strongly called into question. Care theory introduces the realm of the sensitive and the affected, and underlines the pre-eminent role of the person and identity. Care nurtures a real political project, which is destined to encounter other social sciences such as sociology, anthropology, political science and ethnology.

But the Care economy is above all action-oriented. As Aristotle and Descartes put it, this is the essential knot that 'links cognition and passion to action'[4]. It's an approach that leads to action. In this way, we are close to the work of Amatayakul Supakwadee[5], who invites us to draw on René Descartes in that he takes the universality of the human condition as the foundation of his thought, while focusing on the rational use of human emotions as a means of achieving a good life – to use the term used in our general introduction. Paradoxically, as early as the 17th century, the father of modern rationalism and mind-body dualism, in his last work, *Les Passions de l'âme* (1649), proposed an emotion – 'generosity' – as a means of achieving the greatest happiness one can know in a good life.

In line with our previous work, inspired by Aristotle and Descartes, and based on the work of Carol Gilligan, Joan Tronto and Donald Winnicot, we will use the following definition for our reflection: the care economy is a generic activity based on generosity and consideration for others, which gives meaning to actions designed to maintain, perpetuate and repair our world, so that we can live in it as well as possible. These actions, which refer to both Care and Cure, are an ideal field in which to mobilize a transdisciplinary approach.

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Designing a Transdisciplinary Legal Curriculum Tailored to Fuse Social, Technological and Ethical Considerations. Elevating the Voice of International Law

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Abstract: *This research deals lucidly and objectively with the possibility of applying the epistemological practice of transdisciplinarity to the science of law, as well as developing a transdisciplinary curriculum in law. To this end, it first presents some characteristics of transdisciplinary thinking, highlighting the complexity and development of transdisciplinary research (as compared to disciplinary, interdisciplinary and multidisciplinary research), which can be more easily addressed in law. It then presents Thomas Kuhn's thoughts on the evolution of the sciences, highlighting scientific revolutions, the process by which one paradigm succeeds another ─ a model that inspires the idea of transdisciplinarity in law. All this is accompanied by numerous examples. He also analyzes some national regulations in Brazil and Romania, such as Resolution CNE/CES No. 5 and Resolution No. 75 of the National Council of Justice, identifying the forums of transdisciplinarity in the provisions of these documents (which set guidelines for law). Finally, it identifies legal positivism as a paradigm of legal science and presents some of its limitations in the face of transdisciplinarity and the evolution of social phenomena (characterising its crisis), giving the example of international law, in which context it is proposed to challenge the transdisciplinarity of law.*

1. Introduction

`*Rigour, openness and tolerance are fundamental characteristics of the transdisciplinary attitude and vision. Rigour in argumentation that takes into account all the data is the best against possible deviations. Openness implies acceptance of the unknown, the unforeseen and the unpredictable. And tolerance means recognising the right to ideas and truths contrary to one's own[1].*`

The epistemological practice of transdisciplinarity is increasingly extending to the various scientific specialties, which are questioning their epistemological premises and attempting to establish relations – albeit timidly – with the pillars of transdisciplinarity. More and more studies are appearing that apply the same main key to a multitude of disciplines with the common aim of opening up and connecting the fields of one speciality with all the others by understanding their boundaries from a complex perspective[2].

You can find studies on various topics – pedagogy, health sciences, administration, human rights – all under the aegis of a transdisciplinary *vision* and *attitude*, as if scientists from different, hitherto incommunicable fields were beginning to speak the same language.

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[1] Article 14 of the Charter of Transdisciplinarity, adopted at the First World Congress on Transdisciplinarity, Convento da Arrábida, Portugal, 2–6 November 1994. This document, drafted by the greatest thinkers of the contemporary world, paved the way for numerous studies that have made a huge contribution to the evolution of scientific research worldwide.

[2] Nicolescu, Basarab. *Transdisciplinarity – past, present and future*. In: *Reshaping sciences, policies and practices for endogenous sustainable development*. Edited by Bertus Haverkort and Coen Reijntjes. The Netherlands, Compas Editions: 2006. p. 142-166.

In this context, the Transdisciplinarity Charter[3] can be considered an important milestone, as it represents a synthesis of the reflections of thinkers who have dedicated themselves to thinking about science and the world from the perspective of transdisciplinarity, providing the first guidelines from which to promote awareness of the complexity of the world. To this end, science plays a central role, as it is science that has for centuries called for the right to speak about the world with a greater degree of precision. But the method of understanding the world proposed by transdisciplinarity requires a paradigm shift.

Since the Charter of Transdisciplinarity is a substratum for various reflections, its few lines are like the tip of an iceberg (a synthesis), which has surfaced and shown itself to the world only because it has a huge submerged base supporting it. As a corollary, the provisions of the Charter for Transdisciplinarity ─ though clear, pointed and objective ─ must be contextualized within the *paradigm* shared by the thinkers who signed it in order to understand the reflections on science and the world that gave rise to it. Otherwise, it would be a reductionist interpretation of a perspective that is complex par excellence. Therefore, in order to raise the level of understanding of transdisciplinary proposals, it is essential to think about them in the context from which they emerge. This is the purpose for which I have given the example of international law, itself transdisciplinary in nature.

In this line of reasoning, the context of the Transdisciplinarity Charter is the thinking of all those who participated in the Arrabita Conference in Portugal, especially its rapporteurs: Lima de Freitas, Edgar Morin and Basarab Nicolescu. Therefore, the *mens legis*[4] of the articles of the Charter (as well as other documents resulting from similar events), needs this contextualization, from which a hermeneutic of the Charter can be made, extracting reflections that help to think about the Science of Law in the light of Transdisciplinarity, and the aim of this research is to build such a rationale. For this approach, not by chance, the example of international law appears developed in this study. International law plays a leading role in finding the most effective solutions. In terms of transdisciplinarity in law, when we look at the human being (the natural person) through the prism of his dignity and nationality, it can indeed be said that 'the *recognition by international law* of this double belonging – to a nation and to the Earth – is one of the aims of transdisciplinary research'[5].

These reflections are structured as follows: first, the general lines of transdisciplinarity are presented from a predominantly epistemological perspective, developing and organizing elements of the transdisciplinary method for science.

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[3] Freitas, Lima de ; Nicolescu, Basarab; Morin, Edgar; *Transdisciplinarity Charter. First World Congress on Transdisciplinarity:* Arrábida Convention, 2–7 November 1994. Available at: <http://www.cetrans.com.br/textos/documentos/carta-da-transdisciplinaridade.pdf>. Accessed: 1 March 2010.

[4] 'Intention, objective or purpose of the law. Indicates the social purpose proposed by the law, constituting an essential element of its interpretation.' (Silva, de Plácido e. *Legal Vocabulary*. 24. ed. Rio de Janeiro: Forense, 2004. p. 911.).

[5] Article 8 of the Charter.

Then, based on Thomas Kuhn's thought, it will be analysed in what sense transdisciplinarity can be said to be proposed as a new *paradigm* and what is necessary to apply it to legal science and legal education. Our discourse creates a new space, touching on details that can contribute to changes in the law curriculum and to the establishment of an international transdisciplinarity department with several chairs, including for law.

Finally, the last point of this research aims to link transdisciplinary thinking with the science of law, in dialectic with the proposals developed in the previous topics, making considerations about the possibility of overcoming the current paradigm of law in order for it to become transdisciplinary. Some dynamics of international law are presented as examples.

2. Transdisciplinary Guidelines

In order to build a bridge between the transdisciplinary perspective and the science of law, with implications for its teaching and methodology, this first moment will address the proposal of transdisciplinarity.

Since it is a very broad perspective, with infinite possibilities for development due to its openness, it is essential to make a methodological choice to delimit (but not close) which aspects of transdisciplinarity will be addressed[6]. However, even if the points of transdisciplinarity to be addressed are delineated, its main purpose cannot be overshadowed and must be emphasised. For Nicolescu, the purpose of Transdisciplinarity 'is the understanding of the present world, for which one of the imperatives is the unity of knowledge[7]'. And to achieve this goal, Nicolescu also points to 'three pillars of transdisciplinarity – the levels of Reality, the logic of the third included and complexity – [which] determine *the methodology of transdisciplinary research.*

The first two pillars, the idea of levels of reality and the logic of the third included, are mainly drawn from recent discoveries in physics and are more evident in this area. The third pillar, complexity, which also has its foundations in physics, transcends this discipline and is used to a greater extent in various sciences. According to Morin, it can be observed in all sciences, given a polysystemic structure in which all things are connected, directly or indirectly, to all others.

In complexity there is initially a closer contact with law, and the link

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[6] Despite proposing approaches that explore cross-cultural and trans-religious perspectives, for example, in an attempt to understand the world, the focus of this research will be epistemological. The reason for this choice is logical, as the formation of the transdisciplinary view that is used to analyse meta-scientific issues (such as culture, the relationship between religions, social, economic and political issues, etc.) necessarily involves the epistemological prism. The formation of a transdisciplinary view of a particular problem in a particular discipline depends on its epistemological basis (considerations that will become clearer in section 3).

[7] Nicolescu, Basarab. *O manifesto da transdisciplinaridade/Manifestul transdisciplinarității.* Translation by Lucia Pereira Souza. Lucia Pereira de Souza. 3. ed. São Paulo: Triom, 2005. p. 53.

between law and complexity ─ as a starting point for building a bridge with trans-disciplinarity ─ is less obscure than the first two pillars. There is no denying the possibility that law is linked to all three pillars proposed by Nicolescu, but as a first approach, the link between law and complexity is more obvious. And from this initial link, reflections can be drawn. For the particular advancement of international law, the link with all three pillars will be as close as it is useful, as we will detail below.

Professor Basarab Nicolescu arrived at the application of the following three axioms of transdisciplinarity methodology, which, if applied even to international law research, would lead to more concrete results: 1) the ontological axiom: there are, in Nature and in our knowledge of Nature, different levels of Object Reality and, correspondingly, different levels of Subject Reality; 2) the logical axiom: the transition from one level of Reality to another is ensured by the logic of the included third party; and 3) the epistemological axiom: the structure of the totality of the levels of Reality is a complex structure: each level is what it is because all levels exist at the same time[8].

Abstracting for demonstrative purposes the relevant theory as it relates to international law, we begin the exercise by presenting the logic of the included third party (or trivalent logic) as a formal system of logic whereby three truth values are admitted: true, false and indeterminate. This logic has been developed for situations where statements cannot be proven true or false with certainty. The apparent difficulty of the exercise is ultimately useful in that, by materialising the establishment and use of formulas such as those to be presented, subjects of public international law will find solutions in a more rapid and objective way.

In classical binary logic, every statement can be classified as true or false. In contrast, in the logic of the included third party, there is also a third, indeterminate truth value, which reflects situations where statements are ambiguous or incomplete. For example, the statement 'There is peace in the world' can be true or false, depending on the exact perception of the subjects, but it can also be indeterminate if the state of peace is in the range between calm and unrest. In this framework, the logic of the included third party can be considered an important tool in solving transdisciplinary problems that are characterized by ambiguity, uncertainty and complexity. By admitting a third truth value, the logic of the included third party can shape a more flexible framework of thinking and leads to the development of solutions that take into account a multitude of perspectives and variables.

The logic of the included third party can be received in international law in various ways, particularly in relation to international conflict resolution and

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[8] Nicolescu, B., *La transdisciplinarité manifeste,* Monaco: Rocher, 1996 (English translation: 2002, Manifesto of transdisciplinarity, New York: SUNY Press, translation from the French by K.-C. Voss). See also Piaget, J., *L'épistémologie des relations interdisciplinaires. in L'interdisciplinarité — Problèmes d'enseignement et de recherche*, eds. G. Berger, A. Briggs, and G. Michaud, Paris: Organisation for Economic Cooperation and Development, 1972, pp. 127–139.

treaty interpretation (for situations where the paths and interests at stake are different and cannot be reconciled through a binary approach based on true or false). By valuing a third, indeterminate truth value, the logic of the included third party has the potential to identify new compromise solutions as well as finding possibilities for avoiding conflict escalation[9]. More concretely, in international conflict resolution, the logic of the included third party can be used in mediation or arbitration to identify compromise solutions, why not?

For example, if two states are involved in a territorial conflict, the logic of the included third party may be operative in identifying solutions that take into account the interests and perspectives of both parties, such as the division of territory or the development of a regime of autonomy. It is interesting how the application of the logic of the included third party in international law overcomes the limitations of dualistic thinking.

The ontological axiom that there are, in nature and in our knowledge of nature, different levels of object reality and correspondingly different levels of subject reality can be applied in public international law by understanding that international society is made up of a diversity of actors, with different interests, origins, perspectives and capacities, and that this diversity must be taken into account in the process of drafting and applying international law by recognizing the existence of several levels of object reality, such as: The physical level, the biological level, the social level, the cultural level, the economic level and the political level, as is often the case in human rights. Each level of reality can influence the way in which international problems, whether simple or complex, are perceived and dealt with, and can have a bearing on the way in which the rules and norms of international law are developed and applied.

In terms of levels of subject matter reality, the use of this axiom can lead to the recognition that there are different levels of power and influence in what we call the 'world order', and these levels will be taken into account in the process of developing and applying international law because powerful states and international organisations may have a greater influence on the development and practice of international law compared to smaller states or civil groups, for example.

By applying this axiom, certain differences between the subjects of international law can be highlighted, depending on their legal nature, their capacity to take part in the normative elaboration and application process.

Another current difference is that states are considered as primary, classical subjects of international law, while international organisations, civil groups and other entities are considered as secondary or special subjects. It follows that by putting this ontological axiom into practice, international law can become more flexible and adaptable to the diversity of existing interests and perspectives,

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[9] For example, in the interpretation of international treaties and agreements, the logic of the included third party is useful in situations where their terms and clauses are ambiguous or incomplete and by admitting a third, indeterminate truth value, the interpretation of terms and clauses is made more flexible and rigid interpretations that may not reflect the intention of the parties are avoided.

which evolutionarily supports the development of a fairer and more efficient system for resolving contemporary international challenges, especially in the context of technological change.

The logical axiom (moving from one level of Reality to another) can serve public international law by recognizing that there is a close connection between the different levels of reality of the object and subject, and that this connection can be understood and managed through the logic of the included third party. Although the embedded third party is full of mysteries especially in the field we deal with in this paper, it can prove useful when we seek to understand and manage the interactions between the different levels of object and subject reality in international law. Applicable, when researching a specific issue, we are to consider not only its physical or political level, but also its social, cultural, economic and environmental levels.

In the remainder of the paper, we will also present some aspects of these levels. The logic of the enigmatic third party included can develop a more robust and equitable decision-making process by integrating many different perspectives into the whole mechanism of regulatory development and enforcement[10].

The epistemological axiom encompasses the complex structure of the totality of the levels of reality and each level is what it is because all levels exist at the same time. This axiom can find an effective role in public international law by recognising that the rules and norms of international law are constructed in the context of multiple levels of reality, which supports understanding and managing the interactions between the different levels of reality in the structure of international law issues. Issues of this kind are generally influenced by political, social, cultural, economic, environmental and security factors, and these levels of reality are obviously interconnected and influence each other[11].

We will take this exercise further with a comparison. According to Basarab Nicolescu's model, the four levels of reality are 1) the physical or empirical level perceptible by the senses and which can be studied by the scientific methods of physics, chemistry and biology; 2) the quantitative or mathematical level which concerns mathematical models and mathematical symbols, used in the exact sciences; 3) the mental or psychological level as the level of thought and consciousness, which can be studied through psychology, philosophy and other humanities; and 4) the transmental or transpersonal level – is the transcendent level, which goes beyond the individual limits of consciousness and refers to the connection with a higher level of existence and knowledge.

What would the application of these levels of reality in public international law generally mean?

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[10] When negotiating and drafting an international convention, the perspectives and interests of different international groups and actors will be taken into account in order to arrive at a solution that truly encompasses as many aspects of the subject matter as possible.

[11] E.g. at a general level, climate change regulations we observe take into account not only the impact on the environment, but also on the economy, security and welfare of the population.

1) The physical or empirical level is where we are in the study of the effects of the physical actions of states or individuals on other states or persons (or entities). Here we have the example of transboundary pollution which can be considered a complication of public international law whereby the physical or empirical level of pollution and its impact on the environment and the health of the population is brought into question.

2) The quantitative or mathematical level can be implemented by using mathematical models and mathematical symbols to analyse and understand public international law phenomena. A mathematical model can be used very well to predict the evolution of conflicts between states or to analyse the economic impact of sanctions imposed by one state against another.

3) The mental or psychological level is reached by studying thought and conscience in the context of public international law, where we are mainly concerned with the analysis of human rights and the responsibility of states to protect them, through the study of values, morals and ethics, and we will see these connections below.

4) The transmental or transpersonal level is when there is recognition of a higher level of existence and knowing that goes beyond the individual boundaries of consciousness and is based on increasingly global and transpersonal connections. In this context we cite the example of new attempts at codification in animal law, nature law or the law of the soul and bioenergy of life forms[12].

As specialists, if we take into account these four levels of reality, perhaps we could develop a more appropriate and comprehensive system of deepening, which would lead to one result: a well-deserved attempt to develop a system of international law more sensitive to the plurality and diversity of levels of reality it faces. Implicitly, this also implies the appropriate modification of the law curriculum through the introduction of transdisciplinarity in law.

Of course, in these approaches we will also take into account some criticisms that can be made of transdisciplinary theories in their application to public international law. We refer, first of all, to the complexity sometimes considered excessive. This may be compounded by the difficulty of measurement, as it may seem that in transdisciplinary theories it would be difficult to measure the results of their application in the field of public international law in order to assess their effectiveness. But is there another applicable theory that is not subject to this criticism?

Further to the exposition of possible criticisms, it could be that transdisciplinary theories are often criticised for being accessible only to experts, which can make it difficult to apply them at the general level (including in public international law). And, even if we overcome this set of possible criticisms, in the end

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[12] See in general Cristina Elena Popa Tache, *Vers un droit de l'âme et des bioénergies du vivant*, Ed. L Harmattan, Collection: Logiques Juridiques, 2022, preface by Jean-Luc Martin-Lagardette.

there are problems of practical application which can be difficult because of institutional limitations and problems of cooperation between different organisations, states or other international actors. For these reasons, the solution that emerges *ab initio* is the creation of international transdisciplinary law departments.

This is only the first stage in the transdisciplinarisation of law.

The next section will be devoted to presenting the main characteristics of the complexity needed to introduce the transdisciplinary research proposal.

2.1. The complexity of Edgar Morin

The third pillar of transdisciplinarity, complexity, takes its deepest and most scientific form in the thought of Edgar Morin, which is why this author will be the theoretical reference for this section.

The fundamental idea is to focus on the established organization, to describe the parts of an object, their organization and interaction with the whole and with the other parts of the object, as well as the relation of the object to elements from other sciences in a context that encompasses all phenomena. Blaise Pascal's thought clarifies this problem: '[…] The parts of the world all have such relations and such a chain with each other that I consider it impossible to understand one without reaching the others and without penetrating the whole'[13].

In order to understand this interconnection of all elements, complexity, in addition to the analysis of the object itself, takes into account other aspects of the object, namely the *context*, the *global, the multidimensional* and the *complex,* which by no means exhausts the object and does not cancel out disciplinary research ─ which excludes these elements ─ but provides a richer analysis of the problem when they are seen together in a complementary relationship.

The literature has 'felt' transdisciplinarity although it has not always carried that name. This set of transdisciplinary rules is often referred to as 'interdisciplinary' and is used to gain a richer understanding of legal issues[14]. It is often referred to in the Saxon system as: 'intersection' between several disciplines, or cross-disciplinarity, transculturality, disciplinary interconnectedness, disciplinary syncretism, disciplinary convergence, disciplinary holism, transcontextuality or cross-disciplinary diversity. In China, for example, the concept of transdisciplinarity is often associated with the term 'xueke guanxi' (学科关系), which roughly translates as 'interdisciplinary relations'.

Researchers and thinkers, including Stefan Lupasco, Basarab Nicolescu, Edgar Morin, Ervin László and Ilya Prigogine, have contributed significantly to the development and popularisation of this concept. E. Wilson affirmed the uni-

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[13] Pascal, Blaise. *Thoughts.* Trad. Sergio Milliet. 2. ed. São Paulo: Abril Cultural, 1979. p. 55.
[14] Methods of this type are sometimes referred to as 'bi-disciplinary'. See Moshe Hirsch, *Invitation to the Sociology of International Law*, Oxford University Press, 2015, pp. 13, 126 and 185.

fied theory of knowledge across disciplines – an Esperanto between physics, biology, social sciences and humanities. In fact, from the beginning, in the process of scientific knowledge, it is worth noting the success of several scientists' attempts to bring together certain different concepts for comparative analysis, as we found in the works of the scientist Constantin Rădulescu Motru, who went further after trying to base certain opinions on different sciences such as biology, philosophy, history in particular, psychology, the arts, etc. and subjected some theories to analysis by connecting the cosmic environment, the soul environment with the natural environment, opposing the soul world to the material one[15]. E. O. Wilson's book, *Consilience,* was also a revelation in the same sense[16]. This *jump together* of specialists from different fields but also of substantially different notions can provide unified theories particularly useful for scientific research.

Context, as mentioned in the introduction, is the environment in which the object is situated, affecting it at the same time as it is affected. For example, in physics, the same experiment repeated in different environments can have different results. Similarly, in law, the same legal rule in different legal systems will have different interpretations, which is why context cannot be ignored by blind reduction[17].

Some probability theories continue to help the law where legal precedent is not recognised, for example, by recognising more frequent judicial practice (thanks to Bayesian probabilities). The propulsion of technological transformation has brought law closer to integrating social, technological and ethical issues, all of which paves the way for innovation in legal education. Bayesian theory and learning can be applied in law today in a number of ways, provided they are adapted to the specific context of the legal field. The algorithms that underpin the artificial intelligence used in the legal field are inspired by Bayesian theories. In law, there are often situations where the likelihood of a particular event or interpretation of the law needs to be assessed. Bayesian theory can be used to update convictions based on new evidence in court trials, where the jury or judge thus assesses the probability of a defendant's guilt based on the evidence presented. In legal practice, Bayesian methods can be used to develop models that

[15] See C. R. Motru, *Personalism in Energy and Other Writings*, published successively from 1927 until 1984, when it was republished by Eminescu Publishing House, pp. 267, 271.
[16] Edward Osborne Wilson, *Consilience: The Unity of Knowledge*, Random House (1998), in which he explores the chemistry of the mind and the genetic basis of culture or postulates the biological principles underlying works of art, from cave drawings to Lolita, apud Cristina Elena Popa Tache, *Vers un droit de l'âme et des bioénergies du vivant*, Ed. L Harmattan, Collection: Logiques Juridiques, 2022.
[17] Morin, Edgar. *The Seven Knowledges Necessary for the Education of the Future*. Trad. Catarina Eleonora F. da Silva, Jeanne Sawaya. 5. ed. São Paulo: Cortez, 2002. p. 36. In the work cited, Morin explains: 'Knowledge of information or data in isolation is insufficient. It is necessary to know information and data in their context in order for them to acquire meaning. In order to have meaning, the word needs the text, which is the context itself, and the text needs the context in which it is enunciated. In this way, the word "love" changes its meaning in context, and a declaration of love does not change its meaning.'

take into account both available data and prior knowledge to make more accurate estimates of risk and better predictions.

By way of demonstration, we state that Bayesian networks provide a concise way to represent conditional independence relations in a domain and to make inferences. For law, one can use dynamic Bayesian networks that represent temporal probability models. They are organized in time slices and each slice can have several state variables X_t and evidence variables E_t.

To build an RBD, you need to specify:

- A priori distribution of state variables $P(\mathbf{X}_0)$
- Transition model $P(\mathbf{X}_t+1 \mid \mathbf{X}_t)$
- Observation or sensor model $P(\mathbf{E}_t \mid \mathbf{X}_t)$

In turn, these networks can model Markov processes. According to the Markov assumption, the current state depends on a fixed finite number of previous states. It is among the algorithms that are used in judicial processes involving Artificial Intelligence when establishing, for example, the degree of dangerousness of an individual based on recidivism.

In the figure, it shows:

(a) a Markov process of order I
(b) a Markov process of order II.
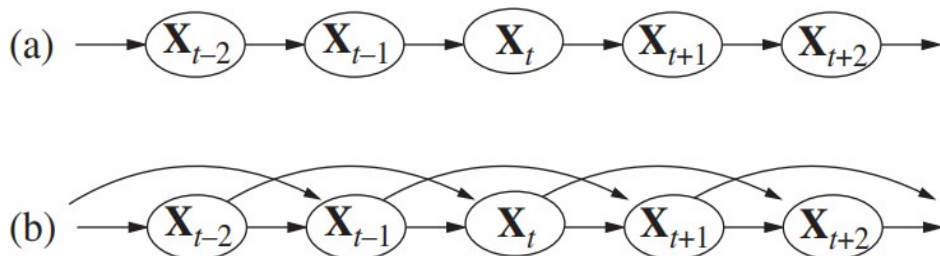
In theory, it has been noted that in the last 20 years, worldwide and especially in the United States, there has been a serious debate on the use of Bayesian methods in legal matters. Statistics have become evidence in legal proceedings[18]. If we follow the line of innovation given by legal informatics or computer law, we could think of developing, why not? a Bayesian Law, to support specialists in better understanding the phenomenon of technological change. Bayesian law currently seems more than a chapter of general legal theory because Bayesian theories are widespread internationally and already underpin artificial intelligence algorithms. At present, it could constitute a discipline, although we cannot exclude its formation as a branch of law in the future. This would require the grouping of

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[18] Fienberg, Stephen E., and Finkelstein, Michael O., 'Bayesian Statistics and the Law', in J M Bernardo, and others (eds), *Bayesian Statistics 5: Proceedings of the Fifth Valencia International Meeting* (Oxford, 1996; online edn, Oxford Academic, 31 Oct. 2023), https://doi.org/10.1093/oso/9780198523567.003.0007, accessed 19 Apr. 2024.

legal institutions according to criteria: objects of regulation, method of regulation (legal equality or subordination), quality of subjects (a certain quality is required), character of legal rules (dispositive or imperative), character of sanctions, principles. The law is obliged to keep pace with new trends[19]. The phenomenon of globalisation, with repercussions in the field of law, is interpreted by some authors as a natural adaptation of law to the new forms of interdependence and global awareness[20].

The positive aspect that emerges from this is the effort made by specialists to analyse and re-establish the limits through appropriate regulations. The role of transdisciplinarity is the same as that of a foundation, because, as the Transdisciplinarity Charter states, transdisciplinarity is complementary to the disciplinary approach; from the confrontation between disciplines, it brings out new results and new bridges between them; it gives us a new vision of Nature and Reality. Transdisciplinarity does not seek to develop a super-discipline encompassing all disciplines, but to open up all disciplines to what they have in common and to what lies beyond their boundaries (art. 3)[21].

The global, a broader environment than context, refers to the relationship between part and whole. To know the whole you need to know the parts, and to know the parts you need to know the whole, in an interdependent relationship. Hyperspecialisation (which will be discussed in section 3 of this research) ignores the whole, analysing only the parts, without their interaction with the whole: '[…] hyperspecialisation prevents the perception of both the whole and the essential. It even prevents us from properly addressing particular problems, which can only be proposed and thought about in their context.'[22]

Multidimensionality refers to the relationship between the parts of an object and other parts[23]. The same applies to the integration of social, technological and ethical aspects in almost all branches of law.

Finally, in order to understand *complexity,* we initially consider the etymology of the word *complexity,* which is what has been woven together. 'Complexity is the union of unity and multiplicity'[24].

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[19] N. Popa, *General Theory of Law*, 5th ed. H. Beck, 2014, p. 11.

[20] A. Giddens, *The Consequences of Modernity*, Polity Press, Oxford, 1990.

[21] The Charter of Transdisciplinarity, adopted at the First World Congress on Transdisciplinarity, Convento da Arrábida, Portugal, 2–6 November 1994, paved the way for numerous studies that have made a huge contribution to the evolution of scientific research worldwide.

[22] Morin, 2002. p. 41.

[23] Ibid, p. 38. In Morin's words: *'Complex units, such as the human being or society, are multidimensional in this way; the human being is at once biological, psychological, social, affective and rational. Society includes historical, economic, sociological and religious dimensions… Relevant knowledge must recognise this. Not only is it impossible to isolate one part from the whole, but also the parts from each other the economic dimension, for example, is in constant interrelations with all the other human dimensions.'*

[24] Ibid, Loc. cit.

This idea makes it possible to relate to the complex system, which conceives of its elements in terms of the relationship between the parts and themselves and the whole. When studying parts, it is necessary to conceive of them in different ways: as a function of the whole, in isolation, in relation to other parts. In addition, it is necessary to consider that the part is also a system, which has interacting parts, and that there is always a connection which is essential for transdisciplinary research.

And above the systems, there are other systems, forming a polysystemic chain ─ a system of systems. Finally, Morin gives us a definition of the *complex system*, clearly prioritising the organisation of knowledge[25]: *'From now on, the system, or organized complex unit, appears to us as a pilot concept, resulting from the interactions between an observer/conceptualizer and the phenomenal universe; it allows us to represent and conceive complex units, made up of organizational interrelations between elements, actions or other complex units; the organization that binds, forms and transforms the system has its own principles, rules, impositions and effects; the most notable effect is the constitution of a global form which feedback on the parts and the production of emergent qualities, both globally and in the parts; the notion of a system is neither simple nor absolute; it includes, in its unity, relativity, duality, multiplicity, division, antagonism; the problem of its intelligibility opens a problem of complexity[26]*.

This interdependence between all parts of the complex system means that the elements cannot be understood in isolation. The quest to visualise this complexity constitutes the transdisciplinary attitude described in Article 1 of the Transdisciplinary Charter: "Any attempt to reduce the human being to a mere definition and to dissolve it into formal structures, whatever they may be, is incompatible with the transdisciplinary vision".[27] .

Given the idea of complexity, a pillar of transdisciplinarity, the following section will present transdisciplinary research (its idea and methodology), which is necessary to relate it to law.

2.2. Transdisciplinary Research

Transdisciplinarity does not claim to be a hyper-science or a science of sciences. It does, however, defend the existence of a unity of science that is achieved through communication and articulation between the plurality of research fields, establishing a true network in which each discipline retains its autonomy but participates in a larger unity that represents the complex system. All

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[25] In order to fully understand the concept below, it is necessary to refer to elements that have not been explained but are part of Morin's thinking.
[26] Morin, Edgar. *Method 1: the nature of nature/Metoda 1: natura naturii.* Translation by Ilana Heineberg. Ilana Heineberg. 2 ed. Porto Alegre: Sulina, 2008. pp. 186–187.
[27] Freitas; Basarab; Morin, *op. cit.*, 1994.

the disciplines that intend to carry out transdisciplinary research must be contextualised in this articulating system of fields of knowledge, in which, ultimately, all fields of knowledge communicate with each other-directly or indirectly ─ with all the others. This is the only way to transcend reductionism and open a bridge to the transdisciplinary method.

It should be noted that this articulation is not a random linking of all fields of knowledge. Based on the idea of levels of Reality (the first pillar of Transdisciplinarity) there are preliminary stages in which the major fields of knowledge are initially interconnected[28]. For example, connecting a specific legal discipline does not relate directly to equally specific research in physics, but the system in which one discipline is included relating to the system in which the other discipline is included. In other words, there is a direct relationship between large fields, whose branches have an indirect relationship with other fields. To demonstrate this, we return to the example of international law, highlighting its links with mathematics, which have so far been little treated[29]. For example, international conventions are typically drafted in complex legal language, and sometimes expressed in precise mathematical terms. In these cases, mathematics can be used to interpret and analyse legal texts and to determine their clarity and coherence.

Also, through game theory as a branch of mathematics that deals with the study of strategic decisions taken in a context of social interaction, we can analyse the behaviour of states in international negotiations to better understand the decisions they take and to predict the outcomes of these decisions. International economics, e.g. is closely related to both international law and mathematics, through the study of international trade relations, capital flows and other economic issues that can be regulated by international treaties. For lawyers, knowledge of international economics can be useful in understanding the effects that various trades or investment policies may have on countries or regions. Legal calculus also has a role to play in that here, mathematics can be used to assess the legal consequences of certain facts or situations: mathematics can be used to calculate the damages resulting from an accident, to determine the value of a contract, or to

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[28] Morin divides knowledge into three major fields: physics, biology and anthroposociology, all with their respective divisions and subdivisions and taking into account the links between the fields (MORIN, 2008, p. 332).

[29] We just do a brief review of some as well: 1) international trade disputes where mathematics calculates financial losses and assesses damages; 2) determining the value of an investment and the rate of return; 3) for the delimitation and use of international waters, mathematics calculates the quantities of water available and determines its distribution between different states; 4) in cases of pollution or natural resource management to assess the impact of human activities on the environment and to develop mathematical models to identify environmental solutions; 5) in the analysis and interpretation of statistical data on human rights violations in a particular region or country; or 6) in mathematical modelling of judicial processes to identify problems in the judicial system and to improve its efficiency and effectiveness.

calculate the probability that a certain event will occur[30], which can be important when analysing risks and making decisions in international law.

In terms of theory, mathematics can be used to develop mathematical models that describe the relationships between different variables and factors in international law, as is the case when mathematics develops economic models that describe the impact of a trade treaty on national economies or models that describe the evolution of international relations over time. As well as being able to calculate damages in cases of harm caused by violations of international rights, it can assess the impact of international decisions such as border disputes or issues related to the use of shared natural resources. Mathematical methods develop legal theories and concepts in international law such as the "intersection of sovereignty" or the "intersection of interests", which are used to manage legal problems in international relations. Algorithms to identify violations of international rights can detect and prevent this phenomenon[31].

Algorithms can also be used to draw the lines of a robot's behaviour, more precisely, under the conditions of computer ethics, artificial intelligence is programmed to respect the applicable law. The solution, for research and education, would be a transdisciplinary department in every discipline today, which would be closer to reality and have the potential to satisfy specialists in their diversity. Referring only to law, we note that this does not mean looking from one discipline outwards, but it means 360-degree law based on a transdisciplinary chair for profound analysis and sustainable solutions.

In order to explain the transdisciplinary proposal, which has so far been presented in a more abstract way, it will be compared with other types of research – disciplinary, interdisciplinary and multidisciplinary.

Firstly, it is about large-scale disciplinary research. A discipline is a delimited field of scientific knowledge, with a specific object that is often isolated from its context, with its own language, with terms that have a semantic load specific to its field – for example, the concept of *solidarity* in the law of obligations has semantics used only in this discipline – and its own method, which seems to prevent communication with other fields of knowledge. Until now, within a specific field, the discipline has been sovereign in the face of any attempt to relate to external elements. The whole complex that articulates myriad disciplines continues to be fragmented, establishing, like a map, boundaries between

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[30] Mathematical calculus is used as a tool in Bayesian theories.

[31] Regarding the intersection of sovereignty, through mathematics we can develop various scenarios on territorial sovereignty and state power: we determine the most effective strategy to defend a country's borders or calculate the impact of a military intervention in a disputed area. At the same time, at the intersection of interests, mathematics analyses and even models the interactions between the different interests of states. More concretely at an applied level, it determines the economic effect of a trade treaty between two states or determines the impact of climate change on the natural resources and geopolitical interests of different states. Appropriate policies that take account of these possibilities can reduce the risk of conflict between states.

territories that are only imaginary lines that do not exist in reality. The development of science around disciplines, while promoting invaluable advances in knowledge, is proving insufficient, because this practice results in the negative effects of reductionism, often leading to a situation where the discipline is unable to solve the problems within its competence.

This type of research is extremely fruitful, providing a wealth of information, but, as Morin states in Kuhn's interpretation, "The development of science does not take place through the accumulation of knowledge, but through the transformation of the principles that organize knowledge"[32]. In the same vein, Nicolescu reinforces the importance of the advances provided by disciplinary research, but compares the proliferation of disciplines – with over eight thousand disciplines organized in Nicolescu's taxonomy — to a new Tower of Babel due to the diagnosis of their incommunicability.

Interdisciplinarity, on the other hand[33], establishes points of contact between disciplinary boundaries, relativising their sovereignty. Interdisciplinary research often gives rise to a new field of research with disciplinary characteristics by connecting two or more disciplines, such as biophysics and bioethics. This type of research weakens isolated scientific development because it establishes connections that require the opening of frontiers, but continues to privilege local and decontextualised knowledge, failing to recognise the complexity of its objects, which are connected to all things. Interdisciplinarity can be represented by the image below[34], in which each letter represents an autonomous discipline and relates to other fields to study a theme' [t]'.
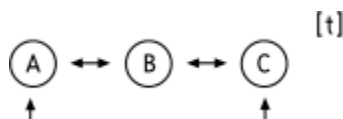

Multidisciplinarity addresses complex problems, dealing with systems that no single discipline can encompass, such as the Universe, the Earth, the ecosystem and environmental issues. It is usually developed by researchers from different fields focusing on a common problem, analysing it from the point of view

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[32] Morin, Edgar. *Science With Conscience*. Trad. Maria D. Alexandre and Maria Alice Sampaio Dória. 9. ed. Rio de Janeiro: Bertrand Brazil, 2005. p. 137.

[33] The thinker who proposed the scheme of evolution of disciplines was Eric Jantsch, who went so far as to differentiate between disciplinary, multidisciplinary, interdisciplinary (with categories), metadisciplinary and transdisciplinary research. All of these are plotted and are evolutionary stages of complexity. However, for the purposes of this research, these categories will be simplified, adopting the synthetic and nomenclatural classification (which differs subtly from Jantsch's) used by both Morin and Nicolescu for this evolution. An explanation, while indispensable at deeper levels of explaining transdisciplinarity, is dispensable. Transdisciplinarity, is dispensable for an introductory paper.

[34] Almeida Filho, *Naomar de. Transdisciplinarity and the post-disciplinary paradigm in health*. In: 'Saúde e Sociedade'. v. 14. n° 3. pp. 30-50. Sep-Dec 2005. pp. 38–40.

of different disciplines and establishing complementarities between analyses. In short, it is an association of disciplines around a problem whose scope falls outside the domain of a single discipline, requiring a joint effort to cover the problem. The figure below illustrates this approach, where 'D' represents the common problem that requires the cooperation of the other disciplines to address.
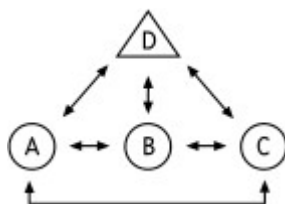

Finally, transdisciplinarity is only possible by considering its pillars, at this point emphasizing the complexity that affirms the connection of all things in a great polysystem. Nicolescu states that the prefix *trans* refers to 'what is at the same time between disciplines, across disciplines and beyond any discipline[35].' Furthermore, he proposes the reconnection between subject and object, acknowledging a margin of subjectivity in scientific research, supporting the margin of uncertainty and error at its various levels and domains. It does not constitute a new discipline, but merely promotes broad communication so that disciplines can serve as tools for understanding the world, addressing problems through contextualisation, globalisation, reconnection and complexification. According to Morin, 'transdisciplinarity today means indisciplinarity[36].' It is a cognitive schema that opens frontiers, forming the link between all knowledge and thus unifying science.

The representation below will be enlightening, where 'G' represents the problem to be addressed, but is properly contextualized in a system that interacts with all other spheres and their subdivisions[37]:

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[35] Nicolescu, 2005, p. 53.
[36] Morin, Edgar. *Introduction to Complex Thought*. Trad. Eliane Lisboa. 3. ed. Porto Alegre: Sulina,2007, p. 51.
[37] Although the picture does not illustrate it, each letter has its own divisions. For example, in the subject 'A' you will have identified as 'A1, A2, A3' etc.
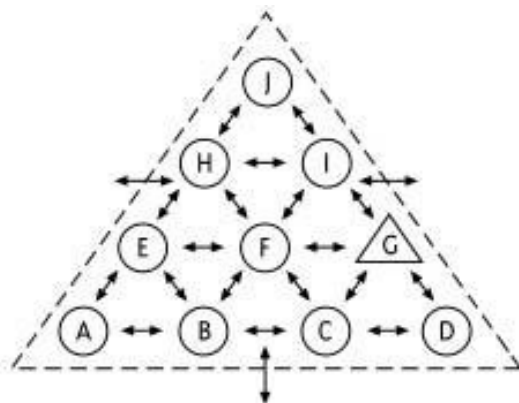
This type of research does not exclude the forms explained above; on the contrary, it needs them[38]. Transdisciplinary hypotheses aim to organise knowledge, but without disciplinary research this cannot be achieved. Nicolescu explains how all disciplines ─ like all things ─ are interrelated: *'Discovering this dynamic necessarily involves disciplinary knowledge. Although transdisciplinarity is neither a new discipline nor a new hyperdiscipline, it feeds on disciplinary research which, in turn, is illuminated in a new and fruitful way by transdisciplinary knowledge. In this sense disciplinary and transdisciplinary research are not antagonistic but complementary,[39]*.

In this way, the science of law, if seen as a polysystemic whole (based on the recognition of complexity through transdisciplinarity), will be seen in relation to other disciplines, making it possible to relate law to other social spheres and to the unity that these spheres (including law) form, and giving individuals space to express themselves.

In the light of the analyses carried out in this section, transdisciplinarity shows promise, but a challenge remains: how can we link this epistemological proposal to legal science? In order to answer this question, the next section will analyse the structure of scientific revolutions proposed by Kuhn, linking it to the current paradigm of Law and Transdisciplinarity.

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[38] Article 3 of the Charter for Transdisciplinarity says: 'Transdisciplinarity is complementary to the disciplinary approach: it brings out new data from the confrontation of the interlocking disciplines; it gives us a new vision of nature and reality. Transdisciplinarity does not seek to dominate the various other disciplines, but to open them all up to what cuts across and goes beyond them.' (Freitas; Nicolescu; Morin. 1994).

[39] Nicolescu, 2005, p. 54.

3. Paradigm Shift Based on a Scientific Revolution

Transdisciplinary studies are beginning to emerge in the legal sciences[40]. Alongside all this, for the transdisciplinary method to work properly, it is necessary for it to be at the *paradigmatic* level, and not just to relate to transdisciplinary elements.

Promoting transdisciplinary research in legal science means understanding legal phenomena from a transdisciplinary *point of view* and *attitude*, not by simply drawing parallels or appropriating elements to label research as complex or transdisciplinary, thus becoming a fad, as Ernildo Stein says[41].

Nicolescu explains that there are degrees of transdisciplinarity, just as there are degrees of scientificness[42]. Taking the transdisciplinary proposal to a paradigmatic level would maximise the degree of transdisciplinarity in legal research. In law, at present, this is mainly carried out at a local level and far from the scientific proposal of the Charter, but it is nevertheless an extremely useful approach, as it contributes to the propagation of this perspective[43]. However, considering transdisciplinarity as a paradigm, as a guiding star for research, would offer new horizons for such studies.

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[40] Irma J. Kroeze, *Legal Research Methodology and the Dream of Interdisciplinarity,* PER/PELJ 2013 (16)3, pp. 36–65, http://dx.doi.org/10.4314/pelj.v16i3.3; or de la Rasilla del Moral, Ignacio, *Notes for the History of New Approaches to International Law – Not a Map but Perhaps a Compass* (April 24, 2012) 'New Approaches to International Law: The European and the American Experiences' (ed. by David Kennedy & José María Beneyto, T.M.C. Press 2012 (Forthcoming), Available at SSRN: https://ssrn.com/abstract=2045719.

[41] Stein, Ernildo. *Preface.* In: 'Streck, Lenio Luiz. *Hermenêutica Jurídica e (m) crise: uma exploração hermenêutica da construção do Direito.* 8 ed. Porto Alegre: Livraria do Advogado, 2009.' pp. 6–10. p. 6.'*We should write about certain topics only when our analyses have opened up a new space. Otherwise, we fall into repetition. Gloss or even parody. In the field of law, this has happened with scandalous frequency. That's why we rejoice whenever a new perspective presents itself, whether it's to broaden our theoretical vision, raise hypotheses about case law or make a new contribution to the epistemic universe.'*

[42] '[…] there are degrees of disciplinarity proportional to the greater or lesser fulfilment of the three methodological postulates of modern science. In the same way, the greater or lesser fulfilment of the three methodological pillars of transdisciplinary research generates different degrees of transdisciplinarity. Transdisciplinarity research corresponding to a certain degree of transdisciplinarity will be closer to multidisciplinarity (as in the case of ethics); to another degree, it will be closer to interdisciplinarity (as in the case of epistemology); and to another degree, it will be closer to disciplinarity.' (Basarab Nicolescu, 2005, p. 55).

[43] Interdisciplinary and multidisciplinary studies are common in legal research, with more and more lines of research emerging in this direction. However, the CIRET-UNESCO project, a result of the 1997 Locarno International Congress on Transdisciplinarity, explains that with regard to transdisciplinarity, 'the aim of pluri [or meta] and interdisciplinarity is always disciplinary research' (Basarab Nicolescu). All these forms of research, disciplinary, interdisciplinary, multidisciplinary and transdisciplinary, are necessary and complementary. Transdisciplinary studies are still a few.

3.1. The Structure of Scientific Revolutions for Thomas Kuhn

The purpose of this article in reflecting on the transdisciplinarity of law is precisely to demonstrate that transdisciplinarity, not only as a method, but especially as a *vision* and *attitude*, must be seen as a paradigm; otherwise its proposal will be distorted. In this vein, Kuhn's reflections are timely because they clarify how one paradigm in one scientific community succeeds another.

The semantics of the concept of paradigm[44] is used by Thomas Kuhn in two main senses[45]: *[…] 'Paradigm' is used in two different senses. On the one hand, it indicates the whole constellation of beliefs, values, etc. shared by members of a given community. On the other hand, it denotes a type of element in that constellation: concrete solutions to puzzles which, when used as models or patterns, can be used to solve problems[46].*

One sense encompasses the other. The broadest is called the *disciplinary matrix,* which is referred to when we talk about the paradigmatic revolution. It consists of a) *symbolic generalisations*, which manifest themselves in the use of symbols by the scientific community, which also gives these symbols their own semantics ─ such as the elements of an equation in physics (*$E=mc^2$ in* relativity theory), or the concept of *resolution* in the law of obligations, for example. b) *collective beliefs and commitments*, which constitute the presupposition from which scientific research starts, and these presuppositions are not questioned ─ as if they were dogmas ─ such as the belief in the non-existence of atoms, present in physics until the 18th century, or, to a lesser extent, the belief in the non-existence of atoms. c) *values,* which are initially subjective elements that are reflected in research, in Kuhn's words: '[…] theory must be chosen for reasons that are ultimately personal and subjective'[47]. This characteristic manifests itself in relation to the theoretical choices that are given to the research. There is therefore a margin for subjective values that will be objectified by the community and will constitute the paradigm. d) *the example*, as the second meaning of the term paradigm, which designates the formation of the researcher within a certain disciplinary matrix, which takes place from the beginning of his/her career. The various factors that contribute to the constant formation of the scholar constitute the *exemplar*.

This training creates a paradigm, in the sense that it will be the prism from which the scientist will view his research[48].

With *paradigm* concepts *in hand,* it is possible to enter into the merits of

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[44] From the Greek *parádeigma*, giving the idea of pattern and pattern.

[45] The term is polysemic, and twenty-two different definitions can be found in Kuhn's work. But of these, only the two used in this research are indispensable.

[46] Kuhn, Thomas S. *The Structure of Scientific Revolutions*. Trans. Beatriz Vianna Boeira et al. 5. ed. São Paulo: Perspectiva: 2000. p. 218.

[47] Ibid, p. 245.

[48] Ibid, pp. 227–232.

the forms of development of scientific knowledge indicated by Kuhn.

The first of these relate to the accumulation of knowledge through continuous analysis of the subject matter, fragmenting and progressively verticalising knowledge. If problems arise in this research, in order to maintain the consistency of the scientific premises with the results obtained, it is sufficient to create a new category or a local reformulation of the concepts, without having to change the premises guiding the research.

This form of development relates to most research, which increasingly fragments its object, delimiting it in order to better understand it, as described by Descartes's second rule of method[49]. Lately, this type of research[50] has begun to fragment not only objects, but also to compartmentalize disciplines, a context in which Nicolescu states that there is a new Tower of Babylon. The same context allows Hilton Japiassu to state that 'We have reached a point where the specialist is reduced to the individual who, at the cost of knowing more and more about less and less, comes to know everything (or almost everything) about nothing'[51]. Kuhn also states that sometimes the accumulation of knowledge runs into inconsistencies that cannot be resolved by changing categories or local reforms, making it necessary to change the premises on which the research is based so that the results obtained will again make sense. In other words, removing paradoxes requires real *scientific revolutions*.

This is the second way in which scientific knowledge is developed. These are *revolutions* in which the previous paradigm is abandoned, which requires more profound changes, opening up space for the establishment of new premises capable of guaranteeing the coherence of scientific activity for the time being.

Scientific revolutions can be schematically represented as follows[52]:

Prescience → normal science → crisis/revolution → new science.

The first stage, called foreknowledge, is characterised by a relative acceptance of fundamental concepts. At this level there is not really a scientific community that shares a paradigm that prescribes a method and it is a disorganised activity that precedes the formation of normal science.

Normal science, on the other hand, is practiced by a scientific community

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[49] 'To divide each of the difficulties we are examining into as many tranches as possible and as many as necessary to better solve them.' (Descartes, René. *Discurso do Método*. Trad. J. Guinsburg and Bento Prado Júnior. 2 ed. São Paulo: Abril Cultural, 1979. —The Thinkers–. pp. 37–38.).

[50] Kuhn, Thomas. *The Way from Structure: philosophical essays*, 1970–1993, with an Autobiographical Interview. Edited by James Conant and John Haugeland. Trad. Cesar Mortani. São Paulo: UNESP, 2006. p. 128.

[51] Japiassu, Hilton. *The Transdisciplinary Dream and the Reasons for Philosophy*. Rio de Janeiro: Imago, 2006. p. 28.

[52] Chalmers, Alan F. *What is Science Anyway*? Trad. Raul Fiker. São Paulo: Brasiliense: 1993. p. 124.

in which all the characteristics of a *disciplinary matrix* can be verified. In addition, work in normal science is carried out with the help of the first form of knowledge pointed out by Kuhn, namely the accumulation of information which is organised in the light of the paradigm. However, in the course of research, problems and limitations may arise in their method or in the coherence of the information discovered. As already mentioned, most of these can be resolved.

However, some problems constitute real crises which, in order to be overcome, require changes in the disciplinary matrix, a context in which the paradigmatic revolution guiding the scientific community takes place.

Kuhn states that revolutions are necessary because 'there are no inductive procedures for arriving at perfectly adequate paradigms. Consequently, science must contain within it a means of moving from one paradigm to a better paradigm'[53]. For example, this happened in the transition from Newtonian physics to Einstein's relativity, a theory that can explain why the orbit of Mercury behaves differently from that predicted by Newton's gravity. However, the acceptance of Relativity involves revolutionising the physics paradigm that existed until then. The same reasoning can be observed in law, where a metaphysical ideal of justice derived from natural law has been abandoned, giving way to legal positivism.

Thus, in the light of the new paradigm, a new science emerges which, after the paradigmatic transition, will be seen as a normal science and can develop until it encounters a new crisis, which, to be overcome, will require a new revolution, and so on[54].

Finally, Kuhn highlights three main characteristics of scientific revolutions: first, they are *holistic,* since they affect the whole paradigm, leading to changes in values, premises, symbolic generalizations, etc.; as a corollary of the first characteristic, the second one appears, which is the *need for a new taxonomic formulation to* organize the elements of the *new science*. As the guiding principles of the paradigm are modified by the first feature, concepts that are taught in the light of this new paradigm will have to be adapted, leading to a reorganisation of the disciplinary matrix to promote coherence of science; the third and final feature is the need for a new taxonomy.

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[53] Chalmers, *op. cit*., 1993, p. 135.

[54] There is another implicit question worth addressing: to what extent do revolutions in one science affect other sciences? For example, Transdisciplinarity, which uses elements from physics to think about the human sciences, if there is a revolution in that science, will it be affected? The answer to this question depends on how the relationship between the sciences is viewed. Thus, considering that there is a link between all of them, as Complexity demonstrates, a revolution in one field would affect all the others. For example, in the modern era, when the ideal of accuracy in physics was seen as a model to be copied by the other sciences. In addition to these issues, the intensity of the effects of a revolution in one science on other fields is directly related to the level of generalisation of the science (the idea of levels of reality), i.e. the broader the scope of a science, the greater the implications for other fields, so that a revolution in one field would affect all the disciplines it encompasses and other related fields, but a revolution within a specific discipline of a field – e.g. a branch of biology – would not have the same effect.

The main feature involves *changing the semantics of* pre-existing concepts. For example, the concept of *gravity has a* different semantics in Newtonian physics than that used in quantum physics, and the concept of *justice* in the legal sciences has different definitions depending on the paradigm in which it is thought. In Kuhn's words, this feature involves changes in 'knowledge of nature which is intrinsic to language itself and which is therefore prior to anything that can in any way be characterized as description or generalization, scientific or every day'.

The perception of Law from a transdisciplinary perspective, within what Transdisciplinarity aims to be, is only possible if a paradigmatic revolution is achieved. Below we will analyse some guidelines for legal education that show signs of transdisciplinarity and can be interpreted as the beginning of a new paradigm.

3.2. Signs of the Transdisciplinarisation of Law and its Close Correlation with Education

Adopting transdisciplinarity requires a paradigm shift ─ through a change *of attitude* and worldview ─ and cannot be implemented programmatically, i.e. by simply reformulating disciplines.

This means that it is not enough just to have a project that takes a transdisciplinary approach. Transdisciplinarity, in addition to a scientific methodology, is an *attitude* and a worldview that its scientific methodology incorporates. Thus, the incorporation of interdisciplinary research into curricula or the creation of multidisciplinary research lines are indispensable but insufficient to recognise the potential paradigm. To this end, a deeper reform is needed.

