

Towards a Transdisciplinary Hermeneutics

A New Way of Building the Scientific Mind for Learning in the Perspective of Complex and Long-term Change

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1. Introduction

The Problem

The central theme of this conference "Building the Scientific Mind for Learning in the Perspective of Complex and Long-term Change" is a very important and relevant one for the world that we are facing and living in today. The quest to build the scientific mind for learning in the perspective of complex and long-term change is being contemplated against a backdrop of some unprecedented levels of fragmentation in the world. On the one hand, we have seen a rapid proliferation of disciplines and sub-disciplines across all academic institutions all over the world – also referred to as the 'disciplinary big bang'.¹ On the other hand, we see multiple crises and problems² in the form of global warming, energy, water, waste, poverty, forced migrations, biodiversity loss, and violence etc. – all manifesting themselves simultaneously and on a scale never experienced before in human history. Also, these global problems have serious long-term consequences. Should they remain un-solved, they pose a real threat to our continued and peaceful existence on earth. What is unique about our current situation is the *complexity* of what we are facing. Not only is their scale and potentially irreversible consequences part of their complex nature, but none of these problems can be singled out as the one and only 'big problem' threatening our future. Neither can any of these problems be isolated as if they only occur in some remote or localised spot on the earth – 'out of site out of mind' as the saying goes. Edgar Morin has managed to capture describing this complex situation very well by saying that we are currently living in a 'planetary context' confronted by a '*polycrisis*'.³ Describing the same complex reality we are being faced with, Manfred Max-Neef uses the term '*problematiques*'.⁴ Morin and Max-Neef are just two out of a growing number of thinkers who have tried to depict the fact that we are living in global / planetary era which is profoundly different to any other era in human history in which the said problems have become so intertwined that each person, nation or society on earth, irrespective of location, origin, race, class or creed, are being confronted with these challenges. However, what really distinguishes the times we are living in from any other in human history is that these *problematiques* or *polycrisis* are human-made. For the first time in our history we are being confronted with the devastating consequences of our own actions and thinking, on a global / planetary scale never experienced or witnessed before. This is truly a unique situation from which no-one can escape and it is, then, in this planetary context that we are posing the question about building the scientific mind for learning in the perspective of complex and long-term change.

¹ Nicolescu, 2002, p.34.

² Time and space prohibits us from going into a detailed description of these multiple crises. The following are only five sources which give similar but also different perspectives on the state of the world: (i) "The State of the World Watch Books, 2007" – www.worldwatch.org, (ii) The Stern Report, www.sternreview.org, (iii) George Monbiot, *Heat*, 2006, (iv) James Lovelock, *The Revenge of Gaia*, 2007 and (v) The Intergovernmental Panel on Climate Change (IPCC) *2007 Climate Change Report* – www.ipcc.ch

³ Morin, 1999, p.73.

⁴ Max-Neef, 2005, p.1.

Although we may not have fully comprehended the relationship between the fragmentation of the *problematiques* of the world and our knowledge-systems, the simultaneity of both phenomena strongly suggests that there is an interconnectedness that needs serious and ongoing exploration. However, as a point of departure, what we are increasingly becoming aware of is that the crossing the disciplinary divide constitutes a necessary prerequisite when looking for sustainable solutions to the complex problems we are facing today – we simply cannot look for solutions from *within* the confines of the single disciplines or sub-disciplines. The complex nature of the *polycrisis* we are facing clearly warrants a trans-disciplinary response, which has as its aim the development of an interdisciplinary dialogue capable not only of crossing disciplinary boundaries, but, at the same time and in the process of doing so, finding practical, long-term solutions which may have the potential of ensuring our presence on the earth for many, many generations to come.

It is then against this background of fragmentation, both in the world and in our knowledge-systems, that I will be approaching the theme of this conference from the point of view of a transdisciplinary hermeneutics. Critical to this approach will be to explore the possibilities of a conceptual framework for imagining and understanding the question of the 'unity' of our knowledge as a pre-condition for finding sustainable solutions to complex problems. Embedded in this approach is the argument that building the scientific mindset capable of learning and dealing with complexity cannot happen within the current fragmented knowledge-systems and is, therefore, inextricably linked to the question of crossing the disciplinary divide. The latter has its epistemological roots in the Cartesian *subject* <-> *object* partition and trying to build the scientific mind capable of dealing with complexity and long-term change *within* this chasm not only creates a theoretical-logical conundrum of how to find solutions to problems created by this fragmentary mindset in the first place⁵, but also drives the wedge even deeper in the way that we come to see and accept ourselves as 'objects'⁶ apart or detached from the world. The consequences of this approach are all too familiar to us. Once the subject–object relation has been severed, and the 'object' (the world) exists in the mind of the 'subject' only as theoretical concepts or mathematical principles, then we would be inclined not to 'see' any linkage between what we *think* and what we *do*. The logical outflow of this position is one of absconding ourselves from any intellectual, moral-ethical or socio-political responsibility and accountability for the consequences of our own thinking and actions. Alternatively, should we accept some form of responsibility and accountability and decide on getting involved in the task of looking for solutions, but still follow the instrumental logic of Cartesianism, we would most probably be inclined to look for techno-scientific type of solutions only. However, the last thing on our minds, literarily and figuratively speaking, would be to change the way we *think* – or more precisely, changing the way we *think about our thinking*. There would simply be no need for this as our resolve in the status of our own ideas and knowledge have undergone some spectacular transformation – from the mere dancing images or chimera on the wall inside Plato's cave, to the absolute certainty of Cartesian mathematical principles, through to the Kantian transcendental thought categories, completely independent from the world and totally self-sufficient *in* and *for* themselves (an sich) for their own existence and validity – but always sufficiently removed from the world to, seemingly, have no relation to the crises unfolding in front of our eyes. Therefore, should we continue to allow these assumptions and ideas associated with this type of fragmentary thought into our own thinking whilst trying to build the scientific mind capable of dealing with complexity, we would certainly be running the risk of perpetuating the very problems of fragmentation we are hoping to overcome.

⁵ The words of Einstein come to mind here: that we cannot hope to solve problems within the mindset that created these problems in the first place.

⁶ In this sense, it becomes possible to speak of the 'objectification' or 'reification' of the subject – i.e. the subject coming to see itself as an 'object' in, but apart from the world, losing sight of its evolution out of or from the world.

Thinking the Complex

The inseparability of the subject–object relation is the reverse side of the assertion that our detachment from the world and our inability to ‘see’ a connection between our thinking and doing is rooted in the *subject* <–> *object* partition. Implied in this argument is another assertion, namely that our re-connection to the world is dependent upon our ability to posit this inseparability of the subject and object as a mutually interdependent relationship. In other words, what is important for us is to imagine our coming into consciousness as a process in which the subject becomes aware of its ‘otherness’ *in* the world in a self-affirming and inclusive way. To understand the emergence of this ‘otherness’ in the act of consciousness as affirming, rather than negating, the position of the nonseparability of subject–object relation presupposes what Edgar Morin has been referring to as the ability to ‘thinking the complex’. Whilst accepting the consequences of the subject distinguishing itself *from* the object in the act of consciousness, it means refusing to interpret this in terms of the binary logic of Cartesianism. Instead of following this path of dualism, Morin argues that we need to reform our thinking so that what appears as ‘separation’ or ‘partition’ between the subject and object can be imagined as a relationship of ‘interdependent circularity’, or as he puts it: “a thinking that re-links that which is disjointed and compartmentalised a thinking capable of conceiving recursive relations”⁷. The ability to see the interdependent ‘recursivity’ or ‘circularity’ in the subject–object relation is key to building the scientific mind, capable of thinking the complex from the very outset of self-reflexive thought. The philosophical, epistemological and moral-ethical implications of this are far reaching. Thinking the complexity of the subject–object relation allows for a reform in our thinking, without having to revert to the simplistic notions of pre-modern mysticism in which the subject can ‘know’ the world ‘directly’ in some or other magical / un-mediated way. Neither are we forced to fall back onto either positivism or idealism, two forms of reductionism in which the object and subject are set-up as opposites against each other as the ultimate locus of absolutely certain knowledge. In short, complex thinking enables us to re-imagine our connectedness to the world, to ‘see’ the links between our thinking and doing, between our thoughts and actions and, most importantly, to re-gain a sense of responsibility for the consequences of our fragmented thought.