In the field of law, there have been recent developments that are worth addressing, as they represent important steps towards the paradigmatic transition, even if they act only at a programmatic level, but favour the paradigmatic one.

In Brazil, Resolution CNE/CES No. 5 of 17 December 2018[55], which establishes the curricular guidelines for the undergraduate course in Law, in Article 2, § 1, IV, when referring to the pedagogical project, states that it must include interdisciplinarity as an element of the Law programme. This legal provision can be interpreted extensively to cover higher degrees of interdisciplinarity ─ as Jean Piaget did when he first used the term transdisciplinarity as an advanced level of interdisciplinarity[56]. At least in the field of epistemology, interdisciplinarity was a step towards Transdisciplinarity. In the case of legal education, at the right time, the same phenomenon may operate.

Also in the same resolution, there is the following provision: *'Article 3.*

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[55] Brazil. National Education Council. Higher Education Chamber. Resolution n° 5, 17 December 2018 Available at: </http://portal.mec.gov.br/docman/dezembro-2018-pdf/104111-rces005-18/file >. Accessed on: 28 Apr. 2024.
[56] Basarab Nicolescu, *op. cit.,* 2006, pp. 142–143.

The undergraduate degree course in Law must ensure that the student profile includes a solid general, humanistic and axiological training, the ability to analyse, master legal concepts and terminology, to argue adequately, to interpret and appreciate legal and social phenomena, combined with a reflective attitude and a critical outlook that foster the capacity and ability for autonomous and dynamic learning, indispensable for the practice of legal science, the dispensation of justice and the development of citizenship.' And in Article 5, I: *'The fundamental training axis aims at integrating the student in the field, establishing the relationship between Law and other fields of knowledge, including studies involving essential contents of Anthropology, Political Science, Economics, Ethics, Philosophy, History, Psychology and Sociology.'*

In order to achieve the same objectives as these norms of Resolution CNE/CES No. 5, the proposal for the transdisciplinarisation of Law is presented, as its epistemological basis will provide the necessary support for the realisation of the pedagogical guidelines presented for legal education. The full effectiveness of Resolution CNE/CES No. 5 cannot be achieved by studying the various fundamental disciplines in isolation, even if they are verticalised. It is essential to organise them by highlighting their mutual interactions, identifying the common objectives of these disciplines for the humanistic training of lawyers. And this possible organisation between the different fundamental disciplines of the undergraduate law course would find an abundant source in Transdisciplinarity, the aim to which the proposal for the transdisciplinarisation of Law contributes.

Decision No. 75 of the National Council of Justice[57], in Annexe VI, states that magistrates must have knowledge of legal sociology, judicial psychology, ethics, philosophy of law, general theory of law and politics, which are essential disciplines for understanding the legal phenomenon. This resolution does not mention the communication of these disciplines, but given that their objective is *humanistic education* (title of the Annexe) it is implicit that they revolve around this axis, assuming a multidisciplinary bias.

National systems, however, are not ready for a transdisciplinary approach to law. For example, in Romania, Annex 24 of the Order of the Minister of National Education and Scientific Research no. 6129/20.12.2016 does not recognize interdisciplinary articles or participation in interdisciplinary scientific events, even when the topic is strictly related to law. Only participation in conferences or congresses organized by international scientific societies 'in the candidate's specialization'[58] are recognized by positive points. At the time of writing, the

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[57] Brazil, National Council of Justice, Resolution No. 75 of 12 May 2009. Available at: <http://www.cnj.jus.br/index.php?option=com_content&view=article&id=7506:resolucao-no-75-de-12-de-maiode-2009&catid=57:resolucoes&Itemid=512>. Accessed: 1 Mar. 2010.

[58] The Order of the Minister of National Education and Scientific Research no. 6,129/20.12.2016 approves the minimum necessary and mandatory standards for the awarding of teaching titles in higher education, professional degrees in research and development, the quality of the PhD supervisor and the habilitation certificate. The new minimum standards, available in the annexe to the

public consultation process for new standards has been completed with a view to issuing a new Ministerial Order to recognise the validity of some types of inter-disciplinary or transdisciplinary research. The new draft of the Minimum Standards necessary and obligatory for the conferral of the teaching title of university lecturer and the professional rank of scientific researcher grade II includes a provision in the text of the Commission for Architecture and Urbanism, which recognises: 'Publications *in extenso* in the proceedings of scientific conferences in architecture, urbanism, landscape architecture, design and restoration, and related sciences – for transdisciplinary specialisations, at international/national/local level'. In the same Draft, the Commission of Legal Sciences for the verification of the national minimum standards necessary and obligatory for the conferral of the title of University Lecturer recognises for the first time at this level in paragraph C that 'The organising entity may also have an interdisciplinary profile – if it has an expressly mentioned legal component: e.g. philosophy of law, sociology of law, economic analysis of law'.

In reality, in fact, legal education in Romania is carried out even on levels connected to transdisciplinarity, so that it becomes incomprehensible to maintain regulatory provisions that limit the modern development of specialists.

There is a growing awareness among legal scholars and practitioners of the need to move beyond traditional disciplinary boundaries in order to understand and respond to the complexity of international legal issues. This transdisciplinary approach to international law education is being embraced in Romania, as evidenced by the increasing number of courses and programs that incorporate both legal and non-legal disciplines. The University of Bucharest offers several courses in international law that incorporate transdisciplinary elements, such as Environmental Law, International Economic Law and International Human Rights Law[59]. These courses are taught by legal scholars, but also draw on expertise from other disciplines such as economics, political science and sociology. They are to focus on an interdisciplinary approach to international law, exploring the ways in which different disciplines can contribute to understanding and addressing the complex issues of international law. The Romanian National School of Political and Administrative Studies in Bucharest also offers a range of courses in international law with a transdisciplinary approach, including courses on International Human Rights Law, International Environmental Law and International Trade Law, among others. These courses are taught by experts from different disciplines, including law, international relations and political science. The University of Craiova also offers courses in transdisciplinary international law

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ministerial order, for each CNATDCU committee, are the result of a broad public consultation organised by the Ministry of Education in November on the basis of proposals drawn up by the National Council for the Accreditation of University Degrees, Diplomas and Certificates (CNATDCU).

[59] University of Bucharest, master's degree in European Law and Policy, http://www.faa.unibuc.ro/en/studyprograms/master_degree_programs/european_law_and_policy.

focus on the interaction of legal and non-legal perspectives on international law. Among the topics covered are International Human Rights Law, International Environmental Law and International Commercial Law. The National University of Political Studies and Public Administration in Bucharest also offers courses in international law with a transdisciplinary approach[60] to focus on the relationship between international legal and non-legal disciplines, exploring topics such as International Human Rights Law and International Environmental Law[61].

Finally, the University of Oradea offers a range of courses in international law, including International Human Rights Law, International Environmental Law and International Trade Law, with a transdisciplinary approach. These courses are taught by legal scholars, but also draw on expertise from other disciplines such as economics, political science and sociology.

In the context of the accelerated evolution of society and technology, the need to adapt the legal discipline through education is obvious. In a sense, law is forced by the dynamics of society to change through interconnection. We consider the importance of integrating social aspects, including gender perspective, cultural diversity and social responsibility, into the legal learning process. We also consider the impact of technology on legal practice, highlighting the need for robust training in emerging technologies such as artificial intelligence, blockchain and cyber security. It has become more important than ever to pay particular attention to the ethical dimension, stressing the importance of legal training in professional ethics and awareness of the ethical consequences of legal decisions.

An effective transdisciplinary law curriculum should provide students with skills and knowledge that transcend the boundaries of traditional specialisation and foster a holistic understanding of legal issues, which argues for the need to establish an international transdisciplinary department in legal education institutions. This would facilitate the exchange of experience and knowledge between

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[60] National University of Political Studies and Public Administration, European Union Studies Program, http://www.snspa.ro/en/study-programs/master-programs/european-union-studies-program; or Romanian Institute of International Studies, International Law and Global Governance Program, http://www.irsi.ro/en/international-law-and-global-governance-program/.

[61] At the university level, for example, the National University of Political Studies and Public Administration (SNSPA) offers an interdisciplinary program in European Union Studies (EUS), which is designed to provide students with the skills and knowledge to understand the ever-evolving challenges posed by the European Union legal framework. The program combines courses in the fields of law, economics, political science, sociology, and international relations. At the post-graduate level, the Romanian Institute of International Studies (IRSI) offers a specialized program in International Law and Global Governance. This program combines courses in international law, economics, international relations, and public policy – as well as a dissertation – in order to develop a comprehensive understanding of the legal, political, and economic context of international relations. Several universities in Romania have begun to offer courses that combine traditional legal studies with other disciplines, such as philosophy, political science, and economics. For example, the University of Bucharest offers a master's degree in European Law and Policy that blends courses in law, economics, and political science to provide an in-depth understanding of the European Union's legal framework.

specialists from different fields, thus contributing to the formation of a generation of lawyers prepared for the future of our planet.

Discussions at this stage are concerned with the extent to which the curriculum is adaptable and responsive to societal metamorphoses while ensuring its relevance. Last but not least, future perspectives are considered, including how the curriculum can evolve in line with anticipated changes at the macro, meso or micro level. The latter includes the introduction of compulsory cross-disciplinary literacy courses in the law school curriculum. First and foremost, the Chair would serve as a conducive environment for the exchange of experience and knowledge between specialists in different areas of law globally. On the one hand, opportunities for collaboration and dialogue between professors, researchers, other international scholars and practitioners foster diversity of perspectives and approaches in the teaching process, and, on the other hand, students gain access to diverse contexts and perspectives, preparing them to work in international and multicultural legal environments[62].

At the level of educational units, such an international chair attracts world-renowned professors and researchers, strengthening the faculty's reputation for transdisciplinarity. This facilitates academic exchange and contributes to the development of a dynamic and influential academic community, which serves as a centre of innovation, encouraging continuous curriculum development to respond to transformations in the legal field and in society. New areas of study can be developed, and finally the law can gain a serious chance for its evolution, and this would be worth every possible effort to achieve this goal.

In conclusion, the shift from one paradigm to another, i.e. from the current disciplinary view of law to a transdisciplinary one, will have repercussions on new horizons of research and teaching in legal sciences. The documents cited can be interpreted in a way that corroborates these ideas.

Once we have clarified how the paradigmatic transition from the current disciplinary approach to law to a transdisciplinary one takes place, and what it will take to overcome this phenomenon, a new question arises: how can we think about the law from a transdisciplinary perspective? In order to point to a possible way to solve this question, as well as to verticalise the analysis of the paradigmatic revolution within legal science, the following point will be developed.

4. The Crisis of the Legal Paradigm and the Possibility of its Transdisciplinarization

Law centralises the most important decisions of a society (in all its complexity), so a transdisciplinary *attitude* and *vision* can greatly contribute to a global understanding of the role of law in a polysystemic whole. All social issues

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[62] There is a need for a rigorous platform for academic programmes and cross-border research projects capable of providing students with opportunities to engage with international legal issues and develop intercultural competences.

have an impact on the law, so the actions of lawyers will affect the course of society.

Allowing the legal order to be operated only by lawyers without a complex vision of the legal phenomenon, thinking of it as an object detached from society, may burden this whole order, which is why a complex thinking of law is needed. So, just as Morin said that 'science is too serious a process to be left solely in the hands of scientists[63]', so to law is too important to be left solely in the hands of lawyers. Moreover, since the law centralises all problems, whatever their nature – sociological, moral, economic, etc. – it is transdisciplinary par excellence.

In order to better problematize these issues, the first part of this section will explain why legal positivism can be considered the paradigm of legal science; the second part will identify some of the reasons for its crisis, such as the disconnection from the empirical plane and the distancing from ethical-political issues in the context of contemporary philosophy of law; and in the third and final part, we explore the possibility of transdisciplinarization of law in the context of the crisis of its paradigm.

4.1. Legal Positivism as a Current Paradigm in Legal Science

For a new science to emerge ─ in Kuhn's framework ─ there must first be a crisis in normal science. Therefore, we must first identify the paradigm of law.

The dominance of the legal positivist way of thinking about law is notorious[64], and can be considered the paradigm of law. Wayne Morrison states that 'legal positivism is a label that covers a set of related approaches to law that have dominated Western jurisprudence for the past 150 years'[65].

Legal positivism has exerted and still exerts a particular influence on the development of the science of law[66], and consequently on its practice, since this science has developed on the basis of its epistemological proposition. This was first formulated by John Austin, in his line of thought known as Analytical Jurisprudence, which sought to make only factual judgments, not value judgments, in legal matters. Later, legal positivism reached its (epistemological) peak in Hans Kelsen, who, building on Austin's foundation, the Kantian categories of *being*

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[63] Morin, 2005, p. 133.

[64] Legal positivism by no means sums up the science of law, but its important place is undeniable. Therefore, this research will examine only this line of thought.

[65] Morrison, Wayne. *Philosophy of Law: From the Greeks to Postmodernism*. Trans. Jefferson Luiz Camargo. Technical revision Gildo Sá Leitão Rios. São Paulo: Martins Fontes, 2006. p. 4.

[66] It should be noted that legal science does not refer to the branches of law, which relate more deeply to legal texts, using their own hermeneutics legal texts, which use their own hermeneutic methods and their own language. The science of law discussed in this chapter is the science that deals with the legal order. studied mainly by Philosophy of Law and General Theory of Law.

and *being and the* scientific matrix of the Vienna Circle, developed the Pure Theory of Law, a landmark work for law[67]. Legal positivism brought invaluable advances to the science of law. However, in the face of complexity and transdisciplinarity, it has limitations and shortcomings that deserve to be highlighted.

To this end, this research will only examine Kelsen's thinking on methodological issues. Jurists who have continued Kelsen's thought, such as Bobbio, Hart, Ross, etc., are considered *post-Kelsenian* because they cannot be understood without *Kelsen*'s thought. They improved the description of positive law on the basis of Kelsen's epistemological proposal, without going into the epistemological problems that characterise this paradigm.

Thus, disciplinary presuppositions are predominantly developed by Kelsen. The epistemological discussion of post-Kelsenians, compared to their theoretical framework, is simplified. Therefore, in order to establish a dialogue between the disciplinary approach of legal positivism and transdisciplinarity, the analysis will be limited to Kelsen's contributions in Pure Theory of Law. Only epistemological issues will be analysed. Starting from its epistemological basis, all other important features of the law described appear as a logical consequence of the methodology used[68].

4.2. The Crisis of Legal Positivism. Some Particular Details of International Law

The aim of pure legal theory is to study valid positive law, in other words, the universe of legal norms in a given society. Thus, it seeks only to *describe* positive law as it is, without *prescribing* how it should be. This description is carried out under the aegis of an eminently disciplinary methodology and, as such, has limitations in the face of the proposed paradigm of transdisciplinarity.

The disciplinary approach manifests itself mainly in the delimitation of the subject matter. In order to describe the legal order, it has been isolated and decontextualised from its relations, whether global or with other social spheres,

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[67] Morrison, *op. cit.,* 2006, p. 410. Morrison also points to three features of this paradigm: (i) the argument that law is a human creation; (ii) the claim that our analysis of law would follow the methodologies that have been successful in the natural sciences, specifically that they would be value-free, and that the quest of legal philosophy is a search for 'realist' truth; and (iii) that the concept of law does not imply any substantive moral claims; in other words, that empirically, law can present/represent any ideological or moral position.'

[68] This is not the place to analyse all the points in Kelsen's broad theoretical formulation. In attempting to describe the Law in isolation, it is inevitable to reach conclusions that are so close to Kelsen's, if not identical, that it would be futile to carry out a symbolic analysis of the symbolic recapitulation of the characteristics of the law verified by legal positivism. The fact that the legal order is structured in a step-by-step manner, with a hierarchy of that every act has a legal significance; that the sanction is the legal consequence of the offence; that magistrates carry out the authentic interpretation of legal rules, etc. These are important features of pure legal theory, but they are not its essence for this analysis.

so that only the legal order has been analysed in a *purely[69]* way.

All elements of politics, economics and sociology, as well as moral issues, are removed from law. Thus, everything that is not eminently legal is eliminated from the pure Theory of Law. This disciplinary pruning is done in order to delimit the object of legal science, which does not include other dimensions, but only the legal one, because otherwise there would be influences from other disciplines in the study of the legal order. Kelsen justifies this approach in order to 'avoid a methodological syncretism that obscures the essence of legal science and dilutes the limits imposed by the nature of its object[70]'.

Kelsen's perspective on the law has undeniably contributed to the development of legal science and legal practice, but it has limitations inherent in the disciplinary approach. Among the main criticisms of Kelsen's thought is that the Pure Theory of Law eliminates the relationship between law and justice, so that a legal order can be valid whether or not it conforms to a particular conception of justice[71].

It follows that the pure theory of law is an eminently formal, structural theory that can be used to analyse a positive legal order. The idea of the methodological principle used is to delimit the object. Moreover, by pursuing the judgement on the object (a widely accepted principle in epistemology-the importance of epistemological ethics), the importance of ethical considerations on law is not denied, only that this issue belongs to another discipline and is not the subject of Pure Theory of Law. This excuse is valid in the disciplinary approach ─ and to a lesser extent in inter- and multidisciplinarity and multidisciplinarity ─ but it is not accepted in the spirit of transdisciplinarity, which aims at a global understanding of phenomena.

From this premise, legal science deals only with the validity of legal rules, regardless of their moral content. The only validity that matters for legal theory to analyse is the validity of positive law as a structure. According to this premise, legal science is concerned only with the validity of legal norms, regardless of their moral content. For pure legal theory, the only validity that matters is the validity of positive law as a structure.

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[69] Kelsen, Hans. *Pure Theory of Law*. João B. Machado. 7. ed. São Paulo: Martins Fontes, 2006. p.1. In Kelsen's words: *'When it calls itself a "pure" theory of law, it means that it intends to guarantee a knowledge that concerns only law and to exclude from this knowledge everything that does not belong to its object, everything that cannot be rigorously determined as law. In other words, it wants to free legal science from all elements that are alien to it. This is its fundamental methodological principle.'*

[70] Ibid, p. 2.

[71] Kelsen, Hans. *The Problem of Justice*. João Baptista Machado. 4. ed. São Paulo: Martins Fontes, 2003. p. 11. In Kelsen's words: *'To disregard the validity of all rules of justice, both the validity of those which are in contradiction with a rule of positive law and those which are in harmony with a rule of positive law, i.e. to admit that the validity of a rule of positive law is independent of the validity of a rule of justice – which means that the two rules are considered to be simultaneously valid – is precisely the principle of legal positivism.'*

A related criticism, and one of the most striking aspects of reductionism, is that the legal order is described independently of the social sphere. As a corollary, the question of the efficacy of legal norms, their applicability in the social sphere, is excluded on the grounds that this question is a matter for sociology and not for a positive legal science[72]. In this point, as well as in several other ─ such as the problem of the validity of law ─ Kelsen does not deny the relevance of these questions nor their correlation with law, but stresses that the solution of these problems originating in the relation of law to objects in other disciplines must be solved outside the science of law, whether in philosophy, sociology, economics or political science[73]. These criticisms exemplify the fact that Kelsen has been widely criticized for his theory of not taking into account elements he did not set out to analyze when he delimited its subject matter. However, in the context of the Pure Theory of Law, Kelsen cannot be criticized for this position because his intention was not to address such issues. Thus, within his sole objective of describing Law, it makes no sense to enter into meta-legal issues that are the subject of autonomous sciences.

Today, there are a number of legal phenomena that legal positivism cannot address, in particular institutions or branches of law that have a certain international character. An example of this is the phenomenon of *Lex mercatoria*, which, in general terms, is a systematisation of rules based on custom and customary law that aims to accompany the development of private legal relationships at international level. Theories of legal positivism cannot be used to understand this phenomenon.

As far as public international law is concerned, a number of questions remain which we will address below. Looking at its historical development, we cannot fail to note that it is a relatively new branch of law, being the creation of states as traditional, classical subjects of international law. Today, public international law is a fundamental discipline, which stands out for its expansion, effervescence and importance against the backdrop of the current global problems requiring very close cooperation between its subjects. *Just as the instinct of sociability leads man to form the family, the tribe, the state, so to the state – although at first isolated – is forced over time to enter into contact with other states*[74]. Alongside states, the family of participants in legal relations under international law has multiplied, giving rise to international organisations, for example.

Today's society is experiencing an unprecedented level of internationalisation, be it through technological advances, the kaleidoscope of global crises, armed conflicts or financial and health reforms. Solutions to manage and prevent

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[72] Kelsen, Hans. *What is Justice?* Trad. Luís Carlos Borges. 3. ed. São Paulo: Martins Fontes, 2001. p. 264-265.

[73] These criticisms have been cited because they reflect the evolution of legal phenomena, in all their complexity, which can no longer be understood on the basis of legal positivism.

[74] H. Bonfils, P. Fauchille, *Manuel de Droit International public (Droit des Gens),* 3rd ed. Arthur Rousseau, 1901, p. 3.

them have led to the proliferation of digitalisation and the search for new strategic solutions, including from a theoretical point of view. Society has therefore turned towards the development of international norms, creativity and transdisciplinarity as a tool for understanding and regulating all the problems arising from them, noting the influence of strategic and technological developments on the meaning and interpretation of international law itself[75]. But how can we connect all this today and create new spaces in legal creativity?

For international law, in essence, legal positivism argues that the law should be seen as a set of written rules, and that legal authority derives from a higher source, such as the constitution or international treaties, rather than from moral or natural principles. From this point of view, there is only one possibility: to bring positivism within the limits given by the fact that there is no central authority in public international law; otherwise state sovereignty would be vulnerable. Paradoxically, on the other hand, legal positivism focuses on the respect and application of the rules and procedures laid down in international law, which can help maintain the sovereignty of states in relation to other states and international entities. The rationale extends to strengthening the peaceful settlement of disputes by avoiding the escalation of conflicts and maintaining international peace and security, or promoting equality between states and respect for each other's sovereignty by building and maintaining a climate of trust and cooperation.

Tracing historical developments, we can observe another characteristic of international law: the shift of this field from isolation to actual universality, from statocentrism to cosmopolitanism. Some authors consider that international law became universal when jurists from semi-peripheral countries, such as Japan, the Ottoman Empire and Latin American states, appropriated the legal thinking of the European international community[76]. International law is moving from anonymity to universality, amid increasing interconnections between the subjects of this law[77]. This universality is, in fact, the direction towards the transdisciplinary destination and represents a relevant natural evolution given by the society in transition. It can be said that transdisciplinarity and universality support each other in the destiny of international law.

However, in international law legal positivism is often applied to analyse and interpret international treaties and other sources of its own. The focus is on the rules and procedures established under international law and how they are

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[75] Cristina Elena Popa Tache**,** *Le dynamisme du droit international public contemporain et la transdisciplinarité,* Preface by Florent Pasquier, Ed. L'Harmattan Paris, the collection 'Le droit aujourd'hui', 2023, p. 9.

[76] For more details, see Arnulf Becker Lorca*, Universal International Law: Nineteenth-Century Histories of Imposition and Appropriation*, 51 Harv. Int'l L. L. J. 475, 2010; and Ward Christopher, *The Universal Language of International Law: History and Prospects,* in Chinese (Taiwan) Yearbook of International Law and Affairs. Leiden, The Netherlands: Brill | Nijhoff. 2020, pp.6-13, DOI: https://doi.org/10.1163/9789004443297_003.

[77] Charney Jonathan I., *Universal International Law*, in The American Journal of International Law, vol. 87, no. 4, 1993, pp. 529-51. JSTOR, https://doi.org/10.2307/2203615.

applied by states and other international legal entities. In order to manage some practical issues, the focus is on compliance with and interpretation of the texts of international treaties, protocols and conventions, as well as compliance with recognised international custom and the relevant case law of international courts. It is an approach that focuses on concrete rules and procedures rather than on moral or ideological principles.

This has led to some criticism. Some specialists are opposed to international normative positivism, mainly because of the minimal space in which the above would be possible. Moreover, they consider that 'non-positivism in international law (i) does not lead to quietism in terms of norms (ii) or in terms of the system as a whole (iii) does not give too much power to international judges or (iv) do not act against democratic values, (v) does not lead to anarchy and (vi) cannot be an instrument of imperialism, but rather an instrument against it'[78]. These criticisms are directed more at the idea that international legal positivism is a good thing than at the idea of extracting what is necessary and real from it to be useful today. Specifically, the criticisms converge along the extreme lines: good or bad or traditional or exclusive positivism versus nontraditional inclusive positivism. For example, while Joseph Raz believes that the separation of law and morality is inevitable, Ronald Dworkin is convinced that it is impossible[79].

By its characteristics, legal positivism provides certainty and predictability in the interpretation and application of international law, which contributes to maintaining order and stability in international relations, facilitates consensus and cooperation between states by establishing clear rules and a legal framework acceptable to all international actors. All of these are set in the category of benefits. On the other hand, a criticism of positivism in international law is that it can be too rigid and inflexible in its approach (which is tantamount to difficulties in adapting the law to changes in society and in solving often difficult problems), it can limit the ability of international law to promote justice and morality because it focuses exclusively on compliance with established rules and procedures, without taking full account of ethical and moral issues.

Legal positivism sometimes ignores or underestimates human needs and individual rights in favour of the strictly formal application of international law.

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[78] Maisley, Nahuel, *Better to see international law this other way: the case against international normative positivism,* in Jurisprudence, 12(2), 2021, pp. 151–174. https://doi.org/10.1080/204033 13.2020.1857119.

[79] For different versions see: Joseph Raz, *Ethics in the Public Domain: Essays in the Morality of Law and Politics*, Clarendon Press, 1994, p. 209; Wil Waluchow, *The Many Faces of Legal Positivism*, 1998/48 The University of Toronto Law Journal 387, pp. 395, 396; Jason Beckett, *Behind Relative Normativity: Rules and Processes as Prerequisites of Law,* 2001/12 European Journal of International Law, pp. 627, 629 available at: http://www.ejil.org/pdfs/12/4/1538.pdf, accessed 08.04.2024; and in full Ronald Dworkin, *Law's Empire*, The Belknap Press of Harvard University Press 1986 or George Letsas, *Strasbourg's Interpretive Ethic: Lessons for the International Lawyer,* European Journal of International Law, Volume 21, Issue 3 August 2010, pp. 509–541, https://doi.org/10.1093/ejil/chq056.

In this context, situations arise where human rights and other humanitarian aspects are neglected in the interests of states or other participants in international legal relations.

The separation and consideration of positivism, reported to the middle limits, without considering the extremes, depends on the perspective and context in which it is applied. We can deduce from this that for the transdisciplinarisation of international law, legal positivism can be both a pathway to the transdisciplinarisation of law and a hindrance, depending on how it is applied and integrated into legal practice and academic research.

In terms of adaptability, legal positivism can provide a solid and clear basis for integrating other disciplines into the legal field, because by focusing on rules and procedures, it facilitates the understanding and application of concepts and theories from other fields, such as sociology, economics, psychology, etc. Here, transdisciplinarisation of law can be encouraged by identifying intersections and connections between law and other disciplines (legal positivism can provide a stable and predictable exploratory legal framework).

At the same time, the transdisciplinarisation of law can be hindered by legal positivism, which is considered rigid and inflexible in its approach, thus limiting the exploration of other perspectives or the integration and application of concepts and methods from other disciplines in law. In fact, the exclusive focus on legal rules and procedures may again lead to a limitation of vision and insight from other areas that might be relevant for understanding and solving legal problems.

The transmethodical approach can in no way be understood or used to erase certain branches of law, but its purpose is to highlight the strength and value of their regulatory function. Although, at first glance, the process by which one discipline is influenced by others may be perceived as a loss of disciplinary autonomy or as a merger, this argument does not seem to stand up to the benefits of using transdisciplinarity as a highly effective tool, rather than as a disease of a discipline marked by an inability to maintain its autonomy. There may be situations in which some legal scholars reject or are reluctant to entertain the idea of transdisciplinarity. Among the main reasons is professional conservatism, lack of knowledge or confidence, lack of time or resources, difficulty of interdisciplinary communication (especially different language which can lead to frustration), perceived lack of relevance (it may be thought that solutions from other disciplines are apparently not relevant to legal problems or that these solutions do not apply to the specific legal context), resistance to change, but all these barriers can nevertheless be avoided through open communication, and education about the benefits of transdisciplinarity, successful examples and gradual collaboration[80].

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[80] See Florent Pasquier, La *question de la dimension ontologique en situation éducative. Proposition d'un cadre théorique intégratif pour une pédagogie implicative*: Apports de la méthodologie transdisciplinaire, de la psychologie transpersonnelle et de la technontologie. Education. Université Lyon 2, 2021.

We may encounter specialists who remain attached to professional traditionalism and who may consider that legal knowledge alone is sufficient to deal with problems of the same nature, and that is all. They may be reluctant to bring in elements from other disciplines, feeling that they will be distracted from their normal responsibilities.

Another reason that has already been invoked in practice is the perceived risk of dilution of professionalism which manifests itself in concerns that the integration of knowledge from other disciplines could dilute the specificity of their profession and lead to loss of professional identity or, loss of disciplinary autonomy. On the contrary, new skills can be absorbed and new developments found, which is an opportunity, not a disease of the disciplines, as we will discover later. It is only through a very general view that relevant conclusions can be drawn. So far, disciplinary isolation has failed to demonstrate that it can lead to any progress. Maintaining such a conception is a chimera, an exercise that already consumes time that could be used to develop new possibilities. There have already been proposals in the literature that legal education should focus on the interconnections between international law and other disciplines such as international relations, political science, economics, history, sociology and anthropology[81].

Against the background of developments outside specific sources and standards, a trend towards constructivism has emerged in the evolution and dissemination of international standards[82], harmoniously complemented in our analysis by constructionism. We will examine its current general meanings so that the study can take the basic form we are trying to outline through inter-, multi- or transdisciplinary methods.

Some differences require explanation. From the point of view of legal sociology, we speak of constructionism as a new orientation based mainly on Gergen's works published after 1990, works that inform us about how reality can be known and especially how realities can be constructed. There are different definitions of social constructionism, based on the recognition of the multiple realities generated by the different interactions between the actors who construct these realities. This method, by its very nature, can lead to some essential developments in current international law, mainly through attempts to explain evolution.

According to this theory, international law is not a static and fixed entity,

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[81] Basarab Nicolescu, *Transdisciplinarity Methodology*, World Futures, 70:3-4, 2014. In this article, Professor Nicolescu notes that 'There is a real discontinuity between disciplinary boundaries: there is nothing, strictly nothing, between two disciplinary boundaries, if we set out to explore this space between disciplines through ancient laws, norms, rules and practices' and that 'We define disciplinarity as the set of outcomes – past, present and future – achieved through the laws, norms, rules and practices of a given discipline'.

[82] Dennis R. Schmidt and Luca Trenta, *Changes in self-defence law? Drones, imminence, and international norm dynamics,* Journal on the Use of Force and International Law, 5:2, 2018, pp. 201–245, DOI: 10.1080/20551702.2018.1496706.

but is socially constructed through interaction between states and other international actors. It is learning (knowledge) theory that emphasises the importance of constructing knowledge and understanding through interaction between the individual and the surrounding world, particularly evident in the field of human rights[83] (by extrapolation we can also refer to the reality of certain international organisations or states), which is relevant at the international level for all participants. In theory, this analysis is particularly useful to address the problem of the lack of a 'vocabulary' in international law to deal with the collective dimension, without perpetuating an individualistic vocabulary. Issues such as the conflict between self-determination and state integrity or the effects and limits of state sovereignty in an increasingly internationalised world need to be adjusted[84].

To return to constructivism, it is also possible to create certain tangents between the realities of legal subjects depending on the dynamics of international law, which can be explained by changes in the perception of the identity of states and other international actors and by the evolution of social norms and values. In international law, this theory provides an exercise for a better perception of the behaviour of participants in terms of compliance or non-compliance with these rules. In this way, social norms and values become fundamental in the construction of the identity of international actors and thus in the orientation of their behaviour. In this way, answers can be found to the question of what might be the reasons why some states respect international law while others violate it?

Several levels of these possibilities are outlined below. One of these is the implementation, in the context of specialist education, of notions of the different ways in which international law and these other areas interact and influence each other. It has been suggested in theory that transdisciplinary methods of teaching and energising international law should contain both elements from different cultures and legal traditions of the world and details of how international law interacts with them in practice. Finally, consideration has been given to the analysis of different theoretical and practical aspects of international law, such as international human rights law, international criminal law and international economic law, enabling an understanding of different types/subtypes of international law, both classical and hybrid or related[85].

The specificity of this branch of law lies in the emphasis placed on its

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[83] Francisco F. Martin, *The Constitution and Human Rights: The International Legal Constructionist Approach to Ensuring the Protection of Human Rights,* 1 FIU L. Rev. 71, pp. 71–87, 2006. DOI: https://dx.doi.org/10.25148/lawrev.1.1.9.

[84] For a full analysis, see John R. Morss, *International Law as the Law of Collectives, Toward a Law of People,* ed. Routledge, 2013.

[85] Christopher C. Joyner, *International Law in the 21st Century: Rules for Global Governance,* ed. Rowman & Littlefield Publishers, 4 February 2005, pp. 311–335. See also Nicolescu B., *Transdisciplinarity – Past, Present and Future*, in Moving world-views – Reshaping sciences, policies and practices for endogenous sustainable development, eds. B. Haverkort and C. Reijntjes, Amsterdam, The Netherlands: COMPAS Éditions, 2006, pp. 142-166.

fundamental concepts, essentializing what determines the whole, being considered as a science of essentialization and, after all, the role of any scientific research method is to analyze, discover and highlight what this branch of law represents as a whole, what determines it, the links of this whole with other sciences, the composition and structuring of the system and the foundation of the articulations between its components[86].

In the light of legal positivism, it would lead to retrograde positions. Thinking about the form of law in isolation from its realisation proves insufficient[87].

Another notorious example is that of human rights, the legal discussion of which necessarily involves entering the axiological sphere, analysing cultural diversity in an attempt to extract a substratum. It is not just a question of formal validity that is effective, as such discussions transcend the legal aspects analysed by Legal Positivism.

At the same time, there are theories that go beyond legal positivism in several respects. Carla Faralli[88] groups them along different lines, all of which have developed out of a realisation of the shortcomings of Legal Positivism. Of the lines presented by Faralli, two are more topical in this context of paradigmatic transition. The first refers to a return of Law to *ethical-political* values, an indispensable element for the understanding of democratic constitutions; while the second line, which represents the abandonment of the eminently formal approach to Law, re-approaches the social problems that constitute a *legal realism,* which underlies critical discourses on Law.

In this context of the crisis of the paradigm of legal science, Losano points out essential elements for a global understanding of the legal phenomenon, which are not studied by legal positivism, but which a transdisciplinary approach cannot ignore: *[...] as long as there is a society with a legal system, there will also be a need to reflect on justice, on the structure and function of legal norms, on the behaviours that should be encouraged or repressed, in short, on the type and level of order that should govern that society*[89].

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[86] See in general Cristina Elena Popa Tache, *Legal treatment standards for international investments. Heuristic aspects,* Ed. Adjuris International Academic Publisher, 2021, ISBN 978-606-94978-7-6 (E-Book), http://www.adjuris.ro/reviste/ltsi/Legal%20treatment%20standards.pdf.
[87] In this respect, Friedrich Müller developed his theory of the structuring of law by demonstrating the close relationship between the legal norm (form) and the empirical whole (reality): '[...] the constitutional specificity in principle can only be fully understood from the point of view of the totality of the general political whole in this sense. The fact that the environment alone determines the content and individuality of the constitution is an important perspective in legal theory or one of its requirements for the general theory of the state'. (Müller, Friedrich. *Structural Theory of Law.* Trans. Peter Naumann and Eurides Avance de Souza. São Paulo: RT, 2008. p. 103).
[88] Faralli, Carla. *The contemporary philosophy of law: issues and challenges*. Trad. São Paulo: Martins Fontes, 2006.
[89] Losano, Mario G. *Foreword to the Brazilian edition*. Trad. Marcela Verejão. p. IV - XIII. In Faralli, Carla. *A filosofia contemporânea do direito: temas e desafios*. Trad. Candice Premaor Gullo. São Paulo: Martins, Fontes, 2006. p. XII-XIII.

Pure legal theory cannot be used to understand the complexity of the law. The isolated description of the structure of positive law, while necessary, is insufficient. Kelsen was always aware of this and even stated it[90]. Kelsen adopted a disciplinary approach to law – in other words, complementary to the transdisciplinary approach. Given the plurality of possible approaches, he chose the formal one, which by no means excludes the other disciplines. These are different facets of the same legal phenomenon, the full understanding of which was never Kelsen's claim. Aware of this, Losano makes the following comment: *'Are we really sure that form is the fundamental element for understanding law? Excluding any examination of the inside (i.e. of reality) and any examination of the outside (i.e. of value, of justice), Kelsen is in the position of someone who wants to talk about the egg by proposing to be silent about the chicken as well as the yolk and the white. Are we really sure that the shell is the fundamental element for understanding the egg? If we don't talk about the hen, we won't understand the origin of the egg, its structure or (excuse me) its shape; if we don't talk about the yolk and white, we won't explain its purpose or its possible uses. On the other hand, however, to talk about the egg in an exhaustive way, we should also talk about the shell'*[91].

The delineation of the object is not a problem in the proposed disciplinary research, but if it is viewed from the point of view of complexity, there is a mutilation of the innumerable properties and characteristics of the Law, which are revealed from the interconnections with other objects and which are not analysed as a result of the methodology used. Of course, what lies outside the delimited object can be studied by other sciences, but what is compromised is the understanding of the wholeness of the legal phenomenon. Moreover, transdisciplinarity aims to understand the fields and forms of connection between different sciences, which is not possible from the perspective of legal positivism[92].

In this context, the criticism that can be made of complexity and transdisciplinarity is that describing the law as an isolated object is not the best way to understand the legal order. To this end, in the face of the crisis of legal positivism, the challenge of thinking about the law from the perspective of transdisciplinarity is necessary.

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[90] Kelsen *apud* Losano, Mario G. *Introduction*. In: Kelsen, Hans. *The Problem of Justice*. João Baptista Machado. 4. ed. São Paulo: Martins Fontes, 2003. p. xxv: *« Law can be subject to different sciences. The pure theory of law was never meant to be the only possible or legitimate science of law: there is also the sociology of law and the history of law. These, together with the structural analysis of the law, are necessary to fully understand the complex phenomenon of law ».*

[91] Losano, 2003, p. XXI.

[92] Note that despite all these limitations of the legal positivism proposal, its contribution is undeniable. There is a thorough study of the formal aspect of law, and relating these aspects to aspects in other disciplines leads to a different interpretation of the form of law, but this is only possible by virtue of the study of structure.

4.3. Transdisciplinarity as a Foundation for Legal Science

A transdisciplinary perspective aspires to overcome and organise the fragmentation that exists in the disciplinary fields of law and related fields of knowledge, allowing for a different description of law that takes into account the social, formal, historical and moral spheres, etc. To this end, Kelsen's entire contribution must be taken into account, since understanding the law in its complexity from a transdisciplinary perspective also means describing the form of law.

The partial perception of the legal order by the Pure Theory of Law, coupled with the awareness that this view does not encompass the totality of the legal phenomenon, implies the provisional character of the Kelsenian legacy. If even in physics, where the most precise results are obtained, there are constant revolutions, the law could not aim at a definitive formulation[93]. Kelsen's contributions to law are undeniably great and he has made such great advances that no other jurist has ever equalled them. But it is clear that it is not a definitive theory that could be refined, as was in fact the case with Legal Positivism, which was improved mainly by Hart and Bobbio, as well as by Kelsen himself ─ to name only the most important authors. However, the crisis of this paradigm was inevitable. The emergence of problems and issues in law that could not be explained by Legal Positivism inevitably led to its theoretical weakening, opening a wide and favourable field for the proposal of new theories.

The transdisciplinarity of law, given its complexity in its description, is similar to Kelsen's objective, but from a different paradigm and methodology, leading to the adoption of a different approach to the subject. Legal positivism described law from a formal, disciplinary perspective, considering it as an isolated object. Thinking about law from a transdisciplinary perspective implies understanding it from the perspective of its complex interactions.

In the same way that Morin clearly states that 'complexity is a challenge, not an answer[94]', the proposal to transdisciplinaryise law has a challenging tone. The incorporation of transdisciplinarity into the science of law has been treated as a possible hypothesis, but not a necessary one. It is a proposal that will eventually be accepted (and may be rejected), but in the early stages of formulation, this research is limited to presenting the possibility of pursuing this path.

Complexity exists in social phenomena and, consequently, in law. However, in Sigmund Freud's semantics[95], the vision of the interconnectedness of all

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[93] Kelsen, 2006, p. xviii. Aware of this, Kelsen states in the preface to the *Pure Theory of Law*: 'This second edition of the Pure Theory of Law also is not intended to be regarded as a presentation of definitive results, but as an attempt to be further developed by additions and other improvements. Its purpose will have been attained if it is considered worthy of such development ─ by others than the present author, who is already at the end of his powers.'

[94] Morin, Edgar. *The Epistemological Problem of Complexity*. Europa-America Publications: Lisbon, 1996.

[95] Freud, Sigmund. *Complete psychological works of Sigmund Freud*. Rio de Janeiro: Imago, 1996. pp. 75–77.

elements, which is the synthesis of complex thought, is at an *unconscious* level for the scientific community. The problematization of transdisciplinarity can contribute to raising the interconnections to a *conscious* level*, which* would give rise to new directions for legal science. Awareness of this *complexity* is not possible for a scientist isolated from a discipline, but it is the *transdisciplinary[96] dream* of the scientific community formed by Transdisciplinarity intellectuals.

To conclude this study, a comparison between the proposed transdisciplinarity of law at the paradigmatic level and a legal phenomenon recognized by jurists will be enlightening.

There is now more and more talk about the constitutionalisation of civil law and private law as a whole, a view which suggests that 'one cannot claim to adapt the Constitution to the Civil Code and it is essential to proceed in the opposite direction in order to rework and forge the entire infra-constitutional fabric under the innovative and binding cloak of the broader text[97]'.

This needs to adapt, championed by the most innovative civil servants, not to mention other branches of law, is relatively new. However, within the science of constitutional law, the concept of *constitutional filtering has existed for* a long time[98], according to which whenever the legal order is innovated by the emergence of a new Magna Carta, it is necessary to *filter*, to adapt, the entire infra-constitutional legal order, checking which rules will be accepted or not, promoting the appropriate adjustments of those accepted to the new constitutional guidelines.

Likewise, the essence of the illustrated relationship between the Constitution and infra-constitutional norms – in which the principles laid down in the Constitution are used as hermeneutic vectors to promote a rereading of a branch of law – applies between Transdisciplinarity and Law. Transdisciplinarity, as a scientific paradigm, proposes a method of scientific research. Law, as a science, is conducted under the aegis of a paradigm. Just as there is a need for a *constitutional filtering of the* infra-constitutional legal order when a new Constitution is promulgated, there is a need for the science of law to adapt to the paradigm of Transdisciplinarity, since it ─ like a new Magna Carta ─ presents new principles and horizons for the whole of Law.

5. Final Considerations

The world is complex, but it is not perceived in this way by the disciplinary methodology that has persisted into the modern era. Transdisciplinarity

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[96] Parodying the title of Japiassu's work, the expression is used with the psychoanalytic semantics of 'dreaming'.

[97] Tepedino, Gustavo. *Consumer relations and the new contractual theory*. In: 'Temas de Direito Civil'. Rio de Janeiro: Renovar, 1999. pp. 199–215. p. 206.

[98] Bester, Gisela Maria. *Constitutional law*. v. 1: Theoretical foundations. São Paulo: Manole, 2005. p. 176.

seeks to build a *vision* and an *attitude* that can recognise, even if not fully, the complexity of phenomena.

The proposals of transdisciplinarity and, in particular, complexity, which is initially aimed at science, but whose approach would have implications for a variety of topics (potentially applicable to any problem), are presented as a possibility that will eventually be recognised and incorporated by legal science.

In this reflection, I have only presented the challenge and possibility of thinking about the law from the perspective of transdisciplinarity, indicating the first forums of interdisciplinarity that can be broadly interpreted to transdisciplinarize law. From this point of view, the methodology and teaching of law would take on a different perspective: the organisation of knowledge would be prioritised, the understanding of the legal system would be extended and linked to other social spheres, while allowing a broad communication with other fields of scientific knowledge.

Alongside all this, addressing the problem at an epistemological level is a preliminary step to using transdisciplinarity in legal research; after all, there is no way to conduct scientific research before the method has been established. This article aims to make first considerations on the link between the transdisciplinary paradigm and legal science in order to problematize methodological issues.

Ultimately, it is about giving up the illusion of doing transdisciplinary research without considering and reflecting on the proposed *vision* and *attitude* of transdisciplinarity. The epistemological concept of transdisciplinarity constitutes a paradigm and, as such, proposes new horizons for science. Transdisciplinarisation of law is therefore about reflecting on legal issues under the umbrella of transdisciplinarity, not just appropriating its concepts and elements to support certain research.

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TRANSDISCIPLINARITY FOR INDIVIDUAL & ORGANIZATIONAL EFFECTIVE PROBLEM SOLVING

Understanding: Convergence between Knowing and Being

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Abstract: *This is a challenging and paradoxical aspect of the contemporary crisis: the existence of the hypertrophy of information and knowledge, with broad, unrestricted and immediate access, while at the same time suffering from the atrophy of the process of discernment and understanding. As Heidegger rightly denounces, we have never been so alienated from the human question.*

No era has accumulated as much and as diverse knowledge about the human being as ours. No era has managed to present its knowledge of the human being in such a ready and easily accessible form. But no era has known less about what the human being is.

Martin Heidegger

1. Introduction

On the subject of understanding reality, Basarab Nicolescu[1] begins his book, *Qu'est-ce que la réalité ?*, in a blunt manner: *'The word "reality" is one of the most prostituted in all the languages of the world. Everyone believes they know what reality is, but when we ask ourselves, we discover that there are as many conceptions of this word as there are inhabitants of the earth. So it's not surprising that countless conflicts are constantly raging between individuals and peoples: reality versus reality. Under these conditions, it is by some kind of miracle that humanity still exists (...). However, the triple revolution that swept through the 20th century – the quantum revolution, the biological revolution and the computer revolution – should profoundly change our view of reality.'*

We therefore need to reflect on what prevents us from updating our references and what can open us up to the possible universe of an intrapersonal and interpersonal, subjective and intersubjective understanding, within the framework of a Trinitarian ecology: individual, social and planetary.

Among the external obstacles to intellectual understanding, Edgar Morin[2] points to the existence of 'noise', the lack of understanding caused by the polysemy of concepts, ignorance of other people's rights, habits, values and ethical imperatives, incompatible worldviews and unequal mental structures. As for internal difficulties, Morin points to egocentrism, ethnocentrism and sociocentrism. Perhaps we can expand on these lucid considerations by affirming the existence of a mega-factor that impedes understanding, which consists of what Pierre Weil, Jean-Yves Leloup and this author[3] call *normosis, a pathology of normality.*

2. The Obstacle of Normosis

Pierre Weil[4] conceptualises normosis as anomalies of normality made up of norms, concepts, values, stereotypes, habits of thinking and acting, which are

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[1] Nicolescu, Basarab. *Qu'est-ce que la réalité ?* Montréal : Liber, 2009.
[2] Morin, Edgar. *The Seven Knowledges necessary for the Education of the Future.* São Paulo: Cortez; Brasília: UNESCO, 2002.
[3] Weil, Pierre; Leloup, J.-Y.; Crema, R. *Normose, the pathology of normality.* Campinas: Verus, 2003.
[4] Ibid., p. 75.

approved by consensus or by the majority in a given society and which cause suffering, illness and death.

To put it into context, I'll reflect on the existence of three foundations of normosis. The first is *systemic*: this pathology of mediocrity arises when the system in which we live is dominantly unbalanced, morbid and corrupted; when what predominates are contradictions or symptoms such as a lack of listening, respect, care and fraternity, as well as alarming and growing violence against the individual, society and nature. In this context, a 'normal' person, or rather a normotic person, is one who fits into the sick system and contributes to maintaining the *status quo*. We know from the founding charter of the World Health Organisation (1946) that health is not the absence of symptoms, but the presence of a state of full somatic, psychological and social well-being. The environmental and spiritual factors were later added. This means that when a system is largely in a pathological state, the healthy person is the one who manifests a state of conscious maladjustment, lucid indignation and even sober despair.

The second foundation is the *evolutionary* one, which starts from the principle of the unfinished nature of the human being, as Paulo Freire said[5]. This is what we can translate by saying that we are not born a human; we become human through a systematic investment in the potential for self-development, maturity and possible fulfilment. To put it another way, the human being has introduced another order of complexity into the evolutionary quality of the planet, which translates into conscious and intentional evolution. In addition to chance and necessity, random genetic mutations and battles between the fittest, Darwinian natural selection, human evolution consists of the development of consciousness, which requires working on oneself along evolutionary paths of individuation. As Teilhard de Chardin[6] said, things don't just appear in the Universe: they are born, gestation and evolving, with certain favoured evolutionary directions leading to novelty, the qualitative leap of the event. For this pioneer in the study of complexity, the two great universal events consisted of the passage from pre-life to life and from life to thought. Finally, from the fantastic increase in complexity arises the Human Being and his reflex consciousness, though. This new quality of conscious and intentional evolution, characteristic of the human being, is supported by contemporary cartography of the integral approach to consciousness, such as the research of Maslow[7], Rogers[8], Jung[9], Grof[10] and Wilber[11], to

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[5] Freire, Paulo. *Pedagogy of the Oppressed.* Rio de Janeiro: Paz e Terra, 1975.

[6] Teilhard De Chardin, P. *The Human Phenomenon.* São Paulo: Herder, 1970.

[7] Maslow, A. *Introduction to the Psychology of Being.* Rio de Janeiro: Eldorado, n.d.

[8] Rogers, C. *A Way of Being.* São Paulo: E.P.U., 1983.

[9] Jung, C. G. *Studies in Analytical Psychology, Complete Works, Vol. VII.* Petrópolis: Vozes, 1981; Jung, C.G. *Foundations of Analytical Psychology.* Petrópolis: Vozes, 1983.

[10] Grof, S. *Psychology of the Future.* Niterói: Heresis, 2000; GROF, S. *The holotropic mind.* Rio de Janeiro: Rocco, 1994.

[11] Wilber, K. *The spectrum of consciousness.* São Paulo: Cultrix, 1990; Wilber, K. *The integral vision.* São Paulo: Cultrix, 2009.

name but a few representatives of the humanistic and transpersonal movement of cutting-edge psychic science.

Morin[12], who postulates a meta-natural aspect of the human, states that hominisation has led us to a new beginning: the hominid is humanised and thus the concept of the human acquires a double principle, biophysical and psycho-sociocultural, dialectically linked. In his words: '*We develop beyond the physical and living world. It is in this "beyond" that the fullness of humanity takes place.' In* this sense, normosis is characterised by a lack of investment in psychic, ethical and noetic potential, representing a state of stagnation in conscious, properly human evolution.

The third foundation is *paradigmatic*, speaking in the broader sense that Thomas Kuhn[13] gave to this concept. In this case, normosis arises when a paradigm, although already exhausted in its creative potential and to some degree sclerotic, still prevails over another emerging paradigm postulated by a minority group. As Max Planck said, according to Kuhn[14] '*A new scientific truth does not triumph by convincing its opponents and making them see the light, but because its opponents finally die and a new generation grows up familiar with it'.* Fortunately, there are examples of scientists, philosophers and great thinkers – Edgar Morin is an icon of this possibility, with his vast body of work that dares to reconfigure knowledge – who are capable of a fearless openness to the new, with the lucid prudence of preserving the positive in the old. This is the nobility indicated by Henry Thoreau's paradoxical and happy expression[15], the *majority of one! ...*

On the other hand, the concept of normosis resonates with some of Morin's[16] reflections on the seven knowledges, especially when, when analysing the blind spots of knowledge, he talks about the normalising force of dogma and the prohibitive force of taboo, as well as the determinism of convictions and beliefs and cognitive and intellectual conformism, which we can call a *cognitive normosis of normalisation. In the* same way, Morin refers to cultural *imprinting* as a *matrix mark,* which establishes a type of unquestionable conformism, which we can consider as the normosis of cultural *imprinting*.

On the occasion of the *International Holistic Encounter* in Mendonza[17], I came into contact with Manfred Max-Neef, an alternative Nobel Prize winner in economics. In his talk, this famous scientist said that, from an early age, he wondered what the unique characteristic of the human species was. Culture, in-

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[12] Morin, Edgar. *op. cit.,* 2002, p. 87.
[13] Kuhn, T. *The Structure of Scientific Revolutions.* São Paulo: Perspectiva, 1987.
[14] Ibid, p. 53.
[15] Thoreau, H. D. *Walden or Life in the Woods.* São Paulo: Global, 1985.
[16] Morin, Edgar. *op. cit.,* 2002, p. 89.
[17] Max-Neef, M. *Conference at the Encuentro Holístico Internacional, El Fundamento Humano y Ecológico de la Empresa y la Economia.* Mendonza, November 1989.

telligence, language? No, because other species also develop them. Was it hu-
mouring? When he met another scientist, Nobel laureate in ethology Konrad Lo-
renz, he learnt that it wasn't there are other humorous species. So, he continued
with this enquiry until an unexpected moment when his father, a man for whom
he had great respect, asked him: – *My son, isn't it stupidity?*

Max-Neef said that at that moment a light went on and he became the
first *stupitologist*! Stupidology is a science that needs to be studied with rigour
and urgency. It is important to clarify that it differs from harmless imbecility in
that it has a logical rationality and is exercised mainly through technical language.
The suicidal devastation of the planetary ecosystem, for example, can be justified
or rationalised stupidly through developmental logic. Here's an image that could
be a metaphor for this trendy attitude: a man sawing off a tree branch – with an
elegant, statistically well-founded speech about progress – right where he's sit-
ting! Another notable Nobel Prize winner, Albert Einstein, used to say that, for
him, only two things were infinite: the universe and human stupidity. And as far
as the universe was concerned, he ironically concluded, he wasn't entirely sure
yet! …

Edgar Morin[18] refers to this same reality when he talks about the exist-
ence of two *cretinisms*. The first is from *below*, from a banal mass culture and an
alienated media, which the university world, according to the author, is very keen
to denounce. However, according to Morin, there is also cretinism *from above,*
for which he feels a particular repugnance*,* proper to an official and intellectual
subculture, a certain rationalised obscurantism, characterised by ignorance and *a
priori* judgements, with stereotypes, conformisms and arrogant conventional
ideas, what we can call the *normosis of scientism*.