Such then is the challenge before us to build the scientific mind capable of thinking the complex in the very act of self-consciousness. A key aspect in responding to this challenge will be our attempt to explain in more detail how the ‘interdependent circularity’ between the subject and object can be conceived of as a dynamic *complex unity* between the ‘transdisciplinary subject’ and ‘transdisciplinary object’. Critical to the success of this will be to incorporate the notion of the ‘logic of the included middle’. In order to avoid that the notion of an ‘interdependent circularity’ between the subject and object from becoming the proverbial ‘vicious circle’, incorporating the ‘included middle’ plays a crucial double-edged role. By incorporating this important notion it becomes possible, on the one hand, to maintain the *distinction* between the subject and object, established in the act of consciousness. On the other hand, bringing in the logic of the included middle will enable us to conceptualise of the *unity* between the subject and object – without falling into the trap of mysticism or reductionism. Therefore, as will be argued, conceiving of the subject–object relation as a *complex unity* in this manner forms the basis for the possibility of a truly trans-disciplinary dialogue between all the sciences, which, in turn, is considered to be of key importance when considering building the scientific mind capable of complex thinking and learning. In other words, what needs to be demonstrated is that the unity achieved at the epistemological level, can be extended and to the level of interdisciplinary dialogue where a crossing of disciplinary boundaries can occur in order to satisfy the need for solving complex problems. It is against this background that it becomes very difficult, if not impossible, to imagine how the prevailing fragmented mono-disciplinary environment can provide the right intellectual space and institutional

⁷ Morin, 1999, pp. 130 – 132.

framework for building the scientific mind capable of complex thinking to meet the challenges facing us today. For the different disciplines to be able to enter into a meaningful trans-disciplinary dialogue with each other, whilst engaging with the *problematiques* confronting humankind, is considered to be a *sine qua non*, an essential intellectual and institutional space and framework within which the undertaking of building a learning and complex thinking scientific mind can be pursued. If this is indeed the case, then grounding such a trans-disciplinary dialogue in the notion of a *complex unity* between the subject and object is of critical importance. For as long as the subject and object remains to be seen as binary opposites within the Cartesian fold, it remains impossible to see on what basis the disciplinary divide can be overcome and, in turn, on what basis mind the scientific mind can be constructed. The latter presupposes the creation of a truly trans-disciplinary intellectual space and dialogue within which the scientific mind can work relentlessly and rigorously at finding solutions to large-scale, complex problems never witnessed before in our relatively short stay on the earth.

Therefore, when viewed from such a unified perspective, ontologically and epistemologically speaking, it becomes impossible to 'de-link' the fragmentation in the world from our fragmented thinking and knowledge-systems. The current rather dramatic unfolding of the planetary crisis cannot only be explained in terms of certain social or market forces 'out there', somehow detached from ourselves and our thought-processes. Such alienation and reification of thought is impossible from the position which sees the subject-object relation as a complex unity – despite all systematic attempts to either 'de-link' (modernity) the subject from the object or 'de-construct' (post-modernity) both the subject and object as mere social reconstructions, thereby collapsing the subject-object relation *per se*. Furthermore, not only does an interpretation of the world from *within* the conception of a unified subject-object relation help us to de-mystify what otherwise would appear as 'objective' forces detached from our own thinking, the effects of reification, but what this perspective also offers is an understanding of the consequences of persisting with the logic of fragmentary thought into the future. This is so, not only because of the slowness or possible complete lack of response to the planetary crises facing us, but also because of persevering with the type of 'solutions' generated and offered by the prevailing instrumental reasoning and techno-scientific responses which have characterised and dominated our mono-disciplinary approach to these problems. Should we, therefore, uncritically allow our response(s) to the world and its problems to be dictated by the logic of fragmentary thought, we are at risk of not only having to face the consequences of our own thinking and actions, but the irreversibility of these consequences – i.e. having to face a situation where we will have no control over the consequences of the self-induced, manmade planetary crises we are facing, irrespective of what and how we think and what actions we intend taking. The persistent interference of our cumulative economic actions with Nature over the last 150 years or so would have reached and gone beyond a 'threshold' point where we would become mere spectators to *problematiques* that have spun out of control⁸. Whether we have already reached such a point of no-return or not is a moot point on which the proverbial jury is still out. However, what this does suggest is that there is a sense of urgency behind our attempts to unify our fragmented knowledge-systems. The overcoming of the fractured *subject <-> object* relation and the consequences hereof for our interpretation, understanding and responses to the world we are living in is, certainly, not of theoretical or philosophical interest only. Consequently, it is then in this context that this particular attempt to develop a transdisciplinary hermeneutics is inspired by a vision of the world in which our knowledge-systems have become unified, where the intellectual and institutional space and framework for complex thinking and learning have been created by an ongoing and truly trans-

⁸ There are a growing number of thinkers who believe that we have already reached this point. James Lovelock in his book *The Revenge of Gaia* is one such eminent thinker who believes that the problem of global warming has become irreversible and that whatever we will do to decrease the amounts of CO₂ emissions will not stop the planetary consequences of this problem.

disciplinary dialogue and where all of this are contributing to the finding of long-term, sustainable solutions to those complex problems threatening our stay on earth if remained unresolved.

Whether I succeed or fail in this endeavour I will leave up to the reader-listener to judge. However, I ask of the reader-listener to be judged from the point of view of accepting the inseparability of the subject–object relation. I, therefore, ask the reader-listener therefore not to be judged from the point of view of reductionism, where the subjectivist and objectivist positions of idealism and positivism-empiricism reign supreme on either side of the Cartesian chasm. I would also ask the reader-listener not to be judged from the even more problematic position of deconstructionism where the subject–object relation has been imploded as a result of the ‘deconstruction’ of both the ‘subject’ and ‘object’ as mere social reconstructions. I am not suggesting here not engage in rigorous debate with these positions at all, as will become clearer in my defence of hermeneutics immediately below. However, it is my view that both forms of reductionism and deconstructionism are too simplistic for our purposes of understanding and representing the *complex unity* of the subject–object relation. As has been alluded to so far, this notion of a ‘complex unity’ can only be imagined in terms of a notion of ‘interdependent circularity’ in which the subject, in the act of consciousness, both distinguishes itself *from* and identifies itself *with* the object. To the extent that the positions of idealism, positivism and deconstructionism fail to comprehend and represent the complex unity involved in the subject–object relation, by separating or tearing the latter apart, do they render themselves obsolete for our task at hand of developing a transdisciplinary hermeneutics which not only seeks to understand the complexity of our multi-levelled relationship to the world, but to use such understanding for the purposes of building the scientific mind capable of engaging with a complex world and finding long-term, sustainable solutions. It is, then, on this basis of not only seeking to understand the unity, *not* the separation or demolition, of the subject–object relation that this study will proceed, but also, to the extent that we succeed in doing so, to consider the positive consequences and outcomes of such hermeneutic inquiry to work towards the creation a truly trans-disciplinary dialogue between the sciences and to achieve the ultimate goal of the unification of our fragmented knowledge-systems.

2. In Defence of Hermeneutics – Some Philosophical Considerations

Why choose a ‘hermeneutical’ approach to focus the attention on overcoming the problem of disciplinary fragmentation? And, more specifically, why try and join ‘transdisciplinarity’ with ‘hermeneutics’ to develop a ‘transdisciplinary hermeneutics’ at a time when the field of hermeneutics has come under such severe criticism from post-modern thinkers such as Foucault and Derrida. Derrida in particular has been scathing in his attack on hermeneutics and has chosen to drop the term all together from his own philosophical vocabulary. In his philosophy of *deconstruction* and *difference*, Derrida not only disputes the possibility of discovering any form of ‘truth’, but also argues that there are no thought rules (methodologies or methods) to which we could appeal or that can guide our thinking along the way as it were. ‘Truth’ is not only an illusion as it is only through numerous socially constructed iterations and *repetition* that we come to believe in the ‘universality’ of these (repeated) ideas, values and principles. However, in the end, these are nothing more than social constructions and it is the task of deconstructionism to be vigilant and guard against treating any notion, including that of the ‘subject’ and ‘object’ *per se*, as universally true. It is, then, against this background that Derrida launches his fundamental critique of hermeneutics to the extent of getting rid of this notion altogether. For him, hermeneutics is too closely associated with the ‘discovery’ of ‘hidden meaning(s)’ somewhere to be ‘revealed’ to the

hermeneut-interpreter⁹ whose task it is to translate these as 'messages' in and to a particular context. In fact, Derrida goes so far as to say that hermeneutics is per definition a theological or rabbinical project by nature – hermeneutics, even the secular versions as articulated in the thoughts of philosophers such as Heidegger, Gadamer and Husserl, in the final analysis, follows the same theological methodology, namely to repeatedly interpret and re-interpret an already-given 'Truth' (inscribed in the tablets on the Mountain). After having 'received' this 'revealed' message, all that remains to the interpreter is to 'understand' the context of the 'receiver' of this message and to, then, 'translate' and 'explain' the 'meaning' of this (a priori) message to the listener-receiver.

I do not wish to go into the detail of Derrida's onto-theological critique of hermeneutics. What is of more interest to me at this point is to level some critique against his own thinking and, in so doing, explain why the choice of a 'transdisciplinary hermeneutics' is intellectually justified. Derrida's philosophical ideas of 'difference', 'repetition' and 'deconstruction', in the main, have three problem areas. In the first place, to accentuate so strongly and repeatedly that there are 'no rules', 'principles' or 'values' to which we can appeal or fall back onto in our thinking amounts to a 'thought rule' in itself. To be able to be a vigilante or guardian of the 'no truth' position, deconstructionism has to adopt through relentless repetition this thought rule of 'no rules'. This position affirms, rather than contradicts, the fundamental hermeneutical notion that there is no 'presuppositionless' or 'value-free' understanding or interpretation. Our thinking will always be based on or influenced by our assumptions and it is, therefore, better to admit what these presuppositions might be, or be open to be made aware of them. Secondly, the insistence by Derrida on the principle of difference, namely that words or concepts do not have meaning in themselves, but only in their *difference* to other words and concepts, constitutes a logical problem of sorts. If we apply this very rule or principle to itself, then it implies that the very word 'difference' can only be understood in terms of what is *different* or *dis*-similar to itself – in other words, its own 'non-difference' which implies some or other notion of *coherence*. What this means is that we need a mode of thought which can think of both *difference* and *coherence* at the same time – i.e. a non-binary thinking which does not think in mutually exclusive terms only. The challenge to develop this way of 'thinking the complex' has already been alluded to above. Thirdly, the further repeated insistence in Derrida's thoughts that 'nothing is or ever was innocent, integral or undivided' comes very close to constituting a 'metaphysics of the divided'. Not only is such a fixed position highly problematic in terms of the notions of the 'unity of matter' and a 'coherent universe' in quantum physics¹⁰ and emerging quantum cosmologies¹¹ respectively, but it is the binary logic and repeated insistence on 'division' and 'difference' that takes on the dimensions of the very type of metaphysical thinking which Derrida has so painstakingly tried to deconstruct.

However, acknowledging the complexity of the subject–object relationship, rather than deconstructing it, is to admit what Nicolescu has metaphorically referred to as the 'two ends of the stick' which can never be separated¹². Or, to put it another way, applying the principle of 'thinking the complex' to the subject–object relationship is to admit from the outset that the current fragmentation of the world and our knowledge-systems constitutes both an epistemological and ontological challenge, at the same time. Attempts to either sever the subject – object relationship will not only end up with two more sticks, each with their own inseparable subject – object ends, but attempts insisting on such separation will lead us back into the trap of Cartesianism or post-

⁹ The word 'hermeneutics' is named after the Greek god 'Hermes' whose task it was to interpret the messages of the gods and make it understandable to the people – in essence a 'messenger' figure, translating what the gods have 'spoken' into meaningful and humanly understandable language.

¹⁰ Heisenberg, pp. 138 – 139.

¹¹ Laszlo, 2006.

¹² Nicolescu, 2002, p. 23 – 26.

modern reductionism with a similar end-result or position of a 'reification' in our self-reflective thought – i.e. thinking from a position of severance or detachment from the world – the latter losing any notion of having ontological status, either as ideas / mathematical principles in the mind or as a socially or inter-subjectively reconstructed illusion. In either case, as the subject – object relationship has been severed, our 'detached thinking' in itself cannot be conceived of as having contributed in any way to the complex problems of the world. This is thought trapped inside itself and signifies the epitome of fragmented thinking, which has the cunning ability to "ab-stract, that is, to extract an object from a given field, (it) rejects the links and interconnections with the environment, and inserts it in the abstract conceptual zone of the compartmentalised discipline, whose boundaries arbitrarily break the systemicity (the relation of the part to the whole) and multi-dimensionality of phenomena"¹³.

Furthermore, not only does this type of context-less thinking have very little to contribute to finding solutions to the planetary problems, but it also works against the latter in a kind of a subversive way in that our already fragmented thought undergoes a further 'deepening' of fragmentation when processed, as it were, through and by the powerful forms of critique emanating from this mode of thought. Explaining this situation, Bruno Latour categorises these forms of critique into the three broad categories of 'naturalization' (E.O Wilson), 'socialization' (Philip Bourdieu) and 'deconstruction' (Jaques Derrida). He points out that these critics have developed these three distinct approaches to talk about our world in a manner that if the first speaks of 'naturalised phenomena', then societies, subjects and all forms of discourse vanish. When the second speaks of 'fields of power', then science, technology, texts and the contents of activities disappear. When the third speaks of 'truth effects', then to believe in the real existence of brain neurons or power plays becomes absolutely superfluous. He goes on to say that each of these forms of criticism of the world and our knowledge of the world is powerful in itself, but impossible to combine with the other two. Latour then asks the pertinent question whether we can imagine a study on the ozone layer or global warming as simultaneously naturalised, socialised and deconstructed. Clearly, in this context of these fragmented modes of critique, this would be highly unlikely, leading us to conclude with Latour that "our intellectual life remains recognizable as long as the epistemologists, sociologists and deconstructionists remain at arms length, the critique of each group feeding off the weaknesses of the other two. We glorify the sciences, play power games and make fun of the belief in reality, but we must not mix these three caustic acids"¹⁴. Indeed, following the logic of this mode of thought it would appear that the contours or fissures of our fragmentary thinking have been significantly deepened. Not only have we structured and institutionalised our intellectual life according to definite, almost 'reified', disciplinary boundaries, but surprisingly enough the self-critique of our own actions and thinking emanating from within such a fragmented structure seems to display very similar lines of division and separation.

As already mentioned, I do not wish to enter into a detailed analysis of Derrida's deconstructionist philosophy any further. The purpose with these few cursory critical remarks is rather to explicate that the choice of a transdisciplinary hermeneutical approach to overcoming the already mentioned problem of fragmentation in our knowledge-systems is in fact a post-postmodern choice. It is to demonstrate that, at some fundamental level of our thinking, we cannot escape the logical impossibility of 'presuppositionless' thinking, interpretation and understanding. In fact, the very act of reaching 'commonality' or 'common understanding' is being made possible because of the presence of our *different* presuppositions, not because of their absence. Therefore, by bringing the key notions of hermeneutics and transdisciplinarity together holds great potential not only for being able to 'think the complex', i.e. the ability of conceiving simultaneously of *difference* and

¹³ Morin, 1999, p. 123.

¹⁴ Latour, 1993, p.6.

coherence, of discontinuity and continuity as interdependent recursive relationships, but also being able to demonstrate how, on the basis of this mode of thought, it becomes possible to imagine the emergence of a meaningful trans-disciplinary dialogue as a means of moving beyond disciplinary boundaries. This is a far cry from what might be construed as wanting to introduce or en-force some sort of a 'meta science' out of the plurality of existing sciences. 'Transdisciplinary hermeneutics' is rather an attempt to investigate the possibilities of not only *what* happens when we cross disciplinary boundaries, but also *how* this may happen – including looking into the consequences of this for our understanding *of* and responding *to* our unsustainable world. When looked at from this type of hermeneutical perspective, it indeed becomes possible to envisage that such a trans-disciplinary dialogue can materialize in a manner which both respects and transcends disciplinary boundaries and which, in turn, may result in the generation of 'new', trans-disciplinary knowledge and solutions to some of the complex problems were currently facing today.