I consider stupidity, as well as passive aggression, translated as indiffer-
ence on the part of those who don't care about the common good or the human
cause – which Mahatma Gandhi considered to be worse and more destructive than
active violence – to be two of the most important characteristics of this insidious
and tragic disease we call normosis.

As Basarab Nicolescu[19] states, *three* and *trans* have the same etymologi-
cal root, with three meaning the transgression of two, just as transdisciplinarity is
the transgression of binary duality, towards a complex plurality and an open
unity, two faces of the same reality. Adopting our concept, Nicolescu said at a
conference in Strasbourg[20] that we need to go beyond the *normalisation of the
binary.*

Finally, in order to achieve what Morin calls the *ethics of understanding* –
centred on intellectual and moral solidarity at the service of the human race – we

[18] Morin, E. *My demons.* Rio de Janeiro: Bertrand Brasil, 1997.
[19] Nicolescu, Basarab, *op. cit*., 2009, p. 47.
[20] Welter, R. (ed.) *Transdisciplinarité — Um chemin vers la paix.* Éditions F.B.V. pour le C.N.R.S.,
2005.

need to transgress the normosis that lies at the root of the contemporary civilisational crisis.

3. Psychic Functions

According to the vast research of psychiatrists Carl Gustav Jung[21], there are four psychic functions inherent to human beings: *thought*, *feeling*, *sensation and intuition.* It's not hard to see that the dialogue between thought (rationalism) and sensation (empiricism) gave rise to contemporary *science*. Just as the alliance between sensation and intuition gave rise to *art*; from thought and intuition, *philosophy*; and from feeling and intuition, *mysticism, from the* Wisdom Tradition. So, as far as the individual foundation is concerned, the four well-known classical epistemological fragments arise from the creative dynamics of our psychic functions.

In general, individuals only develop one or two of these functions, while the others remain atrophied and undifferentiated. The development of the deficient functions and their integration and harmonisation with the others leads, according to Jung, to a fifth function, which he called the *Self,* the intelligence of the psychic totality. The pioneering Jungian approach postulates, beyond mere healing, a process of *individuation* that can lead the individual, through an inner path and a movement of circumvolution, from the periphery of the ego to the centrality of the Self, which is the psychic instance from which real understanding emanates.

This conception of psychic functions has guided us in the fundamental theory of the International University of Peace, UNIPAZ, since its founding event, the First International Holistic Congress – I CHI, which we held in Brasilia (1987), and is also at the heart of our well-established transdisciplinary project, Holistic Basic Training – FHB, which has been in fruitful practice for over twenty years.

As Morin himself points out, we don't need to preach peace, since everyone knows its importance as the only way to avoid the horrors of war. What we really need is a pedagogy of human understanding. Ultimately, educating for peace means educating for understanding. How? Here we come up against the need for an integral education that reconciles the dimension of knowledge with that of being.

In other words, understanding is a natural expression of the convergence of knowing and being. We don't understand only with knowledge and not only with being. This is a lost alliance that we need to recover. As Ubiratan D'Ambrosio says, it's a question of evolving from the arrogance of knowing to the humility of seeking. Authentic searching requires the elegance of the *ignorance of* not knowing. To know not to know, that is the question! Transdisciplinary art consists

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[21] Jung, C. G. *Psychological Types, Complete Works, Vol. VI.* Petrópolis, Vozes, 1981.

of balancing knowing with not knowing, learning with unlearning, acquiring knowledge with emptying oneself of the known, thinking with not thinking, reflection with contemplation, words with silence…

The Cartesian paradigm of scientific rationalism, which is characterised, according to Morin, by disjunction, reduction and abstraction, centred exclusively on knowledge, has been very competent in developing a sophisticated technoscience that is, unfortunately, disconnected from the hemisphere of being, from where the values of an essential ethic emanate. And we know very well the consequences of a powerful and disorientated technology, of science without conscience, of effectiveness without affectivity. This is the immense value of a basic document from UNESCO itself (1992) which proposes, based on the research and report of Jacques Delors[22], the four pillars of a new transdisciplinary education: educating to *know*, educating to *do*, educating to *live together* and educating to *be*. With conventional pedagogical models, in a fragmented way, we have only been educated to know and to do. The immense and stimulating challenge, which has to do directly with the question of understanding, is to educate and to live together – to live with oneself, with the other, with others, with nature – and, above all, to educate to be.

4. Holology and Holopraxis

The famous *Venice Declaration* (1986), a redefining document that resulted from a colloquium organised by UNESCO[23], centred on the theme, *Science facing the ends of knowledge: the prologue to our* cultural *past,* in its second article states: '*Scientific knowledge, by its own internal movement, has reached the ends where dialogue with other forms of knowledge can begin. In this sense, recognising the fundamental differences between science and Tradition, we see not their opposition, but their complementarity. The unexpected and enriching encounter between science and the different Traditions of the world allows us to think about the emergence of a new vision of humanity, even a new rationalism, which could lead to a new metaphysical perspective.*'

Pointing in the same direction, Morin[24] postulates a self-critical and open rationality, capable of integrating aspects of what other non-European cultures have developed and which have been atrophied in the West, in order to repair activism, pragmatism, 'quantitativism' and consumerism. But also, to safeguard, regenerate and disseminate the best of Western culture: democracy, individual protection and human rights.

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[22] Delors, J. *Educação: Um* Tesouro *a Descobrir.* São Paulo: UNESCO, MEC, Cortez, 1999.
[23] Declaration Of Venice, Venice Colloquium, *Science facing the confines of knowledge: the prologue of our cultural journey.* Final Report, UNESCO, 1986.
[24] Morin, Edgar. *op. cit.*, 2002, p. 37.

In order to respond to this lucid call, Pierre Weil[25] developed two complementary concepts that are fundamental to this urgent task of integrating the hemisphere of knowledge with that of being: *holology* and *holopraxis*. Holology refers to the rational path of study, critical reflection and experimentation of the holistic paradigm, aimed at the dimension of knowledge, while *holopraxis* consists of the experiential path of awakening to the holistic vision, through practices from the wisdom traditions of East and West, aimed at the dimension of being.

We presented the integration of these two complementary paths at the aforementioned I, CHI. Holology, through conferences, symposia and free-theme sessions. Holopraxis, through experiential spaces facilitated by representatives of different Western and Eastern traditions. In the same way, these two methods are present at the FHB and in all UNIPAZ programmes and projects, because it is their combined exercise that paves the way for human understanding which, in turn, is the direct route to peace.

5. Analytical and Synthetic Method

In order to elucidate the process of understanding, I believe it is essential to delve deeper into the methodological reflection involved. This brings me back to research I've been carrying out for over two decades, in the clinical and educational context, on the synergy of two ways of grasping reality: *analysis* and *synthesis*[26].

We Westerners have all been conditioned to analyse, since the analytical method lies at the heart of the paradigm of modernity, which represented a necessary, compensatory and Enlightenment rescue of critical reason, whose great contribution in the 17th century was to have highlighted the dual consciousness of differentiation.

To briefly summarise, the *analytical method* is an important fruit of scientific rationalism, which arose as a healthy and necessary response to the decadent moment of an undifferentiated medieval obscurantism, which created a perverse symbiosis between religion and science, under the tyranny of the Inquisition. It focuses on the part, looking for the constitutive units, acting as an efficient scalpel that shreds totalities. It relates to the Greek concept of *diabolos*, that which divides. It generated the disciplinary approach from which the specialist is modelled, characterised by a reductionist tendency and unilateral vision and action. Its basis is somatic, substantialist. It is based on the psychic functions of thought and sensation. Based on mechanical physics, it leaned towards a mechanistic approach and its classical realism, which emphasises continuity, simplicity, local causality and objectivity. It is characterised by its quantitative aspect, pursuing

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[25] Weil, P. *New holistic language.* Rio de Janeiro: Espaço e Tempo, 1987.
[26] Crema, R. *Saúde e Plenitude – Um Caminho para o Ser.* São Paulo: Summus, 1995; Crema, R. Old *and New Therapists – A transdisciplinary approach to therapy.* Petrópolis: Vozes, 2002.

the ideal of mathematical codification. It forms the basis of egos, personal identity. It starts from the linear logic of local causality, prescribing the existence of necessary and general laws that engender determinism, with a pretence of control and predictability. It wears the sophisticated garb of accuracy. It is progressive and accumulative. It starts from an extroverted basic attitude, asserting itself as an excellent tool for studying and exploring outer space. It's ideal goal is objectivity and value exemption, excluding the subject from the field of science. Its vocation is experimental: its typical product is generated in sophisticated laboratories with impeccable manipulation of variables. Its metaphorical neurophysiological substrate – taking into account brain interconnection – is the dominant hemisphere, usually the left, of rationality, prediction and also of human anguish. It characterises the typical Western mentality. It postulates an explanatory function: it aims to actively explain the universe. We call the agent of this classical method an *analyst*.

After the great advance of the Enlightenment in the 18th century, this method began to show signs of exhaustion and insufficiency, becoming a source of increasingly visible contradictions. As Ken Wilber[27] said, what was an awareness of differentiation and a scientific spirit in the 17th century degenerated into dissociation and scientism in the 19th century. This path, followed exclusively, has led us to what I call a *syndrome of analyticism*, characterised by symptoms such as fragmentation, dissociation, disconnection, loss of fundamental values and the atrophy of subjectivity, intersubjectivity, in short, of interiority itself. As G.K. Chesterton said, *the worst madman is the one who has lost everything except reason.*

It was the genius of the German philosopher Wilhelm Dilthey[28], in the 19th and early 20th centuries, who demonstrated the need for a method other than the analytical one. Denouncing the contradictions of the reductionist scientific-natural path, in his theory of expressive understanding, Dilthey founded the *sciences of the spirit,* later called the *human sciences,* affirming the human being as a unity, far beyond a conglomeration of atoms. Transcending positivism, in his historical-biographical proposal, Dilthey prescribes two paths: that of *describing life* and that of *understanding life* for itself. '*Nature can be explained, the soul can be understood',* the philosopher shouted, affirming life as an unfathomable mystery, susceptible to being understood by itself, as an all-and-part rhythm that can be experienced, which unveils meanings – but not explained. According to Christine Delory-Momberger[29], by affirming the radical difference that constitutes the human subject, Dilthey developed, against the analytical and generalis-

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[27] Wilber, K. *The Eye of the Spirit.* São Paulo: Cultrix, 2001.

[28] Dilthey, W. *L'édification du monde historique dans les sciences de l'esprit.* Paris: Les Éditions du CERF, 1988.

[29] Delory-Momberger, C. *Les Histoires de Vie — De l'invention de soi au projet de formation.* Paris: Anthropos, 2004.

ing methods of sociological positivism, an epistemology founded on the recognition of the human by the human, in other words, on lived experience and understanding, whereby the human being and society are in a relationship of reciprocal inclusion and action. Having consolidated the foundations of the current biographical approach, Dilthey considered autobiography to be a paradigm of intelligibility, the highest and most instructive form from which the understanding of life manifests itself for us.

Following Dilthey's singular and striking contribution, other significant voices were raised, clamouring for synthesis. Jan Smuts[30], in his evolutionary approach, unveiled the concept of *holism,* defined as a single principle that organises totality and creates sets, in a universe that is synthetic, vital and creative. Carl G. Jung[31] developed an interpretation of dreams at the level of the subject, calling it *synthetic*. Roberto Assagioli[32] developed a *psychosynthesis.* Viktor Frankl[33] created his *Logotherapy* school*,* based on a synthetic methodology. Karlfried Graf-Durckhein[34] founded *initiatory therapy*, prescribing what he called an *exercise* – a meditative practice of a synthetic nature – so that the essence can shine through in existence. Ramon Soler[35] founded a *University of Synthesis* in Argentina, where the method of synthesis is also a way of human integration. The Hindu sage J. Krishnamurti[36], whose life and work, dedicated absolutely to the essential, was given significant prominence in René Barbier's transversal approach[37], can be considered a living symbol of the embodiment of synthesis.

In short, the *synthetic* method emerged at the end of the 19th century as a response to the crisis of fragmentation, dissociation, disconnection and, in short, dehumanisation. It focuses on totality, interconnection, form and context, with a view to the process of linking and unifying. Its tendency is to amplify and integrate. It refers to the Greek concept, opposite to diabolos, of *symbolos,* the factor that reconnects and re-establishes wholeness. Valuing an inclusive and global vision, it is at the basis of the generalist ideal. It is a qualitative path, which is indicated more by mythopoetic and archetypal language. It is based on the psychic functions of feeling and intuition. It starts from a space of indeterminism, freedom and responsibility. Its basis is psychic and noetic. It emphasises participation and singularity. It occurs instantaneously, in the abrupt leap, in the *insight*: it is non-

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[30] Smuts, J. *Holism and evolution. In:* WEIL, P. *Holística - uma nova visão e abordagem do real.* São Paulo: Palas Athena, 1990.

[31] Jung, C. G. *The practice of psychotherapy.* Petrópolis: Vozes, 1981.

[32] Assagioli, R. *Psychosynthesis.* São Paulo: Cultrix, n.d.

[33] Frankl, V. *A meaning for life.* Aparecida: Sanctuary, 1989.

[34] Graf-Durckheim, K. *L'Homme et sa double origine.* Paris: Albin Michel, 1996; Graf-Durckheim, K. *L'expérience de la transcendance.* Parisk: Albin Michel, 1984.

[35] Soler, R. P. M. *Universidad de Síntesis.* Buenos Aires: Depalma, 1984.

[36] Krishnamurti, J. *The first and last freedom*. São Paulo: Cultrix, 1981; Krishnamurti, J. *The web of thought.* São Paulo: Cultrix, 1984.

[37] Barbier, R. *L'Approche Transversale — L'écoute sensible en sciences humaines.* Paris: Anthropos, 1997.

cumulative. Through the logic of simultaneity, it opens up to the open universe of synchronicity, meaningful coincidences or the principle of a causal connection, of transcausality, according to Jungian research. It has a living, imprecise, flexible fabric, detached from exactitude. It expands on the descriptive and biographical aspects. It is guided by an introspective vision that unveils and investigates the inner space. It opens up to what is beyond the ego, to transpersonal consciousness. It is based on microphysics and quantum realism, characterised by a discontinuity, the principle of superposition, non-separativity, non-locality and indeterminism. It assumes a subjective consciential character, intersubjectivity and values. It focuses on purpose, meaning and sense. Its vocation is experiential: its typical product is the fruit of the vibrant laboratory of human experience. Its metaphorical neurophysiological substrate is the non-dominant cerebral hemisphere, usually the right, of *gestalt,* musicality, poetry and mysticism. It characterises the classical oriental mind. It cannot be distinguished from the subject. It fulfils a comprehensive function of participatory communion. I call the agent of this way of apprehending reality a *synthesiser.*

The diagram below summarises the basic characteristics of the analytical method and the synthetic method:

| **Analytical Method**	**Synthetic Method**
Reaction to medieval dogmatism and obscurantism	*Reaction to modern positivism and analysis*
Emphasis on the part	Emphasis on the whole
Text	Context
In the service of decomposition: *diabolos*	At the service of the reconnection: *symbolos*
Psychic functions: thought and sensation	Psychic functions: feeling and intuition
Specialist	Generalist
Quantitative	Qualitative
Causality: determinism	Transcausality: synchronicity
Linear logic of succession	Global logic of simultaneity
Somatic, substantialist basis	Psychic and noetic basis
Personal	Transpersonal
Mathematical coding	Archetypal mythopoetic coding
General, regular	Singular, biographical
Progressivity, accumulation	Instantaneity, non-accumulation
Outer space: object	Inner space: subject
Control	Participation
Experimental	Experiential
Macrophysics	Microphysics
Classical realism	Quantum realism
Left hemisphere metaphor	Right hemisphere metaphor
Western mind	Eastern mind
Explanatory function	Comprehensive function
Two of duality	One of unity
Holology	Holopraxis
Analyst	*Synthesiser*

6. The art of integration: the three

It is essential to emphasise that the analytical and synthetic methods are not in a relationship of antagonism, but of *complementarity*. The concept of complementarity comes from quantum science and was proposed by Niels Bohr to solve the *particle-wave* paradox in microphysics. The same can be applied to the methodological paradox of analysis and synthesis. A one-sided emphasis on analysis leads to reductionism, while synthesis leads to totalitarianism, both mistaken extremes that we need to avoid. I like to represent the inestimable value of this heuristic methodological synergy with the symbol of infinity, combining the analytical and synthetic methods in a dynamic of constant and paradoxical interactions:
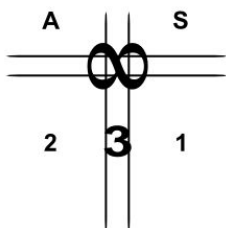
Arthur Koestler[38], maintaining that part and whole do not exist in the realm of life, reconciled atomism with holism through his concept of the *holon* – where *holos* refers to the whole and *on to* the part – referring to an open, self-regulating system that has properties that are both autonomous of a whole and dependent *on a* part. In his approach, the organism is considered to be a multi-levelled hierarchy of subparts, endowed with relative autonomy.

The Koestlerian symbol for the colon is a deity from Roman mythology, *Janus*, who had two faces, facing in the opposite direction: one forward, representing the future, and the other looking backwards, symbolising the past. In the same way, each sub-mode, inserted in an ascending order of complexity, has one face of the 'whole' facing the subordinate levels, while the other face, facing the apex, is that of a dependent 'part'.

'No man is an island: every human being is a Holon. A two-sided entity like Janus who, looking inwards, sees himself as a unique and complete whole and, looking outwards, sees himself as a dependent part. Its self-affirming tendency is the dynamic manifestation of its condition as a unique whole, of its autonomy and independence as a Holon. The antagonistic tendency, also universal, which is integrative, expresses its dependence on the greater whole that integrates its condition as a part,*'* says Koestler[39].

To put it another way, there are two basic tendencies in living nature: one

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[38] Koestler, A. *The ghost of the machine.* Rio de Janeiro: Zahar, 1969.
[39] Ibid, p. 76.

of *differentiation* and the other of *fusion.* Differentiation is self-affirming, a cen-
trifugal force that pushes towards difference, singularity. Fusion is integrative, a
centripetal force that drives towards belonging, towards interconnection. The task
of health is to maintain a synergetic balance between these two dynamics, since
an excess of differentiation leads to the pathology of exclusionary individualism
and isolation. While an excess of fusion leads to the alienation of symbiosis and
absolutism.

In convergence, Martin Buber[40] states that the double movement of *sep-
aration* and *relationship* defines the principle of human life and that an authentic
relationship only occurs when the other is placed at the right distance, so that the
I-Thou is possible. Otherwise, we are condemned to an object-like and reductive
relationship, which Buber calls *I-Thou.*

We therefore need synergy between the analytical method – of differen-
tiation – and the synthetic method – of fusion. Not *one,* not *two,* don't mix, don't
separate*:* this is a transdisciplinary principle that calls for *three.*

The richness of three is that it contains within itself the one of fusion and
the two of differentiation. Using the metaphor of the neurophysiological sub-
strate, the salutary and wise exercise of integration is supported by the *corpus
callosum,* which connects the two cerebral hemispheres, that of analysis and syn-
thesis. This is what the wisdom tradition symbolises as the third vision or the horn
of the unicorn. For this reason, Carl Sagan[41] says that the future of education
depends on the corpus callosum. We might add the future of understanding too!

7. The Tao of Understanding

Lao Tsé[42] said that *the high rests in the deep*. Parodying the Taoist sage,
we can say that synthesis rests in analysis. The whole rests in the part, the sky
rests in the earth, the wings rest in the roots…

In his work, Edgar Morin[43] places great emphasis on a thought by Pascal,
a true pearl of the holistic vision: '*All things being caused and causing, helped
and helping, mediated and immediate and all intertwined with each other, by a
natural and insensitive bond that connects the most distant and the most different,
I find it impossible to know the parts without knowing the whole; I also find it
impossible to know the whole without knowing the parts.*

The wise and inspiring concept of the Tao, from the Chinese tradition[44],
indicates the integration of the masculine *Yang* principle with the feminine Yin,
in a symbolic interpenetration of opposites and the harmonious transcendence of
opposites. We can consider it a symbol of the path that leads to understanding.

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[40] Buber, M. *I-Thou.* São Paulo: Cortez & Moraes, 1977.
[41] Sagan, C. *The Dragons of Eden.* Rio de Janeiro: Francisco Alves, 1987.
[42] Lao-Tsé. *Tao Te King.* São Paulo: Alvorada, 1979.
[43] Morin, E. *op. cit*., 1997, p. 131.
[44] Lao-Tsé, *op. cit.,* p. 57.

On the other hand, a pedagogy of understanding imperatively calls for the science and art of *hermeneutics*, above all through the recovery of symbolic intelligence. Intelligence comes from *inteligere*, which means to *read inside* – of letters, of facts, of experiences. It's this symbolic reading that allows us to overcome the normative stupidity of a certain simplistic surface literalism, the source of the fundamentalism and fanaticism that are so prevalent today, not just in religion, but also in ideology, marketing and teaching, among others. It is hermeneutics that make it possible to grasp and understand the plurality of meanings and senses inherent in every phenomenon, every crisis and every experience.

The ability to interpret goes beyond the analytical exercise of explanation, including the synthetic route, which probes the subtle and the interior, capable of extracting the polysemy of meanings implicit in every human experience. It is also an interpretation that elevates us from the condition of the object of facts and circumstances to the status of a subject of our own existence, endowed with the gift of freedom. We are not free in relation to what happens to us; our freedom consists of what we do with what happens to us, which calls for an art of listening that, beyond mere hearing, is also interpretation. A person who is skilled in the exercise of interpretation, in the broad and transdisciplinary sense, is also capable of overcoming the most arduous existential challenges. Because the only destructive crisis that can be fatal is one in which we can't make sense of anything because of our inability to listen and interpret.

8. Conclusions

The great teachers and educators of humanity have always warned us about the danger of judgement, which is the source of so many conflicts and tears. Understanding is an effective antidote to this destructive power struggle, because those who understand do not judge. Judgement is the failure of listening and understanding.

Edgar Morin[45] lucidly and boldly affirms the spiritual mission of education in the intersubjective task of *teaching understanding* through the combined virtues of openness, sympathy and generosity. It is an art of living with intellectual and moral solidarity and dialogue, capable of understanding incomprehension, without complacency or accusations, at the service of *Homo sapiens demens, of* metamorphosis and of our *community of destiny*.

The Tao of understanding is the Alliance between knowledge and being. A realisable utopia, a path to peace.

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The author declare that they have no conflicts of interest with respect to

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[45] Morin, Edgar, *op. cit.,* 2002, p. 67.

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The HPTD-M Proposal for a TD Chair: A Paradigm Shift

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Abstract: *The Modern Age has promoted advances in technoscience and material quality of life. However, a cycle has been created in which the hypertrophy of logic and analysis does not solve the complexity of human phenomena. This author's HPTD-M theory (Holopraxis Transdisciplinary Management) emerged in this context. The objective of this article is to provoke a comprehensive discussion on the creation of a transdisciplinary chair (TD chair) in universities, including courses of short duration for public and private organizations, envisaging effective and dialectical problem solving for issues involving the complexity of human phenomena, when the mechanistic and the systemic-biological-environmental approach are not enough. Thirty-five-year transdisciplinary research and professional experience culminated in the HPTD-M theory and a 14-hour successful TD pilot course for mediating managers in March/2023. This author's proposal for a paradigm shift and TD Chair involves 1) A transdisciplinary course in the first semester of university graduation; 2) Simplification and flexibility to start (concepts of technoscience and complementarity); 3) The mediating professor for learning to learn and understanding, not only knowing; 4) Creation of a TD kind of Ph.D. and M.Sc. focused on the dialogue between theory praxis and generalist specialist. An MBA with more theory could be a starting point; 5) The three types of logic as tools for problem solving in dialogue with new ideas that make sense, considering the level of complexity in each concrete case; and 6) The abstract-concrete complementarity in problem solving and the concept of quaternary complementarities for troubleshooting in practice.*

1. Introduction

The Modern Age, since the 18th-century Enlightenment or *Age of Reason*, has promoted advances in technoscience and material quality of life. However, a spiral cycle has been created in which the hypertrophy of logic and analysis does not solve the complexity of human phenomena. A more comprehensive understanding of ancient philosophies and traditions has been lost. Understanding has been reduced to knowledge or binary logic, fractioned by narrow analytical and scientific views of reality. Many human sciences borrowed such rationalist models from the hard sciences in a reductionist approach of merely mechanistic or biological-environmental views, which can't be applied effectively to complex human phenomena.

In the 21st century, the Western mainstream paradigms can no longer deal with the level of uncertainties, conflicts, polarization, and ideologization in which the West finds itself, the result of a binary worldview that has its explanations in the Western culture itself, focused on causality, which does not consider the various interactions in dualities, like the subject-object and conscious-unconscious at intertwined levels, as is clear from the Jung Analytical Psychology and Modern Physics, considering the principle of complementarity.

In 2022 this author's HPTD-M theory emerged (*Holopraxis Transdisciplinary Management*), influenced by Carl Gustav Jung (1875–1961), a psychiatric scientist and physician who created Analytical Psychology, a complementary school to Freud's Psychoanalysis. The Jungian vision involves not only technoscience but also philosophy and traditions, besides the four archetypal elements – the analogy between states of matter, namely Solid, Liquid, Gas, and Plasma (from the most concentrated to the most expanded), with the psychological functions, respectively Sensation, Feeling, Thinking, and Intuition (from the most concrete or solid to the most abstract or expanded). Such functions, which Jung discovered empirically in his patients, interact in complementarities, and Jung himself already hinted in a 1957 interview that the psyche is a quality of matter, a different kind of matter. No wonder Jung coexisted and discussed his theory with modern physicists. Even the Nobel Prize winner Niels Bohr was aligned with the Jungian view of complementarity between subject-object and conscious-unconscious. This is the basis of TD and the HPTD-M view, as a way of dealing with the complexity of human phenomena for concrete and effective problem solving. The idea of complementarities is present in Hermetic Philosophy, Taoism, Greek Philosophy, European Alchemical Tradition, Modern Physics, and

Analytical Psychology.

Quaternary complementarities (quaternary because it involves four elements) is the HPTD-M main framework, coming from Greek Philosophy: Empedocles (Earth, Water, Air, and Fire) and Heraclitus (cycle of transformations in dualities, rise and fall in the four elements), considering especially the comprehensive framework of the European Alchemical tradition. Besides, an analogy between states of matter in modern physics (from the most solid to the most dispersed): Solid, Liquid, Gas, and Plasma. Furthermore, the concept is analogous to Jungian psychological functions (from the most concrete to the most abstract): Sensation, Feeling, Thinking, and Intuition.

The HPTD-M framework considers four epistemic ways or main disciplines, i.e. technoscience, philosophy, tradition, and art. Another way to see the same principle is the complementarity between culture and technoscience. Culture can be seen as the conjunction of philosophy + tradition + art, and science cannot be confused with technoscience, because technoscience is the complementarity feedback between technology and science: A newly discovered technology that works may not be explained scientifically, and a new scientific discovery may not have technological applications at once. Furthermore, religion cannot be confused with tradition, because tradition involves not only religions but also other cultural traditions, and spiritual traditions, like the Alchemical tradition which was also a protoscience until the 17th century.

This author's theory and praxis will be simply mentioned in this text as **HPTD-M**. Besides, the noun **'transdisciplinarity'** or the adjective **'transdisciplinary' will be referred to as TD**.

As far as TD principles are concerned, some quotes influenced this author's *Holopraxis Transdisciplinary Management* (HPTD-M) to construct the theory and praxis framework.

1) Albert Einstein (1879–1955), Relativistic Physics:

— *We cannot solve problems using the same kind of thinking we used when we created them*[1].

— *The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift.*[2]

2) Carl Gustav Jung (1875–1961), Analytical Psychology:

— *Until the unconscious becomes conscious, it will guide your life and you will call it destiny*[3].

[1] Costa, L. S. G. M. (2022). Applied transdisciplinarity through Plato's philosophy, Taoism, Alchemical tradition, and Jungian psychology. *Transdisciplinary Journal of Engineering & Science, 13*, p. 1-21 https://www.atlas-tjes.org/index.php/tjes/article/view/261/214

[2] Max-Neef, Manfred A. (2005). Foundations of transdisciplinarity. *Ecological Economics 53 (2005) 5–16*. Elsevier, p. 10. https://nova.org.za/assets/max_neef_2005_foundations_of_transdisciplinarity.pdf

[3] Costa, L. S. G. M., *op. cit.* (2022), p. 1-21.

— Asking the right question is already half the solution to a problem[4].

3) Niels Bohr (1885–1962), Quantum Physics:

— [...] dividing this reality into an objective and subjective side will not get us very far. [...] even when an individual tries to achieve the greatest degree of independence possible, he will still be influenced by existing spiritual structures – consciously or unconsciously.[5]

4) Manfred Max-Neef (1932–2019), Economics and TD:

— I was used to diagnosing and analyzing but not used to understanding [...] the idea [...] of demonstrating what economics looked like behind its mask of supposedly exact, mathematical, and judgment-free science[6].

5) Fritjof Capra (1939-), Modern Physics and Holistic Systems:

— The physics of the 20th century has convincingly shown us that there is no absolute truth in science, that all concepts and theories are limited and approximate. The time has come for other sciences to broaden their underlying philosophies[7].

6) Basarab Nicolescu (1942-), Physics and TD:

— Transdisciplinarity [...] is at the same time between the disciplines, across the different disciplines and beyond all disciplines[8].

7) Roberto Crema (1951 -), Anthropology, Psychology and Holistic TD:

— Judgment is the failure of listening and understanding[9].

— No one transforms anyone, and no one is self-transformed alone. We

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[4] Ibid.

[5] Popova, Maria (2018). Nobel-winning physicist Niels Bohr on subjective vs. objective reality and the uses of religion in a secular world. *The Marginalian*. Full text available at: https://www.the marginalian.org/2018/02/01/niels-bohr-science-religion/ *[...] splitting this reality into an objective and a subjective side won't get us very far. [...] even when an individual tries to attain the greatest possible degree of independence, he will still be swayed by the existing spiritual structures – consciously or unconsciously.*

[6] Max-Neef, Manfred; Smith, Philip B. (2014). *La economia desenmascarada*. Icaria editorial, 1 ed., 2014. Free translation from Spanish to English of part of p. 13: *Todo mi discurso como académico económico convencional era completamente inadecuado para que pudiese decir algo significativo. Estaba acostumbrado a diagnosticar y analizar, pero no estaba acostumbrado a comprender.* https://www.traficantes.net/sites/default/files/pdfs//9788498885576.pdf.

[7] Capra, Fritjof (1982). *The turning point: science, society, and the rising culture.* Bantam Books, p. 57, http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning _Point__Science,_Society,_and_the_Rising_Culture__-Bantam (1988).pdf.

[8] Nicolescu, Basarab (2005). Transdisciplinarity, past, present and future. Conference paper presented at the *II World Congress of Transdisciplinarity*, September 6 to 12, 2005, Vila Velha/Vitória – SC – Brazil. Available at: https://www.tercercongresomundialtransdisciplina riedad.mx/wp-content/uploads/2019/08/Transdisciplinarity-past-present-and-future.pdf.

[9] Crema, Roberto (2010). Conference paper in Portuguese: Understanding: convergence between knowledge and being. *Conferência Internacional Os Sete Conhecimentos para a Educação de Hoje*, de Edgar Morin. Fortaleza, Brasil, de 21 a 24 de setembro de 2010 (UNESCO, UEC, UCB). Available in Portuguese at: https://robertocrema.com.br/compreensao-convergencia-entre-o-saber-e-o-ser/.

transform ourselves in the Encounter.[10]

Finally, the objective of this article is to provoke a comprehensive discussion on the creation of a TD chair in universities, including courses of short duration for public and private organizations, envisaging an effective and dialectical problem solving for issues involving the complexity of human phenomena, when the mechanistic and the systemic-biological-environmental approach are not enough. In other words: When the binary and feedback types of logic are not sufficient to deal with the concrete problem to be solved. For that purpose, this text is divided in the following sections:

1. Introduction.

2. TD Background and References

3. TD Concepts through the HPTD-M

4. Cultural Transformation and Paradigm Shift

5. The HPTD-M Types of Logic and Mythology in Dialogue with Logic.

6. The HPTD-M Analytical and Synthetic Models: Quaternary Complementarities for a TD Chair.

7. Proposal for a TD Chair and Conclusions.

Appendix 1: Questions for the Panel - March 2024 21–22 TD Chair Symposium.

Appendix 2: Background of TD Courses in Brazil Aiming at the International TD Chair.

Nowadays there are some formal approaches of TD worldwide. The Romanian Nicolescu is the most well known through the French NGO CIRET, an international organization for TD studies established in 1987. The holistic TD from Brazilian UNIPAZ, the 'The University of Peace', a private foundation also established in 1987, is a complementary view, besides ARKOS education institutions in Mexico, the scientific TD approach of the so-called Zurich approach, and HPTD-M as the integration of Brazilian TD with other approaches.

Dr. Sue L. T. McGregor, a senior member of CIRET from Canada, shared with this author her presentation slides of ***Three Leading Approaches to Transdisciplinarity*** (*The Future Is Not What It Used to Be: Thinking Differently Through Transdisciplinarity, Team Science, and Socio-Technical Controversies.* Cleveland State University: March 30, 2023, 11:00 – 1:00 p.m. EST):

— **Nicolescu (new methodology).**

— **Zurich (science still reigns).**

— **HPTD-M (applied knowledge).**

To complete Dr. McGregor's view, in our opinion as the creator of HPTD-M, it comes from the TD theory + engineering & management praxis,

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[10] Crema, Roberto (2017). *O poder do encontro: origem do cuidado* [*the power of encounter: origin of care*]. São Paulo: Tumiak Produções; Instituto Arapoty; UNIPAZ. Crema invited this author to the book release by e-mail on 28.02.2017, also mentioning in Portuguese: *Sempre afirmo que ninguém transforma ninguém e ninguém se transforma sozinho; nós nos transformamos no Encontro.* (free-translated into English).

based on 35 years of professional experience in Brazil, involving background in urban development, international trading, business, public finance, and public management, i.e. TD activities by nature.

In this framework coming from concrete TD experiences complemented by theoretical studies, this author understands the necessity of developing a TD chair to provoke a cultural transformation, a paradigm shift from a dominant scientist and dogmatic view focused on binary logic to a transdisciplinary approach focused on the dialogue between culture and technoscience for concrete problem solving in the complex issues of our civil society.

2. TD Background and References

This text involves not only research and TD theory, i.e. references directly or indirectly connected to TD in literature. **The HPTD-M promotes a TD dialogue between theory and praxis, considering this author's following background** in engineering, entrepreneurship, urban development, international trading, public finance, and public management:

1) More than 30-year professional experience connected and correlated to TD:

— Engineering and Entrepreneurship – an urban development planning and execution in Brazil. Besides this author's 16-year experience in international trading, there was a parallel activity with engineering: a Brazilian project that created the district *Vivendas Santa Mônica*, starting from a 170-hectare rural area to a cottage district of 1,100 lots, an economical-financial viability study, business plan, environmental impacts report, law assistance, project approval by the authorities, construction and selling agreements (from 1996 to 2002). This means a TD project, involving planning and execution, considering the various disciplines involved. This author was a business partner in the enterprise and also participated in the technical engineering solutions[11].

— Public Finance – Brazilian federal funds. A TD diagnosis and a proposal for a taxonomy of the Brazilian public and private funds as a way of administering public resources, in view of the financial law bill to replace the Federal Law 4,320/1964[12].

[11] Costa, L.S.G.M.C. (1996). Vivendas Santa Mônica Project: Urban development applied project which was part of the author's post-graduation degree in engineering economics at the 48th Class of Fundação Dom Cabral (FDC), 1996. http://dx.doi.org/10.13140/RG.2.2.21666.71368.

[12] Costa, L.S.G.M.C. (2011). Fundos Federais: um diagnóstico [Federal funds: A diagnosis: Monograph]. Honorable mention at a monograph contest from the Brazilian Federal Government: *IV Concurso de monografias da SOF (Secretaria de Orçamento Federal) com ESAF (Escola Nacional de Administração Fazendária).* https://repositorio.enap.gov.br/handle/1/4690; Costa, L. S. G. M. C. (2012). Uma visão sistêmica dos fundos federais [A systemic vision of Brazilian federal funds]. *Série de textos para discussão do Tesouro TD n. 7/2012.* https://repositorio.enap.gov.br/handle/1/4268; Costa, L.S.G.M.C. (2017). Fundos federais: Abordagem transdisciplinary

— **Public Management – Quality of Public Expenditure.** A TD approach for the Brazilian federal administration, especially considering the complementarity (trade-off) corruption vs. mismanagement, besides its effects on the behavior of the good-will managers, through the equation model $0.17 \times + 0.83$ y, where x > 0 and y < 0; x is the positive effect in % of the bureaucratic combat to corruption and y is the negative effect (mismanagement) in % on the good-will managers[13].

— **HPTD-M Theory and Praxis (e.g. Public Administration Disciplines).** The quaternary-complementarities framework of analytic and synthetic models for problem solving in the HPTD-M, including a model for mapping TD leadership through governance vs. governability, besides creating a definition of Public Administration Disciplines in a TD level, considering the interdisciplinarities of two by two and the TD as the mediating management in the center of the interaction of those four, i.e.:

—Politics – not to be confused with ideological partisanship.
—Technoscience – including economics and administration.
—Bureaucracy – law and legislation.
—Humanities – including psychology[14].

2) TD publications throughout the USA, France, Canada, South Africa, and Brazil, in English and Portuguese, related to the framework of what would be the HPTD-M theory after April/2022. One book[15], two monographs[16],

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diante do Projeto da Lei de Finanças Públicas [Federal funds: Transdisciplinary approach considering the Brazilian federal public finance bill]. *Série de textos para discussão do Tesouro TD n. 29/2017.* https://repositorio.enap.gov.br/handle/1/4541.

[13] Costa, L. S. G. M. (2021). Qualidade do gasto público em abordagem transdisciplinar: levantamento com gestores, acadêmicos e controladores em 2020 e 2021 [Quality of public spending in a transdisciplinary approach: survey with managers, academics and controllers in 2020 and 2021: Monograph]. *ResearchGate, 104 p.* http://dx.doi.org/10.13140/RG.2.2.19988.99201; Costa, L. S. G. M. (2020). *Gasto público: Uma Perspectiva ampliada [Public expenditure: An amplified perspective].* Clube de Autores. https://www.amazon.com.br/Gasto-P%C3%BAblico-Leonardo-Martins-Costa-ebook/dp/B08H78N84H; Costa, L. S. G. M. (2020). Presentation at the 29th GIRC Network Panel promoted by *the Brazilian Ministry of Economy and the Comptroller General of the Union (CGU)* on the theme of public spending: the bias of corrupt centrism and the search for efficiency. Abstract in English and slides presentation in Portuguese available at: http://dx.doi.org/10.13140/RG.2.2.28140.03206.

[14] Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, 14. https://doi.org/10.22545/2023/00228.

[15] Costa, L. S. G. M. (2020). *Public spending: an amplified perspective [Gasto público: uma perspectiva ampliada].* Clube de Autores, 229 p. 1st Edition in Portuguese. https://clubedeautores.com.br/livro/gasto-publico.

[16] Costa, L.S.G.M.C. (2011). Fundos Federais: um diagnóstico [Federal funds: A diagnosis: Monograph]. Honorable mention at a monograph contest from the Brazilian Federal Government: *IV Concurso de monografias da SOF (Secretaria de Orçamento Federal) com ESAF (Escola Nacional de Administração Fazendária).* https://repositorio.enap.gov.br/handle/1/4690; Costa, L. S. G. M. (2021). Qualidade do gasto público em abordagem transdisciplinar: levantamento com

and three articles[17] published in Portuguese (Brazil). Besides, nine articles published in English: the USA[18], Canada[19], France[20], and South Africa[21].

3) 14-hour successful TD pilot course in 2023: The course was given in March/2023 for Brazilian public managers at the federal, state, and municipal levels[22], which received very good feedback from 14 participants who evaluated

gestores, acadêmicos e controladores em 2020 e 2021 [Quality of public spending in a transdisciplinary approach: survey with managers, academics and controllers in 2020 and 2021: Monograph]. *ResearchGate,* 104 p. http://dx.doi.org/10.13140/RG.2.2.19988.99201.

[17] Costa, L. S. G. M. (2023). Skills of the transdisciplinary mediator [Habilidades do mediador transdisciplinar]. *Centro de Educação Transdisciplinar (CETRANS).* Parte do Boletim CE-TRANS INTER@TIVO 56, Ano XIV, Outono 2023. Abstract in English and article in Portuguese: http://dx.doi.org/10.13140/RG.2.2.20330.29124; Costa, L. S. G. M. C. (2012). Uma visão sistêmica dos fundos federais [A systemic vision of Brazilian federal funds]. *Série de textos para discussão do Tesouro TD n. 7/2012.* https://repositorio.enap.gov.br/handle/1/4268; Costa, L.S.G.M.C. (2017). Fundos federais: Abordagem transdisciplinary diante do Projeto da Lei de Finanças Públicas [Federal funds: Transdisciplinary approach considering the Brazilian federal public finance bill]. *Série de textos para discussão do Tesouro TD n. 29/2017.* https://repositorio. enap.gov.br/handle/1/4541.

[18] Costa, L. S. G. M. (2022). Applied transdisciplinarity through Plato's philosophy, Taoism, Alchemical tradition, and Jungian psychology. *Transdisciplinary Journal of Engineering & Science, 13.* https://www.atlas-tjes.org/index.php/tjes/article/view/261/214; Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science, 13.* http://atlas-tjes.org/index.php/tjes/article/view/272/229; Costa, L. S. G. M. (2022). HPTD-M for Public Management Sustainability: A Proposal for Brazil. *Transdisciplinary Journal of Engineering & Science, SP-3.* Special Issue on Complex Resilience and Sustainability. Transdisciplinary Perspectives, edited by G. del Cerro Santamaría. https://www.atlas-tjes.org/index.php/tjes/article/view/347/272; Costa, L.S.G.M. (2023). A stress tests for the HPTD-M transdisciplinarity through Alchemical Psychology. *Transdisciplinary Journal of Engineering & Science, 14.* http://dx.doi.org/10.22545/2023/00222; Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science, 14.* https://doi.org/10.22545/2023/00228; Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science, 15.* https://doi.org/10.22545/2024/ 00243.

[19] Costa, L.S.G.M. (2022). Effectiveness and styles of leadership in Public Management: Quality in the context of transdisciplinary HPTD-M Theory. *Integral Leadership Review, vol. 22, no. 1 Dec. 2022.* https://ilr.scholasticahq.com/article/57734-effectiveness-and-styles-of-leadership-in-public-management-quality-in-the-context-of-transdisciplinary-hptd-m-theory.

[20] Costa, L. S. G. M. (2022). HPTD-M: A transdisciplinary integration of three paradigms – Mechanistic, Systemic, and Synchronistic. *Transdisciplinary Journal of Human Plasticity (PLASTIR) 65,* June/2022 (Quarterly Journal, bilingual/ISSN n° 2105–2794). http://www.plastici tes-sciences-arts.org/PLASTIR/daCosta%20P65.pdf.

[21] Costa, L. S. G. M. (2021). Transdisciplinarity of Physics, Philosophy, Economics, Law, Psychology, and Politics applied to Public Administration. *African Journal of Governance and Public Leadership (AJoGPL) ISSN: 2789-2298 Vol. 1. Issue 2.* pp. 53–66, Dec 2021. https://ajogpl. kab.ac.ug/index.php/1/article/view/28.

[22] Costa, L. S. G. M. (2023). The mediating manager. A course of transdisciplinary tools applied to organizations, based on the HPTD-M theory and the new conception of mediation and leadership. *Brazilian National School of Public Administration (ENAP).* https://suap.enap.gov.br/portal doaluno/curso/2136/?area=16. The ENAP certificate is in the following link, which also explains

the course through a process called in Portuguese 'reaction evaluation'. The average age of the participants was 44 and the evaluation average was 8.6 in 10, which was considered a very good grade for a pilot course.

4) International TD activities:

— Independent transdisciplinary theorist and practitioner (HPTD-M): publications in five countries.

— Since December 2023 member of CIRET, *Centre International de Recherches et Études Transdisciplinaires*, a French NGO in Paris, founded in 1987, promoter of international transdisciplinary research and studies. Site: <ciret.hypotheses.org>.

— Idealization and co-organization, as speaker and author, of the following international transdisciplinary symposiums:

- In June/2023, *The Transdisciplinary Mediator for Effective Problem Solving in Organizations and Civil Society*, promoted by CIRET[23].

- In November/2023, *Artificial Intelligence and Human Mediation*, promoted by CIRET Also, guest co-editor of the event book, released in February/2024 by ATLAS Publishing in the United States, through the same title *Artificial Intelligence and Human Mediation*[24]. The ATLAS, *Academy of Transdisciplinary Learning & Advanced Studies*, founded in 2000, is a non-profit organization by the US Federal Government, providing services to students around the world: i) TD education and research; ii) support social, environmental, economic, and ethical sustainable development throughout the world; and iii) to promote global information exchange through innovative publishing. Site: <theatlas.org>.

- *For an International Transdisciplinary Chair*, promoted by CIRET in March 21–22/2024. See in Appendix 1 the questions presented in the Panel and this author's answers to them.

5) International TD references with which HPTD-M dialogues: During the experience in public service, the HPTD-M theory emerged gradually, since 2012, also considering the following references (see **Table 1**).

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the course main topics through translation from Portuguese to English, so that English-speaking researchers may understand the content: http://dx.doi.org/10.13140/RG.2.2.28025.54884.

[23] Costa, L.S.G.M.; Loisel, M. T. (2023). International Presentation: The Transdisciplinary Mediator for Effective Problem Solving in Organizations and Civil Society (in English and Portuguese), coordinated by Dr. Mariana Thieriot Loisel. *CIRET and CETRANS*. Slides are available at: http://dx.doi.org/10.13140/RG.2.2.20460.54401/1. Video of the presentation available at: https://www.youtube.com/watch?v=pSnHVXUEGSg

[24] Costa, L.S.G.M., Loisel, M. T., Landier, H. et al. (2024). *Artificial Intelligence and Human Mediation* (Editors and co-authors among 12 authors: Leonardo da Silva Guimarães Martins da Costa & Mariana Thieriot Loisel). Postface and Appendix by Hubert Landier. ATLAS Publishing. ISBN: 978-0-9998733-8-0 (PDF). Full text available at https://theatlas.org/index.php/ td-teaching-materials/td-books.

Table 1: Applied TD Main References for Each Background Discipline and Publication's Last Year – HPTD-M Design

Item	Type / Discipline	Author	Country	TD Main View
1	Holistic Systems: Modern Physics	Capra[25]	Netherlands	Systemic paradigm: not yet TD
2	TD Methodology: Physics	Nicolescu[26]	Romania	Included Third Logic
3	Holistic TD: Psychology & Math	Weil, Crema, & D'Ambrosio[27]	Brazil & France	Four Epistemic Ways
4	HPTD-M:	Costa[28]	Brazil	Holopraxis TD Management

[25] Capra, Fritjof (1982). *The turning point: science, society, and the rising culture.* Bantam Books. http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turni ng_Point__Science,_Society,_and_the_Rising_Culture__-Bantam(1988).pdf;___Capra,   Fritjof (1989). The Emerging New Culture: 27-minute interview in the *New Thinking Allowed* show with Jeffrey Mishlove. https://youtu.be/e-UQ1QqeTYs; Capra, Fritjfof (1996). The Web of Life: 12-minute interview for the *Thinking Allowed* show with Jeffrey Mishlove. http://www.youtube.com /watch?v=TLiRXM2oZ_U&list=PL943946701C4718FB.

[26] Nicolescu, Basarab (2005). Transdisciplinarity, past, present and future. Conference paper presented at the *II World Congress of Transdisciplinarity*, September 6 to 12, 2005, Vila Velha/Vitória – SC – Brazil. Available at: https://www.tercercongresomundialtransdisciplina riedad.mx/wp-content/uploads/2019/08/Transdisciplinarity-past-present-and-future.pdf;   Basarab   Nicolescu (2010). Methodology of Transdisciplinarity – levels of reality, the logic of the included middle, and complexity. *Transdisciplinary Journal of Engineering & Science, 1.* https://www.atlas-tjes.org/in-dex.php/tjes/article/view/9; Nicolescu, Basarab (2012). Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies, Vol. 1, No. 1 (2012), p. 24.* Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052 009Proceedings.pdf.

[27] Crema, Roberto (2010). Conference paper in Portuguese: Understanding: convergence between knowledge and being. *Conferência Internacional Os Sete Conhecimentos para a Educação de Hoje*, de Edgar Morin. Fortaleza, Brasil, de 21 a 24 de setembro de 2010 (UNESCO, UEC, UCB). Available in Portuguese at: https://robertocrema.com.br/compreensao-convergencia-entre-o-saber-e-o-ser/; Crema, Roberto (2017). *O poder do encontro: origem do cuidado* [*the power of encounter: origin of care*]. São Paulo: Tumiak Produções; Instituto Arapoty; UNIPAZ. Crema invited this author to the book release by e-mail on 28.02.2017, also mentioning in Portuguese: *Sempre afirmo que ninguém transforma ninguém e ninguém se transforma sozinho; nós nos transformamos no Encontro* (free-translated into English); Weil, Pierre; Crema, Roberto; D'Ambrosio, Ubiratan (1993). *Toward the new transdisciplinarity: open systems of knowledge [Rumo à nova transdisci-plinaridade: sistemas abertos de conhecimento]*. Summus Editorial. Edition in Portuguese. Weil, Pierre (2000). *A mudança do sentido e o sentido da mudança [The change of meaning and the meaning of change]*. Rosa dos Tempos. Edition in Portuguese.

[28] Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science,* 13. http://atlas-tjes.org/index.php/tjes/article/view/272/229; Costa, L.S.G.M. (2023). A stress tests for the HPTD-M transdisciplinarity through Alchemical Psychology. *Transdisciplinary Journal of Engineering & Science, 14.* http://dx.doi.org/10.22545 /2023/00222; Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, *14*. https://doi.org/10.22545/2023/00228; Costa, L. S. G. M. (2022). HPTD-M: A transdisciplinary integration of three paradigms – Mechanistic, Systemic, and Synchronistic. *Transdisciplinary Journal of Human Plasticity (PLASTIR)* 65, June/2022 (Quarterly Journal, bilingual/ISSN n° 2105–2794). http://www.plasticites-sciences-arts.org/PLASTIR/daCos ta%20P65.pdf.

	Eng. & Management			
5	TD in Economics	Max-Neef[29]	Chile	Understanding vs. Knowing
6	TD in Psychology	Crema[30]	Brazil	Understanding vs. Knowing
7	TD in Law	Wiviurka[31]	Brazil	'Transdisciplinarization' of Law
8	TD in Intl. Law	Popa Tache & Sararu[32]	Romania	New TD Directions in Intl. Law
9	TD in Politics	Viparelli[33]	Italy	Transpolitics
10	TD in Public Adm.	Uwizeyimana[34]	South Africa	Disciplines in Public Adm.
11	TD in Public Adm.	Nita[35]	Romania	New Type of Education
12	TD in Human Mediation	Costa, Landier & Thieriot[36]	Brazil & France	AI & Human Mediation
13	TD in Educacion & Philosophy	Thieriot & D'Ambrosio[37]	Brazil	Philosophy & Technoscience

[29] Max-Neef, Manfred A. (2005). Foundations of transdisciplinarity. *Ecological Economics 53 (2005) 5–16*. Elsevier, p. 10. https://nova.org.za/assets/max_neef_2005_foundations_of_trans disciplinarity.pdf; Max-Neef, Manfred; Smith, Philip B. (2014). *La economia desenmascarada*. Icaria editorial, 1 ed., 2014. Free translation from Spanish to English of part of p. 13: *Todo mi discurso como académico económico convencional era completamente inadecuado para que pudiese decir algo significativo. Estaba acostumbrado a diagnosticar y analizar, pero no estaba acostumbrado a comprender.* https://www.traficantes.net/sites/default/files/pdfs//978849888557 6.pdf.

[30] Crema, Roberto (2010). Conference paper in Portuguese: Understanding: convergence between knowledge and being. *Conferência Internacional Os Sete Conhecimentos para a Educação de Hoje*, de Edgar Morin. Fortaleza, Brasil, de 21 a 24 de setembro de 2010 (UNESCO, UEC, UCB). Available in Portuguese at: https://robertocrema.com.br/compreensao-convergencia-entre-o-saber-e-o-ser/; Crema, Roberto (2017). *O poder do encontro: origem do cuidado* [*the power of encounter: origin of care*]. São Paulo: Tumiak Produções; Instituto Arapoty; UNIPAZ. Crema invited this author to the book release by e-mail on 28.02.2017, also mentioning in Portuguese: *Sempre afirmo que ninguém transforma ninguém e ninguém se transforma sozinho; nós nos transformamos no Encontro.* (free-translated into English).

[31] Wiviurka, Eduardo Seino (2010). The transdisciplinarization of Law [A transdisciplinarização do Direito]. *XIX Encontro Nacional Conpedi realizado em Fortaleza, Brasil*, nos dias 09, 10, 11 e 12 de junho. http://www.publicadireito.com.br/conpedi/manaus/arquivos/anais/fortaleza/3278.pdf.