It is then against this background of a post-postmodern position that this task of developing a transdisciplinary hermeneutics is approached. Hermeneutics originally developed as a general 'theory of understanding' with a view to give a systematic exposition of what happens in any act of 'understanding', whether such understanding occurs in everyday life and/or in our scientific endeavours. Over time, this general definition of hermeneutics became very closely, almost exclusively, associated with textual interpretation and understanding – whether these texts were of religious, juridical or artistic (literature) nature. However, responding to and wanting to take up the challenge of the 'unity of our knowledge' as a prerequisite for finding sustainable solutions to the complex problems facing us, the transdisciplinary hermeneutics envisaged here wishes to return to the intensions and attempts by some of the original thinkers such as Goethe, Schleiermacher and Dilthey to establish a unified hermeneutical foundation for all the disciplines. Indeed, the unprecedented proliferation of disciplines as well as the ensuing vociferous critique coming from the quarters of post-modernism has just about shattered the vision of a unity in our knowledge-systems held and expressed by these original thinkers. However, the challenge to respond to the *problematiques* facing us today from a position where the disciplinary divide has been overcome, by far outweighs any developments such as the disciplinary 'big bang' or the critique weighing down on us and telling us to give up on a 'dead and buried' romantic and idealistic dream. To be sure, in this paper the intention is not necessary to agree with the content of the idealistic and romantic philosophies of a Goethe, Schleiermacher or Dilthey. Whilst agreeing with their overall vision of the unification of our knowledge, the idea is, rather, to take a fresh look at how this vision can be achieved from a transdisciplinary perspective. Transdisciplinarity, as articulated by one of its eminent proponents Basarab Nicolescu, coming from within the scientific field of quantum physics shows tremendous potential for reviving this original vision of a unity in knowledge in a manner which goes beyond some of the simplistic ideas espoused by the romantic and idealistic philosophies of these original founding figures. Furthermore, when the key ideas of transdisciplinarity are integrated with those from the post-romantic hermeneutical philosophy of someone like Hans-George Gadamer, we are then, I believe, giving a significant step forward in developing a unified 'transdisciplinary hermeneutics' which, in turn, may very well have sufficient potential of providing a systematic framework for understanding the intricacies and complexities involved in bridging the disciplinary divide. Such is the task and challenge ahead of us. The way in which I intend to proceed with this task will be two-fold. Firstly, to give a short overview of the three pillars or axioms of transdisciplinarity expressed in the thoughts of Basarab Nicolescu. In this regard, I hope to demonstrate how the notions of different 'levels of reality' with their corresponding 'levels of perception', the 'logic of the included middle' and 'complexity' constitute the ontological, epistemological and logical conditions for understanding the possibility of disciplinary boundary crossing. Here, in particular, I intend to focus on the crucial notion of the 'complex unity' between the 'transdisciplinary subject' and 'transdisciplinary object', a notion, which, if correctly understood in its dynamic and multi-dimensional terms is absolutely key in

developing a transdisciplinary hermeneutics. Secondly, building onto these foundations of a multi-dimensional ontology and multi-referential epistemology, I intend to demonstrate that, if successfully incorporated and integrated with some of the key hermeneutical ideas developed by Gadamer, we can start to imagine the possibility of the unity of our knowledge through a truly enriched trans-disciplinary dialogue.

In this regard, I intend to specifically explore the interface between what happens at the epistemological-ontological level and the level of interdisciplinary boundary crossing. The key to understanding this important interface would be to bring together and integrate Nicolescu's ideas of a complex unity between the 'transdisciplinary subject' and 'transdisciplinary object' with Gadamer's notion of understanding as a 'fusion of horizons'. In this way it becomes possible to comprehend the overlap between the crossing of 'levels of reality' and, at the same time, the crossing of disciplinary boundaries. In short, we could then refer to this interface as a 'fusion of disciplinary horizons', depicting the fact that the possibility of crossing disciplinary boundaries is rooted in and enabled by our ability to understand fundamentally different 'levels of reality'. This happens when there is a fundamental process of explicating, questioning, suspending and changing of presuppositions and assumptions that, to use biological language and concepts, the permeability or porous nature of the disciplinary boundaries really become manifest. Boundaries are there, on the one hand, to delineate a certain body of knowledge, and yet, on the other hand, their role and function is to allow for an exchange or flow of ideas and knowledge with other disciplines. To take the usage of these biological imagery and concepts one step further, this notion of a 'fusion of horizons' shows some strong similarities with that of 'symbiosis'¹⁵ in that both concepts wish to portray the potential and reality of something completely *new* developing after an intense process of mutual exchange of materials and information. However, the usage of such biological concepts and language should be done with the necessary respect and circumspection it deserves. The crux of the matter with the notion of a 'fusion' occurring between different disciplinary 'horizons of understanding', is that the possibility of a radically 'new' understanding of the world is being made possible as a result of a rigorous and intense exchange of assumptions and presuppositions. Therefore, in conclusion, I will argue that if the unity of transdisciplinary subject and transdisciplinary object is perceived in these terms of a 'fusion of horizons' that, indeed, we have arrived at the core of developing a transdisciplinary hermeneutical theory of understanding which can help us to understand how new, transdisciplinary knowledge of the world can emerge from a process of crossing disciplinary boundaries.

3. Key Epistemological, Ontological and Logical Concepts of Transdisciplinarity

The starting point of developing a transdisciplinary hermeneutics is to investigate the ontological, epistemological and logical foundations upon which such a transdisciplinary hermeneutics will be constructed. Going this route is considered necessary as it would lay a conceptual foundation for understanding the possibility of the 'unity of knowledge' emerging out of a trans-disciplinary dialogue. If we cannot imagine or conceptualise the very nature and possibility of this 'unity' of knowledge, it would be very difficult, if not impossible, to explain how at the level of interdisciplinary dialogue such 'unity of knowledge' can in fact be achieved. Without knowing our

¹⁵ 'Symbiosis' as understood specifically by Lynn Margulis, as an evolutionary mechanism more sudden than mutation when symbiotic alliances formed over millions of years combine to become permanent. In other words, by "creating organisms that are not simply the sum of their symbiotic parts – but something more like the sum of all their possible combinations of their parts – such alliances push developing being into uncharted realms. Symbiosis, the merging of organisms into new collectives, proves to be a major power of change on Earth". Margulis, 1997, pp. 31 – 32.

own ideas on *what* constitutes 'reality', *how* we can gain knowledge of what we consider as 'reality' and on what *logical* grounds do we base such claims, we will be limited to using metaphorical language and concepts from other disciplines only, such as 'symbiosis', in an attempt to explain what needs to be explained¹⁶ at the conceptual level of ontological, epistemological and logical reasoning. As already mentioned, it is not inappropriate to use metaphors from other disciplines, especially in this context of trans-disciplinary dialogue, to help bring across rather complex ideas – but not in a way to replace or substitute what needs to be explained at the primary level of conceptual explanation. In other words, once the nature and possibility of the 'unity of knowledge' has been explained conceptually at the ontological, epistemological and logical levels, it then becomes possible to understand how at the level of trans-disciplinary dialogue such unity can be materialised.

Therefore in order to achieve this, the discussion will now turn its focus onto the three 'pillars' or 'axioms' of Transdisciplinarity, from which and on the basis of which the required conceptual explanation for the possible unity of our knowledge will be conducted. Although three pillars or axioms, I will discuss them under following five headings for the sake of maximum clarity:

Transdisciplinarity: Multi-dimensional Ontology

As far as Transdisciplinarity's conception and definition 'reality' is concerned, Nicolescu asserts that there are three important complementary notions to be considered. Firstly the 'ontological' definition of reality refers to Nature in the sense that: "Insofar as Nature participates in the being of the world, one must give an ontological dimension to the concept of Reality. Nature is an immense, inexhaustible source of the unknown which even justifies the existence of science. Reality is not merely a social construction, the consensus of a collectivity, or some intersubjective agreement. It also has a trans-subjective dimension, because experimental data can ruin the most beautiful scientific theory."¹⁷ From this 'trans-subjective' definition of reality it is clear it departs sharply from any radical post-modernistic viewpoints which hold that all notions of the 'object', even in the case of Nature, is nothing but a social reconstruction. How do we know that this is the case relates to the second important aspect of Transdisciplinarity's understanding of reality which Nicolescu describes as the 'practical' definition of reality, namely that which consistently and continuously *resists* our ideas: "By "Reality" (with a capital R) we intend to designate that which *resists* our experiences, representations, descriptions, images, or mathematical formulations. Quantum physics caused us to discover that abstraction is not simply an intermediary between us and Nature, a tool for describing reality, but rather one of the constituent parts of Nature. In quantum physics, mathematical formulation is inseparable from experience. It *resists* in its own way, by its simultaneous concern for internal consistency and the need to integrate experimental data without destroying that self-consistency."¹⁸ In other words, if all of reality, and especially Nature, was merely social reconstructions there would be nothing to resist, no tension between our ideas, images and representations and *what* they claim to represent.