[32] Popa Tache, C. E. & Sararu, C.-S. (2023). New Transdisciplinary Directions in International Law? *Lex Humana (ISSN 2175-0947)*, *15*(4), 86–109. Retrieved from https://seer.ucp.br/seer/index.php/LexHumana/article/view/2705.

[33] Viparelli, Irene (2019). Transdisciplinarity and politics. A possible encounter? [Transdisciplinaridade e política. Um encontro possível?]. *Perspectivas – Journal of Political Science*, vol. 21. 2019. https://www.perspectivasjournal.com/index.php/perspectivas/ article/view/ 2507.

[34] Uwizeyimana, D. E. & Basheka, B. C. (2017). The multidisciplinary, interdisciplinary, and transdisciplinary nature of public administration. *African Journal of Public Affairs,* Vol. 9, No. 9 December 2017. https://journals.co.za/doi/pdf/10.10520/EJC-c13a0cbc0.

[35] Nita, Mircea Aurel (2013). Types of truth, transdisciplinarity and a new type of education in public administration. *Curentul Juridic, 16,* pp. 157–170. Available at: http://revcurentjur.ro/old/arhiva/attachments_201304/recjurid134_17F.pdf.

[36] Costa, L.S.G.M., Loisel, M. T., Landier, H. et al. (2024). *Artificial Intelligence and Human Mediation* (Editors and co-authors among 12 authors: Leonardo da Silva Guimarães Martins da Costa & Mariana Thieriot Loisel). Postface and Appendix by Hubert Landier. ATLAS Publishing. ISBN: 978-0-9998733-8-0 (PDF). Full text available at https://theatlas.org/index.php/ td-teaching-materials/td-books.

[37] Loisel, Mariana Thieriot (2024) *Les mutations humaines: dialogue entre la philosophie et les technosciences*. Editions Amalthée. https://www.plasticites-sciences-arts.org/editions-plasticites/; Thieriot Loisel, M. & D'Ambrosio, U. (2006) TD Chair ministered in the São Bento Monastery Faculty of Philosophy, São Paulo, Brazil, from 2005 to 2006.

14	TD in Educacction & Spirituality	Pasquier[38]	France	Education & Spirituality
15	TD Academic	McGregor[39]	Canada	TD trends and Transpraxis

3. TD Concepts through the HPTD-M

As HPTD-M understands, there are six essential aspects for the TD Chair:

1) Disciplinarity: disciplines studied separately by specialists (isolated disciplines).

2) Multidisciplinarity: specialists in a meeting, working group, or research, with no interaction between disciplines (multi = several).

3) Interdisciplinarity: interaction and interchange among or between disciplines in a meeting, working group, or research, which may even create new disciplines (inter = among or between).

4) TD: the unity of understanding beyond the disciplines (trans = beyond + through), complementary and synergic interactions between specialists and generalists through various ways.

5) Complementarities, such as between disciplinarity and TD, i.e. one-discipline specialists in dialogue with generalists who work with many specialists to promote the comprehensive and holistic TD view. The holistic view, in turn, is made of the *holological* and *holopractical* complementarity ('holos' comes from the Greek and means 'whole'). Complementarity, as a principle, involves the logic of the Included Third. Modern physics rediscovered at the beginning of the 20th century this simple principle. De Broglie demonstrated the wave-particle duality and Einstein the convertibility between mass and energy ($E = mc^2$). All of this was intuitively already known by the Alchemical Tradition, as seen in the Ouroboros symbol and the Taoist Philosophy, through the circular Tai Chi symbol of Ying-Yang. The Tao means the way, i.e. the true way is not the true way (like in a Zen koan to provoke meditation through paradoxes). So, complementarity can be seen clearly through technoscience, philosophy, tradition, and art to demonstrate that binary logic can be applied only to certain contexts in practical terms. Complementarity also involves the balance of opposites.

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[38] Pasquier, F. (2022). From Spirituality to Technontology in Education. *Journal of Systemics, Cybernetics and Informatics*, *20*(6), 49–52. https://doi.org/10.54808/JSCI.20.06.49

[39] McGregor, S. L. T. (2023). Transdisciplinarity and public policy. *Transdisciplinary Journal of Engineering & Science, 14.* https://doi.org/10.22545/2023/00219: McGregor, S. L. T. (2020). Transdisciplinarity and Transpraxis. *Transdisciplinary Journal of Engineering & Science, 11.* https://doi.org/10.22545/2020/00134; McGregor, S. L. T. (2023). Shifting paradigms: Bringing transdisciplinarity into the light. *Transdisciplinary Journal of Engineering & Science, 14.* https://doi.org/10.22545/2023/00235; McGregor, S. L. T. (2024). Russian school of transdisciplinarity as a metadiscipline. *Universum: Social Sciences, 3* (106), 53–65. https://7universum.com/ru/social/archive/item/17087.

6) Quaternary Complementarities, as seen in the HPTD-M through archetypal relations for effective and dialectical organizational problem solving. Roughly, this principle can be seen by the complementarity between soft skills (human abilities) and hard skills (technical abilities), considering the quaternary types of intelligence, i.e. empirical, emotional, rational, and intuitive. This means soft skills are emotional and intuitive, and hard skills are empirical and rational. In Analytical Psychology, the four HPTD-M types of intelligence can be seen through the four Jungian functions, respectively: sensation, feeling, thinking, and intuition. In Physics, quaternary complementarities can be shown through the four states of matter (solid, liquid, gas, and plasma), besides the astronomical cycle of solstices and equinoxes, which marks the changing of seasons, involving Earth's orbit around the Sun, i.e. two solstices (summer and winter) and two equinoxes (spring and autumn) occurring each year. Those also involve archetypal symbols, not only physical concepts. The symbolic and mythological counterpart can be understood through cultural traditions, e.g. the Christian cross (four vertices interacting through horizontal and vertical axis), the Celtic cross (with a circle in the center), and the swastika (an ancient symbol that reflects the quaternary cycle, present in many ancient cultures).

Some of the HPTD-M perspectives were influenced by **Nicolescu**'s TD methodology, for which there is a fertile complementarity between disciplinarity and TD, comprising the logic of Included Third and the idea of Hidden Third [9]. Others come from Weil, D'Ambrosio, and Crema[40], especially the concept of holistic view and four epistemic ways, besides Capra's holistic systems[41].

There is a connection to the HPTD-M view of the **complementarity principle** as a balance of opposites, since the Niculescu's Included Third element of harmonization may also emerge in **Plato's dialectics** (427 - 347 BC), as the fourth level of knowledge in Plato's Divided Lines, another HPTD-M reference. This view differs from the logic of Aristotle (384 - 322 BC), which separates the opposites, comprising the linear logic, which is still our Western society's dominant view, the causality paradigm[42].

Therefore, the HPTD-M understands that TD is a new cultural, philosophical, technoscientific, and creative approach that goes beyond and through disciplines (TRANS), in search of UNDERSTANDING reality to solve problems, more than simply KNOWING rationally. Here are two authors who corrob-

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[40] Weil, Pierre; Crema, Roberto; D'Ambrosio, Ubiratan (1993). *Toward the new transdisciplinarity: open systems of knowledge [Rumo à nova transdisciplinaridade: sistemas abertos de conhecimento].* Summus Editorial. Edition in Portuguese.

[41] Capra, Fritjof (1982). *The turning point: science, society, and the rising culture.* Bantam Books. http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turning_Point__Science,_Society,_and_the_Rising_Culture__-Bantam (1988) .pdf.

[42] Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science,* 13. http://atlas-tjes.org/index.php/tjes/article/view/272/229.

orate this vision, as per the difference between UNDERSTANDING and KNOW-ING:

— **Max-Neef:** economist and academic, Alternative Nobel for his *Barefoot Economics* theory. As per Max-Neef, formal knowledge, linked to reason, is constructed according to the rules of method and causality, while understanding, more linked to intuition, regulates method and causality: *Einstein […] declared that 'the intuitive mind is a sacred gift, and the rational mind is a faithful servant. We have created a society in which we honor the servant and have forgotten the gift.'[43]*

— **Crema:** anthropologist, psychologist, therapist, and TD theorist, creator of the 5th Force in Therapy. In the scholar's view (free translated from Portuguese): *There is the hypertrophy of information and knowledge, of broad, unrestricted, and immediate access, concomitant to the atrophy of the process of discernment and understanding. […] There is a mega-factor impeding understanding, which consists in what Pierre Weil, Jean-Yves Leloup, and this author have called normosis, a pathology of normality. Pierre Weil conceptualizes normosis as abnormalities of normality conformed by norms, concepts, values, stereotypes, habits of thinking and acting, which are approved by consensus or by the majority in a given society and which cause suffering, illness, and death[44].*

In this connection of Holistic TD, Weil, D'Ambrosio, and Crema are not physicists like Nicolescu, but psychologists (Weil and Crema) and math professor (D'Ambrosio). So, their perspective is complementary to Niculescu's TD framework when showing two new ideas for the TD theory[45];

— **Holistic view** as the complementarity between the hololology (study of the whole) and holopraxis (the praxis of the whole). However, a similar view is presented Capra's holistic systems, developed from Modern physics[46].

— **The four main disciplines or epistemic ways –** the idea of four epistemic forms (disciplines) as science, philosophy, religion, and art, which HPTD-M adapted in 2022 aiming at a more concrete problem-solving approach, to technoscience, philosophy, tradition, and art.

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[43] Max-Neef, Manfred A. (2005). Foundations of transdisciplinarity. *Ecological Economics 53 (2005) 5–16*. Elsevier, p. 10. https://nova.org.za/assets/max_neef_2005_foundations_of_trans disciplinarity.pdf.

[44] Crema, Roberto (2010). Conference paper in Portuguese: Understanding: convergence between knowledge and being. *Conferência Internacional Os Sete Conhecimentos para a Educação de Hoje*, de Edgar Morin. Fortaleza, Brasil, de 21 a 24 de setembro de 2010 (UNESCO, UEC, UCB). Available in Portuguese at: https://robertocrema.com.br/compreensao-convergencia-entre-o-saber-e-o-ser/.

[45] Weil, Pierre; Crema, Roberto; D'Ambrosio, Ubiratan (1993). *Toward the new transdisciplinarity: open systems of knowledge [Rumo à nova transdisciplinaridade: sistemas abertos de conhecimento]*. Summus Editorial. Edition in Portuguese. https://www.amazon.com.br/ Rumo-Nova-Transdisciplinaridade-Pierre-Weil/dp/8532304427.

[46] Capra, Fritjof (1982). *The turning point: science, society, and the rising culture.* Bantam Books. http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/CAPRA%20Fritjof_Capra-The_Turni ng_Point__Science,_Society,_and_the_Rising_Culture__-Bantam (1988) .pdf.

The French Weil was a Ph.D. in psychology and university professor in Brazil, a prolific writer, also a human resources consultant for Brazilian banks. D'Ambrosio, in turn, was a Ph.D. in math, a university professor in Brazil, and one of the 1986 UNESCO Venice Charter signatories. Both deceased. Crema, in turn, is an ex-psychoanalytical therapist, the current dean of UNIPAZ in Brazil, a TD organization <unipazdf.org.br>.

Other sources that may establish a bridge for TD for applied disciplines:
— Corporate Feedback – Missel[47].
— Transpolitics (TD in politics) – Viparelli[48].
— Transdisciplinarization of Law (TD applied to Law) – Wiviurka[49].
— TD in International Law – Popa Tache & Sararu[50].
— Systemic Law – Brazilian Bar OAB[51].
— 'Hammer-Nail' allegory – replicated by the website of a technology company[52]: 'There is an old saying: *If the only tool you have is a hammer, you will start treating all your problems like a nail.* Abraham Maslow modified it in 1966 to: *If all you have is a hammer, everything looks like a nail.*

As per Dr. Loisel TD view – free translated from Portuguese[53]: *Competition and hierarchies among the various disciplines are fed, stimulating a hiatus between Human and Exact Sciences, with contempt for all knowledge that comes from tradition.* (p. 9) *A pathos emerges, a disease that corrodes the relations between the disciplines, as each one calls true to its territory, to its cage, resisting the fact that truth emanates from a whole superior to the parts.* (pp 9–10) *[...] when new meanings emerge, the relationship transgresses the position of the marked places, of the disciplinary cages, as Ubiratan D'Ambrosio would say, to occupy a new place, in which we are all learners. It is the moment when a single*

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[47] Missel, Simoni (2016*). Corporate Feedback: How to know if it's going well [Feedback corporativo: como saber se está indo bem]*. São Paulo: Saraiva. Edition in Portuguese.

[48] Viparelli, Irene (2019). Transdisciplinarity and politics. A possible encounter? [Transdisciplinaridade e política. Um encontro possível?]. *Perspectivas – Journal of Political Science*, vol. 21. 2019. https://www.perspectivasjournal.com/index.php/perspectivas/article/view/ 2507.

[49] Wiviurka, Eduardo Seino (2010). The transdisciplinarization of Law [A transdisciplinarização do Direito]. *XIX Encontro Nacional Conpedi realizado em Fortaleza, Brasil*, nos dias 09, 10, 11 e 12 de junho. http://www.publicadireito.com.br/conpedi/manaus/arquivos/anais/fortaleza/3278.pdf

[50] Popa Tache, C. E. & Sararu, C.-S. (2023). New Transdisciplinary Directions in International Law? *Lex Humana (ISSN 2175-0947)*, *15*(4), 86–109. Retrieved from https://seer.ucp.br/seer/ index.php/LexHumana/article/view/2705.

[51] Brazilian Bar – OAB (2020). Systemic Law Booklet [Cartilha de Direito Sistêmico]. *OAB Santa Catarina*. Booklet available in Portuguese at: https://oabms.org.br/wp-content/uploads/2020/ 02/cartilha-ebook-1.pdf. Release note of the booklet available in Portuguese at: https://www.oab-sc.org.br/noticias/cartilha-comissao-direito-sistemico-ja-esta-disponivel-para-download/17300.

[52] Sorrells, Philip (2017). If your only tool is a hammer. *COMMSCOPE.* https://www.com mscope.com/blog/2015/if-your-only-tool-is-a-hammer/.

[53] Loisel, Mariana Thieriot (2013). Perlaborar ou a consciência do não intencional: primeiros elementos para uma escuta transdisciplinar [Perlaboring or the awareness of the unintentional: first elements for a transdisciplinary listening]. *CETRANS – Centro de Educação Transdisciplinar.* https://1drv.ms/b/s! AqLPNeNwvK2zgp5LSWsgdm2mCWxeMg.

sunflower appears on the canvas and resists time, or when a new conceptualization shakes the established order. The itinerary that leads to discovery is not an exact path, which does not exclude the precision and rigor. The path is that of labour, not of building a bridge or adjusting a machine. (pp 12–13) *It is the consciousness of the fact that will establish the relationship between knowledge and the meaning of human norms.* (p. 15)

Considering two academic TD colleagues:

— Ph.D. Canadian public policy consultant and retired professor (e-mail to this author on April 16, 2023): *The KEY feature of transdisciplinarity is that it is BEYOND disciplines. It is disciplinary and sectoral. Trans means beyond to a new space. To count as TD, the work must include more than just academics.*

— Ph.D. American professor – The Pennsylvania State University (e-mail does this author on June 22, 2023): *The core impulse of TD is action, practical changes, enacted solutions – practitioners, change agents are doing TD without calling it that, because they are organizationally mandated and responsible for results. To me, practitioners are central to advancing TD (emphasis on 'trans') while academic TD (emphasis on Disciplines) is still struggling to disciplinary interspaces.*

By the 1994 Charter of the First World Congress on TD in Portugal[54], TD is complementary to the disciplinary approach, considering 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.*

Also, by the Charter, three topics interest HPTD-M:

— **Complexity:** Preamble, second paragraph: *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;*

— **Levels of Reality governed by different logics** – 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.*

— **Ethics** – Article 13: *The transdisciplinary ethic rejects any attitude that refuses dialog and discussion, regardless of whether the origin of this attitude is ideological, scientistic, religious, economic, political or philosophical. Shared knowledge should lead to a shared understanding based on an absolute respect for the collective and individual Otherness united by our common life on*

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[54] First World Congress on Transdisciplinarity (Convento da Arrábida, Portugal, November 2–7, 1994). Participants' letter which contains a set of fundamental principles of the 2 community of transdisciplinary spirits. https://ciret-transdisciplinarity.org/chart.php#en.

one and the same Earth.

In this connection, HPTD-M considers the following basic concepts and principles:

— **Complexity**: The complexity of human phenomena needs to be treated in an adequate and non-reductionist way, by means of mechanistic, systemic, and TD paradigms, each one with its scope of action and level of adequacy according to the variables to be treated, without excluding beforehand, in a prejudiced way, any of these three ways of approaching reality.

— **Levels of Reality governed by different types of logic**: The Binary Logic must dialogue with the logic of the third party included (Included Third Logic), depending on the concrete case to be dealt with, whichever is simpler and more adequate for the approximation of reality. In this context emerges the quaternary-complementarities concept of the HPTD-M, the archetypal four elements interacting through complementarities. Those principles of earth, water, air, and fire can also be seen as levels of reality, not only symbolically, but in terms of consciousness functions, according to Analytical Psychology: sensation, feeling, thought, and intuition, as characterized in the MBTI[55], i.e. concrete, subjective, objective, and abstract levels. In this connection, MBTI is the *Myers-Briggs Type Indicator*, also known as the MBTI System, used for the classification of psychological types, based on the Jungian typology, however with sixteen types instead of eight in the Jungian perspective.

— **Ethics in the HPTD-M view**. The four epistemic paths need dialogue: technoscience, philosophy, tradition, and art. As a heritage of the Modern Age and the Enlightenment, the lack of dialogue in our Western rationalist culture tends to cause **dogmatic scientism feedbacked by partisanship**, which tends to undermine technoscience, as if only science matters and there is no possibility of technologies or techniques not originated or explained by science. Cultural traditions go in this direction of dogmatism and partisanship as if there could be no diversity of views of reality, only the 'true' one, considering the others as 'false' by the ideology corroborated by the 'science' of the moment. In other words, science can be approached ideologically, when scientific results are used selectively to substantiate or justify a particular ideology or belief system, ignoring or distorting scientific information that does not fit that perspective. This can occur in both political and religious ideologies. As Jung said in *AION*: *[…] the spirit became non-spiritual and […] the vitalizing archetype gradually degenerated*

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[55] First World Congress on Transdisciplinarity (Convento da Arrábida, Portugal, November 2–7, 1994). Participants' letter which contains a set of fundamental principles of the 2 community of transdisciplinary spirits. https://ciret-transdisciplinarity.org/chart.php#en; Nicolescu, Basarab (2012). Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies, Vol. 1, No. 1 (2012), p. 24.* Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf; English, Trevor (2020), Louis Broglie and the Idea of Wave-Particle Duality: Broglie devised that all matter had properties of both waves and particles. *Interesting Engineering*. https://interestingengineering.com/louis-broglie-and-the-idea-of-wave-particle-duality.

into rationalism, intellectualism, and doctrinairism, all of which leads straight to the tragedy of modern times now hanging over our heads like a sword of Damocles[56].

4. Cultural Transformation and Paradigm Shift

In the HPTD-M view, TD involves cultural transformation and paradigm shift. The Modern era is dominantly guided by the Binary Logic and sciences, the Newtonian paradigm, and the Cartesian mechanism. The subject has been reduced to object. In the early 20th century, Modern Physics (quantum/micro and relativistic/macro), in parallel with Analytical Psychology, highlighted the inconsistency of the Western tendency to reduce human phenomena to the mechanical. Modern physics discovered inseparability and complementarity as a **concentration expansion**, evidenced by:

1) **Particle-Wave**: De Broglie's duality in Physics[57].

2) **Mass-Energy**: Einstein's convertibility in Physics[58].

3) **Subject-Object**: Bohr in Physics[59] and Jung in Analytical Psychology[60].

4) **Conscious-Unconscious**: Bohr in Physics[61] and Jung in Analytical Psychology[62].

So, the historical cycles involving oscillation of such opposites are natural, as per:

— The cycles of nature, such as day and night, or the alternating hot and cold seasons throughout the year.

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[56] Jung, Carl Gustav (1959). *AION. Researches into the phenomenology of Self.* Princeton University Press, p. 86.

[57] English, Trevor (2020), Louis Broglie and the Idea of Wave-Particle Duality: Broglie devised that all matter had properties of both waves and particles. *Interesting Engineering.* https://interestingengineering.com/louis-broglie-and-the-idea-of-wave-particle-duality.

[58] Einstein, Albert (2021). Albert Einstein explains the theory of relativity. 1m48s video. *YouTube.* https://www.youtube.com/watch?v=aNuuYKieHRY.

[59] Franz, Marie-Louise von (1980). *Projection and recollection in Jungian psychology: reflections of the soul.* Open Court Publishing; Jung, Carl Gustav (1959). *AION. Researches into the phenomenology of Self.* Princeton University Press, p. 86, https://ia800606.us.archive.org/11/ items/collectedworksof92cgju/collectedworksof92cgju.pdf.

[60] Franz, Marie-Louise von (1980). *Projection and recollection in Jungian psychology: reflections of the soul.* Open Court Publishing.

[61] Popova, Maria (2018). Nobel-winning physicist Niels Bohr on subjective vs. objective reality and the uses of religion in a secular world. *The Marginalian.* Full text available at: https://www.themarginalian.org/2018/02/01/niels-bohr-science-religion/ *[...] splitting this reality into an objective and a subjective side won't get us very far. [...] even when an individual tries to attain the greatest possible degree of independence, he will still be swayed by the existing spiritual structures – consciously or unconsciously.*

[62] Jung, C. G. (1966) *Two Essays in Analytical Psychology.* Princeton University Press. https://vdoc.pub/documents/two-essays-on-analytical-psychology-5m8ujeeupn00.

— The Apollonian (more rational) and Dionysian (more sentimental) cycles in history and literature; the ways of thinking throughout history; in the Middle Ages, more religious; in the Renaissance, more rational; in the Baroque, more religious and sentimental; in the Enlightenment, very rational; in 19th century Romanticism, more sentimental and religious; and in the 20th century, totally rational.

— The political business cycle theory, in which rulers are prescribed to apply all unpopular measures at the beginning of their government, to receive the fruits at election time, close to the end of their mandate.

— The energy flow in the human body, represented by a rhythm, a vibration, or a constant pulse shown in the electroencephalogram, for example.

Finally, as per **Figure 1**, HPTD-M sees a transition process between an old modern concentrated scientism, to be replaced gradually by an expanded TD view through cultural transformation. Cultural transformation means considering not only science for problem solving but also the interaction between technology and science (technoscience): Besides, the technoscience interaction with culture. In turn, culture can be understood as philosophy, tradition, and art. So, technoscience provides the rational, empirical, and material means to solve problems concretely, and culture completes with the ethical, anthropological, and philosophical views of the problems to be solved, in organizations and civil society.

Figure 1: Emergence and Decline of Dominant Paradigms. Process of Cultural Transformation: From scientism to TD[63]
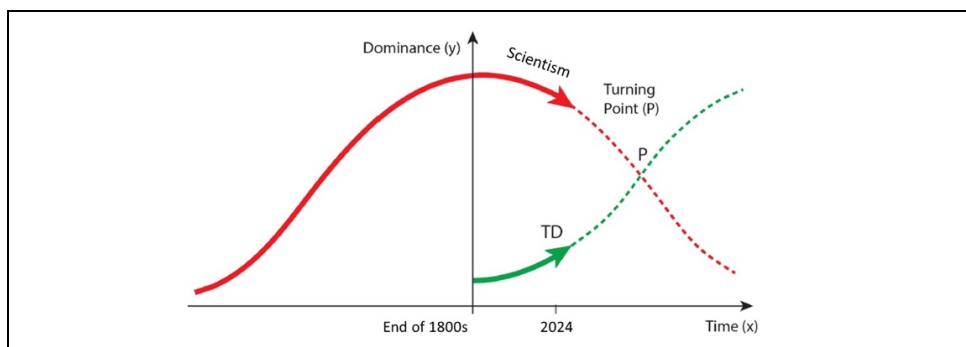
5. The HPTD-M Types of Logic and Mythology in Dialogue with Logic

As far as the dialogue between of logic and mythology is concerned,

[63] Costa, L. S. G. M. (2022). HPTD-M for Public Management Sustainability: A Proposal for Brazil. *Transdisciplinary Journal of Engineering & Science, SP-3*. Special Issue on Complex Resilience and Sustainability. Transdisciplinary Perspectives, edited by G. del Cerro Santamaría. https://www.atlas-tjes.org/index.php/tjes/article/view/347/272.

HPTD-M can see three levels of complexity do deal with problem solving, presented in **Figure 2**, which also shows mythology as complementary to the types of logic through feedback arrows.

1) Types of Logic:

— **Binary Logic**: involving 'True' or 'False', 'Right' or 'Wrong', in terms of a mechanistic view when the variables of the problem function like a machine. Cause and effect are direct. Also shown through 0 or 1 computer binary language. This type of logic is correlated to the **MECHANISTIC paradigm** according to HPTD-M.

— **Feedback Logic**: in self-regulating living systems, the cause-and-effect work in feedback, like in homeostasis, and that is the reference for this type of logic. If the variables function like living systems and ecosystems, Feedback Logic can be applied. This type of logic still keeps the binary cause-effect perspective of the mechanistic view, but through a more sophisticated way, correlated to the **SYSTEMIC paradigm** according to HPTD-M.

— **Included Third Logic**: in view of the complexity of human phenomena, like in questions involving organizational, sociological, and psychological behavior, the Binary and the Feedback Logic is not enough to solve problems. The idea of dialectics emerges as a possible solution, through the TD paradigm. The Logic of the Included Third (T) involves preference bias, e.g. considering the universe U is represented by the larger circle, by personal preference there are the 'A' who defend an ideology, a dogma, or are part of factions inside organizations. In contrast, there are the 'Non-A' opponents. For 'A' and 'Non-A', who have a personal taste as a reference, it will be difficult to understand the 'T' perspective, not for, nor against. The T paradigm is at another level of reality. For example, the pursuit of excellence in problem solving. This has nothing to do with ideologies, dogmatism, or personal preferences. Therefore, 'A' and 'non-A' tend to have a mistaken view of the nature of 'T', as if 'T' was their ideological opponent, but 'T' only may be on the opposite side by chance. After all, the 'T' can be seen as those initiated in TD. Besides, the Included Third Logic can be seen through two types of schemas, i.e. HPTD-M and Nicolescu, as presented in **Figure 2**. An alternative view of this type of logic, in the same sense, can be considered through the binary 'True' vs. 'False', 'Right' vs. 'Wrong', expressing the '0' or '1' in the computer's language: It is inappropriate or ineffective to describe the reality of complex human phenomena. Also, the Feedback Logic is for systemic, biological, and environmental issues, not enough in this context, simply because there is no simple relation of cause and effect, even in the feedback process, through the Included Third perspective. This type of logic is correlated to the **TD paradigm** according to HPTD-M.

2) Mythology and Logic in Feedback. Nicolescu understands that pre-Modern man had no will of his own, but a magical-vitalist vision of the world, in which everything would be an expression of God's will. Thus, the man of this

period would have the subject immersed in the object. Nicolescu divides the relationship between subject and object into three periods of history. In Pre-Modernity the subject was immersed in the object. Everything was a trace or signature of a higher meaning. The world of pre-modern man was magical. In Modernity, subject and object became totally separated by a radical epistemological cut, thus allowing the development of Modern science. The object was there, to be known, deciphered, dominated, and transformed. In Post-Modernity the role of subject and object are changed in comparison to Modernity and reversed in comparison to Pre-Modernity: the object, then considered as outside the subject, however, is a social construction. It is not really 'there'. It seems more like an emanation of the subject. In this context, **the idea of TD leads to a new understanding of the relationship between subject and object. As in Modernity, subject and object remain separate but are united by immersion in a third element**, which Nicolescu calls the 'Hidden Third,' whose radius of action is infinite[64], in the same sense as the **Included Third Logic** as presented by HPTD-M.

The Greeks were an exception in Pre-Modernity. As per psychiatrist Bernardo Gregório, **the Greeks became rational, they invented logic from mythology**, and they brought myths into logic, something that gave birth to philosophy and then science. In addition, they were the forerunners of the theater, recognized today as one of the forms of therapy. Tragedy is a way of dealing with the suffering of life, as in a process of catharsis, recognizing it. Satire is the way to laugh at this suffering, using humor to make it lighter. In the Greek theater, satire was performed in the morning and tragedy in the afternoon. These are rituals that made up the current idea of theater, whose current symbol is the image of the two masks together, the comic and the tragic[65].

The understanding of myths, parables, legends, and fairy tales is important to map the language of dreams, which in most cases is symbolic, subjective, and rarely objective or premonitory. In many traditions, there is the myth of the great hero, the one who wins the confrontation with monsters, a theme that sometimes also appears in the oneiric world. Also, to understand myths it is necessary to understand **the Greek idea of the 'symbolic' (to bring together) as opposed to the 'diabolic' (to separate)**. The two concepts form a duality and must dialogue, so it is another type of complementarity in the HTPD-M view. The unconscious works in a symbolic way, much older than reason, it is a simpler way of structuring than written language. Symbolic communication in dialogue

[64] Nicolescu, Basarab (2010). Methodology of Transdisciplinarity – levels of reality, the logic of the included middle, and complexity. *Transdisciplinary Journal of Engineering & Science, 1.* https://www.atlas-tjes.org/index.php/tjes/article/view/9; Nicolescu, Basarab (2012). Transdisci-plinarity: the hidden third, between the subject and the object. *Human and Social Studies,* Vol. 1, No. 1 (2012), p. 24. Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf.
[65] Gregório, Bernardo de. (2014). Entre o céu e a terra [Between Earth and heaven]. One hour 30 minutes *interview to TV Brazil* on December 15, 2014. Available in Portuguese at: https://www.youtube.com/watch?v=2uDYSwitcCY&t=1506s.

with logic is important because the unconscious is like a background to manifests itself in dreams, visions, insights, and subliminal communications. Symbols can be recognized in dreams, mythology, and legends, also having to do with the TD idea (the interaction and integration of opposites). The symbol acts on each one even if one does not recognize it, as in the case of advertisements where subliminal messages are used. **A symbol influences us unless we become aware of it**. In this connection, an **archetype is a primordial form from which all human ideas emerge**, a term that has existed since Plato and was adopted by Jung. Independent of culture, the deepest unconscious is formed by these archetypes.

According to Jung, archetypes would also be the image of God – *Imago Dei*. A Jungian psychological concept, the Self, in mythological terms would be the seed of God that each person carries within[66].

In the view of the already mentioned psychiatrist Gregório, who is also a philosopher, theater director, and Jungian therapist, in an interview about studies comparing types of archetypes reported by civilizations, communities, tribes, and peoples who have never met, **archetypes can be summarized in three dualities: i) masculine and feminine, ii) light and shadow, and iii) human and divine**. The shadow is often related to evil in these cultures, and Jung is said to have developed the psychological idea of *animus* and *anima*, which reflects the duality of masculine and feminine in the sense of soul and soul, respectively. In parallel Chinese Taoism comes with the duality of Yin and Yang, reflecting respectively the polarities of a) high, masculine, luminous, and divine, as opposed to b) low, feminine, dark, and material[67].

One simple example in the context of concrete problem solving can be shown in this context: German scientist Kekulé discovered the formula for Benzene in 1865 after hard work on the matter and a subsequent dream of a snake eating its tail[68], a variation of an ancient alchemical symbol: the *Ouroboros*. According to Kekulé: *Gentlemen, let us learn to dream, and perhaps then we shall find the truth [...] but let us also be careful not to publish our dreams until they have been examined by the waking mind*[69].

The scientist woke up and worked out at that moment the formula for the molecule, as a closed chain of six carbon atoms bonded to six hydrogen atoms. This example shows that symbols can be a way to describe complex ideas with

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[66] Jung, Carl Gustav *et al* (1964). *The man and his symbols.* Anchor Press. https://antilogi calism.com/wp-content/uploads/2017/07/man-and-his-symbols.pdf.

[67] Gregório, Bernardo (2015). Five-minute interview on archetypes in Portuguese. https://youtu.be /x6gqBR6GLW4.

[68] Massachusetts Institute of Technology – MIT (2015). Kekulé's dreams. https://web.mit.edu /redingtn/www/netadv/SP20151130.html.

[69] Oliveira, Jane Raquel Silva de (n.a.). The intriguing of Kekulé's dream: considerations on the history and nature of science [O intrigante do sonho de Kekulé: considerações sobre a história e a natureza da Ciência]. *Fundação Cecierj / UFSCar.* Free translation from Portuguese. http://projet oseeduc.cecierj.edu.br/eja/recurso-multimidia-professor/quimica/novaeja/m4u1/12_O%20Sonho %20de%20Kekule.pdf.

simplicity, through images, like mythology. The images that come from the personal and collective unconscious can be important instruments for concrete solutions if well translated into the reality experienced.

To establish finally the connection between Mythology and Logic seen through the HPTD-M perspective, the lower part of **Figure 2** is a schema reflecting the dialogue between Mythology and Types of Logic. From an objective and concrete perspective, Mythology is also in connection to abstract ideas coming from symbols, images, and dreams, e.g. Kekulé's Benzene formula discovery.

Figure 2: Mythology in dialogue with Logic (a new HPTD-M schema in this text), including the HPTD-M Types of Logic[70] and the Included Third Logic Schemas: HPTD-M[71] vs. Nicolescu[72]

The HPTD-M Dialogue Between Mythology and Logic for Problem Solving

[70] Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, *15*. https://doi.org/10.22545/2024/00243.

[71] Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science,* 13. http://atlas-tjes.org/index.php/tjes/article/view/272/229.

[72] Nicolescu, Basarab (2012). Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies, Vol. 1, No. 1 (2012), p. 24.* Available at: http://www.basarab-nicolescu.ciret-transdisciplinarity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf.

6. The HPTD-M Analytical and Synthetic Models: Quaternary Complementarities for a TD Chair

Reflecting the TD basic principle of complementarity, the synthetic schemas tend to show symbols, images, geometric forms, theory of sets, involving dominantly a gestalt perception, i.e. an intuitive perception of the whole, not segregated in parts. As complementary tools for troubleshooting (requirements) and problem solving (attributes), the analytic schemas tend to use tables, charts, math, interdependence relations through arrows, and so on, involving dominantly rational judgement. Naturally, this type of classification is a mere reference to give a direction, like a compass is, it is not an absolute idea, since there can be simultaneously both types of attributes in a schema, analytic and synthetic. The same happens with the four archetypal elements that lead to the four types of intelligence and the four epistemic ways (**technoscience, art, philosophy, and tradition**). The question here is the predominance of one or another to understand the complementarity principle of HPTD-M in praxis through the four elements.

In the context of HPTD-M applied for a TD chair, psychology emerges as an important issue. There are four Jungian functions of the psyche, which imply, as per HPTD-M, four types of intelligence, namely **empirical, emotional, rational, and intuitive**. In the literature, as Prof. Dr. Mircea Nita informed this author in November/2021 from Bucharest, Romania, at the *8th Annual International Conference on Law and Administrative Justice from an Interdisciplinary Perspective*[73], it had been very common to consider three types of intelligence in Romania, i.e. **rational, emotional, and spiritual**. These can be translated to the HPTD-M paradigm as follows:

— Rational (Rational in the strict sense plus Empirical in HPTD-M).
— Emotional (Emotional in HPTD-M).
— Spiritual (Intuitive in HPTD-M).

On the other hand, according to Figure 3, Prof. Nita himself corroborates the quaternary view of reality, by proposing a new type of Public Administration education, in the sense of learning to:

— KNOW the methods that help distinguish reality from illusion (Rational intelligence in HPTD-M).
— DO something in specialized professional practice (Empirical intelligence in HPTD-M).
— LIFE respecting the norms and bases of human community interaction (Emotional intelligence in HPTD-M).
— BE questioning oneself continuously in a process of self-knowledge (Intuitive intelligence in HPTD-M).

In the view of Dr. Mariana Thieriot Loisel, Secretary-General of CIRET

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[73] Costa, L. S. G. M. (2021). Quality of Public Expenditure and Transdisciplinarity. 8th Annual International Conference on Law and Administrative Justice from an Interdisciplinary Perspective. Bucharest, Romania. *ResearchGate*. http://dx.doi.org/10.13140/RG.2.2.23501.72169

<ciret.hypotheses.org>: Those four perspectives of Prof. Dr. Nita are originally from UNESCO. However, this author's HPTD-M theory and praxis were not based on the UNESCO framework. As per the HPTD-M view, there is a fifth element that balances those four, i.e. **learning to learn** (see **Figure 3**).

Figure 3: New Type of Education: HPTD-M model adapted from Nita[74] except for the arrows and the 'Learning to learn' green circle, which is a new HPTD-M idea
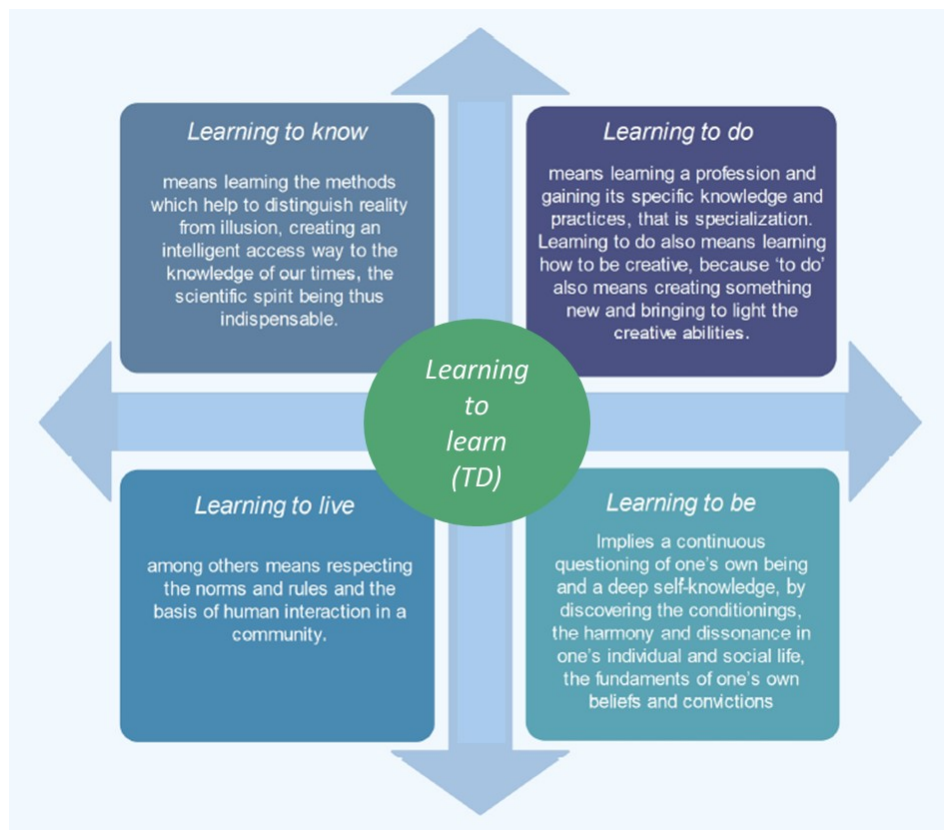
As demonstrated in **Figure 4** and establishing a dialogue with adapted Nita's **Figure 3**, besides the dialogue between TECHNOSCIENCE and CULTURE, HPTD-M understands four types of intelligence, i.e. 1) Intuitive – learning to BE, 2) Rational – learning to KNOW, 3) Emotional – learning to LIVE, and 4) Empirical – learning to DO, in connection to the four epistemic ways: A) Philosophy, B) Tradition, C) Art, and 4) Technoscience (technology in feedback with

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[74] Nita, Mircea Aurel (2013). Types of truth, transdisciplinarity and a new type of education in public administration. *Curentul Juridic, 16,* pp. 157–170. Available at: http://revcurentjur.ro/old/arhiva/attachments_201304/recjurid134_17F.pdf.

science).

Examples of hard skills and analytical method – Empirical and Rational Intelligence[75]:

1) Empirical Intelligence – by discretionary need when it fits, without science or bureaucracy to support it (inductive method):

— An engineer, by experience, uses his empirical formula for project sizing, which is not possible to be deduced mathematically.

— A physician prescribes to his patient an off-label medication, given the few calculated side effects and his professional experience in similar/analogous concrete cases.

Figure 4: TECHNOSCIENCE vs. CULTURE in HPTD-M: Levels of Abstraction and Epistemic Ways[76]
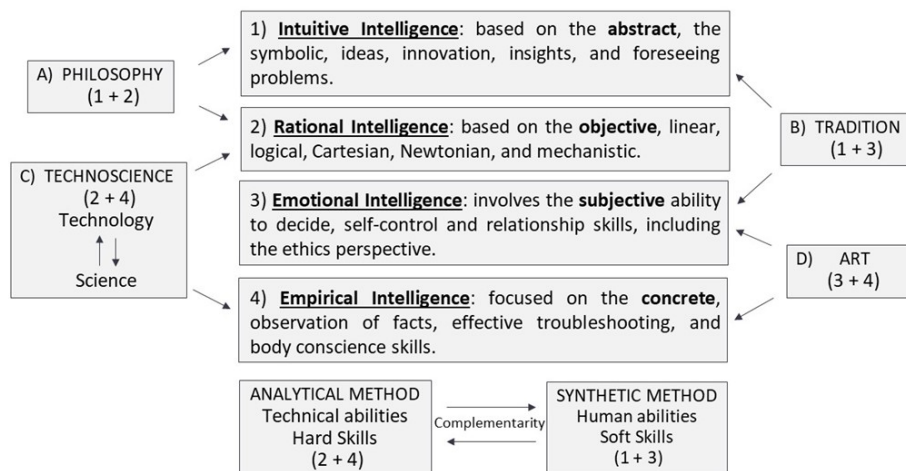
Conclusion: In TD, TECHNOSCIENCE dialogues with CULTURE (PHILOSOPHY + TRADITION + ART)

2) Rational Intelligence – through published scientific models or deduced modeling, mathematically or otherwise (deductive method):

— Modeling in economics: econometric models deduced with mathematical equations.

— Drug research by laboratories with published results scientifically proven through statistics.

Examples of soft skills and synthetic method – Emotional and Intuitive Intelligence[77]:

3) Emotional Intelligence – the ability to deal with oneself and others:

— The manager learns to control himself psychologically (consciousness development by various forms of therapies helps).

— Understands how their colleagues behave psychologically (the MBTI[78] is an interesting learning reference as a self-leadership and management system).

— Knows how to decide based on what he diagnoses and on the feedback from his colleagues.

— Understands what may be rational, but not reasonable, as to sensibleness, acceptability, and proportionality.

4) Intuitive Intelligence – searches for decision-making elements when data/diagnosis are insufficient:

— A police investigator follows his 'guts' and searches for clues to solve a case.

— Politicians follow their 'feeling' to take a certain course of action in uncertain situations.

— A businessman follows his instinct and goes against the results of an economic-financial viability study with an attractive internal rate of return, deciding not to invest.

— Insights can give the manager ideas for innovation.

— An idea that does not make sense should not go on, because making sense is the starting point.

Figure 5 shows the HPTD-M analytical model built from the four archetypal elements. These elements interact in complementarities. That is the meaning

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[77] Costa, L. S. G. M. (2023). The mediating manager. A course of transdisciplinary tools applied to organizations, based on the HPTD-M theory and the new conception of mediation and leadership. *Brazilian National School of Public Administration (ENAP).* https://suap.enap.gov.br/portal doaluno/curso/2136/?area=16. The ENAP certificate is in the following link, which also explains the course main topics through translation from Portuguese to English, so that English-speaking researchers may understand the content: http://dx.doi.org/10.13140/RG.2.2.28025.54884.

[78] First World Congress on Transdisciplinarity (Convento da Arrábida, Portugal, November 2–7, 1994). Participants' letter which contains a set of fundamental principles of the 2 community of transdisciplinary spirits. https://ciret-transdisciplinarity.org/chart.php#en; Nicolescu, Basarab (2012). Transdisciplinarity: the hidden third, between the subject and the object. *Human and Social Studies,* Vol. 1, No. 1 (2012), p. 24. Available at: http://www.basarab-nicolescu.ciret-transdiscipli narity.org/Docs_articles/ClujHiddenThird052009Proceedings.pdf; English, Trevor (2020), Louis Broglie and the Idea of Wave-Particle Duality: Broglie devised that all matter had properties of both waves and particles. *Interesting Engineering.* https://interestingengineering.com/louis-broglie -and-the-idea-of-wave-particle-duality.

of 'quaternary complementarities', as already mentioned. As the HPTD-M approach demonstrates, these elements are reflected in various scientific views, philosophies, and traditions, not only in Jung's Analytical Psychology and Nita's framework for a new type of education in Public Administration.

Figure 5: The HPTD-M Analytical Model of Four Elements Interacting in Dualities[79]
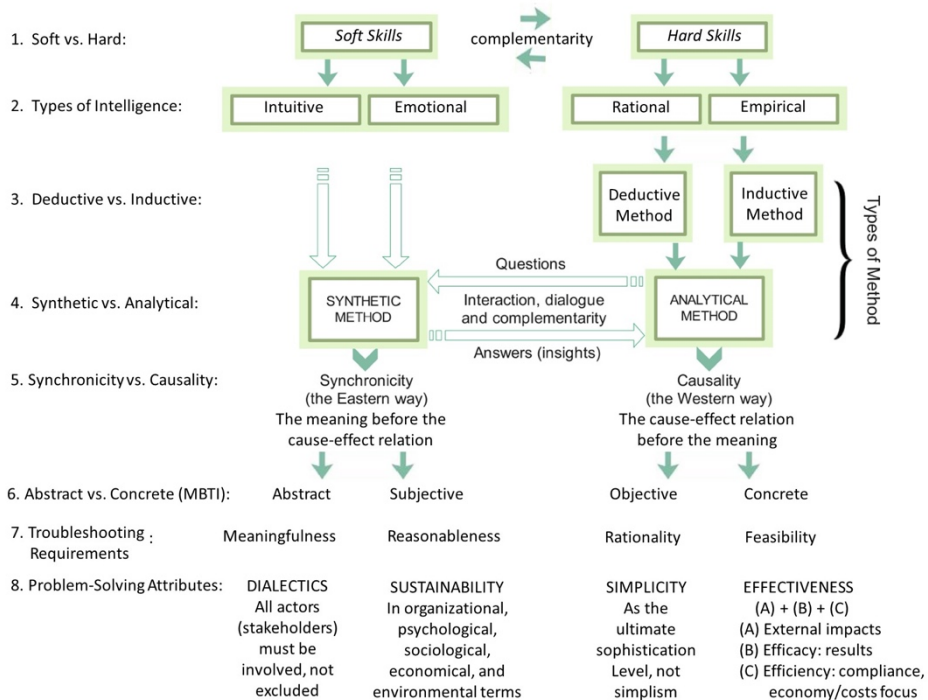
In this perspective:

— **Troubleshooting is the process of finding a solution** (the requirements in **Figure 5**).

— **Problem solving involves the solution itself** (the attributes in **Figure 5**).

— **Remark about the concept of inductive method:** 'inductive' in the HPTD-M framework is related to the process of transforming something mapped empirically, such as a mechanism or process, into a rational model. However, some philosophers may also use 'inductive' as the process of turning an intuition, insight, or idea, into something rational, like Kekulé's discovery of the Benzene formula through an oneiric image of the Ouroboros.

[79] Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, *14*. https://doi.org/10.22545/2023/00228.

As per the attributes in correlation with the types of intelligence[80]:

1) Effectiveness (concrete, empirical, inductive): More than the mere Efficacy of internal results of an organization or the Efficiency of the economy (costs) and conformity of processes (compliance and bureaucracy). Effectiveness means the result of management in the perception of civil society: The external environment impacts. However, the concepts of Efficacy and Efficiency, as described, are comprised in Effectiveness. This perspective of Effectiveness containing Efficacy and Efficiency is in the Brazilian Public Administration mainstream. Another way of seeing it considering the complementarity principle of HPTD-M is Effectiveness ('doing the right thing') vs. efficiency ('doing things right'). In this conception effectiveness involves the external impacts or 'outer effectiveness', while efficacy can be considered the 'inner effectiveness' in terms of results in the perspective of the organization, and efficiency keeps the same conception of compliance and economy.

2) Sustainability (subjective, emotional, synthetic): The final balance of economic and environmental resources, considering the sociological realm, and especially human psychological well-being at collective and personal levels (human resources at the personal and organizational levels).

3) Simplicity (objective, rational, deductive): A consequence of discussions with all stakeholders and studies to transform the complexity of human phenomena into simplicity as the ultimate sophistication, which should not be confused with a reduction to the mechanical phenomena of hard science or simplism.

4) Dialectics (abstract, intuitive, synthetic): Through the friction of opposites in a discussion (complementarities), the abstract idea is polished until it reaches its mature point of realization, considering that all actors (stakeholders) must be involved, heard, and not excluded for this to occur.

Finally, in Figure 6 the whole HPTD-M model can be seen in a synthetic format, not analytical and complementary to **Figure 4** and **Figure 5**, also evidencing the difference between UNDERSTANDING and KNOWING:

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[80] Crema, Roberto (2017). *O poder do encontro: origem do cuidado* [*the power of encounter: origin of care*]. São Paulo: Tumiak Produções; Instituto Arapoty; UNIPAZ. Crema invited this author to the book release by e-mail on 28.02.2017, also mentioning in Portuguese: *Sempre afirmo que ninguém transforma ninguém e ninguém se transforma sozinho; nós nos transformamos no Encontro.* (free-translated into English); Loisel, Mariana Thieriot (2013). Perlaborar ou a consciência do não intencional: primeiros elementos para uma escuta transdisciplinar [Perlaboring or the awareness of the unintentional: first elements for a transdisciplinary listening]. *CETRANS – Centro de Educação Transdisciplinar.* https://1drv.ms/b/s!AqLPNeNwvK2zgp5LSWsgdm2m CWxeMg.

Figure 6: The HPTD-M Synthetic Model of Quaternary Complementarities[81]
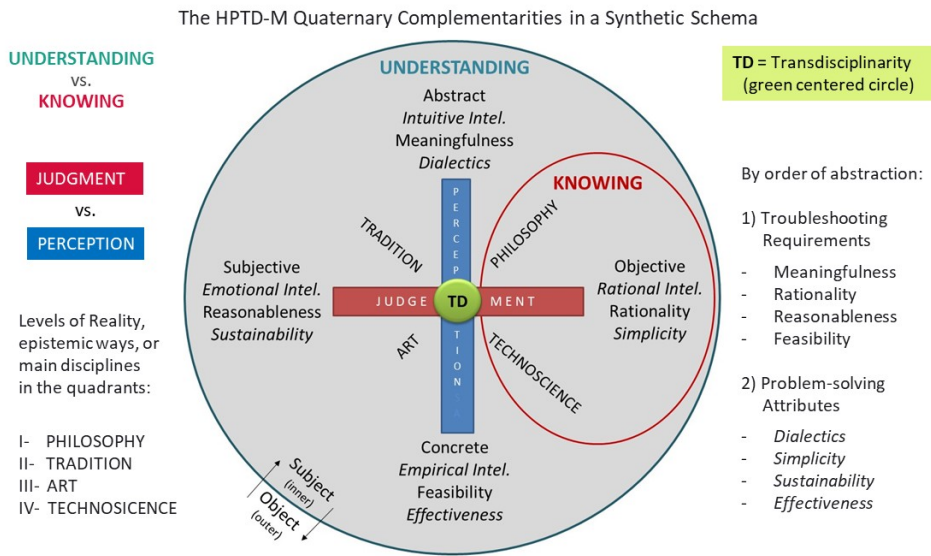
There are various forms of complementarities in the context of the four elements of **Figure 6**, i.e. in the context of quaternary complementarities, such as:

— **Technology-Science** (the most important for our Western scientist bias).

— **Technoscience-Culture** (Culture = Philosophy + Tradition + Art).

— **Technoscience-Philosophy** (the OBJECTIVE complementarity side – right side of **Figure 6**).

— **Technoscience-Art** (the CONCRETE complementarity side – lower

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[81] Costa, L. S. G. M. (2022). HPTD-M: The Holopraxis Transdisciplinary Management Theory. Communication and Mindsets as the main applied example. *Transdisciplinary Journal of Engineering & Science,* 13. http://atlas-tjes.org/index.php/tjes/article/view/272/229; Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations: A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, *14.* https://doi.org/10.22545/2023/00228; Costa, L.S.G.M. (2022). Effectiveness and styles of leadership in Public Management: Quality in the context of transdisciplinary HPTD-M Theory. *Integral Leadership Review*, *vol. 22, no. 1 Dec. 2022.* https://ilr.scholasticahq.com/article/ 57734-effectiveness-and-styles-of-leadership-in-public-management-quality-in-the-context-of-tr ansdisciplinary-hptd-m-theory; Costa, L.S.G.M.; Loisel, M. T. (2023). International Presentation: The Transdisciplinary Mediator for Effective Problem Solving in Organizations and Civil Society (in English and Portuguese), coordinated by Dr. Mariana Thieriot Loisel. *CIRET and CETRANS*. Slides are available at: http://dx.doi.org/10.13140/RG.2.2.20460.54401/1. Video of the presentation available at: https://www.youtube.com/watch?v=pSnHVXUEGSg; Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, *15*. https://doi.org/10.22545/2024/00243.

side of **Figure 6**).

  — **Philosophy-Tradition** (the ABSTRACT complementarity side – upper side of **Figure 6**).

  — **Tradition-Art** (the SUBJECTIVE complementarity side – left side of **Figure 6**).

  — **UNDERSTANDING-KNOWING** (the outer circle in green and the inner circle in red of **Figure 6**).

  — **JUDGMENT-PERCEPTION** (the horizontal red axis and the vertical blue axis of **Figure 6**).

  — **Subject-Object** (the inner environment of an organization like the green circle vs. the outer).

  So, the HPTD-M theory and praxis are about flexibility, new ideas, and content, not the excessive form of bureaucracy, ideology, or dogmatism.