However, we need to immediately add that this notion of a trans-subjective dimension of reality should not be confused necessarily with a materialist ontology. In other words, that which exists 'out there' is should not be equated with matter in a tangible, corporeal sense only. The emergence of quantum physics has had some profound effects on our understanding of reality and

¹⁶ Furthermore, restricting ourselves to the metaphoric level only brings to the fore logical problems of *explanans* vs. *explanandum* – this problem will be dealt with in more detail below (see p. 14).

¹⁷ Nicolescu, 2002, p.21.

¹⁸ Nicolescu, 2002, p.21.

it is exactly because of the holding onto the assumptions of a materialistic ontology that the new ideas introduced by quantum physics was so difficult to come to terms with. Referring to some of the fierce debates around the Copenhagen interpretation of quantum theory, Heisenberg reminds us that, "the ontology of materialism rested upon the illusion that the kind of existence, the direct 'actuality' of the world around us, can be extrapolated into the atomic range. This extrapolation is impossible, however."¹⁹ The discovery of 'energy', or rather 'fields of energy', as that which is responsible for bringing matter into existence is a profoundly non-materialistic conception of reality. Therefore, if we accept the notion of 'reality' as having a trans-subjective dimension *beyond* which can resist the very best prevailing scientific ideas, it does not follow that what exists *beyond* our ideas can only be equated with notions of 'tangibility', 'actuality' or 'concreteness'.

Does this, in turn, mean that all of 'reality' is fundamentally non-materialistic, only consisting of 'fields of energy'? The answer to this question is both 'yes' and 'no' at the same time. In order to understand this rather confusing answer, we need to refer to the third important aspect of Transdisciplinarity's definition and understanding of 'reality', which refers to the notion of the different 'levels of reality'. By "level of Reality," we intend to designate an ensemble of systems that are invariant under certain laws: for example, quantum entities are subordinate to quantum laws, which depart radically from the laws of the physical world. That is to say that two levels of Reality are different if, while passing from one to the other, there is a break in the laws and a *break* in fundamental concepts (such as, for example, causality). No one has succeeded in finding a mathematical formalism that permits the difficult passage from, one world to another. Semantic glosses, tautological definitions, or approximations are unable to replace a difficult mathematical formalism. There are even strong mathematical indications that the passage from the quantum world to the macrophysical world would never be possible. But there is nothing catastrophic about this. The *discontinuity* that is manifested in the quantum world is also manifested in the structure of the levels of Reality. That does not prevent the two worlds from coexisting. The proof: our own existence. Our bodies contain simultaneously a macrophysical structure and a quantum structure."²⁰ It is then only on this basis of accepting the fundamental break, rupture or dis-continuity in the different levels or structure of reality, that we are in a position to assert that reality can be both material and non-material at the same time. At the macrophysical level, reality most certainly manifests all the normal attributes of material corporeality, whereas at the microphysical level the opposite is the case. At face value, this might still sound like a logical conundrum and until we have introduced the second axiom of Transdisciplinarity, namely the 'logic of the included middle', the matter may still be confusing. However, suffice to say at this point is that by having introduced the above trans-subjective and practical definitions of reality as well as the important notion of fundamentally different 'levels of reality', Transdisciplinarity enables us in our ontological thinking to work with a truly dynamic and multi-dimensional concept of reality – i.e. an understanding which allows us to build our image of reality on both materialistic and non-materialistic as well as continuity and discontinuity assumptions.

Transdisciplinarity: Multi-referential Epistemology

Corresponding to the notion of different 'levels of reality' is the notion of different 'levels of perception'. What is important to understand is the relationship between these different levels of perception and reality as the possibility of gaining knowledge of reality is dependent on how we see this relationship. According to Nicolescu, "The different levels of Reality are accessible to human knowledge thanks to the existence of different levels of perception, which are found in a

¹⁹ Heisenberg, 1959, p. 128.

²⁰ Nicolescu, 2002, p.21.

one-to-one correspondence with levels of Reality. These levels of perception permit an increasingly general, unifying, encompassing vision of Reality, without ever entirely exhausting it."²¹ In other words, we need to imagine the relationship between 'levels of perception' and 'levels of reality' both vertically and horizontally. It is on the horizontal level that there is the possibility of a one-to-one relationship with the implication of valid knowledge being gained by the interpreting subject-observer. It is also on this horizontal level of knowledge generation that it would be possible to say that we have correctly managed to capture and represent reality in our images, ideas and representations of reality. A case in point here would of course be that of Newtonian science which has correctly portrayed and depicted reality at the macro-physical level. The ideas, concepts, images and laws used to describe the macro-physical level of reality cannot be used to describe reality at the micro-physical level. To represent the latter accurately, fundamentally new ideas and representations are necessary as there is a fundamental epistemological break²² or rupture between the vertical levels of perception. However, and this is very important for our ensuing discussion on a trans-disciplinary dialogue, this inability to describe one level of reality in terms of the concepts and laws of another should not be construed as mutually exclusive. Rather, the image that should come to mind is one of two bodies of knowledge coexisting with each other side-by-side, both producing valid and accurate knowledge of the world in relation to their respective levels of reality. "Knowledge of the *coexistence* of the quantum world and the macro-physical world and the development of quantum physics have led, on the level of theory and scientific experiment, to the upheaval of what were formerly considered to be pairs of mutually exclusive contradictories (A and non-A): wave and corpuscle, continuity and discontinuity, separability and nonseparability, local causality and global causality, symmetry and a break in symmetry, reversibility and irreversibility of time, and so forth."²³

Transdisciplinarity: Logic of the Included Middle

If premised on the axioms of Aristotelian logic, namely A is A (identity), A is not non-A (non-contradiction) and the impossibility of the simultaneity of A and non-A (excluded middle), it becomes impossible to see the world both in terms of *wave and particle*, *continuity and discontinuity*, *separability and non-separability*, *local causality and global causality* and *reversibility and irreversibility*. In terms of the binary logic of Aristotle, these clearly constitute mutually exclusive contradictions and asking to imagine their coexistence would be asking the impossible. Nicolescu reminds us that "history will credit Stephane Lupasco with having shown that the logic of the included middle is a true logic, formalizable and formalized, multivalent (with three values: A, non-A, and T) and non-contradictory."²⁴ However, on its own this logic of the included middle T remains somewhat problematic. It is only when we introduce the earlier concept of different 'levels of reality' that our understanding of the axiom of the included middle T, which is at the same time A and non-A, becomes clarified. Conversely, it is the projection of the T-state onto the same single level of reality that produces the appearance of mutually exclusive, antagonistic pairs (A and non-A).

It is when we deal with a single level of reality only that antagonistic oppositions are being created. In other words, the logic of the included middle T is a formal logic which enables us to

²¹ Nicolescu, 2002, p.55.

²² Reference to Gaston Bachelard's notion of 'epistemological rupture' – showing similarities and differences

²³ Nicolescu, 2002, p.23.