  Bureaucracy can be seen in **Figure 6** as part of the quadrant of technoscience, and dogmatism as a deviation of tradition and science in many forms, such as religious fanaticism, scientism, political partisanship, and so on. So, dogmatism tends to be seen through the quadrant of tradition and the quadrant of technoscience, configuring a pernicious ideological complementarity between tradition and science (as part of technoscience).

  The antidote to this Western dogmatic bias is the idea of **learning to learn**, as already seen in the center of **Figure 3:** It looks like the archetypal quintessential or fifth element of the European Alchemical tradition[82] that could also be placed in the TD green center of **Figure 6**. This is essential both for teachers and students: In the HPTD-M perspective teachers act as working-group coordinators, as a mediating manager focused on UNDERSTANDING more than KNOWING for effective and dialectical problem solving, considering the quaternary complementarities.

  Of course, it is necessary to establish mechanisms of **transmitting knowledge for students to understand and learn: Through the same quaternary principle of HPTD-M**, which is simple but not simplistic, not only in view of technoscience but also through its quaternary complementarities with culture as the example of the stress test this author demonstrated in the comparison between HPTD-M and the Alchemical Psychology[83], considering also the Figure 6 relation between UNDERSTANDING and KNOWING.

  In that sense, as an example, **Figure 7** reflects the levels of awareness through the concept of levels of shadows and unconscious.

  Some previous concepts to understand the model: according to Jung's Analytical Psychology, the levels of the psyche can be classified as[84]:

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[82] Costa, L.S.G.M. (2023). A stress tests for the HPTD-M transdisciplinarity through Alchemical Psychology. *Transdisciplinary Journal of Engineering & Science, 14.* http://dx.doi.org/10.22545/2023/00222.

[83] Ibid.

[84] Costa, L.S.G.M. (2023). The Mediating Manager for Effective Troubleshooting in Organizations:

— **Personal Conscious:** whose content is the **EGO**, a personal center of consciousness.

— **Personal Unconscious:** related to the **SHADOW**, the rejected or unknown part, the shadow of the unconscious, the 'alter ego'. The shadow may contain qualities that need to be integrated in favor of a more comprehensive ego structure.

— **Collective Unconscious:** also called the objective or transpersonal unconscious, whose contents are archetypal images on level 8 of the HPTD-M model: archetypes are images and patterns of emotional and intellectual behavior, models, or universal scripts, independent of culture.

— **Collective Conscious:** the cultural world of shared values and forms.

— **SELF:** the regulatory center of the psyche, a fifth unifying function, which transcends sensation, feeling, thought, and intuition (the four Jungian functions of the psyche).

In other words, as per the HPTD-M view: Consciousness development or awareness is the light that can guide us through our personal and collective shadows, which are the repressed or oblivious parts uncomfortable to deal with in our journey.

Besides, **Table 2** demonstrates this didactic perspective in technoscientific in cultural aspects (philosophical, traditional, and artistic) through the idea of consciousness in the HPTD-M approach.

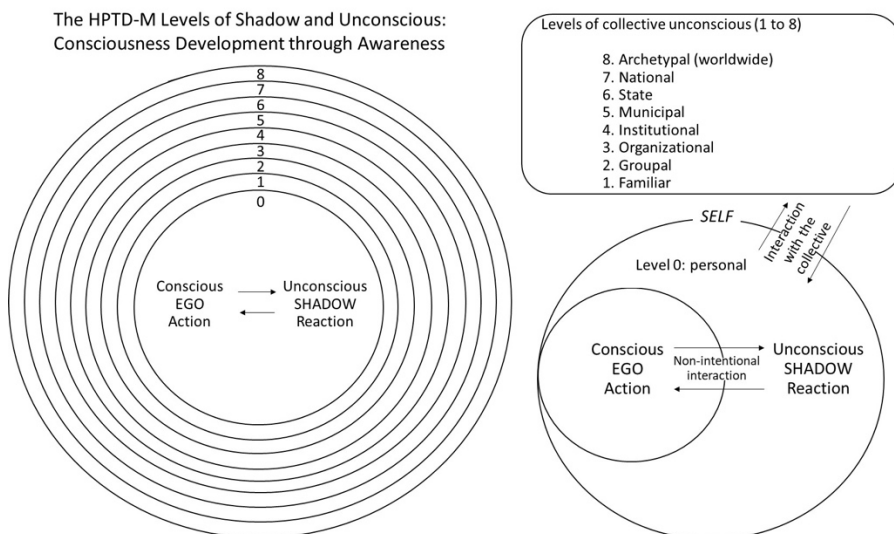**Figure 7:** Awareness Levels of the Collective Unconscious[85]

A Transdisciplinary View from HPTD-M. *Transdisciplinary Journal of Engineering & Science*, *14*. https://doi.org/10.22545/2023/00228.

[85] Ibid.

Table 2: Consciousness seen in the context of HPTD-M Quaternary Complementarities

Type of Approach	Vehicles or Instruments of Consciousness Manifestation			Observer/Consciousness
1. Symbolic Alchemical Elements[86]	Earth	Water	Air	Fire
2. Physical States of Matter[87]	Solid	Liquid	Gas	Plasma
3. Psychological Functions[88]	Sensation	Feeling	Thinking	Intuition
4. Greek Philosophy[89]	Soma	Psyche		Nous
5. HPTD-M Types of Intelligence[90]	Empirical	Emotional	Rational	Intuitive
6. HPTD-M Psychosomatics[91]	Physiological-Energetic	Emotional	Intellectual	Consciousness
7. Galvão's Philosophical view[92]	Physical-Energetic	Emotional	Mental	Consciousness
8. Thieriot Loisel's TD view[93]	----	----	Cognition	Awareness

Source: Author's Conception adapted from[94]

7. The HPTD-M Proposal for a TD Chair and Conclusions

  The TD Chair can be an instrument for transforming a culture fragmented by specialists and isolated disciplines, aiming at concrete, effective, and dialectical solutions to organizational problems through the transdisciplinary mediation of generalists. That is the opinion of this author after more than 30-year research and professional experience which culminated in the 2022 HPTD-M theory. The idea of a 14-hour successful TD pilot course by the author was turned into reality

[86] Costa, L.S.G.M. (2023). A stress tests for the HPTD-M transdisciplinarity through Alchemical Psychology. *Transdisciplinary Journal of Engineering & Science, 14.* http://dx.doi.org/10.22545/2023/00222.

[87] Ibid.

[88] Ibid.

[89] Costa, L. S. G. M. (2022). HPTD-M: A transdisciplinary integration of three paradigms – Mechanistic, Systemic, and Synchronistic. *Transdisciplinary Journal of Human Plasticity (PLASTIR)* 65, June/2022 (Quarterly Journal, bilingual/ISSN n° 2105–2794). http://www.plasti cites-sciences-arts.org/PLASTIR/daCosta%20P65.pdf.

[90] Ibid.

[91] Ibid.

[92] Galvão, Lúcia Helena (2016). BHAGAVAD GITA - Comentários filosóficos sobre o livro sagrado indiano. [BHAGAVAD GITA – Philosophical commentary on the Indian holy book]. *New Acropolis Brazil*. https://youtu.be/FYqJ5fwR4Ps?si=OQcp3AZONdJlrs1r.

[93] Loisel, Mariana Thieriot (2024) Les mutations humaines: dialogue entre la philosophie et les technosciences. Editions Amalthée, https://www.plasticites-sciences-arts.org/editions-plasticites/.

[94] Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, *15*. https://doi.org/10.22545/2024/00243.

in 2023, aiming at developing and training a TD mediating public manager, for participants in the Brazilian federal, state, and municipal levels, some of them with a Ph.D., M.Sc., or MBA titles.

As a background theoretical support to our proposal, here are some basic TD principles, considering what has been shown so far:

— TD is beyond and through disciplines, i.e. more than multidisciplinary (many disciplines not interacting) and interdisciplinarity (disciplines in interaction).

— TD is the dialogue between technoscience (the feedback process between technology and science) and culture (philosophy, tradition, and art).

— TD is the dialectical process between opposites, which includes the complementarity of disciplinarity vs. TD, i.e. specialists in dialogue with generalists to promote the TD view.

— The TD approach can be used for concrete problem solving, in public and private organizations, including civil society. If there is no complementarity between theory and praxis, it is not TD, i.e. discussions about the epistemology of TD or the science of TD are only part of TD but not TD itself.

Besides, there are Brazilian initiatives that influenced this author's HPTD-M theory and praxis: i) UNIPAZ, ii) Dr. Ambrosio & Dr. Thieriot, and iii) Dr., Hyssa, M.D., MBA, besides HPTD-M itself (see **Appendix 2**).

So, this author understands that some steps are necessary for a paradigm shift, to develop a TD Chair in universities and courses of short duration for public and private organizations:

1) A TD course in the first semester of university graduation: In this author's perspective it would be interesting to start the first semester of each graduation with a TD chair, considering:

— In the US, the first two years of a four-year undergraduate program are often referred to as the 'general education' or 'core curriculum' years. During this time, students are exposed to a broad range of disciplines and subjects, allowing them to acquire a well-rounded education before specializing in a particular field.

— In this author's concrete case in the Brazilian five-year civil engineering graduation from 1987 to 1991, two years of hard sciences, i.e. calculus, physics, mechanics, analytical geometry, statistics, chemistry, geology, and ecology, before going to technoscience and engineering itself in the last three years of graduation, including one semester of administration, economics, architecture, law, geology applied to engineering, environmental sanitation, sanitary chemistry, and sanitary biology, as applied disciplines connected to civil engineering. By the way, civil engineering can be an example of TD, if well-studied, since it is everything that is not military engineering.

— As a Federal Auditor of Finance and Control from the Brazilian career, after being approved in a difficult text for the economic-financial area for becoming a civil servant: This author is professionally involved in economics,

finance, public finance, public management, and law. So, the experience with economists, other engineers, lawyers, and public administrators corroborates the above-mentioned view, considering the TD complexity of problem solving in public management.

— Especially for any course involved in technoscience, i.e. theory and praxis with concrete problem solving like medicine, engineering, law, economics, and psychology, it would be essential to start the graduation first semester with the conception of TD, including the epistemic ways and disciplines, to make clear the difference between technology and science, besides the interaction between art and technoscience as the concrete way of solving problems. Considering technoscience, as per Weil, Crema, and D'Ambrosio: *The roots of technology are lost in the night of time. The first agricultural techniques, the production of fire, cooking, the manufacture of tools of all kinds, such as axes, bows and arrows, are all part of an archaic phase of technology. This archaic technology has been replaced by scientific technology or technoscience, which can be understood in two ways: one consists of using scientific discoveries to create or perfect methods of action; the other puts technology at the disposal of science itself. This establishes a feedback relationship that makes it often difficult to separate science from technology[95].*

2) Simplification and flexibility to start (concepts of technoscience and complementarity): A TD chair could start rationally, in the Western way, by simplifying processes, such as the bureaucracy of presenting articles, reports, and texts, following flexible rules, such as references by numbers between brackets, e.g., to make the content cleaner. A TD chair base involves the essence before the form of standards; otherwise, the ideas may be lost to excessive bureaucracy feedbacked by dogmatism. The Western culture has been creating this kind of Cartesian, mechanistic, and positivist trap since the end of the 18th century: The scientism feedbacked by dogmatism, which in the end tends to focus on the form rather than the essential content itself. In simple terms: technology is the empirical, practical, and inductive way to solve problems concretely, and science is a rational, theoretical, and deductive way to find abstract principles with possible future applications. So, to be guided merely by science does not seem to be a wise thing to do concretely, since it may lead to the so-called dogmatic scientism, which is disconnected from the problem-solving reality. **Even some TD academics don't understand concretely the idea of technoscience as the interaction and complementarity between technology and science**. Those tend to think about the interaction between science and culture as the essence of TD, which is an important point of view, but not complete in terms of TD epistemic forms. So, HPTD-M understands essential for TD to evidence clearly and concretely the

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[95] Weil, Pierre; Crema, Roberto; D'Ambrosio, Ubiratan (1993). *Toward the new transdisciplinarity: open systems of knowledge [Rumo à nova transdisciplinaridade: sistemas abertos de conhecimento].* Summus Editorial, p. 18, free translation from Portuguese to English. https://www. amazon.com.br/Rumo-Nova-Transdisciplinaridade-Pierre-Weil/dp/8532304427.

concepts of technoscience and complementarity, considering that some technic or technologies cannot be demonstrated by science and may have connections to culture through a complementarity technic vs. culture, i.e. some technic may come from tradition (part of the culture), e.g. Ayurvedic medicine and Traditional Chinese Medicine, both coincidentally also based on the complementarity and balance, including the concept of opposites.

3) The mediating professor for learning to learn and understanding, not only knowing: In a TD view the professor tends to be closer to a working group coordinator, a mediating manager of the participants as students, who need to be stimulated to think and create new ideas, learning to learn in the realm of UNDERSTANDING, not simply absorbing information through KNOWING, since computers can provide information faster and more efficiently than humans, especially, considering Artificial Intelligence.

4) Creation of a TD kind of Ph.D. and M.Sc.: Nowadays those post-graduations are specialized and focused on disciplinarity. Traditionally Ph.D. stands for 'Philosophy Doctor' and M.Sc. stands for 'Master of Science.' However, in a TD context where integration beyond traditional academic boundaries is valued, these titles may be seen as limited in capturing what is understanding (not only knowing) and the required skills in practice. For example, the US MBA (Master of Business Administration), created in the late 1950s, reflects a specific focus on practical business skills and management expertise that may be perceived as more directly applicable to real-world praxis compared to some Ph.D. and M.Sc. programs. In this context, it sounds reasonable to create a complementarity dialogue through a generalist TD approach. A new conception of Ph.D.s and M.Sc. coexisting with the traditional one could be interesting, i.e. the creation of a transdisciplinary Ph.D. and M.Sc. with the same status as the usual Ph.D. and M.Sc. but focused on theory and praxis An MBA with more theory could be a starting point.

5) The three types of logic as tools for problem solving in dialogue with new ideas that make sense, considering the level of complexity in each concrete case: Binary, Feedback, and Included Third, as per the HPTD-M framework. TD is an answer to complexity, as Dr. Marco Fioravanti from the University of Florence, Italy, mentioned in the Panel of CIRET TD Chair Symposium of March 21–22, 2024. In this perspective, HPTD-M understands problem solving using tools depending on how complex the problem is. Binary Logic is for mechanistic problems (clear relations of cause and effect – 0 or 1, right and wrong, true and false, and so on), Feedback Logic for environmental and biological issues (cause and effect in feedback – self-regulation) and Included Third Logic for the complexity of human phenomena, which involves cultural, sociological, and psychological issues (dialectic process, a solution between opposite arguments).

6) The abstract-concrete complementarity in problem solving and the concept of quaternary complementarities for troubleshooting in practice.

This item envisages the concreteness of a TD chair that is practical, not only theoretical, involving the quaternary complementarities principle of HPTD-M with the following troubleshooting requirements (the process of finding solutions) and problem-solving attributes (of the solutions themselves), through the complementarity of the analytic and synthetic methods:

— Troubleshooting requirements: viability, rationality, reasonableness, meaningfulness.

— Problem-solving attributes: effectiveness (not only efficiency), simplicity, sustainability (especially psychological, not only biological-environmental), and dialectics.

An effective and dialectical TD chair means achieving simultaneously the concrete and the abstract attributes in HPTD-M (see **Figure 5** and **Figure 6** that complete each other), so evidencing the complementarity principle of TD.

Finally, this HPTD-M perspective may be an interesting approach to balance the Western rational hypertrophy, aiming at a feasible troubleshooting process through many aspects of human phenomena, considering disciplines such as Psychology, Medicine, Engineering, Economics, Administration, and Law. This TD Chair proposal is a possible way to promote a Western cultural transformation since The West still has a dominant mechanistic, scientistic, and dogmatic view of reality. So, the TD Chair may lead to effective problem solving in organizations and civil society, including universities' transdisciplinary courses envisaging a paradigm shift: From the mere disciplinary, multidisciplinary, or interdisciplinary approach to a fruitful dialogue between disciplinarity and transdisciplinarity.

Appendix 1: Questions for the Panel - March 2024 21–22 TD Chair Symposium

For the Panel of the March 2024 21–22 TD Chair Symposium, there were four questions made for discussion:

1) What is the TD CULTURE?
2) Is TECHNOSCIENCE a necessary dialogue between technology and science?
3) How can we mediate conflicts with TD?
4) What should the TD Chair explore basically?

A few days before the event, this author shared with the speakers' group his view, for reflections and discussions of the participants. After that, in the Panel of the event, some content was added. This is the consolidation of everything.

1) What is the TD CULTURE? Reference: this article

Culture involves the three epistemic ways of **tradition** (religion included), **philosophy**, and **art**. Considering the tradition's perspective, a symbol influences us unless we become aware of it. In this connection, an archetype is a primordial form from which all human ideas emerge, a term that has existed since

Plato and was adopted by Jung. Independent of culture, the deepest unconscious is formed by these archetypes. TD will take time to be absorbed by a critical mass of academics and practitioners, and considers the following basic concepts and principles:

— **Complexity**: The complexity of human phenomena needs to be treated in an adequate and non-reductionist way, by means of mechanistic, systemic, and TD paradigms, each one with its scope of action and level of adequacy according to the variables to be treated, without excluding beforehand, in a prejudiced way, any of these three ways of approaching reality.

— **Levels of Reality governed by different types of logic**: The Binary Logic must dialogue with the logic of the third party included (Included Third Logic), depending on the concrete case to be dealt with, whichever is simpler and more adequate for the approximation of reality. In this context emerges the concept of quaternary complementarities, the archetypal four elements interacting through complementarities. Those principles of earth, water, air, and fire can also be seen as levels of reality, not only symbolically, but in terms of consciousness functions, according to Analytical Psychology: sensation, feeling, thought, and intuition, as characterized in the MBTI, i.e. concrete, subjective, objective, and abstract levels. In this connection, MBTI is the *Myers-Briggs Type Indicator*, also known as the MBTI System, used for the classification of psychological types, based on the Jungian functions, the evolution of Jungian typology.

— **Ethics**. The four epistemic paths need dialogue: technoscience, philosophy, tradition, and art. As a heritage of the Modern Age and the Enlightenment, the lack of dialogue in our Western rationalist culture tends to cause **dogmatic scientism feedbacked by partisanship**, which tends to undermine technoscience, as if only science matters and there is no possibility of technologies or techniques not originated or explained by science. Cultural traditions go in this direction of dogmatism and partisanship as if there could be no diversity of views of reality, only the 'true' one, considering the others as 'false' by the ideology corroborated by the 'science' of the moment. In other words, science can be approached ideologically, when scientific results are used selectively to substantiate or justify a particular ideology or belief system, ignoring or distorting scientific information that does not fit that perspective. This can occur in both political and religious ideologies. As Jung said in *AION*: *[…] the spirit became non-spiritual and […] the vitalizing archetype gradually degenerated into rationalism, intellectualism, and doctrinairism, all of which leads straight to the tragedy of modern times now hanging over our heads like a sword of Damocles.*

There is a transition process between the Modern scientism, to be replaced gradually by an expanded TD view through cultural transformation. Cultural transformation means considering not only science for problem solving but also the interaction between technology and science (technoscience): Besides, the technoscience interaction with culture. In turn, culture can be understood as philosophy, tradition, and art. So, technoscience provides the rational, empirical, and

material means to solve problems concretely, and culture completes with the ethical, anthropological, and philosophical views of the problems to be solved, in organizations and civil society.

2) Is TECHNOSCIENCE a necessary dialogue between technology and science, in a feedback process, i.e. a new technology can emerge without scientific proof at first, and a scientific discovery may not be technologically applied at first? **Reference: this article.**

As per Weil, Crema, and D'Ambrosio: *The roots of technology are lost in the night of time. The first agricultural techniques, the production of fire, cooking, the manufacture of tools of all kinds, such as axes, bows and arrows, are all part of an archaic phase of technology. This archaic technology has been replaced by scientific technology or technoscience, which can be understood in two ways: one consists of using scientific discoveries to create or perfect methods of action; the other puts technology at the disposal of science itself. This establishes a feedback relationship that makes it often difficult to separate science from technology.*

Technology or technique often interacts with science, but frequently technology tends to be confused with science. Technology is applied, coming from concreteness and the inductive method. Science is theoretical, coming from abstraction and the deductive method. Both complement each other in a feedback process.

Eng. Leonardo Costa, a TD author with professional experience in urban development and public management in Brazil, has already seen some engineers that use empirical formulas for dimensioning: They have already discovered that technologies or techniques can be independent of science. For the effect of problem solving, engineers tend to feel no need to demonstrate that a solution is 'scientific' according to this or that codification, methodology, or standards, especially if it doesn't make sense in the concrete case, i.e. solving problems with technics developed with professional experience that works and give concrete results tend to be enough for engineers. Another example comes from the health area. Once, this same author watched an interview with Dr. Zerbini, a surgeon who performed the first heart transplant in Brazil (1968). The doctor reported seeing personally how the health system worked in China, impressed with a lung surgery in which the patient was anesthetized only with acupuncture. In this context, some physicians and scientists, not being able to explain acupuncture scientifically, simply deny its existence, in this same isolated rationalist paradigm that may be seen also in Artificial Intelligence (AI). As demonstrated by this author, tools like the ChatGPT do not admit that a technique such as acupuncture exists independently of science. Obviously, it is very risky to deny the existence of something simply because it cannot be explained rationally or scientifically, even if empirically it is evident, like the 'off-label' prescriptions of medicines by physicians: They understand that it works but don't know the mechanism.

Finally, **simplification and flexibility to start (concepts of technoscience and complementarity):** A TD chair could start rationally, in the Western way, by simplifying processes, such as the bureaucracy of presenting articles, reports, and texts, following flexible rules, such as references by numbers between brackets, e.g. '[1]', to make the content cleaner. A TD chair base involves the essence before the form of standards; otherwise, the ideas may be lost to excessive bureaucracy feedbacked by dogmatism. The Western culture has been creating this kind of Cartesian, mechanistic, and positivist trap since the end of the 18th century: scientism is feedbacked by dogmatism, tending to focus on the form rather than the essential content itself. In simple terms: technology is the empirical, practical, and inductive way to solve problems concretely, and science is a rational, theoretical, and deductive way to find abstract principles with possible future applications. So, to be guided merely by science does not seem to be a wise thing to do concretely, since it may lead to the so-called dogmatic scientism, which is disconnected from the problem-solving reality.

Even some TD academics don't understand concretely the idea of technoscience as the interaction and complementarity between technology and science.

Those tend to think about the interaction between science and culture as the essence of TD, which is an important point of view, but not complete in terms of TD epistemic forms, i.e. **technoscience**, **tradition**, **philosophy**, and **art**. TD needs to evidence clearly and concretely the concepts of technoscience and complementarity, considering that some technics or technologies cannot be demonstrated by science and may have connections to culture through a complementarity technic vs. culture, i.e. some technics may come from tradition (part of the culture), e.g. Ayurvedic medicine and Traditional Chinese Medicine, both coincidentally also based on the complementarity and balance, including the concept of opposites.

3) How can we mediate conflicts with TD? See Reference[96]

Through Dr. Thieriot Loisel Gray Zone[97], in connection with the perspective of social audit of the French economist, mediator, and social auditor Dr. Hubert Landier, considering Eng. Leonardo Costa's HPTD-M, the idea of the transdisciplinary mediating manager emerges as an alternative for problem solving in organizations.

The rationalist models borrowed from the hard sciences configure a reductionist approach of merely mechanistic AI or biological-environmental views, which can't be applied to complex human phenomena, for which the proposal of

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[96] Costa, L.S.G.M. (2024). Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M. *Transdisciplinary Journal of Engineering & Science*, *15*. https://doi.org/10.22545/2024/00243.

[97] Thieriot Loisel, M. (2024). Artificial Intelligence and Our Secret Mind: Human Mediation in Grey Zones. *Transdisciplinary Journal of Engineering & Science*, *15*. https://doi.org/10.22545/2024/00247.

the mediating manager emerges as a possible alternative. An article evolved from this perspective together with a training course given by Eng. Leonardo Costa to public managers in Brazil.

The idea of the mediating manager involves various disciplines to create integration by understanding beyond and through disciplines, which may lead the mediator to four dimensions:

— **Generalist**: Manager as an articulating leader, a generalist articulating many specialists.

— **Peacemaker**: A mediator promotes agreement between the parties to resolve conflicts before judicializing an issue, including by using techniques along the lines of the Systemic Law discipline of the Brazilian Bar OAB. In the case of public management, the manager is in the role of a facilitator, articulator, and conflict harmonizer.

— **Ghostbusters**: With the ability to put the right people in the right place. Two mediators in a social audit (different from an accounting audit) looking for the 'ghosts in the organizations' environments', according to Dr. Landier: The ever-present, yet unspoken memory of an event or a person that destabilized the community and contributes to keeping this collectivity divided, for no apparent reason. In the specific case of the public manager, the development of the expertise to put the right people in the right place so that 'ghosts' are prevented through organizational synergy.

— **Welcoming in a broad sense**: The capacity to listen, to hear, and to welcome all the actors. A therapist is a mediator for the conscience development of his clients, on a personal, family, or organizational level. As for the manager, the ability to listen and welcome (accept and integrate) all stakeholders or actors involved in work groups and organizations, so that the best solutions are developed. Regarding the levels of listening within working groups:

— **Level 1 – Distracted listening**, not paying attention completely to what is said.

— **Level 2 – Burocratic or pro forma** listening, just taking notes of what is said.

— **Level 3 – Listening rationally**: according to personal/organizational mindset or mental models. Those may swear that they listen to everyone, but they do it only pro forma or bureaucratically, not accepting different opinions.

— **Level 4 – Welcoming in a strict sense: i) acceptance**: the leader must emotionally accept to discuss new ways or ideas, even if considered weird or unusual, through the skill of emotional intelligence; **ii) integration** of all stakeholders into the workgroup, making everybody feel included, which is difficult, but it is what solves the problem dialectically and effectively, as per the HPTD-M analytical model attributes from the most abstract to the more concrete: dialectics, sustainability, simplicity, and effectiveness.

This expertise can avoid costs for organizations and civil society be-

cause the problem is solved before it happens, or in the beginning. Transdisciplinary mediators act like _fire extinguishers_ before the fire spreads. Also, those mediators promote the consciousness development to listen more than bureaucratically and rationally, with acceptance and integration of all the stakeholders or actors involved in work groups and organizations.

4) What should the TD Chair explore basically? Reference: this article.

— A transdisciplinary course in the first semester of university graduation.

— Simplification and flexibility to start (concepts of technoscience and complementarity).

— The mediating professor for learning to learn and understanding, not only knowing.

— Creation of a TD kind of Ph.D. and M.Sc. focused on the dialogue between theory praxis and generalist specialist. An MBA with more theory could be a starting point.

— The three types of logic as tools for problem solving in dialogue with new ideas that make sense, considering the level of complexity in each concrete case.

— The abstract-concrete complementarity in problem solving and the concept of quaternary complementarities for troubleshooting in practice.

Appendix 2: Background of TD Courses in Brazil Aiming at the International TD Chair

1) UNIPAZ (established in 1987): A 481-hour course on Holistic TD called FHB, i.e. _Holistic Basic Training_ with 25 instructors. For any student or professional over 18 years old, those seeking a new way of being in the world, or those interested in the holistic transdisciplinary approach as a tool for improving personal and professional dimensions. The deans: Pierre Weil (deceased in 2008) and then Roberto Crema, Brasília-DF, Brazil. Regarding the FHB course: Roberto Crema was responsible for implementing and coordinating its Pilot Group at UNIPAZ in Brasilia from 1989 onwards. So, the FHB has already a 35-year tradition[98].

2) From 2005 to 2006: A TD Philosophy Chair was ministered by Dr. Ubiratan D'Ambrosio (one of the 1986 UNESCO Venice Charter signatories) and Dr. Mariana Thieriot Loisel, for the Monastery of São Bento Faculty of Philosophy, São Paulo, Brazil. This information was given by Dr. Thieriot Loisel in a conversation with this author.

3) Marco Ernani Hyssa, M. D., MBA. TD practitioner ex-mayor of Altinópolis in São Paulo State. A pediatrician who took the FHB course of UNIPAZ

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[98] https://unipazdf.org.br/produto/formacao-holistica-de-base/.

(see item 1). Considering Hyssa's public management as mayor, the French media defined Altinópolis as a 'Brazilian Utopia', e.g. in 2004 the first page of the *Le Monde*[99] and in the 2014 *Positive Economy Forum Le Havre*[100]. In 2006, The Mato Grosso State Government School, Brazil, hired Hyssa to give a TD course for public managers[101].

4) Eng. Leonardo da Silva Guimarães Martins da Costa, MBA, civil-servant auditor and independent TD theorist/practitioner. The author has a concrete experience based on his international HPTD-M theory: *The mediating manager and quality of public expenditure*. A 14-hour course of transdisciplinary tools applied to organizations focused on TD and concepts of mediation and leadership. A 1st Edition was given as a pilot course at the Brazilian Government National School of Public Administration (ENAP) in March/2023. The ENAP site description in Portuguese of the objective, methodology. The course was very well evaluated by the participants, i.e. municipal, state, and federal public managers of the 44-year-old average[102].

Unfortunately, those Brazilian TD courses that promote a concrete dialogue between theory and praxis are ministered only in Portuguese. However, **this author's HPTD-M theory was designed and codified originally in English, as an effort to integrate TD researchers worldwide.** As per the February-2024 Berlitz's list of the 10 most spoken languages in the world and the major Western languages[103]:

1. English: 1.45 billion.
4. Spanish: 548 million.
5. French: 280 million.
8. Russian: 258 million.
9. Portuguese: 257 million.

In this context, to complete the 10 most spoken languages with those not considered part of the Western culture, for obvious reasons.: 2. Mandarin (1.12 billion), 3. Indi (602 million), 6. Modern Standard Arabic (274 million), 7. Bengali (272 million), and 10. Urdu (231 million).

All that said, in this author's opinion through the HPTD-M, **the most**

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[99] https://www.lemonde.fr/archives/article/2004/10/01/altinopolis-une-utopie-bresilienne_381363_1819218.html

[100] https://www.youtube.com/watch?v=VUt4wORb5y8&t=62s.

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[103] www.berlitz.com/blog/most-spoken-languages-world.

effective way to promote an international TD Chair that provokes cultural transformation in the Western dominant dogmatic scientism feedback by ideologies (not ideas) seems to be through English, a language that can achieve as many readers as possible worldwide. This could provoke a critical mass to introject new paradigms in the Western collective unconscious, by using the personal conscious of influencers in a constructive sense. The theory basis for this finding can be demonstrated by the HPTD-M perspective of complementarity, like in Modern Physics and Analytical Psychology, especially because English is an international language spread worldwide.

Acknowledgments and Conflicts of Interest

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Considering Transdisciplinarity for a New Engineering Systems Science

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Abstract: *The role and importance of each country in the world economy are in direct dependence on how much it owns high technology. Engineering is what makes technology possible and the flexibility in the nature of this engineering and the type of engineers trained to solve complexities facing our world is of paramount importance. Engineering education is developing as a link in the system of continuous education and is intended to meet the needs of the individual, society and state in the training of specialists with a high level of professional competence and mobility. Aristotelian-based engineering science is not prepared to tackle modern complexities affecting our world today because it is limited in mechanics and scope, it also does not understand this because it is empirical analytical-based. A new type of engineering science that can foresee such occurrences, understand its microphysics and mechanics, even predict them and craft suitable engineering-based preparedness (along with suitable systems technologies for tackling them) lies in the integration of the Transdisciplinary scientific logic and process, the in between and hidden third that today's engineering science does not consider. This new engineering can only be achieved through the consideration of a Transdisciplinary chair which would infuse Transdisciplinary culture in academia. The case of this new engineering systems science is used for substantiating the call for a Transdisciplinary chair and an aspect of Transdisciplinary systems engineering used for unifying entropy and order, to produce intelligence explained as further evidence.*

Keywords: modern complexities; transdisciplinary entropy; transdisciplinary systems engineering science; transdisciplinary systems science and engineering.

1. Introduction

Society's transition and indeed leap from their underdeveloped state to the advanced, further sophisticated and relatively stable through the deliberate, careful and dynamic application of technology. The realization, for instance, of the central features of Rostovian hypothesis for economic growth: the preconditions for take-off, take-off, drive to maturity, and age of high mass consumption[1] are all predicated on this deliberate consideration of scientific development and support made possible by the science of engineering, its application and resultant technologies utilized directly for sustaining the operationalization of key economic infrastructure. The role and importance of each country in the world economy therefore are in direct dependence on how much it owns high technology[2]. The transition of the economy of industrially developed countries on the path of technological development, the dominance of science and knowledge-based economies determine the key role of highly qualified personnel of an engineering profile in the socio-economic sphere of society and have a significant impact on the formation of a new content for the training of future engineers to multifunctional engineering activities[3]. Simply put, the application of key technology for this purpose is made possible and incubated through an engineering process backed by effective public-capital and regulatory policy.

New problems[4] gnaw us in the face and these new problems which are extreme complexities, even considered more distressing than wicked problems themselves. Identifying therefore the direction, the deep microphysics and scale of modern day complexities indeed entail that the engineering we possess must also change to adapt to the dynamism and evasiveness of these new complexities. This process therefore calls for a critical look in the science of this engineering and to make this possible, our engineering has no choice than to have a Transdisciplinary shift from its foundational, traditional methods to something reflective

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of the change, dynamism and Transdisciplinary nature of modern complexities. The entire gamut of this shift must have to be predicated on a deliberate consideration of the type of engineering studies right from academia where the knowledge of this science is first incubated and researched (processed). The entire structure must not only consider the shift in engineering curricular but should involve an entire pedagogical adjustment which would also consider how Transdisciplinarity itself can be brought into other spheres of science, since all problems are connected. This new engineering must consider seriously the connectedness factor in other sciences and develop integration or infuse methodology for looking at the complexities in those sciences through the lens of engineering and Transdisciplinarity because Aristotelianism (upon which modern engineering is founded and regulated in our countries) does not possess Transdisciplinary culture. There is therefore the need to identify extensive, effective methods for determining how the complexities these societies would face will be tackled. The effectiveness-ability for tackling these complexities would therefore depend on the farsightedness in the design and delivery of the engineering scientific basis of such societies. Again, the ability of this new engineering to detect early enough (and it can), the dynamic change and evasiveness of the complexities that are meant to meet them as a causality necessity, the ability of such societies to overcome these complexities and even use them for their benefit, giving these societies a fulfilled direction, will be dependent on the flexibility and robustness of their (society's) engineering science. What crowns this up will entail how the training of these engineers would be, as much as the type of engineering science they would be trained in. For the relevance of Transdisciplinarity and the need for its inclusion in all sciences, the consideration of a new engineering that agrees with Transdisciplinary culture is an undisputed requirement for managing the complexities of our 21st century world and beyond.

In the study, engineering is used as a theme (a case study) to drive home the need why a Transdisciplinary Chair is needed as a stronger basis for tackling the complexities we face in our world today. The study makes a strong case why this new form of engineering systems science is needed using a method of unifying disorder and order through explaining how intelligence emanates from this activity (entropic intelligence). This demonstration is a complete shift from the formerly held belief of Aristotelian predicated science and engineering that entropy is anti 'order'. The boldness for considering therefore this Transdisciplinary insight in engineering systems science attempts something different, stating unequivocally that indeed disorder creates order and the entire activity produces a realism known as 'intelligence'.

2. The Limitation & Reductionist Factor of Aristotelian Logic-Based Engineering

Aristotelian-based engineering is inflexible. It is heavily predicated on the following notion that 'for something to come to be, it must come either from what it is or from what it is not but it cannot come from what it is, for what already exists cannot come to be; nor can it come from what it is not, because there would not be anything for it to come to be from.

What it is
What it is not
What already exists

Contentions (empiricism & sensory logic)

Table 1. Aristotelian predicated engineering contentions

Aristotelian logic limits engineering science to empiricism & sensory experiences alone and leaves no room for transcendental & pure logical realism. How can engineering science or developed engineered Systems prove what it is, what is not & what already exists when empiricism alone is the governing rule? Aristotelian logic is reductionist and does not allow the investigation and explanation of the mechanics of what is or what is not. It assumes full empiricism but has a blind spot in considering that not everything has 'known' or 'discernable' values but exist and are dynamic in nature. That we cannot see or measure them does not mean they do not exist or be. Aristotelian logic-based engineering therefore has no room for understanding quantum states or the mechanics of subatomic elements and their intelligence. In considering this, accepting their intelligence in engineering (the mechanics of the intelligence of subatomic elements) becomes a utopia if not laughable. But this dynamic nature exists also contributing to what is considered intelligence associated with entropy or disorder.

Aristotelian logic is also Western epistemology & dialectics based, restricting the entry & acceptability of the imagination and epistemologies of other peoples. And every scientific realism first draws its life and inspiration from an epistemological knowledge-based realism before the metrological basis sets in, as indeed, the ability of a people to estimate and understand scientific logic by metrology is heavily predicated on the epistemological originality of the people, their culture, cosmologies and environment, because we first imagine before we investigate or have or develop. A typical example for explaining this is demonstrated in the narrative of Dr. Zerbini (the surgeon who performed the first heart

transplant in Brazil in 1968) who saw how the health system worked in China, impressed with a lung surgery where a patient was anesthetized only with acupuncture[5]. In this context, some physicians and scientists, not being able to explain acupuncture scientifically, simply deny its existence, in this same isolated rationalist paradigm that may be seen also in Artificial Intelligence (AI), in tools like the ChatGPT and therefore do not admit that a technique such as acupuncture exists independently of science[6].

From this, we see further how Aristotelian-empirical-premised engineering cannot explain the mechanics of that which is, what is not, nor what already exists because it relies solely on empiricism which does not have the capacity and tenacity to accept nor utilize transcendental or imaginative realism. Based on this premise, modern engineering science cannot define, for instance, the distinction between quantum states & the complex intelligence & operational dynamics of subatomic elements nor can it unify disorder exhibited in these complex elements. Thus, modern engineering systems science does not present any solutions for complexities predicated on this as its functions and insights are only limited to mere empirically observational spheres and not the real epistemological and transcendental coordinate realities. The idea of the real epistemological and transcendental coordinate sphere logic of engineering science must involve the intermingling with other sciences and unification created for understanding them as a whole with their associated problems. The problems of climate change, expected coronal mass ejections possibly hitting our earth, space wars which could be triggered by the deliberate and heightened militarization of space against the 1967 Outer Space Treaty, the means of conserving water and food availability, threats of HIV/AIDS, Tuberculosis, Cancer, and even the most recent technoscientific worry of the advancement of AI and how Transdisciplinary AI and the possible human replacement agenda[7] are all real treats which modern engineering does not seem to have proactive solutions for. It is therefore pertinent that we train engineers in the understanding of Transdisciplinary culture, making them further familiar with a new engineering systems science that would allow a Transdisciplinary outlook on new problems. The premise of this would only be made possible through the effective presence of a Transdisciplinary Chair in our universities and research institutes of learning.

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3. Unification of Entropy and Order

Mankind has paid dearly as a result of the inflexibility of modern engineering. The case begins to present a possible picture that is very embarrassing to accept that former civilizations could indeed have been more scientifically and technologically advanced than us. Though one may admit that they never had airplanes, computers and AI, but a careful study of their times shows they never needed such technologies as we have today as they operated within the normalized use of telepathy for communication and teleportation for travel, and even the smartest mobile satellite-based technologies or airplanes of our day would seem analogue to them a useful technology or enablement worth celebrating. We visit today the Stonehenge in England, the Pyramid of Khafre in Egypt and Aramu Muru Portal in Peru as tourist sites and with our seemingly vast knowledge of science and engineering cannot decipher how to reprogram these communications, knowledge and transport portals to achieve our envisaged smart world views, we mostly do not seem in most cases to understand what these portals were used for and in this, our capabilities as humans continue to be limited. For mankind therefore to transcend into the next level, it must be prepared to redesign its engineering systems science to allow Transdisciplinarity and this is when it can arrive at the premise where it can be said it has succeeded in living at a time where it has conquered science and achieved full intelligence. Until this time comes, mankind, it must be said, would have not been able to capture full intelligence.

A premise for further explaining this (as a case in this study) is in unifying disorder, defining the intelligence that creates order, the intelligence of entropy or entropic intelligence, using a simple Bread Crumbs Reality.
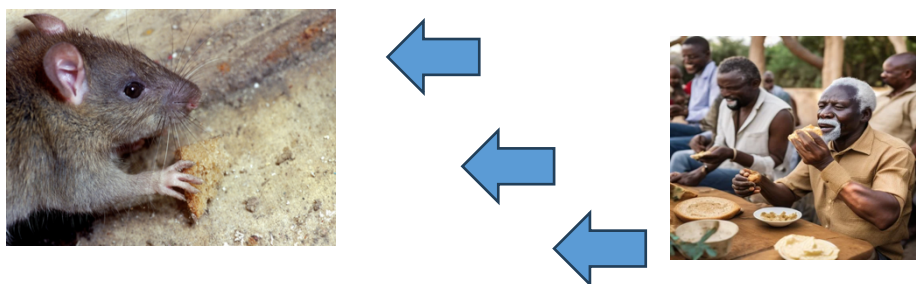

Fig.1 Demonstration of entropic intelligence (The Bread Crumbs Entropic Interaction)

The breadcrumbs entropic interaction explains a simple term which reveals that indeed it is disorder that makes way for order. Using this demonstration (**Fig.1**), a group of men enjoy a meal of bread, a staple food (for breakfast) in most African societies. What they do not know is that as they enjoy the meal, the crumbs fall (must fall) to the ground to provide food for the waiting mouse and

other super micro-organisms unseen to the human eye or even observable using known scientific procedures. An interesting thing in this activity is that their ability to prevent these crumbs from falling either from their hands or the table and by this from dynamically providing food for the mouse and other super micro-organisms (even when they seem to clean the entire table and floor) is beyond their ability or carefulness. The mouse and the super micro-organisms having this awareness that this must happen (that the crumbs must fall to the ground) are patient, waiting for the men to leave the space, for the intelligent process to complete through them, for it to partake in what it considers a meal. The body of the men after eating the bread undergoes a careful biological digestive process which leads to defecating the food and right from the toilet to the soak away pit or septic tank, this excretes awaits consumption by millions (if not billions) of super micro-organisms which wait and know under this intelligence that their food must be provided. This to them (what we humans see as the messy floor or disorder) is an intelligence which reports to them every natural and dynamic process of intelligence needed for their survival. So, the entire cycle (intelligence) of the crumbs falling to mess the ground for the human (a disorder) is an intelligence which is perfectly in order (an order) for the mouse and super micro-organisms.

The nature of the unseen crumbs that fall to the super micro-organisms and the nature of the super micro-organisms themselves are all supported by quantum mechanics in that although we do not have the empirical basis for determining their existence, we know they are there, and even when we debate that they are not there, it does not in any way imply they do not exist in their super subatomic, perfectly, structurally dynamic states and levels. The electromagnetic field effects emitted from the bread in the men's hands, the exhaling of their breath and touch on surfaces, all contribute to a certain form of what Aquinas defines as 'the elan (vitality) in everything'[8] which sustain the structural materials used for building the house and sustaining the macro environment enabling all to remain green and active, without which the wood of the house, the walls and even the air (inside and outside) and plants would all degrade or die. The entire cycle is a complex intelligence which emanates from what is formally considered a disorderly or disorganized process. While modern engineering stops here concluding and insisting it is disordered, not useful and must be overcome, Transdisciplinary systems engineering refutes this and says though it agrees that a process of order is expected and must be made possible, it must be made possible through a process and system that accepts (or agrees) that it is a normalized process climaxing to order (intelligence). This entire entropic intelligence is explained using the following formula that a certain **force of disorder (Fn)** is indeed responsible for the **activity (y)** which in turn results to the unification of another factor **Fn-y** to produce a grand factor **Fn = Fny2** as the product of order or that which we

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[8] Fox, M. 2020. 'The Spiritual Leadership of Thomas Aquinas'. Creation Spirituality Leadership. February 19, 2020, https://dailymeditationswithmatthewfox.org/2020/02/19/the-spiritual-leadership-of-thomas-aquinas/.

may consider as **intelligence (entropic intelligence).** The formula for the intelligence derived from this entropic process can then be given as a binomial function which properly sets the probability of the entropic intelligence resultant factor as:

$$\text{Fny}^2 (y + a)^n = \sum_{k=0}^{n} \binom{n}{k} y^k a^{n-k}$$

y being the independent case of any element of disorder (disordered or displaced activity), while the factorization of the entire sequence produces a constant (an expected constant of order or intelligence) when computed.

3.1. Consubstantiality of Disorder, Order and Intelligence

Intelligence is therefore a product of disorder and disorder must be present before there is order or intelligence. Disorder is the beginning of order, disorder is the force of order, the activating force of order and the rudimentary element of intelligence, intelligence comes from disorder, and whenever there is disorder, if allowed to complete its cycle (or climax), must produce order, the entire activity resulting in intelligence. Matter, space and time are not the only components of our world, there are transcendental realities and Aristotelian, empirical dependent engineering cannot search this out. And for the need for tackling modern complexities, these transcendental realities need to be searched-out and understood, if not for the science of it but to understand how they are associated with new problems, their microphysics and dynamic operational nature. Our new endeavors in Space for instance expected to consider life and activity there will be predicated on such Transdisciplinary engineering culture. So, apart from what is formally held by Aristotelian engineering that disorder is anti-order, indeed Transdisciplinary systems based engineering hypothesizes that entropy is a unique function of order and intelligence. A simple description of this can be seen also in the resultant feature of a pearl which comes about as a result of a healed wound. If an oyster has not been wounded in any way, it does not produce pearls. Pearls are products of pain, the result of a foreign or unwanted substance entering an oyster, such as a parasite or a grain of sand bread (a seemingly disorder).

In Hegelian master-slave dialectics[9], self-consciousness is achieved when two people meet at a balanced state (both seeing themselves as equals) until a fight to death ensues (disorder) with a first self-realization and self-consciousness realism taking place where the one seeing that he is about to be killed submits (and becomes the slave or bondman) and the other assumes the position of a lord or master. After a period of time, a second self-realization and self-consciousness begins when the slave or bondman realizes that because he serves the needs of the master (food, water, medicine when sick, shelter, etc.), the life of the master

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[9] Hegel, G. 1977. 'Hegel's Phenomenology of Spirit'. New York, Oxford University Press, pp. 16–18.

is in his hands. The master also on realizing this strives to achieve an equilibria understanding and normalcy (order), to be perpetual friends with the bondman (and in his good books) to preserve his own life (intelligence). This brings about balanced relations (intelligence) with the slave and general life becoming better (intelligence), passing the decorum and equity bar (intelligence). Having explained that a Master-Slave Psychology Syndrome exists in relations between nation states[10], the disorder-turned-order in master-slave realism is also expectantly tenable in relations between formerly sworn state enemies who have (and can now) become great friends and partners in multilateral global development and prosperity. A good example is the realism of the 1618–1648, 30-year war in European history (disorder), a resultant realism of the 1648 Peace of Westphalia (order) which culminated (or climaxed) to modern diplomacy (intelligence) and further the strength of the European union today (intelligence). Using the aforementioned entropic intelligence therefore, whatever conflict that exists between states, however, grave these conflicts are, are indeed a coordinated process, expected at some point to achieve good and normalized relations (order) between such states. Intricate dynamic factors (some known and unknown) and at the mercy of time and chance would always facilitate this.

Therefore, it is apt to imply that any situation that presents itself as a disorder indeed is the consubstantiality of order and intelligence. Whether it be in the form of unexplainable chaos and underdevelopment of nations or dark societies seeking light, all are coordinated and intricately involved in a complex dynamic intelligent cycle of events meant to achieve order, sustainable development, stability and beauty whenever it climaxes. The knowledge of this, therefore, would allow mankind seek this order and intelligence hidden in disorder as presented in the initial manifestation of the first self-consciousness or first self-realization factor (the disorder) and even forecast what the end of such disorder or crisis can be (entropic forecasting or entropic intelligence forecasting), going further as even inviting or preempting this order before the time-centric process. This area requires future research and Critical Systems Heuristics[11] may provide

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[10] Idejiora-Kalu, N. 2019. 'Understanding the effects of the resolutions of 1884-85 Berlin Conference to Africa's Development and Euro-Africa Relations'. Prague Papers on the History of International Relations. Issue 2. pp. 99-108; Idejiora-Kalu, N. 2020. 'Economic and religious interplay of interests as a reason for drastic change in Africa's electioneering dynamics'. In Bondarenko, D. (Eds.), Africana Studia no. 31, WP/CEAUP/#2020/1, pp. 1–16; Idejiora-Kalu, N. 2021. 'Master-Slave Psychology Syndrome: Imbalances in the Legal Interface of Treaties between powerful & less-powerful States'. Public Goods and Governance Journal. Volume 6. Issue 2. DOI 10.21868/PGnG.2021.2.2.

[11] Idejiora-Kalu, N. 2023a. 'My Journeys, My Story!' Doctorate of Professional Studies (DProf) Stage 1 Review (Registration) submitted to Middlesex University, London, UK in partial fulfillment of the award of the DProf Degree in Transdisciplinary Practice (Transdisciplinary Systems Engineering and International Relations). Supervisor: Dr. Nico Pizzolato (unpublished); Idejiora-Kalu, N. 2024b. 'Unravelling the Microphysics of Disorders in Institutions in Post-colonial Countries using a CSH-based Transdisciplinary Systems Engineering Paradigm – A Case study of Nigeria'. Sixteenth International African Studies Conference 'The New World Order: From the Legacy

models for achieving this.

4. TD Chair in Academia

The driving home of the understanding of the new engineering systems science has to take footing in our tertiary institutions. The rule must have to be relaxed and must not take the same orthodox admission criteria which fall within Aristotelian rule-based reductionism and must be spearheaded by a new engineering systems science that would have the following study, pedagogical and research architecture:
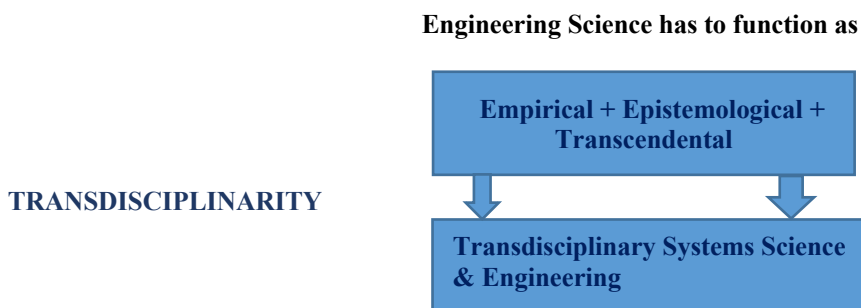
Engineering Science has to function as

TRANSDISCIPLINARITY

Empirical + Epistemological + Transcendental

Transdisciplinary Systems Science & Engineering

Fig.2 Transdisciplinary architecture of the new engineering science (Transdisciplinary systems engineering)

Engineering has to assimilate epistemology and not base only on empirical logic because not all real and dynamic systems have yet known empirical signatures. Because of the subatomic and mostly evasive and transcendental nature of these elements, their empiricity (or empiricism) may be unknown and can disprove valid scientific enquiry. Costa (2024) strongly affirms that it is very risky to deny the existence of something simply because it cannot be explained rationally or scientifically, even if empirically it is evident, like the 'off-label' prescriptions of medicines by physicians: They understand that it works but don't know the mechanism[12]. Also, in Huxleyian logic which states that 'facts do not cease to exist because they are ignored', the dynamism and facts of the life and

of Colonialism to Sovereignty and Development'. Moscow, Russia May 21–23, 2024 (Published Abstract); Ulrich, W. 2002. 'Boundary critique'. In H. G. Daellenbach and R.L. Flood (eds.), The Informed Student Guide to Management Science, London: Thomson Learning, pp. 41–42; Ulrich, W. 2005. 'A brief introduction to critical systems heuristics (CSH)'. Paper available in the Open University's ECOSENSUS project web site, http://projects.kmi.open.ac.uk/ecosensus/about/ csh.html, or in the CSH section of Werner Ulrich's Home Page, http://wulrich. com/csh.html; Ulrich, W. & Reynolds, M. 2010. 'Critical systems heuristics. In: Reynolds, Martin and Holwell, Sue eds. Systems Approaches to Managing Change: A Practical Guide. London: Springer, pp. 243–292.
[12] Costa, 2024 Costa, L., 2024. 'Artificial Intelligence and the Transdisciplinary Human Mediation of HPTD-M'. Transdisciplinary Journal of Engineering & Science, 15. https://www.atlas-tjes .org/index.php/tjes/article/view/864/393.

mechanics of these super subatomic elements imply they ought to be investigated and accepted as real even when we do not have empirical logic for supporting their existence and dynamic activity. In this way, Transdisciplinary systems engineering can assume the flexible nature (or shedding light into the objective and less objective) consideration of the value of realness contained in epistemological insights (**Fig.2**) which explain transcendental nature and activity, a high form of intelligence which expects to reveal more of the dynamics of new problems and the complexities we face now and beyond.

The institutionalization of this should take a central stage in academia and must acquaint other fields on the Transdisciplinarity in their spheres. There is the need to acquaint 'the Transdisciplinarity' in other sciences and fields if our complexities and new problems can be given a strengthened attack as it ought to. Transdisciplinarity would therefore have to be infused into modern engineering as a Specialized Academic Concern (TD Chair) and expanded in other sciences and fields using a Universal TD Integration Systems (UNITD) Model. This *'TD in everything'* would show how Transdisciplinary thinking can be integrated into the disciplinary thinking of other sciences. In this manner, solutions that emanate from this sort of thinking would have a Transdisciplinary patterned process which would produce solutions that are vast in scope and applicable for the complex problem area. In this way, the complexity factor in new problems would be unable to escape the solutions bracket (or solutions trap) and the intelligence from their consubstantiality factor of empirical intelligence made quickly possible and brought to the fore.

Expounded further, the following would have to be the case and inform the engagement architecture as a rule:

- Transdisciplinary rationality would have to be explained for all sciences, fields & complexities.

- A comprehensive Curriculum for Transdisciplinary Systems Science and Engineering as an academic discipline (BSc, MSc, MProf. PhD, DProf, DSc-Habilitation) all without traditional admissions criteria would have to be prepared and made functional in our universities.

- Arrange funding for the creation, teaching & research of Transdisciplinary studies, Transdisciplinary sciences, Transdisciplinary systems science and engineering, in universities across the world.

- Prepare engineers & scientists that can understand new problems and tackle them if we would succeed also in new frontiers such as Space and the unknown extraterrestrial.

5. Conclusion and Recommendations

The international community must make sure that a global funding scheme which would assist developing regions integrate this study, pedagogical and research engineering process into their universities and research structure is

made available, the process of accessing it must be free also from traditional fund accessing bottlenecks and bureaucracy. This is it to make sure that the divide in this new area of understanding is not further widened as history has shown that because of lack of funds, most developing regions are unable to implement their chapters or components of Transdisciplinary study even when they identify the relevance. During the course of this research, universities like Peaceland University in Nigeria in noticing the relevance of Transdisciplinary studies (itself an institution built on interdisciplinary and multidisciplinary ethos) indicated interest to host a pioneering faculty of Transdisciplinary studies and research in Nigeria on the condition that a modality must be made possible for funding its set-up, management and sustenance. This reflects the general envisions of many universities in countries across Africa and the global south in this quest to institute strong study and research chapters of Transdisciplinary science in their countries.

The International Center for Transdisciplinary Studies and Research (CIRET) therefore ought to take it upon herself to galvanize these funds (possibly through mediation with specialized agencies of the United Nations, governments, the Sovereign Wealth Funds and even willing private sector, to support the creation and running of such faculties for Transdisciplinary studies (and their TD Chairs) in especially global south countries grappling with problems of funding, and indeed augment the meager funds made available to them through their lean national budgets as Transdisciplinarity is an expensive science. CIRET cannot fully achieve its mandate if it does not have a deliberate policy for the institutionalization of Transdisciplinary studies and research all over the world. The idea again has a common sense of earth and humankind sustenance logic, as the problems of cancer, HIV AIDS, tuberculosis, terrorism, climate change, coronal mass ejections and hunger are shared, it makes sense therefore to allow and share the solutions paradigm. This will include considering a Transdisciplinary exchange of ideas for this and the outlook of Transdisciplinary research and culture has to be encouraged and supported from the epistemological lens of other societies and not only in the West. This, when done, will broaden our scientific scope and remove epistemological limitations.

Finally, tackling modern day complexities which we know today as new problems is serious business if we intend eradicating or putting a control system over what we consider our shared, humanist problems. The overlooking of outside empirical logic because we do not have an engineering that factors this in will continue to have damaging effects on our world and existence as humans, even in the way we see and utilize science. Therefore, the interest in equipping our engineering with this new type of engineering science is paramount. This activity is centered on the need of the TD Chair as this activity must emanate from the stool of academia and engineering plays a coordinating role. The substantiation of this is that it has been explained that engineering education is developing as a link in the system of continuous education and is intended to meet the needs of the individual, society and state in the training of specialists with

high-level professional competence and mobility, a broad outlook, which is based on knowledge related to primary specialty fields, highly creative potential, which is realized in technical creative thinking to solve complex engineering and economic challenges in the increasingly complicated information environment[13].

Our understanding also of disorder in light of the new Transdisciplinary systems engineering that indeed disorder is a component of order and intelligence is interesting revelation for our modern day scientific enquiry as standing on this scientific premise, we may appreciate disorder whenever it arrives and know that indeed we are in the step to finding what is considered normalcy, a whole new perspective in our understanding of thermodynamics, systems thinking and problem mapping. The cleaning of a house because it is untidy creates room for a better environment which produces an ordered space, healthy and comfortable to live in. This should be our focus for every aspect of disorder and outlook to our new problems. Current activity in the research area is in visiting universities and research centers across the world to demonstrate the UNITD process of infusing of Transdisciplinarity in various fields and sciences. The research solicits sponsorship.

Acknowledgments

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Transdisciplinary Chair in the Context of Leadership in Organizations

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Abstract: *The Transdisciplinary Chair in the Context of Leadership in Organizations is an innovative academic position that promotes the integration of multiple disciplines to address the complex challenges of leadership in the modern organizational environment. This chair seeks to transcend traditional boundaries between fields of study, encouraging collaboration among experts in corporate management, psychology, sociology, information technology, and other relevant areas to develop leaders capable of navigating and thriving in an ever-evolving business landscape. AI has played a critical role in improving the operational efficiency of organizations. The future will see an even deeper integration of this technology into the leadership context. AI will not replace leaders, but will serve as a strategic enabler, empowering them with predictive analytics, enabling more informed and faster decision-making. The future of leadership in organizations is shaping up at a rapid pace, in line with the evolution of emerging technologies, especially Artificial Intelligence (AI). The leadership of the future will be characterized by collaboration between humans and machines. The human skills of empathy, creativity and intuition, combined with the analytical precision and data processing capacity of AI, will create a hybrid leadership model. However, the best leaders cannot be replaced by AI, and the adversities that arise in the applicability of AI have the need to identify and improve leadership skills with a transdisciplinary approach eminent, in order to enhance and help leadership focus its cognitive energy, improve its collaborative and problem-solving skills.*

Keywords: transdisciplinary; artificial intelligent; leadership; predictive analytics; decision-making; critical thinking and systemic; multiple intelligences; team leader; soft and hard skills.

1. Introduction & Concepts

Leadership is considered the ability to motivate, influence, inspire, and command a group of people in order to achieve objectives. The nature and exercise of leadership have been the focus of human research throughout its history. Bernard Bass argues that "from its infancy, the study of history has been the study of leaders, what and why they did what they did". The search for the ideal leader is also present in the field of philosophy. Plato, for example, argued in The Republic[1] that the ruler needed to be educated with reason, describing his ideal of the "philosopher king". Other examples of philosophers who addressed the theme were Confucius, Lao-Tzu, and Sun-Tzu, with his "wise king".

Leading of a group of people, transforming it into a team that generates results, is called leadership. It is the ability to motivate and influence the lead, in an ethical and positive way, so that they voluntarily and enthusiastically contribute to achieving the team's and the organization's objectives.

In this context, allied to virtuous leadership[2], the concept of which refers to a type of leadership that is based on ethical and moral values, and which seeks the common good, and starts from the principle that people are not born leaders, but are trained to become one. And that leadership is not about a style or a technique, but about one's character, and without virtues, leadership is nothing more than direction or management. Leaders must be visionaries, thinking beyond the current applications of AI and anticipating future needs and challenges. Leadership in the age of artificial intelligence is not just about staying ahead of the technological curve, but about balancing human and technological skills. Because effective leadership is based on character strengths known as virtues, such as courage, self-control, wisdom and humility, AI (artificial intelligence) can be

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[1] The Republic Is a Socratic dialogue, authored by Plato around 375 BC, concerning justice (δικαιοσύνη), the order and character of the just city-state, and the just man. It is Plato's best-known work, and one of the world's most influential works of philosophy and political theory, both intellectually and historically. One of the most important dialogues of the ancient Greek philosopher Plato, renowned for its detailed expositions of political and ethical justice and its account of the organization of the ideal state (or city-state)—hence the traditional title of the work. See more: https://www.britannica.com/topic/The-Republic.

[2] From the book Virtuous Leadership by Alexandre Havard (a French lawyer who, after years of practicing law in various European countries, founded the Havard Virtuous Leadership Institute (HVLI) in 2007, with the aim of offering executives excellence programs based on the classical (universal) virtues. Since then, he has given successive seminars on virtuous leadership in cities such as Paris, Helsinki, Moscow and many others in the United States, addressing executives, educators, public men and MBA students. He also works as a consultant for major corporations around the world.), Alexandre Harvard has developed a leadership model based on *aetiology** - the philosophy of virtue - which is resonating with high-level leaders in government and various private sectors). The book explores the idea of leadership as a means of becoming a better person and leading others to a better world. It draws on the findings of ancient Greek and medieval Christian philosophers to apply them to modern leadership. The book is recommended for anyone who believes that leadership is not just about leading people, but also about becoming a better person. *Aetiology - Part of philosophy that deals with virtue and moral perfection.

used as a useful tool to enhance leadership, allowing leaders to be more proactive and strategic in their decision-making.

And, in the context of leadership, transdisciplinary leadership refers to the ability to lead teams made up of individuals from diverse backgrounds and disciplines. One study suggests that transdisciplinary leadership requires four main skills: (1) crossing boundaries, (2) systems thinking, (3) anticipatory thinking and (4) interpersonal skills, and another approach to leadership development is interdisciplinary, encompassing complexity, diversity and integration to prepare academics and executives to study and practice a different
type of leadership.

2. Conceptualizing Transdisciplinary

The term transdisciplinary was mentioned for the first time by Jean Piaget[1] at the 1st International Seminar on Pluri and Interdisciplinarity in Nice in 1970, being one of the most studied concepts in recent times by several scholars in the field. On the occasion, he asked participants to reflect on the concept: *"Transdisciplinary is a scientific approach that seeks the unity of knowledge. It seeks to stimulate a new understanding of reality, articulating elements that pass between, beyond and across disciplines, in a search for understanding complexity1. Furthermore, from a human point of view, transdisciplinary is an empathetic attitude of openness to others and their knowledge."*

However, we can affirm that transdisciplinary is not tied to any discipline, and that in fact, this methodology seeks to rely on disciplines to better explain and make understanding the totality of knowledge. D' Ambrosio[2] considers that:
[...] Transdisciplinary does not constitute a new philosophy. Not metaphysics. Not a science of sciences and much less, as some say, a new religious stance. Nor is it, as they insist on showing it, a fad. The essential thing about transdisciplinary lies in a stance of recognition where there is no privileged cultural space and time that allows us to judge and hierarchies - as more correct or truer - complexes of explanation and coexistence with the reality that surrounds us.

Also looking for a definition for the transdisciplinary concept, in 1994, the Transdisciplinary Committee, linked to UNESCO, produced a letter entitled "Charter of Transdisciplinary" which in its article 3 says: *"[...] transdisciplinary*

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[1] Jean William Fritz Piaget (Neuchâtel, 9 August 1896 - Geneva, 16 September 1980) was a Swiss biologist, psychologist and epistemologist, considered one of the most important thinkers of the 20th century. He advocated an interdisciplinary approach to epistemological investigation and founded Genetic Epistemology, a theory of knowledge based on the study of the psychological genesis of human thought. He is considered by many to be the leading figure in 20th-century developmental psychology. And he revolutionized the concepts of children's intelligence with conclusions that brought about a revolution in the old concepts of learning and education. See more: https://www.britannica.com/biography/Jean-Piaget.
[2] D' Ambrosio U (1997*). Ethnomathematics and Iits place in the History and pedagogy of mathematics*, New York: State University of New York press, p. 9.

does not seek domination over several disciplines, but the opening of all of them is that which crosses and goes beyond them (...)". Completing this concept, article 7 of the same document gives a very precise definition of *"[...] Transdisciplinary constitutes neither a new religion, nor a philosophy, nor a new metaphysic, nor a science of sciences.*"

Piaget's 4 Stages of Development. Piaget's theory, called Piagetian theory, focuses on child development and is therefore called development theory. According to him: *"Childhood is the time of greatest creativity in a human being's life."* Anchored in studies on human and cognitive development, Piaget's so-called cognitive theory was called "genetic epistemology" for him. His theory was fundamental to the emergence of the constructivist current and defined 4 stages for the development of ***human cognitive capacity***[3] .

The term cognition comes from Latin and means ***"to know".*** The word skill is a noun that indicates the quality of a skillful person. Therefore, when we talk about cognitive skills we are not talking about memorization, but rather information that is properly understood, assimilated and comprehended, being able to train the brain to obtain or improve cognitive skills such as processing new stimuli, for example. Cognitive skills are tools of the brain that are associated with information learning processes.

Cognitive functioning is a term that refers to the human being's ability to process thoughts that should not be depleted on a large scale in healthy individuals. It is defined as "an individual's ability to perform the various mental activities most closely associated with learning and problem solving. Examples include verbal, spatial, psychomotor, and processing speed abilities." Cognition mainly refers to things like memory, the ability to learn new information, speaking, understanding written material. The brain is generally capable of learning new skills in the areas mentioned, usually in early childhood, and of developing personal thoughts and beliefs about the world. Old age and illness can affect cognitive function, causing memory loss and problems thinking of the right words when speaking or writing ("drawing a blank"). Multiple sclerosis (MS), for example, can eventually cause memory loss, inability to grasp new concepts or information, and reduced verbal fluency. Not everyone with the condition will experience this side effect, and most will retain their general intellect and ability.

According to Piaget, children go through four stages of development until they reach adolescence. These stages are related to the human beings cognitive capacity, that is, to the construction of knowledge in the psyche. Are these:

1. Sensorimotor stage (from 0 to 2 years old) - The name itself already

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[3] Cognitive skills, also called cognitive functions, cognitive abilities or cognitive capacities, are the skills of the mind, as opposed to other types of skills such as motor skills. Some examples of cognitive skills are literacy, self-reflection, logical reasoning, abstract thinking, critical thinking, introspection and mental arithmetic. Cognitive skills vary in processing complexity and can range from more fundamental processes such as perception and various memory functions, to more sophisticated processes such as decision-making, problem solving and metacognition.

indicates that at this stage the child's sensations and motor coordination are developed. Even though the cognition capacity is limited, at this moment, she begins to perceive the world around her, beginning to recognize objects.

2. Pre-operational stage (from 2 to 7 years old) - With the development of speech, the child begins to name the objects that surround him at the same time that he begins to have the mental capacity to remember them (mental representation). Reasoning is also beginning to be developed, although it is in its initial phase.

3. Concrete operations stage (from 7 to 11 years old) - This phase is related to the cognitive ability to concretely solve some problems. In it, the child begins to have a greater capacity for interpretation and, therefore, is able to solve some basic problems. Some concepts are internalized, for example, numbers and mathematical operations.

4. Formal operations stage (from 11 years old to 14 years old) - Already in adolescence, logical reasoning develops, and the individual begins to think for themselves, at the same time as they have the ability to create theories and reflect on the possibilities of the world. It is, therefore, a phase of autonomy.

Early Childhood – The Importance to Development. Humans generally have a high capacity for cognitive functioning once born, so almost every person is capable of learning or remembering. IQ tests and others, although these have issues with accuracy and completeness. In such tests, patients may be asked a series of questions, or to perform tasks, with each measuring a cognitive skill, such as the level of consciousness, memory, awareness, problem-solving, motor skills, analytical abilities, or other similar concepts. Early childhood[4] is when the brain is most malleable to orientate to tasks that are relevant in the person's environment.

Physical Growth and Development. In this phase, there is significant synaptic growth and myelination of neural fibers in the brain, especially within the frontal lobes. For example, between the ages 2 and 6, the brain increases from 70% of its adult weight to 90%. The growth of the brain is followed by a surge in cognitive abilities. Around the age of 5, children start speaking properly and master their hand-to-eye coordination. It is optimal that an environment is provided that encourages physical development and allows the children to explore and try out new things. The physical development in children follows a pattern. The large muscles develop before the small muscles. The large muscles are used for walking, running and other physical activities. These are known as gross motor skills. Small muscles are used for fine motor skills such as picking up objects, writing, drawing, throwing and catching.

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[4] Early childhood is a stage in human development following infancy and preceding middle childhood. It generally includes toddlerhood and sometime afterward. Play age is an unspecific designation approximately within the scope of early childhood. Also called Preoperational for Piaget, ages 2 to 7 years old. Children are able to form thoughts without logic, but it helps give them a better understanding of the world around them.

Cognitive Growth and Development. Called the preoperational stage by Jean Piaget, this is the stage during which the child repeatedly asks, "Why?" and is used to build relationships with the child. The child cannot yet perform the abstract thinking operations. The child has to be able to see what is being talked about, because they do not understand the concepts of logic, betrayal, contemplation, etc. This means that they think literally: if a child is told that they have to go to bed because "night is falling", they will ask how can the night (literally) fall from the sky. They also see the human characteristics in every object, e.g. the table "is bad" if they accidentally hit it with their foot and it hurts. They also exhibit egocentrism; not to be confused with egoism; that being said, they do not comprehend that the other person has beliefs of their own and the children at this age think that what they think, everybody thinks. There is also a matter of perceptive centration, which causes the children to primarily see what is visually most prominent on someone/something, e.g. if a man has long hair, the child will think he's a woman.

Social-Emotional Growth and Development. This includes children understanding a sense of 'self', relationships with others and sociability. The emotional development includes expressions, attachment and personality. Children manifest fear of dark and monsters and around the age of three notices whether they are a boy or a girl and start acting that way. Boys are usually more aggressive whilst girls are more caring. However, aggression is manifested in two different ways: boys are more physically aggressive, while girls are more socially aggressive (name calling and ignoring). In this stage the individual differences become more prominent. Children who often came from lower-income families tended to express more challenges such as bullying, disruptive behaviors, and overall negative outbursts in situations. The results were gained from the National Longitudinal Survey of Youth[5]. Other factors of the mother were also examined such as their ethnicity, education level, the mother's birth age, and even how many siblings the mother had. Poverty, punishment, depression, and the idea of being a single mother are correlated to how the children behaved.

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[5] National Longitudinal Survey of Youth - is a set of surveys designed to gather information at multiple points in time on the labor market activities and other significant life events of several groups of men and women. NLS data have served as an important tool for economists, sociologists, and other researchers for more than 50 years.
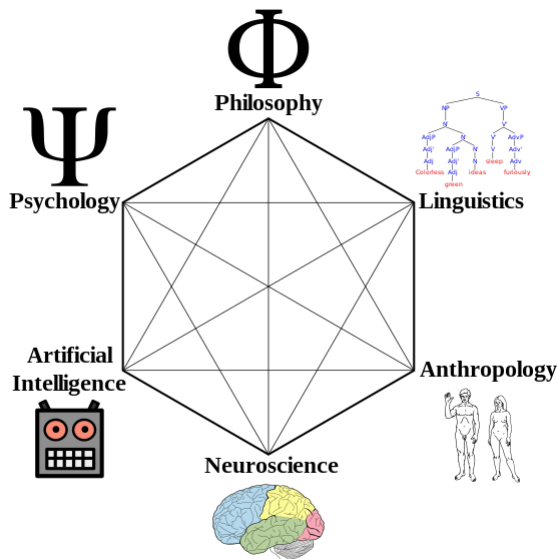
Figure.1. Illustrative figure of the fields that contributed to the birth of cognitive science, including linguistics, neuroscience, artificial intelligence, anthropology, and psychology[1]. This revised adaptation more accurately reflects the image as presented by Miller by Robo CriativeCommos

3. Leadership Styles: Behavior and Motivations

To understand the term "motivation", some concepts will be presented below.

"Motivation encompasses the causes or reasons that produce a certain behavior, whatever it may be." For this author "A motivated person usually means someone who demonstrates a high degree of willingness to carry out a task or activity of any nature", according to Maximiano and "the state of mind expressed in attitudes and behaviors of an individual or group", according to Milioni[1].

Thus, in summary, motivation can be considered a force, a state of mind or a tension that drives a person, through certain behaviors, in search of satisfying needs. In other words, motivation is having "reasons for action".

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[1] Miller, George A (March 1, 2003). *The Cognitive Revolution: A Historical Perspective. Trends in Cognitive Sciences.* 7 (3): 141–144. DOI:10.1016/S1364-6613 (03)00029-9. Printed Version ISSN 1364–6613. PMID 12,639,696. S2CID 206,129,621. Archived From the Original on November 21, 2018. "The cognitive revolution: a historical perspective." Trends in Cognitive Sciences. 7 (3): 141–144. DOI:10.1016/S1364-6613(03)00029-9. printed version ISSN 1364-6613. PMID 12639696. S2CID 206129621. Archived from the original on November 21, 2018.
[1] Milioni, Benedito (2013) *Liderança Prática Agindo Nas 20 Situações Criticas Para O Lider Ético*: Qualitymark.

But what are the needs? "Needs or motives are conscious or unconscious forces that lead the individual to a certain behavior," according to Chiavenato, and for Milioni, "needs are desires, expectations, desires and demands of the person"[2].

Chiavenato further states that "once a need is satisfied, another appears in its place, and so on, continuously and infinitely. Needs motivate human behavior, giving it direction and content."

Furthermore, for his every human need can be satisfied, frustrated or transferred. Thus "every time some satisfaction is blocked by some barrier, frustration occurs". The author adds: "When the individual tries to satisfy some need that is impossible to satisfy, through the satisfaction of another complementary or substitutive need, then compensation or transfer occurs. Thus, the satisfaction of another need appeases the more important need and reduces or avoids the frustration."

Chiavenato describe frustration can lead a person to the following reactions:

➢ Disorganization of behavior.
➢ Aggressiveness, physical, verbal or symbolic.
➢ Emotional reactions such as anxiety, distress, intense nervousness, insomnia, circulatory and digestive disorders.
➢ Alienation, apathy or disinterest in achieving frustrated goals as a form or unconscious mechanism of ego defense.

It can be seen, therefore, that an unsatisfied need is motivating for the individual, as it causes tension that will drive him in search of satisfaction that will bring the organism, once again, to the initial state of balance. However, if the individual does not have their needs met (appropriate remuneration for the position, respect from peers and superiors, for example), they do not make efforts to achieve the organization's goals/objectives, thus losing motivation for their activities, making every day of work in that organization was a hardship for him.

Workers' Behavior Is Conditioned by Social Norms and Standards. People begin to be evaluated by the group in comparison with these norms of behavioral standards.   Humanist authors focused on informal aspects of the organization (informal groups, social behavior of employees, beliefs, attitudes and expectations, motivation, etc.).

According to Chiavenato[3] "The concept of social man arose, where peo-

ple are motivated mainly by the need for recognition, social approval and participation in the activities of the social groups in which they live". And, into[4] states that, "with the advent of the Theory of Human Relations, a new language begins to dominate the administrative repertoire: we now talk about motivation, leadership, communication, informal organization, group dynamics, etc.". Also, for him[5], the Human Relations Theory noted the influence of leadership on people's behavior.

Leadership Theories Can Be Classified into Three Groups:

- ➢ **Personality traits.** According to this theory, the leader possesses marked personality characteristics that qualify him or her for a role.
- ➢ **Leadership styles**. This theory points to four leadership styles: autocratic, participative, democratic and liberal.
- ➢ **Situational leadership (contingency theory).** In this theory, the leader can assume different leadership patterns according to the situation. Chiavenato also points out that "a trait is a distinctive quality or characteristic of the personality. According to this theory, a leader is someone who possesses some specific personality traits that distinguish them from other people."

Some Personality Traits That Distinguish Leaders,

- ➢ **Physical traits**: energy, personal appearance, height and weight.
- ➢ **Intellectual traits:** adaptability, aggressiveness, enthusiasm and self-confidence.
- ➢ **Social traits**: cooperation, interpersonal and administrative skills.
- ➢ **Traits related to the task**: drive for achievement, persistence and initiative.

For Maximiano[6]: "The effectiveness of the leadership style depends on its effect on the performance of the task and the satisfaction of the influenced, be it an individual or a group. If those influenced are satisfied and, at the same time, perform satisfactorily, then the style is effective."

Thus, depending on the leadership style adopted by the company, there will be people who are more or less committed to the organizational objectives,

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ophy/Pedagogy, with a specialization in Educational Psychology from USP, in Law from Mackenzie University and a postgraduate degree in Business Administration from EAESP-FGV. He holds a Master (MBA) and Doctor (Ph.D.) in Administration from the City University of Los Angeles, California, USA. He was a professor at EAESP-FGV, as well as at several universities abroad.

[4] Chiavenato, Idalberto, *op. cit*., 2020, p. 149.

[5] Ibid, p. 88.

[6] Maximiamo, Antonio Cesar Amaru (2004). Teoria Geral Da Administração: Da Revolução Urbana À Revolução Digital. [S.L.]: Atlas. ISBN 85-224-3672-X - (2011 – 8ª Ed), p. 347. Antonio Cesar Amaru Maximiano is Bachelor's degree (USP, 1974), master's degree (USP, 1976) and doctorate in Administration (USP, 1979). Professor of administration at the University of São Paulo from 1975 to 2017. Guest professor at Université François Rabelais (Tours, France, 2009). Member of the academic coordination team at Faculdade Pecege since 2018. http://producao-acad.fea.usp.br/PPGA/membro-2496969804206964.html.

as well as a climate that is more conducive to productivity, interaction, etc. Furthermore, depending on the employee's profile, whether they are more efficient or more responsible, for example, the leader can vary the leadership style adopted, adapting it to the employee or the circumstances.

Still on the subject of leadership style, Franco[7] says that leaders can be:

➢ **Production or task-centred**: the leader establishes their leadership process based on centralization and rigidity, as well as personal monitoring of the tasks being carried out;

➢ **People-centred**: receives more consideration from individuals, as they exercise their leadership by encouraging everyone to participate in the work process and in the goals to be achieved; this helps to ensure high performance, generating a climate of greater trust and respect between leaders and subordinates.

And there are types of leaders who are required by companies in the 21st century:

➢ **Transformational Leader**: he can extract more motivation and performance from people than is expected of them. What's more, this leader transforms people into valuable assets for organizations.

➢ **Charismatic Leader**: he has, in addition to being able to persuade himself, the power to transform people's lives, creating a more interesting and enthusiastic working environment.

➢ **Training Leader:** your satisfaction lies precisely in cultivating people for success and has as a source of inspiration your own ability to develop people and transform them into future leaders or at least provide them with the path to do.

As can be seen, some theories state that leaders are born ready, as they have characteristics that differentiate them from other people. Others, on the other hand, state that it is possible to develop leadership and adapt it to situations and people, through different styles. But, although it is clear how important it is to know the origins of these studies, they are worthless if the leader does not know how to motivate their employees to achieve organizational objectives.

Leadership as a subject of scientific research only emerged after the 1930s, outside the field of philosophy and history. Over time, research and literature on leadership evolved from theories that described personal traits and characteristics of effective leaders, through a basic functional approach, which outlined what effective leaders should do, to a situational or contingency approach, which proposes a more flexible, adaptive style for effective leadership.

In recent years, much of this research and work has been criticized for being too narrow in scope, more concerned with explaining the behaviors of leaders face-to-face with their employees, rather than examining leaders in the larger

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[7] Franco Gandolfi is Doctor of Business Administration at Georgetown University | GU · McDonough School of Business - Working on various projects on leadership, organization development, and change management https://www.researchgate.net/profile/Franco-Gandolfi.

context of their organizations, paying little attention to the role of organizational leadership in terms of dealing with environmental change. It is the most important process that should be emphasized.

4. Transdisciplinary and Organizational Leadership Training

Leadership in organizations is a multifaceted concept that serves various stakeholders:

- ➢ **For Whom**? Leadership is for everyone involved with the organization, from employees and management to shareholders and customers. Effective leadership impacts all levels of an organization, fostering a positive work environment and driving success.
- ➢ **How?** Leadership is exercised through clear communication, strategic decision-making, and the ability to inspire and motivate. It involves setting goals, providing direction, and empowering individuals to grow and contribute to the organization's objectives.
- ➢ **Why?** The purpose of leadership is to guide organizations towards achieving their vision and goals. It's about creating a culture of innovation, efficiency, and adaptability in an ever-changing business landscape. Good leadership is crucial for organizational health, employee satisfaction, and overall success.

In essence, leadership in organizations is about nurturing talent, shaping future leaders, and ensuring that the organization thrives in its respective industry.

This differentiates the leader from the boss, who is the person in charge of a task or activity in an organization and who, to this end, commands a group of people, having the authority to order and demand obedience. Today's managers need not only the skills of a boss, but above all those of a leader.

AI Could Create a New Class of Functionally Illiterate. "According to AutoCognita, a Solve member[8], and is an EdTech social enterprise with a mission to help millions of low-literacy adults learn basic literacy skills and lead a better life. Today, in the US alone there are over 36 million adults who are considered functionally illiterate. Existing literacy programs around the nation cannot scale quickly enough to help them. That's why AutoCognita took the technology route to create a scalable literacy app targeting adult learners."

AI and Digital Literacy: In the digital age, being literate extends beyond just reading and writing. Digital literacy, which includes the ability to use digital technology effectively, is becoming increasingly important. As AI becomes more

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[8] Solve is an initiative of MIT. We believe that to achieve a more sustainable and equitable future for all, we need new voices and ideas. We launch open calls for exceptional and diverse solutions to the most pressing global challenges from anyone, anywhere in the world. Selected innovators get the backing of MIT and our community of supporters to scale their impact and drive lasting change.

integrated into our daily lives, there's a risk that those who are unable to use such technology could become functionally illiterate in a digital sense.

They were functionally illiterate: They could read and write but confused the simple with the complex.

The prevalence of functionally illiterate individuals in our society is a worrisome and rising phenomenon. University of Tubingen researcher Réka Vágvölgy[9] and her team wrote a paper in 2016 clarifying that simple illiterates "are unable to read or write", while functional illiterates can read and write, but "are unable to use their acquired literacy skills in daily life". For example, although the functionally illiterate can read, they cannot fill out an application, understand a tweet or written instructions, or "compare the cost of two items to choose the item that offers the best value".

Instead of inspiring the search for new experiences and skills, this type of illiteracy may lead to a dull learning style. The result: Weakened cognitive skills that, instead of pushing the acquisition of basic literacy, favor a simpler source of information like social networks and videos.

This is why functional illiteracy is a worrisome phenomenon. It goes beyond school or job performance—functional illiteracy can create an illusion of skill acquisition.

The dangers of weak cognitive functions are further confirmed by the World Economic Forum's top five skills to have in 2022 (and remaining on the list in 2023 - Future of Jobs Report)[10]: analytical thinking, active learning, creativity, technology, design, and critical thinking. These skills are replacing others, such as manual dexterity, working memory, management of financial resources, technology installations, and reading/writing. Without the latest cognitive skills, the functionally illiterate lack the ability to integrate into society.

That impact has a ripple effect, adding an extra dimension to the expanding wealth gap and generating not just an underprivileged class, but a functionally illiterate underprivileged class.

Analytical and creative thinking skills take the top spots for what companies are expecting from workers right now. Self-efficacy skills, including being resilient, flexible and agile, being motivated and self-aware, and curious and committed to lifelong learning, round out the top five.

This is "in recognition of the importance of workers' ability to adapt to disrupted workplaces", the report said. Only one technology-related skill — technological literacy — makes it into the top 10 at sixth place. The ability to

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[9] Vágvölgy, Réka – *A Review about Functional Illiteracy: Definition, Cognitive, Linguistics, and Numerical Aspects* – Publicado online Nov 10, 2016. DOI: 10.3389/fpsyg.2016.01617. Réka Vágvölgy - is a senior research scientist at the Fachbereich Sozialwissenschaften (Department of Social Sciences) at the RPTU (Rheinland-Pfalz Technical University) in Kaiserslautern, Germany. Her work focuses on developmental psychology and cognitive science.

[10] In its latest "Future of Jobs" report, WEF lays out which skills are key right now, and which will become vital in the coming years. The report is based on a survey of 803 companies in 27 industry clusters in 45 different economies.

understand and work with AI and big data currently ranks 15th.

Though functional illiterates seek out simplicity, its complexity that is on the rise in our global society. In our world of data, there is incrementally more and more demand on users. In 2012, Jeanne Harris suggested on the Harvard Business Review that non-academics must understand the principles of scientific experimentation and how to apply them to business.

Essentially, there is no room for functional illiterates in a data-driven world. Ongoing research on artificial intelligence skills shows that analytical thinking and curiosity are necessary cognitive skills for working with AI. Both skills require a strong ability to reason and ask pressing questions. According to Tom Pohlmann and Neethi Mary Thomas[11], such questions can be divided into four groups:

➢ Clarifying
➢ Widening
➢ Funneling
➢ Adjoining

The art of asking questions seems to be a massive obstacle for functional illiterates and their weakened cognitive skills. Being able to read and write is not enough. The digital age demands sustained attention (not just selective attention) to perform tasks and contribute.

Four Types of Questions Achieve Four Different Goals

Choose the right one to steer the conversation where you want it to go.

VIEW OF THE PROBLEM		
Wide	Adjoining	Elevating
Narrow	Clarifying	Funneling
	Affirm what we know	*Discover something new*
	INTENT OF THE QUESTION	

SOURCE MU SIGMA   © HBR.ORG

Figure 2.

Modern technologies such as YouTube afford unprecedented access to the skilled performances of other people, but merely Watching Others Perform Can Foster an Illusion of Skill Acquisition.

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[11] Relearning the Art of Asking Questions by Tom Pohlmann and Neethi Mary Thomas, 2015 – Harvard Business Review.

Experiments[12] show the more people merely watch others perform (without actually practicing themselves), the more they nonetheless believe they could perform the skill, too. However, people's actual abilities—from throwing darts and doing the moonwalk to playing an online game—do not improve after merely watching others, despite predictions to the contrary.

5. Transdisciplinary

If we consider the rapid advancement of technology and the increasing dependence on AI systems to perform tasks that previously required human effort, there is a risk that some people will become overly dependent on these systems. This could potentially lead to a form of functional illiteracy, where individuals may have difficulty with tasks that AI normally performs for them when the technology is not available.

If, on the one hand, AI is the great driver of functional illiteracy, on the other hand, AI is also the solution that has been used to combat illiteracy, as well as being used as a powerful tool to combat traditional and digital. We need to ensure that AI and other technologies are accessible and usable by everyone, regardless of their current level of skills and knowledge. Only in this way will it be possible to prevent the emergence of a new class of functional illiteracy.

In today's complex and hyper-connected world, a transdisciplinary approach aimed at developing skills can offer many benefits:

- **Holistic Problem Solving and Understanding** refers to the ability to approach issues and challenges comprehensively, considering all relevant aspects rather than focusing only on isolated parts of a problem. Holistic problem-solving ability is a valuable skill in many contexts, from everyday life to the professional environment.

- **Greater Capacity for Creativity and Innovation** exposing individuals to different disciplines and ways of thinking stimulates creativity and innovation, as well as **Collaboration and Teamwork**. By working together, individuals learn to value approaches from diverse perspectives, communicate effectively, and improve interpersonal skills.

- **Promoting Adaptability and Resilience** by developing a broader set of skills and the ability to integrate knowledge from different disciplines, individuals become more flexible, versatile and adaptable, to navigate rapidly evolving professional scenarios.

- **Real-world Practical Application** makes it possible to bridge the gap between academic knowledge and real-world practical applications, where individuals gain a deeper understanding of how their skills and knowledge can be used.

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[12] Easier Seen Than Done: Merely Watching Others Perform Can Foster an Illusion of Skill Acquisition by Michael Kardas ChicagoBooth.edu and Ed O'BrienView all authors and affiliations.

- **Systems Thinking** or systematic thinking is a conceptual framework that understands reality as a system of interconnected objects or subsystems and interdependencies of various elements within complex systems. Consequently, it tries to understand its functioning and its properties to solve a problem.

- **Career Progression i**n a World of Increasing Volatility, Uncertainty, Complexity, and Ambiguity (V.U.C.A). In essence, VUCA helps organizations adapt to change by encouraging leaders to think strategically about volatility (rapid change), uncertainty (unpredictable outcomes), complexity (interlinked variables), and ambiguity (lack of clarity). Emphasizes the importance of adaptability, resilience and agility in decision-making – characteristics that are crucial to success in today's dynamic environment, as employers increasingly value individuals who can overcome disciplinary boundaries, adapt to new challenges and contribute to teams interdisciplinary.

Transdisciplinary Skills

- TD Skills are nothing new. They comprise a set of higher-order skills, abilities and dispositions that have been identified as necessary for success in today's complex, fast-changing, interdependent and technology-driven society
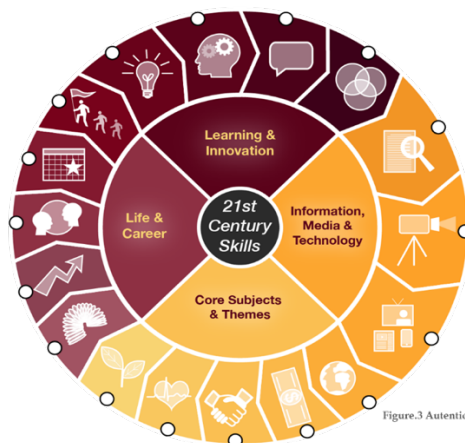
*TD Skills - transdisciplinary skills attributed by the author

Figure 3. Autentic Learning

Creativity, Critical Thinking, Communication and Collaboration - the 4 C. The need for continuous knowledge in information, media and ICT is a direct result of the technologies that change the way we communicate, interact and work together.

Information, Media & ICT. Although organized in slightly different ways, these individual structures are found to be "generally consistent with each other" in their emphasis on creativity and innovation, critical thinking and problem solving, communication and collaboration.

The Importance of Soft Skills. Arguably, some of the most important skills of the 21st century is those that differentiate us from the machine. Being able to live and work in today's globalized, interconnected and interdependent world requires collaboration, social and intercultural skills, adaptability and self-

regulation, productivity and accountability, leadership and responsibility. To develop these interpersonal and interpersonal skills, it is necessary to practice working collaboratively with others, explore cultural differences and perspectives, develop self-reflective practices, appreciate that all knowledge comes with lenses and deal with the complexity inherent in our diverse, interconnected and interdependent world.
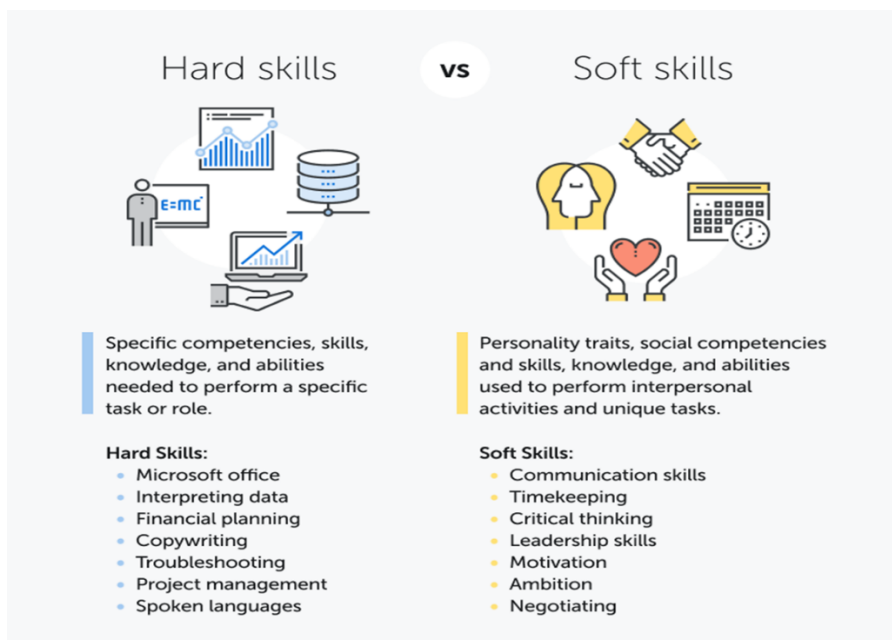

Figure 4. Uploaded by on November 27, 2021, for Ivan Andreev - https://www.valamis.com/hub/hard-skills-vs-soft-skills

21ST Century Themes. Finally, 21st-century themes such as global awareness, financial-economic-business-civic literacy, health literacy and environmental literacy are necessary to understand and respond to the issues faced by today's globalized, interconnected and interdependent societies.

Incorporating the 21 themes into the curriculum helps foster the systems thinking and interdisciplinary mindset that helps us understand today's complex world.

These transdisciplinary skills, or better, TD Skills[13], are not only considered important for a successful economy and are sought by employers from university graduates entering the job market[14], they are necessary for 'effective com-

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[13] TD Skills – transdisciplinary skills attributed by the author.
[14] Bar-Kochva, I., Vágvölgyi, R., Dresler, T., et al. *Basic reading and reading-related language*

munity and social engagement, participatory democracy and for living meaning-ful and satisfying lives'[15].

To develop these important affective and conative skills, educators con-sider HOW students learn and draw on what is known about the science of learn-ing beyond the cognitive to promote these meta-outcomes[16].

6. Conclusion

In the modern business scenario, marked by rapid and simultaneous transformations, the ability to grasp and apply knowledge from multiple disci-plines in different contexts is fundamental.

Organizational leaders are expected to be able to approach complex prob-lems across multiple domains with creativity and depth, where they require a combination of disciplinary and experiential knowledge to understand these chal-lenges and develop effective solutions whenever necessary and requested.

To do so, these leaders need to be able to exercise skills that are not new. These comprise a set of higher-order competencies, skills and dispositions that have been identified as necessary for success in today's complex, rapidly chang-ing, interdependent and technology-driven society.

Transdisciplinary emerges as a response, as it challenges traditional knowledge management models by encouraging the integration of knowledge from different areas, creating innovative and effective solutions for the complex challenges of the business world, and allows incorporating and aligning.

Acknowledgment and Conflicts of Interest
The author declare that she has no conflicts of interest with respect to the

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BEYOND GRAY ZONE: HUMAN MEDIATION

The Primacy of Human Dignity as a Central Concern
for Education in the Future

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Abstract: *This article explores the primacy of human dignity as a central concern for the future of education, particularly within the context of health ethics and end-of-life care. It critiques the prevalent ambiguities and manipulations of the term "human dignity" by examining the Royal Society of Canada Expert Panel's Report on End-of-Life Decision Making, which dismisses the concept of dignity as insufficient for normative ethical questions. The article argues that such dismissals are strategically used to promote the moral right to assisted suicide by overemphasizing individual autonomy. It draws parallels to ideological manipulations of language as described by George Orwell and underscores the importance of maintaining clear and precise definitions to avoid fallacies. The discussion highlights three universal meanings of human dignity—ontological dignity, dignity-decency, and dignity-liberty—and their implications for ethical decision-making in end-of-life care. The conclusion emphasizes the necessity of preserving the authentic understanding of human dignity in educational discourse to ensure ethical integrity in future societal practices.*

Keywords: *human dignity, education, individual autonomy, ethical decision-making, ontological dignity, dignity-decency, dignity-liberty.*

Preamble

A period of political, economic and ecological uncertainty, such as the one we are living through, is also a period of uncertainty with regard to the benchmarks that used to guide us, or by which we let ourselves be guided. The result is all sorts of assertions, resolutions, petitions of principle and declarations, all of which have in common the fact that they are not based on anything that has been properly thought through and argued. This would be no more serious than a passing fad if it did not sometimes result in public decisions that are binding on everyone and of the utmost gravity insofar as they call into question the human subject and the dignity of the human subject.

Professor Thomas De Koninck provides us with an illustration of this with the current debates on 'end-of-life decision-making'. The attitude of doctors towards their patients should be dictated, not by their personal adherence to the Hippocratic Oath, but by a piece of legislation, a text with a virtuous purpose but with insecure foundations limited to the ideas of the moment. What is clearly at stake, beyond the case in point, is the dignity of the individual. The dignity of the individual is being compromised by the atrocities we are witnessing around the world, whether in Ukraine, Gaza or elsewhere, but also by a multitude of low-intensity legal measures that have the effect of reducing the individual to any one of a multitude. In both cases, it is the dignity of the person that is denied, if not violated.

If CIRET has a raison d'être, it is to affirm 'the humanity of humanity' as the guiding principle that should drive us through the changes that lie ahead. This raison d'être invites us to stand at a level of reality that is a little beyond certain current debates and the contradictions they reveal. Thank you to Professor De Koninck for taking us there by reminding us that Antigone will always be right, whatever the cost to her, to want to bury her brother, even if he is a traitor to the laws of the City; because if there is one thing that cannot be transgressed without man ceasing to be human, it is his dignity.

This dignity is not to be found in a discourse that claims to be solely rational, or in the pages of a legal text specific to the City of Thebes as it is to our society. His reason finds its foundation in the depths of the vast forest, the forest of origins that can only be told through the myths at the heart of which what we are finding its true foundation. This call of the forest most often remains alien to the village and to those who sit by the smoking fireplace. Yet it is this call that can lead us to the 'secret of the dawn', a secret that eludes common understanding and demands to be discovered in the uncertainty of being.

Dr. Hubert Landier

1. Introduction

Of fallacies, 'The most prolific and usual is the argument that turns upon names', observed Aristotle at the outset of his *Sophistical Refutations.* Hence it is, he added, that 'those who are not well acquainted with the force of names misreason both in their own discussions and when they listen to others'[1]. Needless to say, the way to deal with the frequent ambiguity of words is hardly to exploit or aggravate it as Sophists do, no less today than yesterday, but rather to correct it by means of precise descriptions and definitions. This is particularly the case for a term as crucial to health ethics as the word *dignity.* And what underscores especially nowadays the extent to which the recognition of authentic human dignity has become a central challenge in health ethics is its place in end-of-life care.

An eloquent example of fallacies exploiting the many-meanings of key-words or expressions, such as 'human dignity' and 'individual autonomy', was recently provided by the Royal Society of Canada Expert Panel in its Report entitled *End-of-Life Decision Making*, published in November 2011. That Report claimed that 'while the language of *human dignity* is seemingly universal, there is currently no consensus on the moral basis or on the precise meaning of human dignity', concluding that 'the concept of human dignity is an unsuitable tool for settling normative questions pertaining to end-of-life decision making'[2]. This stratagem enabled them to hold that there must be a moral right to assist suicide, in view of what they deem 'the paramount status of the value of individual autonomy'[3]. As we shall see, the Report is gravely mistaken on both counts, beginning with human dignity.

There is more still. There is what, on another parallel topic, the Quebec poet Paul Chamberland has incisively summed up in the following terms: 'The total alteration of the meaning of words will allow the fabrication of an official version of what shall pass for reality itself'[4]. One could not better state the fact that, because it is unable to transform reality, ideology alters the meaning of words signifying that reality. Henceforth, as George Orwell put it: 'black is white', 'war is peace', and so forth. The principle is indeed admirably formulated by Orwell in *1984*: one must aim to 'dislocate the sense of reality'. 'In Oldspeak it is called, quite frankly, "reality control". In Newspeak it is called *doublethink*'. You will recall that 'the whole aim of Newspeak is to narrow the range of

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[1] Aristotle, *Sophistical Refutations¸* 1, 165 a 5 and a 15–17, translation by W. A. Pickard-Cambridge, in *the Complete Works of Aristotle*, edited by Jonathan Barnes, Princeton University Press, 1984, vol. 1, p. 278.

[2] Report of the Royal Society of Canada Expert Panel, *End-of-Life Decision Making,* November 2011, pp. 51–52.

[3] *Ibid.,* p. 41 sq.

[4] Paul Chamberland, *Le Devoir*, 8 mai 2013, p. A 8.

thought'. Accordingly, '*Doublethink* means the power of holding two contradictory beliefs in one's mind simultaneously, and accepting both of them'[5]. This was aptly illustrated by the Quebec *Special Commission on the Question of Dying with Dignity*, which transformed the fine expression of *medical aid in dying* into an oxymoron no longer meaning genuine medical aid such as palliative care, but its exact opposite, euthanasia[6]. What made this possible was the confusion that Commission was able to maintain in the use of the word *dignity*, notably within the formula *Dying with Dignity,* which even served to name both the Commission and its Report.

And yet it is easy to notice that the word *dignity* carries at least one superficial sense, which Gabriel Marcel rightly qualified as 'a decorative conception of dignity', consisting in 'impressing oneself outwardly', to quote André Gide[7]. No matter, that is the sole meaning the Commission made its own, even though it has no ethical connotation, and is more a mockery of properly understood human dignity than anything else.

Whereas in fact *human dignity* has three strong universal meanings whose relevance to end-of-life care is soon evident: **1/ontological dignity, 2/dignity-decency, 3/dignity-liberty**[8]**. T**he rest of my exposé today will center on those three meanings and their practical consequences, before a brief conclusion. Discussion of 'individual autonomy' will find its natural place when we reach the third meaning, 'dignity-liberty'.

2. Ontological Dignity

The Preamble of the Universal Declaration of Human Rights of 1948 opens with the following words: 'Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world'. This is what may be called ontological dignity, since it speaks of the inherent and equal dignity of every single human being, belonging, in other words, to his or her very *being*.

The fifth 'Whereas' having reaffirmed the faith of the people of the United Nations 'in fundamental human rights, in the dignity and worth of the human person and in the equal rights of men and women', Article 1 states that 'all human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood'. Article 3 affirms that 'everyone has the right to life, liberty and

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[5] George Orwell, *Nineteen Eighty-Four*, London, Secker and Warburg, 1949; Penguin Books, 1954, pp. 44–45; 169–171.

[6] Cf. *Mourir dans la dignité. Rapport de la Commission spéciale,* Assemblée nationale, Québec, mars 2012, p. 78 and *passim.* No official English translation seems available so far.

[7] Gabriel Marcel, *La dignité humaine*, Paris, Aubier, 1964, p. 168 ; André Gide, *Ainsi soit-il ou Les jeux sont faits,* Paris, Gallimard, 1952 ; édition revue et augmentée, 2001, p. 115.

[8] The best treatment I know of this threefold distinction is in an essay by Jacques Ricot entitled 'La dignité du mourant', in *Le mourant,* Editions M-editer, 2006, pp. 43-81.

security of person'; Article 5 adds: 'No one shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment'; Article 7: 'All are equal before the law and are entitled without any discrimination to equal protection of the law[9]. And so on up to Article 30. That list of the rights and liberties ensuing from the simple "recognition of the inherent dignity of all members of the human family" is truly impressive.

The emphasis in Article 3 on the right to life as the most fundamental of all – given that both the right to liberty and to security of person presuppose life itself – has to be seen as particularly significant. It anticipates, in its very terms, and in their order, Article 7 of the *Canadian Charter of Rights and Freedoms, w*hich reads: "*Everyone has a right to life, liberty and security of person*". In a word, right to life is the *sine qua non* of all other fundamental rights, freedom itself to begin with, for the evident reason that to suppress someone's life is to suppress his or her freedom, whilst the reverse is not the case.

As Hans Jonas noted with good reason, "how strange that we should nowadays speak of a right to *die*, when throughout the ages all talk about rights has been predicated on the most fundamental of all rights – the right to *live".* Indeed, every other right ever argued, claimed, granted, or denied, can be viewed as an extension of this primary right, since every particular right concerns the exercise of some faculty of life, the access to some necessity of life, the satisfaction of some aspiration of life' […] Every further right, equal or not, in natural or positive law, derives from this cardinal one and from the mutual recognition of it by its claimants'[10]. This having been said, the novelty of the 1948 Universal Declaration of Human Rights – which makes it an acquisition of the twentieth century whose import could in no way be exaggerated – is the **affirmation that the right to life and all the other fundamental rights that follow are necessary consequences of the equal dignity of all humans without exception.**

In a word, then, it was universally agreed among nations that the origin and principle of all those fundamental human rights is no less than *human dignity* itself. It is most evidently a dignity tied to the very humanity of each and every one of us, to the fact that we *are* humans. Hence, I repeat, the word 'ontological', which, as dictionaries attest, refers to being as such.

How does one explain, however, such an outstanding and unanimous agreement among nations over the absolutely prior character of the recognition of human dignity? It should be obvious that one primary reason must have been the universal indignation provoked by the Nazi horrors: the Second World War ended in 1945; the Nuremberg trial took place between November 30, 1945 and October 1, 1946; we are in 1948. Ethics are not born in academic debates. The feeling of revolt before an injustice is indeed the moral principle *par excellence*. Albert Camus rightly sensed this essential aspect when he spoke of *anguished*

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[9] Cf. *The Universal Declaration of Human Rights*, Brussels, Amnesty International, 1988.
[10] Hans Jonas, *The Right to Die,* The Hastings Center Report, Wiley Online Library, 2012. p. 31. The words *die* and *life* are underlined by the author.

wonder and predicted*: Indignation will be for all times. We now know it.* [11]. The feeling of indignation precedes the concept of dignity and signals the birth of moral conscience[12].

In point of fact, human dignity is first recognized through the experience of being indignant. Whatever destroys what is worthy, in Greek *axios*, is *felt* to be unworthy, *anaxios*. As Aristotle remarked, 'the servile, the worthless and the unambitious are not given to indignation'[13]. In Éric Fiat's excellent terms, '*a man who behaves badly is unworthy of his dignity, that is all* […] *But as a matter of fact, if we judge his conduct to be unworthy, it is with reference to that ontological dignity we confer on him*'[14]. The keenness of the feeling of indignation before an injustice perpetrated against human dignity further quickens the formation of conscience. '*One only finds these reasons because it shocks',* Pascal justly pointed out. The feeling '*acts in an instant and is always ready to act*', he added, rediscovering anew Plato's intuition on the flash of the instantaneous, *to exaiphnes*, the instant in which everything is turned round and renewed, to which I'll return at the end of this talk[15].

That such a detailed and limpid affirmation of what the absolute priority of human dignity entails should have gained such unanimous approval among nations and cultures so diverse in so many regards is therefore far from surprising. Yet one should none the less rejoice over the fact that the universal recognition of the equal dignity of all human beings *qua* human, without exception, **has at last imposed itself as the ultimate foundation of all rights** and the indispensable rampart, at the level of principles, against barbarism under its multiple guises. '*What does barbarism consist in*, asked Goethe, *unless it is precisely that it is unaware of what excels?*' The barbarian is above all perverse to the point of not being aware of his own humanity any more than that of others, for we all share the same humanity[16].

Now two further capital traits bring out even more the full import of ontological dignity:

A. We owe to modern thought a very helpful 'philosophical formulation' of human dignity. When applied to humans, the word 'dignity' must be understood in an unsentimental, rigorous sense. It means nothing less than this: their

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[11] Albert Camus, *Préface à « l'Espagne libre », Actuelles I, Essais,* Paris, Gallimard, Bibliothèque de la Pléiade, 1965, respectively, p. 1605 et 1607.

[12] See Jean-François Mattéi, *De l'indignation,* Paris, Éditions de la Table Ronde, 2005.