²⁴ Nicolescu, 2002, p.28.

understand *how* what appears to be a complete contradiction on one level gets resolved if viewed or understood from another fundamentally different level of reality. In this non-contradictory way, the logic of the included middle plays a vitally important role in allowing us to imagine the coherence / coexistence of multiple levels of reality with their corresponding levels of perception. To be sure, in the words of Nicolescu, "the logic of the included middle is capable of describing the coherence among these levels of Reality by an iterative process defined by the following stages: (1) A pair of contradictories (A, non-A) situated at a certain level of Reality is unified by a T-state situated at a contiguous level of Reality; (2) In turn, this T-state is linked to a couple of contradictories (A^1 , non- A^1), situated at its own level; (3) The pair of contradictories (A^1 , non- A^1) is, in its turn, unified by a T-state situated at a third level of Reality, immediately contiguous to that where the ternary (A^1 , non- A^1 , T) is found. The iterative process continues indefinitely until all the levels of Reality, known or conceivable, are exhausted."²⁵ As will be explained in more detail below, the introduction of the logic of the included middle T marks a turning point in the understanding of our own thinking and more specifically when looking at the formation and operation of a truly trans-disciplinary dialogue, a critical point, in turn, in comprehending the possibility of the 'unity of our knowledge'. In this regard, it is important to not to see the included middle T merely as a metaphor. Instead, "the logic of the included middle is perhaps the privileged logic of complexity; privileged in the sense that it allows us to cross the different areas of knowledge in a coherent way."²⁶

Transdisciplinarity: Complexity

Complexity or the complex structure in both the levels of reality as well as levels of perception constitutes the third important axiom of Transdisciplinarity. It is when we allow our thinking to be informed and driven by the logic of the included middle that we put ourselves in a position to postulate this complex structure in our knowledge-systems as well as in the structure of reality *per se*. However, although this gives rise to notions of 'coherence' and 'coexistence' between all these different levels, we need to be careful to fall into the trap of simplicity or reductionism whilst claiming to ascribe these categories to our understanding of reality. Although being 'coherent', such coherency should not be confused with notions of stasis or a closed system. On the contrary, the 'coherence' in all the levels of reality and perception is more accurately associated with open-endedness. If we remind ourselves of the earlier notion of a radical rupture between two different levels of reality and perception, then it follows to say that "a new Principle of Relativity emerges from the coexistence between complex plurality and open unity: no level of Reality constitutes a privileged place from which one is able to understand all the other levels of Reality. A level of Reality is what it is because all the other levels exist at the same time."²⁷ In other words, the complexity in the structure of reality and our corresponding levels of understanding of reality can never be understood as something finite, something completely certain and finished. Our knowledge of reality, although, as said earlier, can be coherent, will always be open-ended. This again, as will be demonstrated later, is a key aspect for developing a transdisciplinary hermeneutics as it means that there can never be an *a priori*, transcendental privileged position from which all other levels of reality and/or perception can be viewed from or reduced to. To entertain such ideas will be to fall back into the illusions of Cartesian certainty. What this means for the establishment of a transdisciplinary hermeneutics is a measure of intellectual 'humility' – i.e. acknowledging from the onset the finitude of our disciplinary knowledge boundaries, perhaps even more so when making bold claims to be transcending these boundaries in search of new,

²⁵ Nicolescu, 2002, p.51.

²⁶ Nicolescu, 2002, p. 30.

²⁷ Nicolescu, 2002, p.54.

trans-disciplinary knowledge. On the other hand, this open-endedness in our knowledge does not imply randomness or chaos. To be sure, "quantum physics and quantum cosmologies show us that the complexity of the universe is not the complexity of a garbage can, without any order. A stunning coherence exists in the relationship between the infinitely small and the infinitely large."²⁸

In order for the subject to understand the coherence in the object / reality it is important to 'see' the relationships between things, or the relationships within things. It requires the ability to what Morin referred to above as 'thinking the complex' – i.e. the ability to conceptualise interdependent recursive feedback loops or relationships between seemingly contradictory elements such as order<-->disorder, whole<-->parts, observer<-->observed, subject<-->object, continuity<-->discontinuity etc. For this type of recursive reasoning not to fall in any logical problems of *explanans* and *explanandum*, the introduction of the concepts of 'levels of reality' and the 'included middle' has been very significant. If both *what* needs to be explained as well as that *which* is supposed to do the explaining are sought on the same 'level of reality' Morin's recursive loop might be construed as the proverbial vicious circle. However, if the solution (*explanans*) to an apparent contradiction (*explanandum*) lies at another level all together where the simultaneity of A and non-A is possible, the position of the included middle T, then our ability to 'thinking the complex' has indeed been advanced. Two important aspects about this type of complex thinking must be noted at this point: firstly, that a complex thinking which has been informed and enriched by the notions of 'levels of reality' and the 'included middle', is not the same as that of Hegelian dialectics. The latter always sought 'synthetic' solutions to contradictions, the 'thesis' (A) vs. 'antithesis' (non-A), on the same level of reality, always ending up with a compromise position. "This is why the Hegelian triad is incapable of accomplishing the reconciliation of opposites, whereas the triad of the included middle is capable of it. In the logic of the included middle the opposites are, rather, contradictories: the tension between contradictories builds a unity that includes and goes beyond the sum of the two terms."²⁹

Secondly, that the relationship between the logic of the included middle and the excluded middle is in itself a complementary one, not a mutually exclusive one. "The logic of the included middle does not abolish the logic of the excluded middle: it only constrains its sphere of validity. The logic of the excluded middle is certainly valid for relatively simple situations, for example, driving a car on a highway: no one would dream of introducing an included middle in regard to what is permitted and what is prohibited in such circumstances."³⁰ In other words, the logic of the included middle should not be seen as some sort of a panacea for all type of situations and problems to be solved. It very much depends on the context, complexity and nature of the problem at hand and whether it involves more than one level of reality or not. However, the ability to 'thinking the complex' is hereby significantly improved in that we are not just dependent on the logic of the excluded middle – we have access to a fundamentally different but equally formal logic, the logic of the included middle and this puts us in a position to knowingly decide when, under what circumstances, would it be deemed appropriate to use either or both of these two formal logics. Again, this type of complex thinking has far reaching implications for building our transdisciplinary hermeneutics. The ability to think multi-dimensionally on different levels of reality and having acquired and developed the thinking skills to know when it is appropriate to use the logic of included middle as apposed to or in conjunction with the logic of the excluded middle certainly contributes significantly to our understanding of the conditions for advancing a

²⁸ Nicolescu, 2002, p.38.

²⁹ Nicolescu, 2002, p.30.

³⁰ Nicolescu, 2002, p.30

truly trans-disciplinary dialogue between all the sciences – the means for achieving, or at least making progress towards achieving, our goal of the ‘unity of our knowledge’. – [reference Paul Cilliers here](#)

Complex Unity of the Transdisciplinary Subject and Transdisciplinary Object

From the point of view of a possible transdisciplinary hermeneutics all of what has been said so far about the multi-dimensional ontology, multi-referential epistemology and the logic of the included middle, in a sense, culminates in the notion of the ‘complex unity’ between the Transdisciplinary Subject and Transdisciplinary Object. It is exactly this notion which sets itself apart from both Cartesian modernity as well as Derridian post-modernity. The notion of the subject–object relation being that of a ‘complex unity’ not only decisively breaks with any notion of Cartesian separation, but, through affirming the interactive roles of both the subject and object, it does so in a way that positively postulates the acquisition and gaining of knowledge – not in an absolute finite or completed sense, but as a dynamic and open-ended process in which neither the subject nor the object, or the knowledge emerging from their interaction, can be merely dismissed as ‘social re-constructions’. Transdisciplinary knowledge production acknowledges, on the one hand, the validity and truthfulness of the way in which our ideas and images have come to represent ‘reality’ on and in respect of a certain level of reality. Yet, on the other hand, when looked at from another level, this selfsame ‘reality’ will resist our ideas and representations only to be radically changed and replaced with new ones, equally gaining the status of valid and truthful representation of reality, albeit on another level. ‘Complementarity’³¹ is therefore a key concept in the vocabulary of Transdisciplinarity in the way that knowledge and knowledge production is understood. Although a particular body of knowledge, the assumptions, ideas, concepts and laws on which it is based, e.g. Newtonian science and thinking, gets replaced with another body of knowledge, e.g. quantum physics, we end up with two complementary bodies of knowledge. In other words, both these bodies of knowledge have equally succeeded in capturing and representing ‘reality’ in a valid and truthful way. However, by being able to recognise their complementarity we do not have to come to the conclusion that we are dealing here with mutually exclusive or self-contradictory bodies of knowledge and therefore slump into an eternal or universal doubt of the relation between the *sign* and *signifier*, between the *subject* and *object*. If the passage of the representation of one level of reality to another is understood by means of and in terms of the logic of the included middle there is no need to completely discard with the subject’s ability to truthfully capture and depict ‘reality’. It is only when this passage is in itself understood in terms of the logic of the excluded middle, that we end up in the position of the radical deconstructionists that the subject–object relation has forever been severed and all that is left are our social, inter-subjective re-constructed ‘illusions’ of what might exist on either side of the subject–object relation.

The way in which the complex unity or complementarity between the Transdisciplinary Subject and Transdisciplinary Object is conceived is to bring into focus the simultaneous *coherence*

³¹ Referring to the wave / particle conundrum, Heisenberg refers approvingly to Bohr’s use of the term ‘complementarity’. “Bohr considered the two pictures – particle and wave – as two complementary descriptions of the same reality” – Heisenberg, *Physics and Philosophy*, p.44. It would appear that Heisenberg does not necessarily use the notion of different ‘levels of reality’ when thinking about the complementary structure of reality. However, it could be argued that there is no inconsistency here and that the notion of ‘levels of reality’ is a further refinement of our understanding of reality in that its complementarity exists *between* the different levels. This implies that we can grasp the *simultaneous* continuity and discontinuity of reality – a unity *within* diversity.

between the 'levels of reality' and the 'levels of perception'. The radical ruptures or discontinuous breaks between the different levels of perception and reality is not the only aspect about the structure of reality that we can describe. Ultimately, there is only one, coherent reality of which we are part of, albeit on different levels. To fully understand this complex unity between the transdisciplinary subject and object it is necessary to conceive of the possibility of 'non-resistance' of our ideas. In other words, just as it was necessary to imagine the resistance of our ideas and representations by what is engaged with and considered as 'reality', so it becomes possible to posit moments of 'breakthrough' when there is no more resistance, where it becomes possible to affirm positively that our ideas, images and representations have succeeded in capturing and signifying 'reality' truthfully – a zone where sign and signifier, and subject and object meet. In fact, it is necessary to refer to two zones of 'non-resistance' – one in respect of the levels of reality, which constitutes the transdisciplinary Object, and the other in respect of the levels of perception, constituting the transdisciplinary Subject. The critical moment of this meeting between the subject and object taking place is when the flow of consciousness cutting across the levels of perception meet up or match the flow of information cutting across the levels of reality. Needless to say, the role of the included middle is absolutely crucial in understanding how this meeting or correspondence between subject and object takes place. In the words of Nicolescu, "the unity of levels of Reality and its complementary zone of non-resistance constitutes what we call the transdisciplinary Object", on the one hand, and " the unity of levels of perception and this complementary zone of non-resistance constitutes what we call the transdisciplinary Subject", on the other hand, and, this is critically important, "the two zones of non-resistance of transdisciplinary Object and Subject must be identical for the transdisciplinary Subject to communicate with the transdisciplinary Object". In essence, it is a "flow of consciousness that coherently cuts across different levels of perception which must correspond to the flow of information coherently cutting across different levels of Reality. The two flows are interrelated because they share the same zone of non-resistance. Knowledge is neither exterior nor interior: it is simultaneously exterior and interior. The studies of the universe and of the human being sustain one another. The zone of non-resistance plays the role of the secretly included middle which allows the unification of the transdisciplinary Subject and the transdisciplinary Object while preserving their difference".³²

Conceptualising the nature of the subject–object relation in this way indeed conjures up images of a dynamic and complex unity. This unity is made possible by virtue of the simultaneous resistance and non-resistance of our ideas, by the simultaneous *continuity* and *discontinuity* in our understanding of reality. Knowledge gained this way can never be understood in static manner as a closed-system. What is considered as valid and true knowledge on one level, or a shared zone of non-resistance between levels of perception and levels of reality, can be resisted only to be changed radically to make way for fundamentally different imaginations and representations – a process which will forever remain open-ended. However, stressing this open-endedness should not detract us from focussing on the 'shared zone of non-resistance' – those 'moments' in flowing process where the subject and object meet, where it is possible to state positively that our ideas and representations of 'reality' have managed to correctly and truthfully capture what it has been wrestling with to understand. This indeed goes to the heart of a transdisciplinary hermeneutical theory of understanding and knowledge generation. Without this positive conceptualisation of the possibility of the subject meeting the object, of sharing a zone of non-resistance, we will not be able to go any further with explaining how, hermeneutically speaking, this could be understood at the level of a trans-disciplinary dialogue seeking to cross

³² Nicolescu, 2002, p.55.

disciplinary boundaries in pursuit of sustainable solutions to the *problematiques* or *polycrisis* facing us all today. If this was not possible, we will forever remain entrapped in the already severed *subject* <-> *object* relationship of Descartes, with the different variations of idealism and positivism as the only possibilities, or the post-modern position denying this relation *per se* as a mere social re-construction with very little chance of positive knowledge generation and acquisition. However, having asserted the positive, yet complex and dynamic, position of Transdisciplinarity, it now remains our task to explain how what has been conceptualised at the ontological, epistemological and logical levels can in fact be brought into an understanding of how the different disciplines can cross their boundaries to meet in a 'zone of non-resistance', as it were. How do we understand and explain this in the context of interdisciplinary dialogue where the complex nature of the *problematiques* we are dealing with transcends levels of reality and therefore disciplinary boundaries? Reaffirming our earlier point of departure, namely that sustainable solutions to the complex problems we are facing today cannot come from a mono-disciplinary position within a fragmented knowledge-system, and having established the transdisciplinary conditions of knowledge generation and acquisition, our goal, therefore, is henceforth to explore the possibilities of establishing a truly trans-disciplinary dialogue from which may emerge new, transdisciplinary knowledge *of* and *for* our troubled world.

Summary

Before we proceed with our task, it is important to provide a summary of the important points that have emerged so far and which will be brought into and integrated with certain key hermeneutical concepts with a view to develop our transdisciplinary hermeneutics in a systematic and logical way. This will also be helpful to explicate certain ontological, epistemological, methodological and logical assumptions as we intend moving into the conceptualisation of such a transdisciplinary hermeneutics:

- Reality, although represented by the language, images and ideas of the interpreting subject, cannot be reduced to these representations – reality is trans-subjective and, therefore, has the ability to always resist, and even ruin, our very best scientific or non-scientific theories and ideas;
- Reality is ultimately coherent, but this coherency cannot be understood in static terms, but should rather be understood in terms of the structure of reality which is both discontinuous and continuous at the same time – whilst one level of reality is fundamentally different to another, the overall structure of reality displays a remarkable unity or coherency;
- To the extent that our notion of 'matter' informs our perceptions and ideas on the being and nature of 'reality', it is important to note that from a transdisciplinary point of view such notions may include both materialistic as well as non-materialistic viewpoints.
- The possibility of accurate and truthful representation of reality and knowledge generation is established in the one-to-one relationship which exists between levels of perceptions and levels of reality on the same horizontal plane;
- However, at the same time of such concurrence, we also have to acknowledge that there are radical breaks between the different levels of perception with the implication of having to formulate fundamentally different ideas and images if we want to understand the discovery of a new level of reality – the latter cannot be understood or recognised in terms of the 'old' concepts associated with a another level of reality;
- The above simultaneous concurrence / continuity and non-concurrence / discontinuity between the different levels of perception implies being able to 'thinking the complex' – i.e.

the ability to imagine the possibility of something being itself (A) and non-self (non-A) at the same time.