[13] Aristotle, *Rhetoric* II*, 9,* 1387 b's 13–15, translation by George A. Kennedy.

[14] Éric Fiat, *Grandeurs et misères des hommes. Petit traité de la dignité,* Paris, Larousse, 2010, p. 23. The italics are the author's.

[15] Pascal, *Pensées,* respectively Brunschvicg 276; Lafuma 983; Le Guern 759, and Brunschvicg 683; Lafuma 565; Le Guern 671 ; Plato, *Parmenides*, 156 D.E.

[16] *Goethes Gespräche mit Eckermann*, 22 März 1831, Wiesbaden, Insel-Verlag ,1955, p. 455; cf. my book, *De la dignité humaine*, Paris, Presses Universitaires de France, 1995 (reprinted, 2002), p. 4-6, 223-224.

dignity puts humans, in Kant's words, 'infinitely beyond any price'. As if echoing Pascal's celebrated phrase 'learn that man infinitely transcends man', Emmanuel Kant does provide an excellent description, in his *Foundations of the Metaphysics of Morals*, of this basic distinction between dignity and price: 'In the realm of ends everything has either a *price* or a *dignity*. Whatever has a price can be replaced by something else as its equivalent; on the other hand, whatever is above all price, and therefore admits of no equivalent, has a dignity'. Adding, further on, that what 'constitutes the condition under which alone something can be an end in itself does not have mere relative worth, i.e. a price, but an intrinsic worth, i.e. *dignity*'[17].

Kant also remarks, accordingly, that man 'exists as an end in himself and not merely as a means to be arbitrarily used by this or that will. In all his actions, whether they are directed to himself or to other rational beings, he must always be regarded at the same time as an end. […] Rational beings are designated *persons,* because their nature indicates that they are ends in themselves, i.e. things which may not be used merely as means. Such a being is thus an object of respect, and, so far, restricts all [arbitrary] choice. Such beings are not merely subjective ends whose existence as a result of our action has a worth for us, but are *objective ends,* i.e. beings whose existence itself is an end. Such an end is one for which no other end can be substituted […]'[18].

All this from Kant has consistently been considered to be especially useful, with good reason. For it means, in practice, that to recognize a human being's dignity is to acknowledge that he or she must never be reduced to means to an end. Every single human being has the dignity of an end. This is particularly enlightening with regard to care, especially palliative care, for we may already discern from it that, if humans have a right to full care even when in a state of extreme dereliction, it is because human dignity requires it. He or she always remains one for whose sake we must act.

B. The other capital trait is what Paul Ricœur aptly described as 'a requirement that is older than any philosophical formulation', namely that 'something is due to human beings simply because they are human'[19]. In all the cultures we know from every era, a fragment of tragedy, an epigram, a legislative text, a proverb, an inscription on a tomb, a tale, a song, a work of art, a work of wisdom, have testified to it.

Moreover, recognition of this requirement becomes more explicit as civilizations assert themselves, the most remarkable being the recognition that is

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[17] Pascal, *Pensées*, Brunschwicg 434; Lafuma 131; Emmanuel Kant, *Grundlegung zur Metaphysik der Sitten*, Zweiter Abschnitt (AK IV, 434–435). I quote from Lewis White Beck's translation, The Library of Arts, 1959, p. 53. In this quotation from Kant, as in those which follow, the words underlined are underlined in the text.

[18] Kant, *ibid*. (AK IV, 428); Lewis White Beck's translation, pp. 46–47.

[19] Paul Ricœur, « Pour l'être humain du seul fait qu'il est humain », in *Les enjeux des droits de l'homme*, dir. Jean-François de Raymond, Paris, Larousse, 1988, p. 235-236.

spontaneously given to the weakest and poorest, the importance of leniency and respect toward those who are in a state of dependency and weakness. In India, the *Laws of Manu*, of ancient origin, declare in plain language: 'Children, the old, the poor and the sick should be considered as lords of the atmosphere'[20]. Chinese wisdom ranks the 'ability to comfort others' as most important. *Ren* (or *jen*) insists that one does not 'become human except in one's relationship with others' and that 'the moral tie is most important in that it is the basis of, and constitutes the nature of, all human beings'[21]. Respect for the poor and the suffering, in every sense of those terms, is at the core of the Jewish and Christian traditions. The Koran states duties to orphans, the poor, travellers without lodging, the needy, and those who have been put into slavery[22]. Compassion is one of the two main ideals of Buddhism[23]. Among the Greeks, Sophocles helps us see something similar in the person of old Oedipus, blind and in tatters, practically abandoned, asking 'So, when I am nothing – then am I a man?'[24].

Everywhere we thus seem to discover a sense that a state of destitution reveals the quality of being human most clearly, commanding awareness of one's own particular nobility – the nobility, again, of being, not of something that is possessed. Such recognition of every human being unique dignity, about which civilizations at their best are so remarkable in agreement, is of the utmost importance, because it too proves that the universal recognition of human dignity is not derived from some abstract definition of man; that it is not based on some particular so-called 'philosophical system', or arbitrary point of view.

Respect even for the dead has been universal, as funeral rites devoted to honouring the dead have borne out everywhere, from the dawn of time. Why should one, to this day, be moved to assent before the action of the young girl Antigone in Sophocles's great play when she refuses to let the body of her brother, even though he was denounced as a traitor, to be left to rot in the sun and be eaten by vultures, at the cost of breaking the law and sacrificing her own life? Her ethical commitment, and the universal echo it provokes, implies that even the dead body of a condemned person deserves sacred rites. These will restore it

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[20] Cf. C. S. Lewis, *The Abolition of Man*, New York, Macmillan, 1947, p. 104, 107 and 115.
[21] Anne Cheng, *Histoire de la pensée chinoise*, Paris, Seuil, 1997, p. 68 sq. According to Marcel Granet, all Confucian doctrine of 'the supreme virtue', ren (or jen) is defined as [translation] 'an active feeling of human dignity', based on respect for oneself and respect for others, from which the golden rule is derived; cf. his book *La pensée chinoise*, Paris, Albin Michel, 1968, p. 395–398. Cf. also *The Analects of Confucius* XII, 22; VI, 23; IV, 15.
[22] Cf. *I Kings* 21; *Isaiah*, 58, 6–10; *Deuteronomy* 15, 1–15; 24, 10–15; 26, 12; *Proverbs* 14, 21; 17, 5; 22, 22–23; 23, 10–11; *Matthew* 5, 3–12; *Luke* 6, 20–26; 10, 29–37; *Mark* 12, 41–44; *Luke* 16, 19–25; *Matthew* 25, 31–46; and Azim Nanji, *Islamic Ethics*, in *A Companion to Ethics*, ed. Peter Singer, Oxford, Basil Blackwell, 1991, p. 108 sq.
[23] On wisdom and compassion in Buddhism, see R. E. Florida, in *Buddhist Approaches to Abortion*, in *Asian Philosophy*, vol. 1, no. 1, 1991, pp. 39–50.
[24] *Oedipus at Colonus*, 430, translated by Robert Fagles, in Sophocles, *The Theban Plays*¸ New York, The Viking Press, 1982, p. 286.

to the humanity to which it belongs by right[25]. If this be true with regard to the dead, if even the remains of a condemned man deserve such respect, what should one think of a living human body, destitute or defenceless as it may be?[26]

Her judgment is an ethical one and not simply a judgment of the fact which locates a singular under a category. It is the form of an engagement: I say that the cadaver of my brother merits all the honours due to a human being and it is my duty to act accordingly, even to the cost of my life. So, it can be asked, prior to any other form of argumentation, if, in medical ethics, the example of Antigone, or other similar ones, should be considered to be outmoded. Ordinary experience does not suggest this. A demented old man, for example, is for the most part recognized as a person by his children; even if there is effectively no communication, there is a relation to the others simply because they recognize him. More difficult, certainly, is the recognition of those whom sickness or cruelties have rendered unrecognizable, as in *Isaiah,* 52, 14: 'His aspect was so disfigured that he no longer had a human appearance'. But, as Ronald Dworkin pointed out, this does not prevent the 'intrinsic, sacred value' of human life from being recognized by most of us most of the time[27].

The death that Antigone defended is a limit case. Her example puts magnificently into light, *a fortiori*, the greatness and necessity of care given to patients up to the last instant of their lives, considering that even beyond death their remains have a right to so much respect. And her example has yet another major dimension: she appeals to unwritten laws, inscribed in the human heart, foreshadowing what Claude Bruaire sums up very well for medicine: '*Positive legislation is not all and supposes unwritten laws. It regulates a craft but it cannot prescribe all its ethical norms. A doctor does not only follow an official deontological code, even if he must do so with intelligence and rigour, for he is in contact with questions that do not come solely under written law*'[28].

3. Dignity – Decency

The word 'dignity' is derived from the latin *dignus,* which refers to *decet*, 'it is suitable', to which are attached two substantives: *decus, decor*. *Decus* signifies 'decorum, decency, dignity'; hence 'honour' and 'beauty', physical beauty together with moral beauty, though that last meaning belongs more to *decor*. Isidore of Séville specifies that '*decus* refers to the soul [or spirit], *decor* to the

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[25] Cf. Sophocle, *Antigone*, v. 26–30 (cf. 203–206); v. 453-457; v. 71-74; cf. v. 909–914; and v. 924 (cf. v. 942–943); as well as *Ajax* (cf. 1129 sq. et 1343 sq.), *Oedipus the King* (863 sq.), *Electra* (1090 sq.).

[26] For further detailed references, cf. T. De Koninck, *De la dignité humaine*, Paris, PUF, 1995 (2e edition, 'Quadrige', 2002), p. 7-11.

[27] Cf. Ronald Dworkin, *Life's Dominion. An Argument about Abortion, Euthanasia, and Individual Freedom,* New York, Alfred A. Knopf, 1993, pp. 11–13 and *passim*; on dignity: p. 233-241.

[28] Claude Bruaire, *Une éthique pour la médecine*, Paris, Fayard, 1978, p. 50-51.

form of the body'[29]. One might therefore be tempted to reduce the meaning of the word dignity to '*the sort of elegance which spares others the spectacle of our own distresses*', in Jacques Ricot's fine phrase[30]. This is what a certain rhetoric succeeds at, as the above-mentioned Commission *Dying with Dignity* appears to have done. But authentic decency and beauty are more truly found in the beauty of human relations at their best, namely in friendship, which ancient Greeks such as Aristotle rightly judged to be *what is most necessary* for a human life[31]. Care properly understood offers a splendid illustration of such friendship.

Emmanuel Levinas has successfully emphasized for our day what he termed 'responsibility for the other', by stressing that human vulnerability as such obliges us. This is evident above all in the human face. The face is given to the other's vision. I shall never see my own face save in reflections of it. The human body is turned toward the other. In concrete, ordinary life, such a 'face to face' demonstrates, furthermore, that the other person is one I cannot invent. Her otherness fully resists any reduction to the same as me. Properly speaking, to look at a human face is not to look at the forehead, the nose, the mouth, the chin, etc., so much as to grasp the whole of it, and its 'essential poverty'.

The human face is indeed naked, exposed and even threatened – a dependence which we sometimes attempt to mask through poses or by seeking a countenance. Be that as it may, the face is meaningful in itself. In the other's defenceless eyes can be read the commandment; 'Do not kill', a ban which surely does not render murder impossible – it is merely an ethical requirement – but which explains why the murderer is unable to look the victim in the eyes. Should you mock this, you might well reveal that, not unlike the murderer, you too avoid truly looking at human faces[32]. So soon as the other looks at me in the sense I have just described following Levinas, I am responsible for him or her; even more so, 'responsibility is initially *for the other*'[33]. The relation between us is even asymmetrical: 'from the outset, no matter who the other person may be with regard to me, it is she of whom I am above all responsible'[34]. It is initially in the face, in my responsibility for the other person, that justice manifests itself – or better still, equity – revealing at a still deeper level 'the wisdom of love'. To be responsible, as the word indicates, is to answer *for*, but it is, just as much, to answer. *Noblesse oblige*, as the saying is: I must answer to the call of the other person's face, to its authority, to its command, especially through suffering. Only a barbarian would refrain from it.

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[29] Cf. *Dictionnaire étymologique de la langue latine. Histoire des mots,* by A. Ernout et A. Meillet, 4ᵉ édition, Paris, Klincksieck, 1959, *s. v. decet.*

[30] Jacques Ricot, *Dignité et euthanasie*, Nantes, Éditions Pleins Feux, 2003, p. 13.

[31] Aristotle, *Nicomachean Ethics* VIII, 1, 1155 a 4–5.

[32] Cf. Emmanuel Levinas, *Éthique et Infini. Entretiens avec Philippe Nemo*, Paris, Fayard, 1982, p. 89-132; *Totalité et infini*, La Haye, Martinus Nijhoff, 1971 ; *Humanisme de l'autre homme*, Paris, Fata Morgana, 1972.

[33] Emmanuel Levinas, *Éthique et Infini,* p. 102.

[34] Emmanuel Levinas, *Entre nous. Essai sur le penser-à-l'autre,* Paris, Grasset, 1991, p. 123.

It is worthwhile recalling here that the French verb 'soigner', meaning 'taking care of', possesses the additional connotation found in the expression 'un travail très soigné', where the emphasis is put on the idea of 'up to the smallest details'. Care of the sick could draw inspiration from that other meaning as well, which would translate itself into respect for the sick even unto the smallest details, its motive being the dignity of the sick person and the requirements it entails with regard to her body, her spirit, her culture, and to **the interpersonal relationships so essential to a genuine quality of life**. Health professionals thus have a good chance to be called upon to become experts in humanity. The *essential poverty* of human beings is seldom more evident than in the sick and the dying. It is as if the truth but also the enigma of our condition were even more patent then. These are indeed the *limit situations* (Karl Jaspers) which prove universal, in their essentials, for every human life: suffering, dread or anxiety, aging and death.

In suffering we experience an 'impossibility to free ourselves from the instant of existence', the 'absence of any refuge', 'an incapacity to escape or to draw back'; there is, furthermore, 'the proximity of death'; pain adds Levinas, involves 'a sort of paroxysm'. One experiences an extreme passivity, a kind of pure subjection. Vladimir Jankélévitch likewise observed that 'pain itself is only tragic because of the mortal possibility it contains; and it is again death which is implicitly confronted in every peril, and which is the dangerous in every danger'[35]. All of which may help to generate a clearer conscience of the duty one has – a duty to humanity – to bring to the sick and to the dying the necessary aid[36]. **We may there catch a glimpse of how much medical care remains the central pivot to insure, in a concrete way and in the last analysis, the effective recognition of the dignity of the person, which is the dignity of an end, or purpose, mentioned earlier.**

Please allow me a last remark on this score. Recognition by the other person is the most powerful of all rewards. Respect, recognition and love are in fact all intimately related. The basic theme here is that of the good in its most evident form, the lovable; where resentment and hate desire destruction, love and friendship say, on the contrary, 'it is good that you exist'. '*There lies the root of the joy of love, when it exists: to feel ourselves justified to exist*', wrote Sartre in one of his best pages[37]. Each and every patient, whoever he or she may be, is thus recognized in concrete fashion, through medical care, for what he or she is in truth: unique in the world. Every authentic act of care is accordingly measured by the person of the patient in its integrity and its dignity, invariably present whatever the appearances may be, putting to the test both the competence and

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[35] Emmanuel Levinas, *Le temps et l'autre*, PUF, 2006, p. 55 sq.; Vladimir Jankélévitch, Les *vertus et l'amour I*, Paris, Flammarion, coll. Champs, 1986, p. 134.

[36] Cf. Jean-Louis Baudoin et Danielle Blondeau, *Éthique de la mort et droit à la mort*, Paris, Presses Universitaires de France, 1993.

[37] Jean-Paul Sartre, *L'être et le néant*, Paris, Gallimard, 1943, p.439.

the humanity of health professionals: an immense challenge, to be sure, but the ultimate *raison d'être* of all medical care as such, and of its greatness.

4. Dignity-Liberty

Furthermore, human dignity has at all times, though in diverse ways, been associated to our rational nature and to the ensuing freedom of the will. It was so not only by Kant and the whole Enlightenment, but already by the Ancients, and most explicitly in the Middle Ages. Thus, St. Bernard wrote: 'I call human dignity the free will, thanks to which man is not only placed above the other living creatures, but has the right also to command. I call science the power he has to discern that eminent dignity, a power that cannot have its origin within him'[38]. For Thomas Aquinas, the nobility of human beings stems from the fact that they are intelligent and are the source of their actions, that is to say that they are free, in which regard they are in the image of God[39]. According to Dante, 'The greatest gift which God in His bounty bestowed in creating, and the most conformed to His own greatness and that which He most prizes, was the freedom of the will, with which the creatures that have intelligence, they all and they alone, were and are endowed'[40]. Liberty, in brief, for all of them, expresses the core of the human condition, its two essential components being intelligence and will, both of them immense; witness the experience we enjoy of thinking and willing. They are both also implicit in the formula which, as Paul Ladrière writes, 'dominates the whole history of the notion of person'*,* the one we owe to Boethius: 'an individual substance of a rational nature'[41].

The simplest and most accessible way to see how freedom and the concept of person are linked is the notion of causality, as reflected in ordinary language. The Greek word *aitia,* cause, means at first 'responsibility', as in 'accountability' in the sense of a 'charge'; the Latin word *causa* evolved in a similar fashion, also meaning a legal cause or action or trial, to begin with. The words 'accuse', 'excuse', 'recuse' still bear the mark of such an origin.

If I take you to court, it is because I believe you are responsible (having to answer for, or respond) for something; I recognize you *ipso facto* as a person. You cannot put on trial someone who is unable to answer for his or her actions. 'To treat an individual as a person is to consider him responsible for his actions before the tribunals, in the literal or figurative sense, of law or morality – or even, for some, before the tribunals of divine judgement' (Alan Montefiore). John

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[38] St Bernard, *Traité de l'amour de Dieu*, chapter II, in *Oeuvres mystiques*, translation by Albert Béguin, Paris, Seuil, p. 31-32.

[39] St Thomas Aquinas, *Summa theologiae*, *Ia-IIae*, Prologus ; see also *Ia Pars*, q. 93.

[40] Dante, *The Divine Comedy*, *Paradiso*, Canto V, 19–24, translated, with a Commentary, by Charles S. Singleton, Princeton University Press, 1975.

[41] *Naturae rationabilis individua substantia* (*Contra Eutychen et Nestorium*, c. III, PL 64, 1343). Cf. Paul Ladrière, L*a notion de personne, héritière d'une longue tradition*, in *Biomédecine et devenir de la personne*, dir. Simone Novaes, Paris, Seuil, 1991, p. 49 ; cf. 47-51.

Locke was not mistaken, in that regard, when he saw in the term 'person' a 'tribunal term' (*forensic*)[42].

Notice how far we are here from the 'individual autonomy' proclaimed by the Report of the Royal Society of Canada mentioned earlier. For what its author's advocate is a recycling of the voluntarism of two late mediaeval theologians, Duns Scotus and William of Ockham. Scotus defined the will as 'the sole total cause of volition'; Ockham went a step further by advancing that the good is 'identical to what is desired or willed by the will': *bonum est idem quod volitum sive volibile*[43]. To put it succinctly, whatever your 'autonomy' decides would be *ipso facto* good. Try telling that to a jury in a real murder trial! Both left out reason and responsibility in the quest for the good, as if unaware of the fact that, to quote Schelling, 'the most profound difficulty of the whole doctrine of liberty' is that it is 'a power for good or evil'[44]. The same applies to the Report in question.

Thus, we see autonomy and liberty, in the deeper sense of those terms, as opposed to the reductions of the said Report, amount to the same. The word 'autonomy' refers to *autos*, the self, and to *nomos*, the law. But a law I give to myself in that manner must perforce prove capable of universalization, must be founded in reason aiming at the good, and therefore be the opposite of submission to a selfish impulse. Now this is true even till the instant of death. That instant is none the less indeterminate beforehand, as was admirably underscored by Vladimir Jankélévitch, who, not without reason, saw here no less than the 'foundation of medical deontology'. He wrote: 'Yet if the prolongation of life cannot be indefinite, the date of death, we saw, does remain indeterminate, and that indetermination, authorizing all hopes, is the foundation of medical deontology. Late though death may come, it always arrives too soon […]. In other words, to put to death a dying person more than three quarters dead, to put to death a dying person who is scarcely alive, and nevertheless living and even irretrievable […]*, an infinite distance still needs to be covered'[45].

In order to see more clearly into all this, one must bring to the fore the ultimate experience of liberty in our heart of hearts. No one can force me to love or not love anyone in my heart of hearts, even under torture or in whatever con-

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[42] Alan Montefiore, *Identité Morale. L'identité morale et la personne*, in *Dictionnaire d'éthique et de philosophie morale*, ed. by Monique Canto-Sperber, Paris, Presses Universitaires de France, 1996, p. 691 a, referring to Amelia Rorty, *The Identities of Persons*, Berkeley/Los Angeles, University of California Press, 1976; John Locke, *Essay Concerning Human Understanding* II, XXVII, 26.

[43] Cf. André de Muralt, *L'unité de la philosophie politique. De Scot, Occam et Suarez au libéralisme contemporain*, Paris, 2002, Librairie philosophique J. Vrin, p. 29-31; p. 32-34.

[44] F.W.J. Schelling, *Recherches philosophiques sur l'essence de la liberté humaine et les sujets qui s'y rattachent* (1809), trad. Jean-François Courtine et Emmanuel Martineau, dans *Œuvres métaphysiques (1805-1821)*, Paris, Gallimard, 1980, p. 139 (*S. W.* VII, p. 352).

[45] Vladimir Jankélévitch, *La mort,* Paris, Flammarion, 1977, p. 282-283.

straining circumstance. Moreover, internal experience of thinking and loving reveals that an instant flash suffices to turn everything around in another direction. I may in an instant change completely in my heart of hearts. We shall experience death, you and I, only when our time comes, like everyone. But as some great contemporary philosophers, such as Gadamer, have pointed out, we all enjoy the living trace of it in our experience of the instantaneous – all of a sudden we understand, all of a sudden we decide, in an instant[46].

5. Conclusion

It follows that human dignity can never be lost. It is obvious in the case of ontological dignity, since it has to do with every man's very being. No less so in the case of dignity-decency, since the latter imposes respect to the last, in the perspective of care, without ever making an attempt at anyone's life. And dignity-liberty forbids both euthanasia and assisted suicide, which destroys it by imposing the 'absolute constraint' of death, while pretending to respect freedom[47]. Moreover, it brings out the true sense of individual autonomy, namely the inalienable liberty of the heart of hearts, which must be honoured to the last by the best care possible in order to facilitate its exercise in the most crucial moments of a human life.

When faced with two evils, one must choose the lesser of the two: it is better to live, even when suffering, than to die, death being without remission, as Hamlet reminds us. To kill a person is to remove each and every one of her possibilities, to suppress brutally her very identity, above all her precious liberty. The advocates of euthanasia and assisted self-slaughter, to use Shakespeare's term, entertain an abstract view of the end of each unique, priceless and ineffable human life; there are no exceptions to this uniqueness whatever they may think in scorn of it. They artificially separate that end from the whole it belongs to, which is the complete life of the victim, as if the death of a human being was comparable to the death of an insect deprived of memory, or to disposing of an obsolete computer. They commit the *fallacy of misplaced concreteness,* brilliantly denounced by the great Anglo-American philosopher, A. N. Whitehead, by substituting the abstract, an isolated moment, to the concrete, which is the culminating moment of a full human life. The end of the race will no longer be allowed, the finale of the symphony is censured, and the quest for meaning is trampled underfoot and reduced to nothing, as it was by Macbeth's nihilism. Life would then indeed seem to be 'a tale told by an idiot, full of sound and fury, signifying nothing'[48].

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[46] Cf. Walter Lammi, *Gadamer and the Question of the Divine,* London & New York, Continuum, 2008, pp. 72–76.

[47] Cf. Fabrice Hadjadj, *Réussir sa mort,* Paris, Presses de la Renaissance, Points/Essais, 2005, p. 153.

[48] Shakespeare, *Macbeth,* V, 5, 26–28.

Acknowledgment and Conflicts of Interest

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Why We Must Accept the Existence of the Gray Zone Propositions For a TD Chair

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Abstract: The gray zone is that which eludes common knowledge and all forms of expression. It can only be explored personally, outside the certainties that impose themselves on us unintentionally. This exploration is a manifestation of our inner freedom. It leads to the discovery of misidentified realities that lie outside what we thought we knew. The existence of this grey zone also constitutes a space, an in-between, which enables two people to exchange ideas and, through disputatio, to discover and qualify new realities, whether in the scientific, artistic or spiritual field. From a transdisciplinary perspective, this is how we move to another level of reality, beyond the initial contradictions that set one person's view against the other's view. The certainties of one and the other fade in the face of the discovery of realities that escape the clear-cut categories of what is true and what is false in our own opinion. Being reveals itself as both true and false, depending on how we understand it. This approach is based on the principles of phenomenology[1] and transdisciplinary analysis[2], and it seeks to overcome the causes of conflict and violence between human beings and between human communities.

Keywords: grey zone, in-between, uncertainty, disputatio, levels of reality.

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1. Introduction

Figure one represent a personal photo.

I'm looking at the disc bi, originally from northeast China, which is dated to the Liangzhu period (3400-2200 B.C.) according to the certificate of authenticity given to me by the Hong Kong antique dealer when I bought it when Victoria Island was still a British colony.

We don't know what it was used for, most likely ritual purposes. Nor do I know what color it is. It's jade (not to be confused with jadeite). But what color is this jade? Is it green? No, it's not green. Creamy? No, it's not cream. What color is it? Bluish? Reddish (at least in places)? The more I observe it, the more I vary the light, the more I'm unable to answer this simple question: what is the color of the object before my eyes?

I just don't have the word for it. Which confirms that the object pre-exists in the qualifiers I give it. My disc bi refuses to be confined by the categories I have to describe it. And if I were to claim to qualify it by drawing on the stock of qualifiers at my disposal, I'd be saying something that wouldn't correspond to its reality. So, it's best to keep quiet.

But then a friend comes along, observing it from my side, and says, in a definitive tone: 'It's yellow.' I reply, because I have to, 'No, it's more like green.' We're in danger of clashing because we both feel we're not seeing the same thing. But that's a mistake. We're looking at the same thing, but we're not de-

scribing it in the same way. We use different words for it, stemming from different personal experiences of life. Maybe I said 'It's green,' because I read somewhere that jade is green. Perhaps yellow came to mind when he remembered a yellow vase (or so it seemed to him at the time).

This leaves us with two options. The first is for each of us to stick to our own position, out of principle ('It's mine, so I'm bound to say it better than you'), out of a desire to be 'right', out of an inability to distinguish between what we are and what we see, and what we see in terms of how we formulate it, i.e. how we fit it into a formula. We may even end up fighting. Or (this is the second possibility), we can discuss it, i.e. enter into a dialogue to better understand why we are both, perhaps unwittingly, expressing different qualifiers, and perhaps even agree, on the basis of this, on a happier formulation that would suit us both: 'it's a wet sand color, don't you think? And conclude by saying that this is obvious.

Here's an observation: Mariana Thieriot's 'gray zone' is far from being a dull surface. In fact, it's made up of a complicated, blurred interweaving of multiple hues, some of them very vivid, which result in something we don't know how to name because we don't have the words to say it, perhaps also because we don't have the visual acuity to perceive it, and perhaps finally because we haven't had the opportunity to take an interest in it, unlike others perhaps.

So here we have the problem of the grey zone, and it arises in certain much more serious circumstances in our dealings with others, and with our interlocutors themselves. We find it hard to admit that we sometimes find ourselves, without even meaning to, in the middle of a grey zone, a zone where nothing can be exactly and definitely qualified. And so, this calls for closer examination.

2. What is the gray zone?

The existence of the grey zone is based on this presupposition: the world, in its very being, is greater than the vision we have of it and the interpretation we give to it stays within the limits of our language and our *doxa*. But this hermeneutic is not self-evident. Geometry, as invented by the Greeks, established the logical rules between points, lines and circles, and then postulated that the world could be reduced to a set of points, lines and circles. Firstly, this implicitly admits that our capacity for understanding may be greater than the object to which it applies. Secondly, that our understanding would thus precede the existent to which it applies. This is the principle that leads from Plato to Hegel, from the Cave to the Idea, and forms the basis of our faith in technoscience, i.e. in the human capacity to change the world to suit ourselves.

This idealist and scientistic epistemology is the one that governs the Western epic in its claim to change the world, or rather, to change life – with the consequences we know. It is to such *hubris* that the idea of the 'grey zone' is opposed. The gray zone is that which lies beneath the understanding, even before

it questions the *dasen*. Here we find the confused magma of all that lies beyond – or below – human understanding, whether it's that which pre-existed it ('nature') or the unintended consequences of its action on the world as its earthly home. This is the unknown, the unnamed, opening up to exploration like a virgin forest.

This forest eludes all certainty. It exceeds, once again, our understanding, be it our knowledge, our logic or the vocabulary in which we express ourselves. Exploring it requires a personal commitment: we must leave the clearing of our certainties and embark on the perilous path of what escapes us. But we cannot wander alone without running the risk of insignificance or madness. The gray zone needs to be discovered through encounters with the Other, with the Other in his otherness, with the Other from a village other than the one we come from. It is then, beyond the certainties of the one and the certainties of the other, that a new land emerges, a new space carved out of the forest, which goes beyond the primitive clearings of the one and of the other. And so, the existence of the clearing that gradually takes shape is the very thing that allows us to form a society, beyond the prejudices that lock us both into our own certainties and those of our village.

But that's not all. If we accept that 'man is social by nature', as Aristotle asserts, then we can assert that it is the existence of the grey zone and its exploration, not in solitude but through dialogue, and debate, and action, that makes man exist in his *ipseity* beyond his identity as an individual in the mass of inhabitants of the village from which he comes. But recognizing the existence of the grey zone is not self-evident: it requires us to acknowledge man's finitude in this immensity in which he finds himself thrown. In his contemporary effort to imprint his will in the world, man denies the existence of the grey zone. He locks himself into what he takes for granted, contenting himself in his actions with going further along the path that was already mapped out, 'obvious' to all those around him, to the exclusion of what is not self-evident and would force him to deviate from the village's accepted certainties.

It's not certain that he's aware of this. The *I* and the *self* are not identical[3]. The *self* escapes the *I*. The effects of intentional action come up against unintentional action[4], which often ruins the expected results. These unintentional actions, which the highways of Western *doxa have* imposed on the world, are all too visible in the immensity of their results and the damage they have caused. That's why exploring the grey zone, starting from the different villages into which humanity, past and present, is distributed, is today a vital necessity if we are to establish what 'the secret of the dawn'[5] will be.

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[3] Ricoeur, Paul, *Soi-même comme un autre*, Le Seuil, col. Points, 1990, p. 46.
[4] Landier, Hubert et Thieriot, Mariana, *Dans la forêt profonde,* Plastir 66, 09/2022.
[5] Heidegger, Martin, *op. cit.*, p. 76.

3. Why We Need the Grey Zone

Man's humanity manifests itself less in the closed basin of the harbor where the boats gather than in the uncertainty of the high sea where his curiosity and love of life take him. The harbor locks us into certainties that are meant to be definitive, and that we can only deepen by avoiding any sideways glance that might compromise them. The world is restricted to a shared *doxa*. Its components are well known: the existence of an arrow of history, technical and economic progress leading to prosperity and happiness, an implicitly or explicitly dualistic ontology, the superior power of humanity such that it can impose itself on the whole of reality. There are others. These presuppositions seem self-evident. To claim to depart from them is to run the risk of being either misunderstood, regarded as a deviant or considered a madman. And yet, this is where the grey zone lies.

We need this gray zone to avoid being locked into certainty. It represents the field of human freedom and creativity. It's what allows us to move forward in our humanity. At the same time, it enables us to avoid the confrontation of one village with another. Rigid certainties that cannot be abandoned, for those who rest in them, are opposed by the plasticity that enables us to move from one statement to another, which will then seem more accurate, through the exchange of ideas, without ceasing to be ourselves. The grey zone invites us to avoid confrontation between apparently opposing points of view, in order to reach a higher point of view together, integrating the initial points of view of both sides. It is the condition of humanity's existence as humanity.

But that's not all. The grey zone is the in-between that goes from me to you, from 'I' to 'you'[6]. Human beings, however, are reluctant to leave the familiar circle of certainties that animate them. Sinking into the grey zone represents a risk for the traveler: won't it be necessary, at some point in his quest, to abandon some of the beliefs on which he has based his self-confidence? Doesn't he run the risk of unexpected encounters with other travelers of the mind, driven by different certainties? If so, won't it be necessary, as in a forest encounter with a wild beast, to circle around it, sniff it out, learn to get closer to it, engage in what is called a dialogue? Or should we hunt it down like a malevolent beast with whom we can't come to terms on anything?

Such is the challenge of recognizing the grey zone and wandering within it. Hence everything that will dissuade human beings from taking the risk of going there:

1. And first of all, the refusal to venture beyond the comfortable ideological certainties that, consciously or unconsciously, drive us, and which we believe to be constitutive of a trut[7]h that would be definitive and on which our

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[6] Buber, Martin, *Je et Tu,* tr. fr. avec une préface de Gaston Bachelard, Aubier, 1969, p. 54.
[7] Barreau, Sébastien, *De la vérité dans les sciences*, Dunod, 2019, p. 87.

identity is founded. I'd rather die than give it up! So how can we regard anyone who opposes these ideas, even if only by formulating different ones, as anything other than an enemy to be destroyed?

2. Then there's the *hubris* that drives us unconsciously, in the face of the other, against whom we must measure ourselves according to the principle that 'I impose myself; therefore I am'; using the canon that *'ultima ratio regis',* camouflaging its sound with excellent reasons: propagating True, defending Civilization, destroying the Axis of Evil, doing good for the other, even if he doesn't yet realize it.

3. This amounts to reducing the other to an object, denying his otherness as a human being. If we don't listen to them, it's because we're superior to them, and this in the name of the ultimate truth to which we refer, and which therefore demands to be imposed on them. How can we speak as equals with 'savages'? It's worth noting here that the white man of Western culture is not, and has never been over the last three centuries, stingy with this feeling of superiority by which he has justified his conquests and colonialism, as made possible by a technological superiority supposed to extend to all fields of culture, thought and man's relationship to the world[8]. And it's a grey area that needs to be rediscovered all over the planet.

4. And finally, the quantitative logic that drives technoscience and has come to permeate our vision of the world. What counts is the 'value' produced by the siting of the wind turbine, not the destruction of the harmony of the landscape it disfigures with its massive, disorienting presence. What counts is the pipeline cut through the bush, not the damage caused to the 'primitive' human communities whose sacred land they will have to leave behind. A quantitative logic that finds its latest avatar in the binary logic on which the digital tool is based. And yet, so-called 'artificial intelligence' refuses to accept any grey area between 'yes' and 'no', between '0' and '1'.

And so, there's no longer any room for debate. In the traditional market, I could discuss the price of the object I wanted to buy. And we would agree, the seller and I, after a long palaver, which brought us into society. That's no longer possible: the price is fixed, it wasn't set by the cashier and, since I buy on the Internet, I can't even see his or her face. The automatism of the global machine thus reduces the human being, as Günther Anders so aptly put it, to a mere anonymous functionary, devoid of 'self' and emotion. He finds himself in the position of that rail convoy organizer in 1940s Germany, whose name was Adolph Eichmann. Hence the choice for 'modern man'[9] to accept or not to accept. To accept is to shut oneself away in the cosy circle of one's certainties; to refuse is to accept the personal risk of sinking into the grey zone.

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[8] Habermas, Jürgen, *De l'éthique de la discussion*, tr. fr., Flammarion, col. Champs essais, 2013. p. 40 et seq.
[9] Heisenberg, Werner, *Le manuscrit de 1942*, tr. fr., Editions Allia, 2003, p. 53.

4. The Gray Zone and Transdisciplinarity

The transdisciplinary approach is the name we'll give to the transgression, from the initial certainties that inhabit us, towards the confused and uncertain zone where the chaos of *dasein* and the encounter with the other in his otherness mingle. This chaos, however, is not left to chance; it constitutes a **complex reality**, where loops cross and recross, only some of which appear to our understanding. This is the first aspect of transdisciplinarity: the world is not linear, it is multi-causal; it does not obey the laws we have invented to understand it; determinism is lost in the indefinite to the infinite. At every moment, we must accept to be surprised by the unexpected and the ineffable, by what has not yet been said and, sometimes, cannot be said.

When two travelers meet in the gray zone, they have two options. One is the confrontation, violent or otherwise. The other is to find, together, what makes sense to each other. This means admitting that reality is both black and white, that there are many shades of grey, and that no one can claim to be the holder of the truth in the face of error[10]. If I say I'm right no matter what you say, and that whatever you say is meaningless nonsense to me, it's because I refuse your ability to say anything other than what I expect you to say. I refuse your gaze whenever it differs from mine, I refuse your otherness. And so, we must first admit the existence and validity of this otherness if, on the basis of our respective statements, we are to hope to reach a common statement. This is the **principle of the included third party**: accepting that which escapes the logic with which we are familiar; admitting that truth can be expressed somewhere other than within the closed framework of our respective ease of understanding.

Six plus six can make twelve for one and ten for the other, depending on whether they use a decimal or duodecimal system. Ten is not twelve, and yet it's the same thing beyond the different instruments we use to count. Acknowledging the diversity of our instruments allows us to rise to another **level of reality**. Level of reality or level of understanding the reality? Wrong question: the observing subject is not external to the reality he observes. And so, the being that I am and the being that you are well together have accessed another level of that being that encompasses both of us. And because what you say is different from what 'I' say, you give me access to 'myself'[11], i.e. to my quality of *homo sapiens sapiens*. And so, the existence of the grey zone, where I can meet you, and with you access another level of reality, is the very condition of our common humanity.

5. Back to Disc Bi. Instead of conclusions

I don't know anything about my disc bi. I don't know how old it is, I

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[10] Lao Tsu, in Philosophes taoïstes, traduction par Liou Kia-hway, Gallimard, col. Pleiade, 1967, p. 67; Yamauchi, Tokuryû, *Logos et lemme*, traduction du japonais par Augustin Berque, CNRS Editions, 2020, p. 74.

[11] Ricoeur, Paul, *op. cit.,* 1990, p. 46.

don't know what it's used for, and I can't say what color it is. It's an enigmatic thing. At least I can say what it inspires in me. It's probably a symbol. It can't be a symbol of the world turning around its axis; otherwise, the disc would be circular – but it's not. In addition, there are two holes at the top of the disc, which would have allowed it to be suspended from a cord. This suggests that it was used to distinguish two spaces: the front and the back. From then on, everything becomes clearer: in front, it's our world, the world of humans; behind, it's another world: that of gods or spirits; whatever name is given to them, they are realities that were there before humans were there to see and name them.

And so, the disc bi is a frontier extended between two worlds. But a frontier is a wall that encloses us if it is not pierced by a point of passage. Through this point of passage, this roughly circular opening in the center of the disc bi, we can take you to the invisible, to the other world, to what's already there, behind. And then, almost invisibly, engraved towards the bottom of the disc, a small figure comes to invite us in: it looks like the two eyes of an owl. They're there to help us fly into the grey zone.

Acknowledgment and conflicts of interest

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The Museum Visit: Art and Transdisciplinarity

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Abstract: *The article explores the critical need for contemporary organizations to foster a democratic and meaningful dialogue about life, emphasizing the importance of conscience in career paths and senior management research. It advocates for museums as spaces of reflection, offering an escape from the mechanistic and docile tendencies fostered by technological mediation in human relations. The text highlights the widening gap between management and workers, exacerbated by inequalities and miscommunication, and calls for transdisciplinary scientific research to address these issues. It underscores the impact of unintentional attitudes in pedagogical relationships, both formal and non-formal, and their role in transmitting cultural values and knowledge.*

Keywords: *democratic dialogue, career conscience, technological mediation, organizational inequality, attitudes, transdisciplinarity.*

I'm past the age where nothing's easy[1].

In the spring, perhaps, because there is a serious doubt as to the possibility, the choice and, from there, the will in our contemporary societies to live dialogue, mutual aid and cooperation between people. As Mr. Pister used to say: 'History is stuttering'... It could even be said that history is limping, sometimes stumbling.

1. Introduction

Will we have the material conditions and the freedom to dare to engage in the complex, difficult and arduous, but also democratic, human dialogue in contemporary organisations about the meaning of our lives[2]? Will the place of conscience in a career path finally be on the agenda of contemporary research into 'senior management' (supervision and decision-making; otherwise known as 'executive management')? What if we were to visit the museums, and even build some, so that we could find ourselves there 'eternally', having become a shimmering canvas or a piano composition for a young teenager...? In fact, this text proposes that a visit to the museum is a way of escaping docility in the face of our school machines and, in the presence of art, bringing into play the interface between the world outside and the fantastic and overwhelming world inside, thanks to the often unintentional realisations that living with our past, our history and our creations make it possible. For the museum teaches us through the presence of people who bear witness to and pass through us; it teaches us to discover our impetus, our creative breath, our connection to others and to a human culture that is tenacious, constant in its efforts to evolve, but also to find serenity. The museum, calm, sometimes almost solemn place, is an inhabited place that allows each of us to discover a nature/culture that is beneficial, nourishing and inspiring at the same time... Towards an education through the masterpiece, to the masterpiece, as taught to us by the lineages of journeymen that have existed since the Middle Ages[3].

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[1] Letter from Albert Camus to René Char, 7 November 1949. In *Albert Camus – René Char Correspondances,* Edition established, presented and annotated by Franck Planeille, Gallimard, Paris, 2007.

[2] Barbier René in L*e management émancipant: une philosophie interculturelle du sens du travail humain (de l'imaginaire leurrant à l'utopie créatrice* in Journal des Chercheurs online, Centre d'Innovation et de Recherche en Pédagogie de Paris (CIRPP), 24 janvier 2011.

[3] Pasquier, F. (2016). Espiritualidad y educación. In D. Soto González & A. Buciega Arévalo, Ser cambio educativo/Las sociedades necesitan una ciudadanía global (pp. 186-193). Florida universitària, https://issuu.com/floridauniversitaria/docs/rizomatrans.

2. The Docile

Many of us have noticed that relations between people in today's organisations (companies, training institutions, commercial agencies, factories, in many families) seem to rely more and more on the mediation of machines thanks to the development of science and technology, which on the face of it is a great contribution to relieving humans of repetitive and tedious tasks. However, although the means of communication are multiplying (telephone, fax, Internet, electronic messages, electronic mail, videoconferences, audioconferences, etc.), understanding between people within contemporary organisations remains rather difficult and complex, as the author has pointed outlined Edgar Morin[4]. We are also seeing the emergence of 'docile people' within these same organisations. People who make the machine work, without questioning for whom and in the name of what, simply to 'earn a living', even if it means losing it in the process: it's not just a question of carrying out repetitive tasks or tasks that have no meaning other than to ensure one's subsistence, it can be more insidious. Some machines, even if in a bad way, are at the service of a minority that largely exploits a seemingly bewildered and powerless majority. During a trip to Vietnam in 2013, one of our guides mentioned the suicides of young, exhausted underage women in textile production workshops.

As a result, the gap between the assured management and those who carry out the basic tasks is widening every day, and information between the two circulates little or in a biased way: very often alliances and rejections of middle managers, short-term interests and profit to the detriment of research and a medium- and long-term vision, will intervene in the circulation of information and the demand for better working conditions. Similarly, the situation of inequality in working conditions between those who work in the so-called rich countries and those who carry out their professional life in the so-called 'developing'countries is becoming ever more marked. Archipelagos of poverty on the outskirts of major cities in emerging countries are multiplying, to the virtual indifference of many Western politicians and entrepreneurs.

This distance between entrepreneurs: project designers and investors with a very high level of training and, on the ground, managers with sometimes inadequate training, or even easily corruptible, gives rise to a series of misunderstandings or even misunderstandings, problems linked to an inversion of values: the individual largely prevails over the supposedly common good. The whole panoply of 'flaws' linked to our inability to evolve together and give meaning to our presence in an organisation, at best due to a lack of 'philosophical training', at worst due to our prejudices or to the corruption resulting from a struggle for survival, are thus classified under the terminology of problems due to the 'human

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[4] See a general view in Morin, Edgar in *À propos des sept savoirs*, Ed Plein feux, Mayenne, France, 2000.

factor'. The human falls and wins, Faust signs his contracts, and the circus games continue; under Satan's son and sometimes with blessings to boot. Indeed, in many countries, clerics and monarchs still rule together in corruption.

This observation leads to the need for in-depth reflection on the place, value and meaning that the contribution of transdisciplinary scientific research can have in contemporary organisations for human beings: how is the applicability of this transdisciplinary research conceived, for example? In view of the crises, abuses of power and misunderstandings that scientific knowledge in ill-prepared, corrupt or misinformed hands can trigger?

This is particularly noticeable in North-South development relations. We hear about poverty, that's true, but witnessing it with a feeling of perfect powerlessness because this misery is maintained and the population's cards are dealt in advance according to their purchasing power, is absolutely different.

How much injustice are we witnessing in the name of justice? How much misery in the name of the law? How long will the poor have to pay for the rich? And what is the philosopher to do, alone, in the face of this tidal wave? A text?

Hope for spring, perhaps, and psychoanalyse the devil.

3. Unintentional Attitudes

The original aim of the author's research, from Masters to Doctorate level, was the formative evaluation of unintentional attitudes, which take place during a pedagogical relationship whose mission is to transmit the laws, values and knowledge content of Western culture. The pedagogical relationships studied took place both in the context of formal, school-based education and outside the generally rigid framework of the school institution: in other words, in the context of non-formal education.

After a ten-year study in France and Brazil, and patient metacognitive observation, she realised that unintentional attitudes express the subjectivity of each individual during a learning process, and that their appearance triggers what Paul Ricoeur calls prima facie judgements, i.e. ultra-rapid judgements that express the desirability or undesirability of an intention and an action. The other author, for his part, learned first conceptually, and then through observation, the importance of unconscious bodily reactions, parasitic or self-triggered gestures s depending on the mood and internal reactions of the people involved[5].

These different attitudes and internal reactions manifest themselves in the most varied forms of what E. Levinas defines as passivity, fear, trembling or what S. Freud designates as resistance: slips of the tongue, blockages, denials, flight, aggression towards oneself or others. In this sense, unintentional attitudes can make dialogue difficult in the course of a pedagogical relationship: either

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between the teacher and the students, or from each individual to himself or herself, or between the different members of a group who are going through a training programme, including training for trainers. Unintentional attitudes could be associated with contemporary research carried out in the United States by Brian Lynch and Donald Nathanson, based on the work of Silvan Tomkins on emotions: fear, disgust, anger, shame, stress, surprise, curiosity and joy.

Conveying emotions such as curiosity, non-intentional attitudes also express the new discoveries, creations and innovations that can be made, alone or with others, when during a development process the subjectivity of each person has a framework, an empty space, where freedom of speech and the prohibition of physical and psychological violence coexist[6].

This neutral space, or one neutralised by collective vigilance, allow for open and frank dialogue, during which different, sometimes apparently contradictory, points of view and even logics can be articulated and shape the world in a different way.

Non-intentional attitudes therefore refer to:
1) The overvaluation of desire
2) The devaluation of desire.
3) Mutation based on a dialogue of desires

The discovery of shared meaning in a neutral space, through dialogue, between several members of a group, between different groups, or simply between a subject and himself, the opening up to a Concordia Mundi: the ability to learn and evolve together is the result of desire.

4. The Overvaluation of Desire

Based on the definition of desire formulated by Jacques Lacan in his Écrits, desire is the gap between need and demand. Human desire is complex, which is why it is so difficult to include in our thinking. It expresses both the vital needs of a living organism (the need for protection, earthly nourishment, affection) and a demand for meaning, to understand and be understood rationally.

Human desire seems to be overvalued, by the subject and/or by the group, when the demand for meaning is overvalued despite the satisfaction of the vital needs of a living being. The unconditional preference of others over oneself, of the happiness of others over one's own happiness, is the expression of an age-old ethical thought, which calls for gratuitous action, disinterest, self-forgetfulness, non-recognition and acceptance of the worst, the primacy of the moral over the material, of the collective over the individual. E. Levinas defines this ethical

[6] Florent Pasquier, Tania Lima, Rodrigo Bonacin. Information and Communication Technologies for transpersonal and transdisciplinary goals: Presentation of a work in progress in Brazil for peace education. *Cahiers COSTECH - Cahiers Connaissance, organisation et systèmes techniques*, 2022, 5, online no paginated, https://www.costech.utc.fr/CahiersCostech/?article152; https://hal.utc.fr/hal-03855949.

thinking as an other-than-being or the beyond of the essence, a kind of ideal of sanctity where the subject empties himself of himself, off-centre, to make way for the other and sign the unconditional preferability of others… Thus, attesting to its otherness.

This admirable and elevated attitude, adopted by the famous or anonymous heroes who have built Western culture, fully understandable in contexts where the survival of human values that guarantee the transmission of a law and a culture that make it possible for mankind to become twofold, is threatened, also seems an ambiguous and difficult attitude, which deserves to be contextualised, given the massacres, misunderstandings and pointless sacrifices that it has engendered and continues to engender.

While at first sight it seems to herald generosity, it can also harbour the seeds of self-destruction. Indeed, this attitude raises problems when it becomes a categorical imperative, a duty of sacrifice, when, ironically, unconditional love becomes condition, despite the physical and psychological health of a human organism, in the absolutely banal context of an end-of-year exam, such as the baccalaureate. We then witness or take part in insane work rates, in the formation of elitist classes where only the most enduring win, and we set up sacrificial exams that lead to stress, exclusions for some and narcissistic exaltation for others. G. Deleuze goes so far as to describe the education system as a process of indebtedness that takes place in a theatre of cruelty. This relationship of indebtedness between one person and another establishes a relationship of domination submission to knowledge, which constitutes a serious obstacle to the freedom and joy of dialogue and an impediment to the balance necessary for the happy development of the human being. Of course, personal development always gives rise to crises, but these can be experienced calmly, understood as opportunities for mutual learning and as a source of hope for our common evolution.

Learning does not have to be sad or despairing despite its difficulty; it can be supported by an enthusiastic effort when it reveals the genius and success of those involved. Of course, a journey littered with criticism and failure will leave scars, and these traces of suffering will speak for themselves.

5. The Devaluation of Desire

In contrast to the previous situation, and as a response to it, the devaluation of desire refers to the overvaluation of the vital needs of the living organism despite the possibility of elaborating the meaning that desire carries. The sacrificial dimension of Western ethics has been harshly criticised by F. Nietzsche, who revalues the masterly work of the survival instinct, the surpassing of oneself by oneself, made possible by a healthy body in a healthy mind and which makes possible the acquisition of a Gai savour. The philosopher writes making contempt for the body and the salvation of the soul is a sure recipe for decadence.

However, the transgression of a sacrificial ethic does not always lead to

the advent of a new philosophy (apart from the fact that the apology of the superman can lead to Nazism. Throughout a formative journey, when for a variety of reasons (both avowed and disavowed) desire fails to achieve meaning, the impulse that drives desire can be turned against oneself or others (or even trigger a simultaneous movement to destroy oneself and others). Those targeted in this way are the guarantors of Western law and culture. In the course of the learning process, a process of devaluation of the self, of the representative of the culture and of the values conveyed by Western culture takes place, because for many reasons the meaning of the values and the scope of this culture are not understood, because of the sacrifices or abuses it imposes and justifies.

In fact, for a desire to be able to freely access meaning and become humanised, a few observations are necessary and important for all those who live as educators and are educated by a human relationship, in other words, a history, in the West, but also in other cultural contexts: in the East, in North America, in South America…

1. Human desire is both a desire to understand and to be understood, and a desire to satisfy the vital needs of the organism. And when we allow the expression of desire, we must take into account the complexity and richness of its structure. This structure attests to the existence at the source of human desire of an epistemophilic drive, in other words, a drive to understand which, depending on whether or not it is recognised by oneself or by others, can lead to its transformation into a life drive or a death drive. The demand for meaning at the source of desire can only express itself and develop harmoniously in the context of a ban on physical and psychological violence. This safe, neutral framework is essential for the acquisition of the language that will allow each individual to resolve the difficult equation posed by their desire.

2. The complex structure of human desire leads us to make two observations: on the one hand, we must not forget that the living organism, which expresses a demand for meaning and wishes to understand and be understood, also has physical needs that must be satisfied and without which it cannot develop harmoniously. On the other hand, it seems absurd and painful to repress the vital needs of an organism, to hurt it, to attack it, so that the demand for meaning contained in the laws, values and knowledge of a particular culture can be heard.

6. The Ethical Role of Objects of Knowledge in the Context of Transdisciplinary Research: the Museum Visit

Let's analyse how the object of knowledge constructed by two or more people can assume an ethical role of mediation between positions. The white page, but also photos, paintings, collages, songs, theatre, opera and visits to museums, constitute a third, secret place, a zone of non-resistance, and are situated in a zone of further development for the subjects involved in the relationship.

In this sense, the joint creation of knowledge objects, or even their simple

circulation, can play an important role in transdisciplinary research on emotions, because it is this joint creation, or this listening to difference, that can give rise to new meanings that take into account and respect the diversity of human cultures, but also of living things, while creating the conditions for human development in harmony with the nature from which it emerges.

At the age of fourteen, the author's drawing teacher in Paris noticed her diligence and joy at work, and he first opened the door to the natural science room where she learned to sketch the human skeleton. Then he opened the doors of the Louvre to her. That's how she noticed that she wasn't alone with her notebook.

There were whole groups of people drawing, people sitting alone in front of a painting... After a long walk, she found herself small, stunned in front of the Venus de Milo. And she began her sketches. Before so many others and after so many others. In this way, she became part of a group, not of a ballet or an army, but of 'cursed painters' who didn't even know they were cursed.

Based on examples of dialogue drawn from various contexts, in higher education, in the context of the Philosophy class, but also in the course of dialogue between colleagues from several different disciplines, between several heads of departments, in the context of teacher training (but also outside the context of the Institution, with the Guarani Indians), as an adult, his research opened up on a new awareness: awareness of the unintentional, i.e. of the third, novel and sometimes sublime meaning, which is the result of the intersection of desires and knowledge and which attests to the capacity of human development thanks to its curiosity, the capacity to agree and to learn together, sometimes out of context: in an unexpected visit to the museum where the past was waiting for him and began to speak. It is these objects of knowledge patiently worked out in common that can enable us not to despair of a pragmatic utopia: finding meaning together. Sketches, poems, solutions to equations, third-party objects, floating objects, transitional objects, works of art, all prove that the dialogue has taken place, that we have been able to make something of ourselves: together.

She was able to testify that when we take pleasure in writing a text, preparing a lesson, telling a story, drawing a picture, writing a poem, sharing ourselves through culture, the result is better than through constraints, shame, threat, fear or sacrifice.

Of course, the joint development of knowledge implies an awakening to ethics, but a possible ethic that respects the physical and psychological integrity of each person, their freedom of speech, their singular voice: the richness of their subjectivity, their history, the rhythms of their body and their heart. This is when the transfer takes place: the object of knowledge comes to life, it is inhabited, the poetry watches over it, the canvas speaks, the coat of arms protects, the song weeps with joy, the writings bleed, blossom and carry within them the traces of the human. And other human beings can then discover them, reproduce them, take hold of them and share them, as the author has done by working on his piano

and developing his singing, first alone then as a choir, on existing pieces or from contemporary creations.

But aren't these cultural, third party, inhabited objects that we encounter in museums or in everyday life sometimes capable of reconciling us with others, with ourselves? The authors of this chapter did not know Kant or Nietzsche personally, but at different times in their lives, their writings changed their lives. Without ever having seen them, they seem dear and familiar.

7. A Learning Society: The Museum Visit

Learning democracy requires time, investment in philosophical training for the population of managers or in various professional environments, the ability to exercise more humane management or relationships, to be qualified, properly remunerated, to occupy a place as a subject involved in society, there is a requirement that will undoubtedly impose itself by dint of successive demands and negotiations.

A word of warning: is the role of the human being, as Philippe Sollers has denounced, to be 'a prosthesis' or an extension of the machine in a production system? The writer testifies:

'You see humanoids dragging themselves along as prostheses in the absence of thought and in the absence of poetry, which means that their bodies are themselves already programmed to be evacuated.'

What kind of future do we want for today's organisations? Of course, the reality differs from country to country, but the global trend is still towards privatising investment in research and setting up projects that put the brakes on human development.

However, the exercise of philosophy could enable people to mediate effectively in debates on the future of research projects with an ethical aim, because philosophy offers people the exercise of thinking together to be able to live together, to support themselves together, and this is not easy. Thinking together is a very arduous exercise that requires philosophical training.

In today's organisations, will we have the material conditions and the freedom to dare to engage in the complex, difficult and arduous, but also democratic, human dialogue about the meaning of our lives? Will the place of conscience in a career path finally be on the agenda of contemporary research into senior management? What if we were to visit museums, even build some, before finding ourselves there one day, post mortem, as a shimmering canvas or a piano composition for a young teenager?

While a computer equipped with the latest resources from the artificial intelligence sector can predict changes in a human being's behaviour caused by emotional factors and adapt its responses based on the changes observed, the computer itself does not experience any type of emotion. Some people don't either, and alas, the devil doesn't take them. In fact, the computer currently serves

as a behavioural model for many people. Some people want to programme their brains and their lives like clockwork.

Philosophical conflicts, which are often intersubjective in nature and emotionally charged, cannot be resolved by 'brain computers' or 'people machines'. In the same way, dialogical initiative taking in the event of problems or difficulties of understanding, which are often situated, subjective problems, must urgently form part of the training programmes of present or future contemporary leaders. In his contemporary treatises on management, Thierry C. Pauchant draws on philosophers to talk about 'crisis management' and the 'quest for meaning in organisations'. What has happened to authentic leaders? Those with a democratic vision and a concern for ethics? And not a preoccupation with the media, populism and lies? Should we accept culture being reduced to the role of a commodity? Should we renounce the transmission of human values through the circulation of objects of knowledge? Should we follow in the footsteps of Deleuze and the young Vietnamese women and repeat suicide, ultimately the only suitable way to achieve the rank of respected posterity or to leave behind a pseudo-life that is not worth living? In life, philosophers are marginal or mad; in death, they are elevated to the rank of saints or sages. Cursed philosophers, painters, poets, workers?

We want the seasons to come and go, we want spring to return, we want investment in long-term cooperation and solidarity to (re) reconcile us. Alas, today we are losing ground to a trivialisation and a reduction of thought to easy formulas behind which people hide, or surprisingly boast … avoiding, in any case, the real questions.

Instead of daring to talk to our emotions, we make strategic cuts and anaesthetise our conscience as best we can. In these cases, computers or people machines are said to be more reliable, more efficient at carrying out tasks and to reduce company costs. The point is not to deny the contribution of computers, but to place them at the service of human beings and not the other way round, and to preserve dialogue and the presence of emotions, on the meaning and value of a life story, the weight of a struggle within contemporary organisations.

A second drift then takes place from this first one: the organisational machine created by man perversely begins to control the user when the system breaks down. Imagine the chaos, anguish and problems experienced in a large urban hospital in Sao Paulo, Brazil, in 2004, when its computerised telephone system broke down. The technicians worked for 36 hours straight, including the night shift, under immense strain, until the problem was identified and resolved.

So, to compensate for the problems posed by machines, managers in general are demanding increasingly mechanistic and impersonal behaviour from humans, who cannot be replaced by machines. Employees must be neutral, fast, efficient and above all devoid of any ethical conscience – in short, 'objective' and docile.

The aim of the action must always be 'how much does it bring in' and

above all not 'what sense does it make to the person carrying out the task'.

You have to be malleable, 'multifunctional' and 'desensitised', according to some up-to-the-minute engineers and terminology learned in North America. Beware of love: therapists will treat you for emotional dependence. These people commodities, consumed and replaced in the same way and whose effectiveness is tested and controlled by computers, are certainly a serious factor in the long-term crisis of meaning for contemporary organisations. Have we all become commercial products to be traded on the market for work paid for by the hour, just as the day labourers were in the days of the Bible, the Middle Ages, or the Industrial Revolution? Aren't we, professors of the philosophy of education, like a public service that should be offered free of charge to the public?

Indeed, the spirit of Machiavelli is now to be found at the heart of many managerial theories. The quest for meaning and compassion in organisations is far from unanimous. Textbooks devote whole chapters to Machiavelli, who is described as a brilliant precursor of the 'business class', asserting that a lawful end justifies unlawful means. Of course…

These spiralling drifts lead us into a strange ballet in which the philosophy teacher becomes the extension or slave of a digital brain, at the service of an inaccessible multinational corporation that lives far away, as in the most mind-boggling science-fiction stories of Huxley and his Brave New World. We can also draw a parallel with a disastrous archaic past where tyrants reigned supreme, as in the Aztec or Inca empires, and where human sacrifice regularly appeased the anger of the gods. It's as if the atonement and suffering of the group for the happiness of a chosen few, often the strongest, most intelligent and most cruel – in short, our devils at the top of the pyramid – were the only possible way for human societies to function, like a beehive for bees. Is the ideal model of society a beehive with its bees?

In fact, in the history of certain primitive or first peoples, peaceful peoples such as the Australian aborigines with their communal values, were made enslaved by more aggressive tribes, or forced to flee and abandon their territory to the enemy. Democracies since Athens have survived only thanks to the imperialism of some, and a peaceful land is one of Teilhard de Chardin's pious wishes. Basically, it is still very often the pyramid model that reigns supreme in our societies, even if organisations that operate on the basis of cooperative models are an innovative exception. That said, these types of organisation seem essential for our future and are still a possible choice.

Fortunately, until now, the computing machine has neither the ability to choose between several alternatives when faced with an ethical problem, nor the decision-making power, nor the emotional intelligence required to solve the very complex problems faced by humans in today's organisations. Indeed, we can see that these problems are contextualised and multi-referential in origin, and that ideally they require the players involved having plastic abilities: reflexive, dia-

logic and sensitive, so that they can resolve them calmly, face to face and to-gether, with emotion in a transdisciplinary effort[7].

When a manager refuses to talk openly with his subordinates because he is following a market logic that is incompatible with an individual's demands for meaning, which would require long-term investment, dismissal or problems with work incapacity are imminent. In the event of conflict or difficulty, the manager feels obliged to take refuge behind faxes, emails and overloaded diaries, or even machine persons, to whom he delegates the task of providing arbitrary responses or veiled threats. The result is that the management of some organisations is mod-elled on that of large multinational corporations, and is gradually becoming de-void of any ethical questions about the meaning of its existence, insofar as, cen-tred on the need for immediate profit, it is becoming increasingly impersonal and reluctant to make the necessary changes that would make it possible for people, and hence its organisations, to evolve in a 'dignified' way. Albert Einstein, re-ferring to the value of human consciousness[8], warns us:

'A new way of thinking is needed if humanity is to survive'.

As we have briefly described, we are witnessing what appears to be an irreversible process of replacing the most tedious, even dangerous and repetitive human tasks with machines. In itself, the idea is excellent and laudable; on the face of it, it will save precious time and physical and mental health. Everyone seems to agree on the harmful effects of Taylorism, and the scientific community accepts this replacement without any major problems. The development of auto-mation processes should make it possible to empower people and employ them in more dignified tasks, giving them greater responsibility, autonomy, safety and sometimes even pleasure at work. There's nothing wrong with that. Are we think-ing of going back to living without means of transport, communication, televi-sion, telephone and cinema, without radio or the Internet? Are we going to give up pharmaceutical research because of biological weapons, or the marvellous rockets because of their costs or the damage caused by missiles? More and more ethical councils are tipping towards the other extreme by rejecting scientific and technological progress. F frequenting sects with medieval practices or trying to return to the wilderness is interesting avoidance strategies and can prove forma-tive for those who practise Gregorian chant talking circles around a campfire, but they do not solve the problems. Soliciting philosophy from scientists in the field is less complicated than it seems. There is a close relationship between the logic of scientific discovery and the development of critical thinking of a philosophical

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[7] Mariana Thieriot Loisel, *Les Mutations Humaines*, Ed. Amalthée 2016, p. 122-128. See also Mar Thieriot, *Les sagesses du monde au pluriel... Les voies d'une mise en voix,* PLASTIR 56, 12/2019, pp. 61-92, available here: https://www.plasticites-sciences-arts.org/PLASTIR/Thieriot%20P56. pdf, accessed in 03.-6.2024.
[8] Lopes Pinheiro, S., & Pasquier, F. (2023). Consciousness and Environmental Education: Trans-disciplinary Urgencies from the Post-pandemic Context. *Transdisciplinary Journal of Engineering & Science*, *14*. Pp. 81-94, https://doi.org/10.22545/2023/00223.

nature. Any teacher who has allowed it has certainly experienced some fascinating dialogues in the classroom with the pupils entrusted to him. The problem of meaning can be found everywhere, and it can only be solved in situ, as André Lacroix teaches in Sherbrooke.

The problem, then, lies not in the growth of scientific and technological research per se, but in the direction given to this growth or, on the contrary, in its absurdity; **when the machine becomes the behavioural model for the individual**. In the short term, the absurdity is gaining ground and humanity, with the support of research, is producing increasingly competitive, aggressive and irrational behaviour, insofar as this competition is already causing it a great deal of harm and yet it persists. The technological boom, with the complicity of the public authorities, has reinforced local underemployment. It is cheaper to employ people who are still young, just trained and still devoid of any ethical conscience.

A constructive and promising response would be to increase transdisciplinary and simultaneous scientific, technological and ethical training for the world's populations, enabling them to develop at a high level through bilateral agreements for mutual support for scientific and technological research on site, which would involve different countries in a rationale of cooperation between university researchers and support for sustainable development and the autonomy of each in relation to the other, with respect and dignity and taking account of ethical, human and environmental problems[9].

Petty local government, based on corruption and the lure of profit margins made possible by the maintenance of underemployment and cut-price agreements with multinationals and offshoring, does not seem doomed to disappear. Cronyism' continues to replace competence, through intrigue, factionalism and compromise. So, what's to be done? More bloodshed? Couldn't we imagine and implement a quiet, springlike evolution? Do we always have to go into exile? Children and teenagers are here. What will their legacy be?

The choice remains **'to be or to have',** to use Eric Fromm's beautiful phrase. The heart of the problem of sustainable development of the planet seems to be the ethical and philosophical training of the leaders and managers who sign international economic agreements and promote them in their respective countries. The presence or absence of this philosophical training will determine the direction of scientific discoveries in the field: for or against humans? Bombs or earthly food? Learning the discipline or visiting museums? And in science fiction terms: self-destruction or trips to the Planetarium? We can't want life and death at the same time, and we'll have to accept that one day we'll have to reach out for something that the poet Aragon Paul Eluard wanted the colour of orange in an old, over-listened-to record: Ferrat Chante Aragon in the Collection Disque

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[9] Pasquier, F., & Nicolescu, B. (2019). To be or not to be transdisciplinary, that is the new question. So, how to be transdisciplinary? Transdisciplinary Journal of Engineering & Science, 10. Pp. 1-8, https://doi.org/10.22545/2019/0110/.

d'or… To move towards a modest, reasoned universal of concord, if human be-ings choose life. Today 'Concorde' is the name of a plane relegated to a hangar. Having said that, it can emerge from there.

Indeed, it seems necessary in the context of training scientists, even be-fore engaging in the all-important cross-disciplinary debates, to introduce a stage within these disciplines themselves, an 'intra-disciplinary' or even 'meta-disci-plinary' stage where scientists can establish an ethical link between their object of study and their conscience. Why do they choose this profession? What values guide them? What is the meaning of his or her discipline in the classroom? We will achieve a better dialogue, from one season to the next, if we encourage the presence of philosophical questioning within the various disciplines… Chance encounters in the museums of the world to contemplate together, remember beauty and create new ones.

We have to recognise that we will have the leaders and organisations we are capable of training throughout the world. For the time being, we are training effective devils, and hell always seem to be paved with good intentions. It there-fore seems essential for a contemporary organisation to invest in the philosophi-cal skills of its managers: their capacity for dialogue, self-knowledge, self-edu-cation and critical thinking, their sense of justice and friendship, their long-term vision, their taste for in-depth study and research, and their human virtues[10]. These virtues, which are at the root of democracy, are very difficult to acquire and complex to pass on. Far from being innate, as the dark history of man has shown, they have to be picked up and perfected every day through dialogue. Sometimes we don't feel like it. There are necessary silences like wastelands. The author's Ikebana teacher taught him so much with her patient hands and her wonderful bouquets. The piano teacher shared with the author that she helped her neighbours with their tax returns. You can bequeath a fortune to your children, but your forebears, your teachers, cannot bequeath their character, their gentle-ness, their fortitude, the taste for culture that made them human in some way. The chords of Pablo Casals when he played Bach for the thousandth time, Mozart who beat Salieri to the punch by making him take his Requiem in a note after a lifetime of jealousy and persecution, the storming of the Bastille taught for over two centuries without respite as well as all our red-corrected homework on the abolition of slavery, the right of women to vote at last, a face-to-face encounter with the Venus de Milo. Conscience is a matter of self-training in freedom of choice based on knowledge of human values.

If some people insist on seeing our human organisations simply as profit-making enterprises, then our leaders need to orientate their compasses correctly. There can be no humanity without disinterested culture: but what use will litera-ture, museums … be if humanity is destroyed and we are reduced to slavery by

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[10] Pasquier, F. (2022). From Spirituality to Technontology in Education. *Journal of Systemics, Cybernetics and Informatics,* 20(6), pp. 49-52, https://doi.org/10.54808/JSCI.20.06.49.

way of brains, to being prostheses for computers in organisations, docile 'people machines', and if human is dead in the water and hell become our only homeland? Another bird jumps out of the window.

The only thing we can do, as Levinas advised us, is to bear witness to our constancy of effort and leave the door open to the possibility of a reconciled humanity through philosophical dialogue: leave the door open and the light on. We have a good memory, and all the struggles that humanity has waged and continues to wage for the rights of men, women and children throughout the world, inspired by the French initiative of the Enlightenment, should not, we hope, be in vain.

This new conception of management, centred on the value of the individual and driven by an ethical vision, would characterise the entry into the post-industrial era and, further on, would lay the foundations for another, *post-capitalist* society, which would have learned and respected the value and importance of the act of learning alone and in a group, including from one's mistakes.

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Dialogue Between Two Mirrors
Towards Venetian Transdisciplinarity

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Abstract: The article is a „photographic snapshot" of the interweaving between personal history, cultural heritage, and the concept of transdisciplinarity through the metaphorical lens of Venice's enduring beauty and struggle. The narrative journey reflects the author's Brazilian roots amidst political turmoil, the formative experiences of her European heritage, and the evocative environment of Venice. By intertwining personal anecdotes with broader reflections on history, resistance, and cultural preservation, the article proposes a transdisciplinary approach that bridges past and future, art and science, to address contemporary issues such as the safeguarding of collective memory.

Keywords: transdisciplinarity, Venice, cultural heritage, personal narrative, global warming, resistance, historical memory, Brazilian history, European heritage, art and science integration.

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The Serene One

Morning rises in the mist, showing the meaning of their lives
Like a complex puzzle, attaching oneself to one piece
To another, they must fit together
Everything seems interdependent,
The drawing gradually emerges, the game becomes more fluid
As the action unfolds, the major lines appear
Suddenly, there it is: it's finished

Forever? … Pieces she wished frozen: she arrives in Italy.
Another comes to add pieces, the puzzle widens
From lineage, couple, friendship, critique.
Implications. Divisions. The viability of the form.
One must step back to see better, and the puzzle
Continues becoming work, prayer, or chaos when
A hand comes and undoes everything…
Then they start again,
Slowly, one continues the work of the other,
We find the old marks,
The matrix, Venice!
Does the puzzle have a beginning and an end?
No, it continues, humanity placing pieces on the table
We still poorly perceive the accomplished meaning of all this,
But we perceive that there is meaning to be marked,
Intermittent and fleeting unveiling…
Before everything collapses.
It is the very small day of consciousness that knows itself:
It takes a lot of patience,
The day will be long before the plunge
Of stars into the profound night.

1. Introduction

I walk the narrow sidewalks of Venice along the emerald canals, and I recall what brought me here, what intuitive force, what blood: strangely comfortable in this architectural gem that temporarily hosts one more stranger. A pious grandmother, a devoted godmother, also cradled my childhood. From the nourishing milk of prayers, the firm and nurturing sweetness of hope, and yet Venice flows slowly…

From the kitchen, my mother's employee watched over the light energies above the crib. I was born in the sixties, in Brazil, amidst military dictatorship and the crossfire of urban guerrilla warfare. Violence was omnipresent with its deadly bleeding. The religious faith was overlaid with the fragile and strong faith of comrades, guerrillas, brothers in arms and values, and the bellicose anger of the extreme right. Something of the fury of the Doges, the ferocity of lions in battle. Their feverish struggle showed me at a very young age that there are causes greater than oneself, and life is only worth living if it carries the fight for all freedoms.

I learned to calm the storm between furious adults, singing, dancing, doing theatre. The arrest of a judge before my eyes, and a shift had just occurred in my frail yet strong life. The judge, a friend of my parents, gifted me with the fire he could no longer bear, extinguished by the torments of political imprisonment.

Shortly after being dropped into the Vosges, the reinforcement of my

human values intensified. My grandfather J. went through both wars, four years as a prisoner in German camps; his house was self-sufficient. He hunted in the Black Forest, and his garden was more abundant than a supermarket. His freezers housed wild boars and snails. Outdoor life, mushroom picking with him, shook me from my stupor.

And then, the ski school, like a daily battle. Mediocrity and complaints were banned from the program. Marcus Aurelius lingered in my childhood: endure and abstain.

Thus, Venice endures the sea that will eventually bring it down. Times were tough, but the adults around me had precise compasses. My mother floated, a beautiful translucent young woman, a wounded artist. My father had an obsession with this child defying fate. He taught me chess, books, calligraphy, the passion for writing. Far away, a judge endured and resisted. I knew it… I still walk the echoing sidewalks of Venice. My mother is the permanent absence in this story. She compels me to silence: you will speak of me only after my death. So we will not speak of my mother. We will speak of Venice.

We will speak of transdisciplinarity as well, in a Venitian way: with the resistance of beauty, culture: past and future connected to save the memory of a city from the global heating and keep alive our strongest vows of love.

2. A Smouldering Fire in Venice

On both sides, the elders watched, swiftly into boarding school, summer

with them, I grew up in the shadow of the old trees of the garden, gnarled, rooted, deep, and resolutely vertical. Nothing wavered in a precise and austere education – simplicity, effort, transcendence, vocation, at all costs. Humanity of lions, beasts with skin as smooth as polished marble. Flashback to a grandfather, an academic in Rio, and his library that smelled of old books, and to a great-uncle, a one-legged fighter pilot who used to take me for drives … he loved to drive. Before, long before the forests and the men of bronze, I believe it was the ocean that toughened me. My family also includes the rolling waves, the breakers, and the scorching sand of Rio where I tasted the torrid summer holidays, a preview of the Mediterranean heat. The infinite concrete of Sao Paulo is the complex labyrinth where I screamed for the first time. Venetian statues with faces of beasts: 'Endure,' murmured my ancestors, with a placid and implacable gaze, who taught me to swallow my tears and stand tall during the debacle.

> *Remission?*
> Life paves its way,
> Between the cracks of being
> It slips into the draughts
>
> Words of water
> That irrigate the earth's paths
> Scorched by the sun
> Where almost nothing resists
>
> Words of wind
> That circulate and rustle
> Without wounds or offences,
> Between the gaps and distances
> Light as the truth
>
> Words of Fire
> Subtle and happy clearing
>
> Final sharing of waters,
> Between the lagoon and the sea
> Imperceptible and decisive
> Between life and death.

It is my mother who taught me to doubt everything.

I certainly owe my vocation as a philosopher to her. You don't have children. No.

I take care of those who are here and have been forgotten. I don't believe in maternal instinct. I've seen these street kids suffer so much, condemned to dumps, my poor and combative students, drowned in fatigue and debts. I became passionate about education to understand cruelty and repair its wrongs, with the

precision of a watchmaker. The water of the Grand Canal irrigates my dreams.

Yes. Unintentionally, I am always propelled by the momentum of a judge, the fiery passion of my distinguished translator father, the resistance of my grandfather, a hunter and valiant soldier, by the composure of my great-uncle, a fighter pilot… By a face from the past that resembles me. I am always cradled by the gentleness and faith of those I watched over until death, my grandmother, and my sweet godmother, unforgettable companions. As adults, we developed an unwavering complicity beyond territories, beyond the laws of words. My ancestors explained to me that all my actions would be judged, and my next life would depend on this: when I was twelve. Spirits, astral journeys, energy – a palpable fact in Brazilian culture: images that have both always surprised and attracted me… Because of this, I intuitively know that we are carried, and thus the beauty of Venice still carries me. There is something greater and stronger than us within us… My first soul-to-soul exchange in Venice was with a Lion who alerted me: an iceberg is heading for the city.

3. Under the Portico's Shade

My father built a wall of 15,000 books around us; he compelled me to uproot myself. Equally erudite and clear-headed, he was a great sceptic and my first reader. Stern, he rarely praised me and taught me to be wary of flatterers. He taught me Epicurus and Marcus Aurelius, made me recite by heart the maxims of Descartes, Heraclitus, and Nerval: I think; therefore I am, one never steps into the same river twice, a dream is a second life. My ally in everything, he behaved in chess and in the face of others like my worst enemy. He was ruthless and passionate; I owe him my confusion of feelings. He is my first outlawed love: we

never made love, but our minds were drawn to each other like magnets. He infused culture into me like infusing a lethal poison, a hard drug, an eternal addiction to letters and poetry. His death devastated me. I almost died of sadness after him.

Venice inscribed itself on my body like an indelible and painful tattoo. I didn't inherit a single book, but I learned, like stacking bags of cement to build a dam, to create my own library, which I bequeath to my husband's children like a perforated target.

My mother, I am forbidden to speak of her until her death. That says it all. I keep her at a distance to preserve a garden or maintain the clarity of the waters within me. But the blind spot in this story is a man without a name, without presence, without belonging to a homeland, an esteemed professor at the University of Law, who spied on me until his death and encouraged my work so gently: maybe her lover? To prove it, one would have to unearth his bones. His discipline: civil law. I won't speak of him anymore.

From him, I've learned that I must avoid lawsuits at all costs and stay away from fratricidal wars. From him, I've also inherited my mistrustful thoughts. The feeling that there's someone always following me in the Italian alley. He followed me all my life. Wealthy, erudite beyond erudition, with an elegance that turned heads, he accumulated passions, his sons all born men and acknowledged… For my part, he connected me to nobility without bequeathing me anything else, possibly, except, maybe, the secret bond of blood.

So why have I always kept a course for Venice, despite this multi-referential paternity that would have confused many? A great-grandmother of German origin, Maria Muller, as upright as an I. She was the daily discipline of prayer and care. Obsessive, she always watched over me. As a child, I called her Mum, mixing up the roles, much to my mother's chagrin. This mother disguised as a grandmother had an unyielding will. She called me every day in Brazil. It's my best soil. The fertility of my hope, not a wrinkle in this perhaps overly blameless life. She raised me without a shout, without a slap, by example. Until the end.

The Venetian lion listens to me, in chance encounters in the city's alleys.

Her best friend, my godmother, took over from my grandmother. Hands of both fairy and iron. These two women were soulmates, an almost flawless sisterhood connected with them. As a child, I was either at one's place or the other's. Always watched over… From them, I received so much love: that's why I escaped to Italy.

> *Aurora in the Plain*
> 'Say it, do you know, you who listen and watch me.
> Do you know what I don't say and never will, and it's
> There between us, like an evening falling and
> Obscuring us.'
> Despite the sobered consciousness
> Of that morning

She still believes
'In the promised plain'
In a different truth
at the
break
of day
A new morning
A water-green morning
A happy morning
A Venetian
Liquid
morning
Clear but without bitterness
She tries to declutter hell
To rediscover
The hues of dawn
The devils have loaded this future
with an excess of dreams
With scarecrows
With a jumble of sophisticated projects
Forgetting to live
the colour and thickness
The love vows
of the present hour
Between 'now and now'
Perhaps the values are too
INFERNAL
So distant and sealed
So high
That man
Constantly sends them back
And lose themselves in themselves
Lighten the expectations
Simplify the colours
Understand the ambitions
Give voice
Without possible evasion
To the dawn along the water
To pose or undo naked gestures
Display true touches
Or keep
So heavy and precious,
The difficult secrets
But pronounce
In a complete and irreversible way.
AURORA IN THE PLAIN
Remain with that voice

In an infinite harmony
Always close
Even at the cost of silence
Of the solitude
Of the infamy of rejection
Even at the cost of damnation
Under Satan's blinding fires
YES
The tenacious voice
Broken
And worn out
Impoverished
By so much human cruelty
Will repeat to you
Will sing to you
Will stammer to you
Will deliver to you.
THE AURORA IN THE PLAIN

4. Against the Winds

Enchanted by the beauty of Venice, I embody within me a strange blend of the exercise of Cartesian doubt, as I have been practicing philosophy since 1991, and yet also carry the popular madness that bequeathed me a fervent faith, the assurance that we are not alone, and that there is something greater than us in this world. Belief that has weakened me a lot because of naivety or blindness, I believe that humans have an ever-present potential for learning. I believe that human goodness is possible. I believe that we can achieve a better day together because we can learn to think together for the good of all. I believe that one should never despair of anyone and give everyone the benefit of the doubt. I believe in a good life with and for others in just institutions. I believe that the law can prevail over brute force. I believe that money is not the sole motive of human actions. I believe that freedom is an experience to be lived. I believe that destiny can be swayed by an unwavering will. I believe that life is beautiful and worth experiencing. I believe that a Venetian oath of love can prevail against all odds.

But I know these are beliefs, even utopias, and they are debatable. However, they help us float during drowning. Thus, my steps resound on the pavement of St. Mark's Square. So many steps have trodden this mythical place overlooked by a winged lion, a lion that wants to rise but will collapse sooner or later into the salty and deep waters of the lagoon.

Her phone is a permanent link to the world with him. She texts him a few words, but above all, she inundates him with photos of Venice. She literally bombards the city with her lens as if she wanted to quench an unquenchable thirst for this architectural masterpiece.

Why 'beliefs'? She has suffered very harsh defeats in her life, always for

the same reason: she thought to change others, convince them to adhere to her values, a worldview: freedom, brotherhood, equality in difference… Beauty, serenity, creativity, sharing, common creations… Fidelity, to oneself and to others, reparative truth above all. In a recent conference, she elaborated extensively on this human plasticity of redoing, rereading, retelling, and by retelling, confirming or denying, but in any case, repairing the wounds of one another. Yes, she believes in it. The light entered the room… She had left the door open, and the walls brightened.

The lion responds immediately. A red thread of life that connects them to each other much more than to themselves.

FINALLY YIELDS TO THE STARRY CANAL

LET HER LIGHT FLOW

The list is long of the utopias, superstitions that she cultivates in her secret garden. Taunted, threatened, betrayed, rejected for wanting to keep a flame alive, her revenge is an Italian city that testifies to our humanity.

Thus, a Venetian stranger resides in me, stronger than myself. Gradually, I learned to defend myself, to fight as well, to combat with ideas, acts of commitment, inclusive gestures like dams to contain the sea. Always against the current, against time, against the wind.

> Must we always silence the insult
> Cowardly … done at night
> In front of a disarmed saying.
> It is easy to insult
> And art is difficult.
> Nothing is given in a lifetime,
> Nothing.
> To write a single verse
> To trace a meaning, however, small
> You must have seen Icarus on the ground
> And crawled with him
> In the mud of the fall
> Dance with an empty stomach
> Cry from fatigue
> Not flee one's mediocrity
> Evil will always surprise her
> Born from a last rain
> Cried from a last tear
> A woman on the ground struck
> By fate,
> But standing again
> Vertical
> Under the Venetian sky.

I choose sharing, interdependence, almost instinctive candour. I really had to force myself to understand that I will change nothing and no one, that cruelty is part of our human baggage, and that evil is a concrete experience that

comes to hurt the flesh of all of us, a scratch from the beast at a given moment in our history. That it is in us as well as outside of us and that the biggest job to do is sometimes to sweep in front of our own door. So maybe I often, too compulsively, take examinations of conscience, and I have not completely given up on the idea as an educator that if someone close to me is not doing well, I can help them help themselves. I know it's presumptuous, sometimes inappropriate, unwelcome. Like the rising water. But I resist letting life be as it is, people in pain, the world adrift, towards collective drowning. The flame is there, it dances in my eyes that refuse to pretend that yes … everything is fine. I do not accommodate who I am, who we are. I always try to move one step further, even if it's just a tiny step, in the city that sways, a stranger nestled in the arms of a lion.

> *Peaceful*
> *In the palm*
> *Of the waves…*
> *She lifts her eyes*
> *Awakened abruptly*
> *By arms*
> *Of marble*
> *A face of a wild beast*
> *A holy lion*
> *Fierce and beautiful*
> *That announces*
> *Our metamorphoses*
> *On the steps*
> *Of the Doge's Palace*

And then the other women are there, parading on the almost immortal streets, sisters, rivals, maternal… Beliefs of pious women transmitted by other women: a sense of inferiority, inadequacy, the need to surpass oneself physically: one must suffer to be beautiful… Sorority that has often failed… Sometimes, however, a pioneering solidarity, but one that will be woven at the expense of the masculine. Still, tough battles against windmills, women and philosophy a few leagues from Rome. Almost everything remains to be done or redone. She holds from astronauts that absolutely nothing should be built with crossed fingers. Energy, according to her, is neither believed nor superstitious. It is palpable, perceptible; for example, that of the Lion is relentless combat to track down vulnerabilities before devouring its prey. It's good … but it's also exhausting, this mistrust as a clinical approach. The night has passed on these unresolved questions… I think that if there is one last immovable bastion within every human being, it is the belief in the healing or at least conciliatory power of human love… We say to ourselves: they will eventually understand, they don't know what they're doing… And we try again. While the water rises, the lion's gaze softens. I tend to try a lot, I think of the football or tennis games won during overtime, I tell myself the wheel turns and the game can always change. It takes time for a wounded and hurting person to trust others and live again. Sometimes you have to give them

that time. Mutations are possible, but at the beginning, you start by believing in them. Of course, cruelty, bitterness, resentment, envy is serious opponents for many researchers or clinicians … who 'believe' in the evolutionary plasticity of humans. However, you have to stay the course without losing sight of the horizon. Amen, Venice. Amen.

5. The White Pebbles on the Path

I have received several codes of honour, the most recent being often sworn by my surgeon husband: primum non nocere. Simple, short, sharp as a blade, it emphasizes the suspension that one who has power over others owes to themselves. Venice glows red, I walk almost alone in the city… I am a widow.

I have respected it to the point of harming myself not to harm others, locked alone on New Year's Eve 2020 during the pandemic, I celebrated there all my defeats. My years of analysis have taught me that the code that matters most to me, 'The unconditional preferability of others,' can lead me towards dangerous slopes of sacrifice, of 'see how much I suffer for you', and bear within it the seeds of narcissism and the delights of suicide. A restful and sedative death drive. Trying not to harm oneself and not to harm others when dedicating one's life to others, a sweet sapience of daily life, limits that shift: openness, closure; dia-logos, to support and be supported in existence.

The profession I have chosen, philosophy, love of Sophia, wisdom, draws our attention to the beauty of the gesture, the slightest gesture when laden with meaning. I got my master's degree in 1991. A time when I made the bet of the educability of all subjects, long before the doctorate or post-doctorate. The educability of all subjects, including mine. Ethics is one of my favorite areas, so I can push the exercise quite far, sometimes too far. My weakness: not defending myself, giving up all the space, and then being surprised that the garden is trampled, the flowers torn, and trying to resurrect it afterwards.

This morning, my numb and sore body reminds me to get back on track. My post-doctoral supervisor, Thomas De Koninck, wrote a very beautiful book on human dignity. We are always worthy, even in dishonour, we are worthy of being buried because we are human.

So, I unwittingly respect a code of honour, sometimes despite myself, despite fatigue, despite repeated humiliations… I have often taken the blame upon myself to protect others.

Subliminally, the unconditional preferability of others continues there: obsessive.

Almost despite myself: others come first. A man still follows me.

The shift has occurred only recently: I dare to defend myself. I take close-ups of marble lions. This is a new fact.

I have been severely assaulted in my life and have never filed a complaint. I prefer to keep injustices silent; I entrust them to time.

I have relied heavily on the Tao, the silent wisdom of life that acts for us, even despite us.

So, like a little thumb finding his white pebbles in the thick forest to escape the ogre, I walk in Venice a little every day, as one finds their steps often lost between saying and doing, between the infinity of possibilities and the limits of a situated action; always below the depth of a desire[1].

'A celestial incense floats beyond the clouds.'

'Teaching through non-speaking, the advantage of non-action… Under heaven, few are those who can achieve it.'[2]

Tao: undoubtedly a constant inspiration over the years, becoming clearer as the veils of time give way to the secret of our finiteness. Thus, through observing the silent variations of skies and seasons, one understands the value of reprieve and the luminous and obscure silence that envelops the creations of nature. If there is hope in Italy, its texture seems to be silent and reserved. Lao-Tzu describes with perfection and precision the sagacity of non-action. At a certain period in my life, I spoke too much; I was talkative, teaching in the morning, afternoon, and evening. Gradually, my energy drained, exhausted, the impact of words diminished; confusion invaded my mind, and I felt the need to write and be silent for a few years to restore the balance of the scale and regain the striking power of living speech. Withdrawal, calm, listening to oneself and the world, renewed contemplation of dawn and Canaletto, carried me to the shore of wisdom: this unheard-of love for life and others that one offers like the gratuitousness of a smile to a stranger, fierce.

'Where no one expects me, I am expected.'

Jean-Yves Leloup in 'Seeds of Consciousness' – email of July 23, 2021.

Why sometimes prefer others to oneself? Why establish codes of honour? What is the meaning of our meager human laws in the face of the unstoppable logic of the universe: to be born, grow, diminish, die, disappear … why human dignity, up to the right to a burial. To depart… To return? Big questions remain unanswered. Deep down, we know that a star shines in the darkest and coldest night. And we are crossing dark times together or separated. We need the honour of the heart and the heart of honour. Achieving this is like playing a subtle instrument in the antechamber of death. Intuitively, we know that we are going to cross. Every morning, I see bodies at the end of life in the hospital, bent, paralysed, exhausted… Struggling, struggling, struggling. I know there is a path for each of us. Secret of infinitude. The body at rest, the spirit breathes and passes. We are the wind. He texts me: he fell, he is deeply wounded.

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[1] Sung Chi Wen (656–712) in *Tao Poétique vrais poèmes du vide parfait*, Ed. Bilingue Moundarren, Mars 1986.
[2] Lao Tseu, *Le véritable Tao Te King*, p. 36, translated by Eulalie Steens, Édifiions du Rocher, France, janvier 2002.

6. Disobey to Respect Oneself

However, has the other always comes first in my life? No. This ethic of peaks, where one gives for the simple pleasure of giving and where reciprocity is the other's concern is extremely difficult. To love the infinite above all things and one's neighbour as oneself… Priority to absolute otherness, very difficult to achieve. Unhealthy? Perhaps that's why I delved into the question of evil and the fall.

And if the Latin word for beauty
Had its origin in the word for war
Bello
Old saying
Suffer to be beautiful

And if she slipped to the other side of the mirror
Upside down of the painting
What battles and what graces
Await her on the
Path of beauty
'Veni, vidi.'
She seems to have lost the game
Once again

Doomed to departures
Doomed to hell forever

A body falls gently
A battlefield

Snow-covered and deserted…
But she will reach Venice

For Pascal, the self is hateful… In psychology, the ego and the personality of the Jungian Self are distinguished … the centre in oneself of otherness or the soul. Trying to experience oneself as another. Putting oneself in the place of others. How many times in a day do I fail to do this...? In fact, it's an element of 'self-torture' for me, I undergo recurrent and exhausting self-examinations. Generous to others, I remain adamant with myself. I have to learn to cut myself some slack.

In the distance
A point outside the set
a projector perhaps
A beam of light sweeps across her body
And illuminates a magnificent sailboat
It emerges in the mist
Its flag is black.
Le nave va.
Fellini forgot to turn it off before leaving
A shadow approaches
Places the damned on the ship
The stranger navigates by sight in the fog
With the injured one
Cause of the fall
She refused to fight
She hated military aesthetics
She breathed an unparalleled beauty
With the scent of wet earth
A beauty
Dizzying
Cleared
Of standards
Symbols
Ideologies
Labels

She identified with nothing
Nor anyone
She fell from it
Cursed
Chased
Exhausted

Another important point, I have often lived in non-recognition: non-recognition of the value of my writings, of my hard work, non-recognition of the paintings often given, as well as the books given. I do not appreciate selling, the business of ideas and works, undue profits, but it plays tricks on me. So, I found one of my paintings in a public restroom. I have been mocked, devalued, pirated, dishonoured.

So, I am slowly learning to set limits, to claim my lioness share, to pre-serve my sacred place. My Judeo-Christian upbringing taught me humility, ac-ceptance of non-recognition, the gratuitousness of giving, good faith… Yes, one can live without money, hungry, tired, and still give a lot around. But in the long run, suicide is guaranteed: pushed to the extreme, the unconditional preferability of the other is a narcissistic attack: see how much I have suffered for you. In this sense, I have much to repair: much to legitimise… Copyrights to claim and strengths to rebuild: a man to join. A lion. Twenty-four hours of vertigo in her life as a woman. Life passes so quickly; will I have the time? Reborn from a tear that life shed She rises She moves. She speaks. She writes. She even quotes and accepts the fight. Finally, like him: SHE HAS SURVIVED EVERYTHING[3].

Her silent ship seems like a ghost ship,
The angel and a stranger come from so far for her
A devil maybe or a hermit
Two ghosts
She breathes in a forge
Writes tombs
Floats
Her hell is liquid

She dances the dance of the dead
And she learns with them
A rainbow leads them to her door
A magician dresses them
In purple
In gray
In orange or in black
Red is a sign of life
She is wary of it
Her sobered heart
Dares just to chant
A discreet rhythm
To leave
She refuses
Never without him
A vaporetto crosses the lagoon.

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[3] 'Nous sommes revenus de toute' expression of Mario Cyr in *Dans les soirs parfaits,* Ed. Écrits des forges, Canada, 2017.

The price of honour, the price of peace has often been solitude. Yet one afternoon she clings to him,
Sweaty, she squeezes her trembling chest with all her might, in a long embrace she
Forgets herself, then catches herself just steps from the abyss and gently pushes him away.

Her insubmission remains her signature
Even in exile
Even in the hells of Venice drowning
She knows the Grail among the damned
She knows the labyrinths of her time
Her spools of thread are multicoloured
Ariane's treasures
A lion slept in her arms … tamed
Tired of always playing the villain
Elsewhere they are a legend
Imprisoned by the linearity of their history
Here
They finally find each other
At peace
Abandoned
They have become wallflowers
Books carry them from one place to another
Men
Women
Children
Her paper people have laid down their lances
And carry the weapon on the left
They are elusive.
Their step is light
Their laughter luminous.
They have no defined features
But she always recognises them
In all languages:
It is a people to come
Who haunts the sea
Who populates the forge
Who survives in old grimoires
Who breathe in hell
A people to be reborn in Venice
ANIMA MUNDI

Yet he knows
That she will have to
Come back to earth
And rise from her fall
The ladder is stretched
Towards the opaque reality

At the end of the night of nights

He assures her
 That she will never be alone again
And that the paper people will carry her
 Tenderly,
 In their arms
 To the other shore
The Serene
At the level of water and sky.

They will sail smoothly
with caution
he has learned to be wary
Of the cape of storms

A Grail against their hearts
They will glide over the lagoon
imperceptible

Flesh and ash at the same moment[4]

7. The Remnants of God

The research in philosophy is aimed at finding the authenticity of speech, the meaning of language. Indeed, a being transformed when they are capable of daring their own speech – intuitive, personal, authentic, inhabited, and logically understandable. A speech to which the other can respond with their vision, intuition, and logic. Thus, the immanence of individuals reveals itself in facts: their singularity.

This exhaustive exercise in logical understanding allows access to a 'mediate evidence' constituted by an 'empirically oriented psychological phenomenology'. Perhaps, a historical first definition of psychoanalysis, yet one that does not break with philosophy.

Indeed, Husserl introduces into the philosopher's profession the consideration of the reality of empirical psychological facts and into the psychologist's profession, the method of philosophical investigation. Facts are studied in a context of implication, reflecting values or a lack of values, making sense or not. Phenomenology constitutes a method that is both philosophical and psychological in research and can become a transdisciplinary method, capable of better understanding authentic (because loving and sensible) mutation and the plasticity of humanity in its incompleteness: masculine in search of the feminine, feminine

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[4] Ducos du Hauron *Danse Macabre, Memento mori*, p. 152, anthologies prepared by Florian Balduc, France, 2016.

in search of the masculine, with the help of the neutral.

Within it, she carries a lion. A lion carries her within him.
The danger that awaits us and that this text seeks to thwart is the gradual cessation of research on major existential questions, in favour of research focused on what is utilitarian and can yield concrete benefits. This occurs due to a lack of understanding of the importance of giving meaning to our lives, animated by a thought for others, where we, 'make room for the one who comes'[5].

This is the problem posed by a scientific education devoid of the contribution of philosophical reflection on the meaning of that education. It is an education that aims to adjust individuals to their environment without questioning the mutations of both individuals and the environment.

Time passes, and Venice sinks day by day. An iceberg drifts in its direction. They both know it.

This situation reflects the desire of some experts for finished and definitive results, assigning everyone a role and a place, thereby depriving us of the possibility of evolution. Evolution involves changing positions, having the courage for this change because it raises ethical questions about the place we occupy, the stakes for the people involved, and the environment around us.

Of course, one thinks of the universe described by Foucault, a universe aimed at 'surveillance and punishment'[6], this is to make the gears of a society built on the logic of the law of the strongest and the market economy function. However, in this universe devoid of questions that would propel it forward, humans resist, malfunction, experience crises, depression, they 'dysfunction'.

A lion is dying.

Philippe Meirieu writes: 'What is "normal" in education is that it "does not work", that the other resists, evades, or rebels. What is "normal" is that the person constructing themselves in front of us does not yield easily, sometimes seeks to oppose us, simply to remind us that they are not an object we construct, but a subject constructing themselves.'[7]

However, it is in the face of this resistance from individuals that the path of philosophical problematisation and dialogue can open up, in vivo, in a critical context. Dialogue appears to be the only alternative to confrontation, exclusion, or avoidance. Only through dialogue is there a chance to transform situations where conflicts have their raison d'être, where the resistance of individuals brings us back to fundamental questions, to problems of meaning.

Indeed: 'No one can decide for anyone else what they should learn.'[8].
And 'This decision is precisely what enables each individual to go beyond the given and subvert all expectations and definitions in which their surroundings

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[5] Meirieu, Philippe in Frankenstein pédagogue, ESF, France, 2012, p. 67.
[6] Foucaul T, Michel in Surveiller et punir, Paris, Gallimard, 1975.
[7] Meirieu, Philippe, *op. cit.,* p.63.
[8] Ibid, p. 67.

and themselves so often tend to confine themselves.'[9] Indeed, 'It is a matter of not confusing the educator's powerlessness over the decision to learn and their power over the conditions that make this decision possible,' emphasizes Meirieu.'[10]

It is indeed on the strength of the demand for meaning contained in the desire that the decision to learn ultimately rests, a demand for meaning, irreducible to a need to please, because what is at play in this demand is the act of understanding and being understood.

The conflicts explode
The planet ignites
Religions harden
Easter is celebrated,
As an absurdity.

The gratuitous gift is the utopia
Of a poor fool,
Who screamed to the four winds
The way,
The truth,
Life,
Empty phrases
Repeated uselessly.

Cold wars persist
Bombs continue to fall,
Frequent.
Evil is written on the lips
Of the closest,
Blood continues to shed
Its share of misery.

We fight for labels,
For nothing,
We compete consistently,
With brilliance,
Forgiveness is a sham,
The permanence of Easter:
The story of betrayal.

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[9] Ibid, p. 69.
[10] Ibid, p. 74.

To uncover a ruby
On the wounded flank
A cup gathers
The remains
Of God.

A Grail
 On the horizon,
Shines
In absolute indifference.

Only the song can
Resurrect
In her broken throat,
Calm
And transparency,
Of a naked smile.

She thinks of him, he thinks of her. But they don't say it anymore…

8. Heritage

There are so many lineages within their lineage: the family of blood, the family of spirit… The one less mentioned, recognised between words; at the turn of a gaze, of a phrase. Once again, a long silence has passed between the question and the answer. There are those who give us birth through blood, and then there is life through the human spirit: this second fundamental birth by peers who resemble us; awakened, smiling in the disasters because they know the 'non-paths'. I inherited from Philippe Meirieu, my first mentor in thinking, the wager of the educability of all subjects, which he received from Guy Avanzini, the certainty that humanity can humanise itself, and that everything must be done so that everyone has access to education and knows our best and highest values, the luminous dignity that inhabits us forever, so dear to Thomas de Koninck, the red brotherhood, the white equality, the blue freedom… Everything must also be done to ensure that the conditions for the possibility of health are also present, as my Siamese brother, my surgeon husband, so well taught me, ceaselessly empowering people to do without being able to do it, to discover that they can do it, despite adverse fate, that yes, we are endowed for life, the work done together, the peace of the brave, and profound happiness. Human values: that is the most beautiful heritage; the compass that points to the north of existence, its freedom. With these values as arms and foundational baggage of my humanity, I track the truth like the light at the end of the dead-end: the one that repairs, the one that

connects, the one that, like damp earth, carries us all, clay that binds us and collects our remains. First and last values acquired and transmitted by these familiar friends who elevate us, these strangers who care for us, these unknown ones who pray for us during great sorrows, an unforgettable blessing from our soul brothers… What would we be without them? Socrates, because he makes us think, disturbs us. He disrupts the oppression of false certainties, of biases, and opens the path of the spirit through the values he embodies. Let's continue to pass them on… Our beautiful values, our poor human values. Keep our compass close at hand to continue the journey into the dark night, dare tenderness in these very dark times.

She raises her head and feels that the manuscript is pointing towards the end. The earth trembles beneath her feet. The sea level continues to rise. She rolls her suitcase towards the misty dock, a lion's scratch on her shoulder. He is so present by never being there. She is going to lose him like Venice is lost in the sea, the painful memory, an arm pulls her towards the inside of the vaporetto.

L'ÉTOILE

Moved tears return,
A solitary apnoea,
—And without any grip

A smooth wall
Where she slides,
Towards a blue depth,
To find, without air,
—The starfish

Resurface
In his damned arms,
—These arms that have rolled so much

Stones into hell,
Naked Sisyphus, unchained,
Saved
—By a drowned woman

He starts screaming on the dock… Wait for me! She dives and starts swimming in the water of the lagoon towards the dock. She cleaves the water with all her strength towards him who is screaming. The vaporetto driver throws her a lifebuoy, the lion is seriously ill, the parts of the city begin to crumble.

They meet in extremis. She is wrapped in a half-dead blanket. A gentle woman asks her, do you accept resuscitation? No. They die in Venice.

9. Venice and the Transdisciplinary Learning. Instead of Conclusions

A) The Transdisciplinary Body. We often speak of a corps d'armée, a body of soldiers, or a corps de ballet to refer to a group that fights or dances together. Throughout my encounters worldwide, I've met individuals sharing democratic and humanistic values, concerned with balancing science and conscience, life and meaning, ecology and economy, education and democracy. Becoming transdisciplinary seemed to me like daring to engage in a collective dance for peace, the joy of being and doing together. Never would I have imagined that I would have to learn to fight: valiantly uphold our fundamental human values and sometimes put our image at risk because refusing to choose sides easily labels one as cowardly or a traitor.

The transdisciplinary position demands the sacrifice, as defined by René Girard: 'One has to make a distinction between the sacrifice of others and self-sacrifice. Christ says to the father: you want neither Holocaust nor sacrifice; then I say here I am. In other words, I prefer to sacrifice myself than to sacrifice the other. But this still has to be called sacrifice. […] I prefer to die than to kill, but all men prefer to kill than to die. But you will be killed because a man wants to kill you, not because you volunteered.' (Apocalyptic thinking after 9/11, an interview by Robert Doran with René Girard, Board of Regents, University of Wisconsin's System, 2008, substance, 115 vol. 37 n. 1)

This is an essential clarification.

B) Heritage. Being part of a transdisciplinary group has armed me with courage to peacefully defend democratic values and human rights, for women, children, animals, nature, and our Earth. The difference between disciplinary research and transdisciplinary research is that it demands the ability to yield to another discipline when their argumentation in solving a problem is better, regardless of the researcher's socio-cultural background and academic level. This is an essential requirement. We wanted to dance, and we often had to fight. The water is rising in Venice. The birth of new representations requires immense efforts alternating between the balance of the dancer and the endurance of the valiant resisting soldier… Another way to evoke a learning body: a resilient body.

C) 'So far, So near': knowing how to leave, being able to return. Often our encounters are ephemeral, and I had to accept varying the distance: accepting that the sum is greater than the parts: the sum of the individual and the sum of the group. Sometimes you have to forget yourself for the group, or vice versa, retire to isolation. I found myself somewhat like a tortoise carrying my house on my back, a foreigner, speaking several languages, and I discovered that being part of a transdisciplinary team meant being a translator: the one who says, 'Don't get upset, it seems he meant this,' or 'Is that really what you meant?' Venice, a gray area: between resistance and inevitable collapse.

D) Scars and floatations. Today, the terminology of invisible wounds

is in vogue. The wounds inflicted on the transdisciplinary researcher because he refuses to judge and prefers to understand, to be a mediator rather than a customs officer of knowledge, are numerous. Transdisciplinarity leads him to thwart the pitfalls of vanity or excessive modesty and be able to occupy a unique and singular place in the academic world, both privileged and often targeted. Therefore, we need to have a transdisciplinary skin, to breathe, relax, float… Take the time to heal and sometimes even to be reborn: not to sink. Real dialogues are difficult and risky. You can drown in them.

I participated with Paul Ghils, Marc Williams Debono, Ubiratan D'Ambrosio, and Patrick Loisel in developing the concept of a transdisciplinary chair to teach transdisciplinarity in universities. I am convinced of the importance that this chair is collective, that several lines of thought from different cultures and scientific disciplines are present in the form of relays: like life jackets.

E) A transdisciplinary linguistic and philosophical effort. Michel Cazenave invites us to forge a new language. I imagine this new language as a mix, the result of the encounter of different peoples, but all equally human. Capable, as Susan Sontag indicates, of perpetual self-questioning to avoid being trapped in a rigid form. According to Susan Sontag: 'It is, so to speak, Flaubert corrected by Gide: a more educated, lighter rigour; a relationship of avidity and cunning towards ideas, excluding fanaticism[11].' I would dare to add a lucid language like that of Bazin in, 'La mort du petit cheval,' or visionary like that of Rabindranath Tagore, who challenges us: 'Let them be useless and prosperous, and let me be useless and mad…'[12] For can we conceive human happiness without its pragmatic utopias?' This chair calls for a further effort in the philosophical foundation of the human, capable of going beyond ideologies to provide an ethical, dialogical, and cooperative foundation for human education. In this sense, I don't think the idea of a transdisciplinary chair consisting of a single subject, no matter how cultivated, is relevant or sufficient.

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[11] Sontag Susan, *L'écriture même: à propos de Barthes*, pp. 29, 30, Ed. Christian Bourgeois, Paris, 1982.
[12] Rabindranath Tagore, *Le jardinier d'amour et la jeune lune*, Gallimard, Paris, 1997.

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