- We are not solely dependent on the age-old and dominant Aristotelian logic of the excluded middle – the logic of the included middle is an equally formal logic which can explain, if read together with the notion of ‘levels of reality’, the phenomenon of simultaneity between the identity (A) and non-identity (non-A) of a problem, a problematic situation or an apparent contradiction – it is only when looked at from the point of view of another level all together that an apparent contradiction becomes resolved;
- The relationship between the two logics of the included and excluded middle is in itself not a mutually exclusive relationship – the discovery of the logic of the included middle should not be transformed into a panacea for all problems and all situations – when to use what logic is context specific and the choice over which logic is the more appropriate under certain given circumstances must be done with the necessary circumspect.
- Our knowledge of reality is constituted by the dynamic interaction between the correspondence and non-correspondence of the horizontal and vertical relationships in the structure of the levels of perceptions and levels of reality – the one-to-one relationship between the subject and object at the horizontal level, resulting in accurate and truthful representations of reality, is as much responsible for the constitution and establishment of our knowledge as is the epistemological dis-locations or breaks between the vertical levels – to know what ‘is’ is as important as to know what ‘is not’ for the possibility of any new knowledge to emerge;
- The transdisciplinary triad of A, non-A and the included middle T should not be confused with Hegelian dialectics of thesis, anti-thesis and synthesis – for a ‘solution’ to be found situated at another level of reality and perception all together it is necessary to formulate completely different concepts and laws – without these the different level of reality will not be ‘seen’ – we therefore cannot merely use the same concepts and laws as was used in identifying the contradiction between the ‘thesis’ and ‘anti-thesis’ of Hegelian dialectics – in this case, if the solution contains a ‘synthesis’ of previous ideas and laws it begs the question whether the simultaneity between A and non-A can be conceptualized as a probable ‘solution’ to the apparent contradiction.
- The complex unity between the transdisciplinary subject and object marks a decisive break with three traditions of thought simultaneously: (a) simplistic romantic or mystical ideas of knowing reality ‘directly’, (b) the Cartesian dualistic separation of the subject and object and (c) the radical deconstructionist position of an illusory, socially reconstructed subject–object relation *per se* – the notion of knowledge emerging out of the dynamic and intense interplay in the processes of resistance *and* non-resistance not only confirms the role and function of both the subject and object *in* the subject–object relation, but it also affirms the impossibility of transcendental or ‘directly’ accessible knowledge;
- The idea that our knowledge of reality is being produced when there is both *resistance* and *non-resistance* to our ideas signifies the fundamental open-endedness of the knowledge acquisition and generation process. The accurate and truthful representations of reality, on a particular level of reality, can quite easily be resisted when trying to apply them to another level of reality – such resistance implies having to radically reformulate new ideas and images, which, in principle at least, can never reach a stage of finality;
- The fundamental open-endedness and dynamism of the transdisciplinary knowledge acquisition and production process, therefore, implies a safeguard, as it were, against all

forms of intellectual ideology. This includes a safeguard against itself in that all ideas produced by transdisciplinarity, especially when claiming to have entered the 'zone of non-resistance' and having transcended disciplinary boundaries, should be subject to this ongoing process of resistance and non-resistance. Therefore, transdisciplinarity can never be construed as some or other 'meta-discourse'. Should such bold claims be made, consciously or sub-consciously, it would have placed itself outside the dynamic processes characteristic of the complex unity of the subject–object relation.

4. Towards the Foundations of a Transdisciplinary Hermeneutics – Key Hermeneutical Concepts

One of the great founding figures of hermeneutic philosophy, Martin Heidegger, said that the starting point of any act of understanding is when something has broken down. In everyday life this could be something as mundane as a broken hammer. It is not until it has actually been shattered that we start to question what a hammer really 'is' – how it was assembled or made, what materials were used, how and for what purpose is it used etc. This might seem like a very simplistic example, but it illustrates the point that our questioning into the being and functioning of something is very closely associated with the notions of 'break down' and 'rupture' in what has broken down and the context or environment in which the object was perceived to be part and parcel of. From what has been already mentioned in the introduction in respect of the unprecedented scale and levels fragmentation this notion of a 'break down' as the starting point for our hermeneutic inquiry is a very relevant one. As was argued earlier, we are today living in an unsustainable, troubled world with major complex *problematiques* to be solved. However, the *polycrisis* we are facing is not only a phenomenon of something which has gone wrong in the world 'out there', detached or separated from ourselves. Such an abstract viewpoint of the world and relationship to it is typical of the Cartesian *subject*↔*object* separation. On the contrary, from the point of view of the non-separability or complex unity of subject–object relation, we cannot detach ourselves, our own thinking, from the fragmentation happening in the world today. Inquiry into the complex nature of what has 'broken down' in the world cannot remain at the level of 'objective analysis' only if our own thinking is inextricably interwoven with the very fragmentation we are trying to understand. The multi-dimensionality of the complex social-ecological problems we are facing today implies the straddling of different levels of reality and requires a new interpretive-engagement from our side. Inquiry into what has gone wrong, what is causing our world to being torn apart reveals that we are dealing with levels of complexity not witnessed before. Applying abstract thinking which 'ab-stracts' itself from the planetary context can only lead to a further perpetuation of the problem of fragmentation in that 'solutions' being sought from within such abstract thought would be inclined to 'scientifically' discover and manipulate the 'objective' laws responsible for the breakdown in the world – without ever seeing a need to question or change the thinking which has gone into producing the *problematiques* we are facing today. To then return to Heidegger's example and metaphor of the broken hammer. We cannot merely in some or other instrumental way substitute the 'hammer' with the 'world' as an 'object' independent from ourselves. What has, or rather is, going wrong in the world today is intermingled with our ideas and perceptions of *who* we are and *how* we think. When we touch the world to want to 'fix' it, it is already infused with our ideas and thinking patterns. It is therefore advisable that we acknowledge our inseparable relationship with the world, rooted in the notion of a complex unity of the subject–object relation, and, consequently, to reaffirm our point of departure that the unity in our knowledge-systems is a prerequisite for finding sustainable solutions to the *polycrisis* facing each and every individual, nation and society on the planet.

Fusion of Horizons: The Importance of Contextuality

Building on the core ideas of Heidegger, Hans-George Gadamer argues that our inquiry or questioning into the being and functioning of *what* has 'broken down' always occurs within a certain time horizon. 'Understanding' is therefore never time-less or a-temporal. Instead, it should always be seen as temporal or historical in the sense that the past, present and future is always present and inextricably linked in any act of understanding. This means that our *past* and *present* efforts to want to know *what* something *is* or *how* it works are motivated by our concerns or expectations of the *future*. This, in turn, implies that our inquiry into a particular problem is never 'value-free', but is fundamentally influenced by our expectations and perceptions of the future. This means that we never 'see' reality directly, but always *as this* or *as that* in terms of our own 'horizon of understanding'. By emphasising the temporality of our understanding, Gadamer acknowledges the inherently contextual nature of our understanding the world.

This importance of this historicity (Geschichtlichkeit) and contextuality of our understanding will be elaborated on in some more depth later on. However, suffice to emphasize here from the start that this impossibility of 'value-free' interpretation is not restricted to our everyday life encounters or only to the social sciences where we are, per definition, both players and spectators, observers and observed, of the very life processes we are trying to understand. We do not have access to an a-temporal position or vantage point from which we can completely 'objectively' understand the world. Whether in our daily encounters or in the science laboratory, we cannot escape the temporality of our own understanding. The consequence of this contextuality for the understanding process is that the interpreting subject influences the way the object is being looked at. Werner Heisenberg, although coming from a different intellectual tradition, i.e. quantum physics, makes a similar point on the role and effect of the observer on the observed. After having discussed the similarities, and especially, the differences in the role of 'observation' between classical and quantum physics, Heisenberg concludes that in science "we have to remember that *what* we observe is not nature in itself, but nature exposed to our *method of questioning*. Our scientific work in physics consists in asking questions about nature in the language that we possess and trying to get an answer from experiment by the means that are at our disposal"³³. When we set up our 'scientific' methods of experimentation and use our socially evolved language to inquire into the structure of nature, we will always 'see' *in terms of* the limitations of these methods and language barriers. What 'happens' between one experiment and another we will never be able to know – at least when trying to understand what happens in the sub-atomic structure of reality. Acknowledging the role of the observer implies that the observer 'influences' what is *being* observed. However, a word of caution is necessary here as this does not mean that the observer exercises some psychical or mental powers *over* the observed: "The transition from the 'possible' to the 'actual' takes place during the act of observation. If we want to describe what 'happens' in an atomic event, we have to realize that the word 'happens' can apply to the observation, not to the state of affairs between the two observations. It applies to the *physical*, not the *psychical* act of observation, and we may say that the transition from the 'possible' to the 'actual' takes place as soon as the interaction of the object with the measuring device, and therefore the rest of the world, has come into play; *it is not connected with the act of the registration of the result by the mind of the observer*"³⁴.

Flowing from this idea of the contextuality of our understanding, Gadamer introduces another key notion for our purposes of developing a transdisciplinary hermeneutics. According to Gadamer 'understanding' occurs when there has been a 'fusion of horizons'. This notion contains two

³³ Heisenberg: *Physics and Philosophy*, p.57.

³⁴ Heisenberg: *Physics and Philosophy*, p.54.

crucially important aspects for our task at hand. In the first instance, the said impossibility of 'value-free' or 'presuppositionless' understanding does not negate the possibility of understanding *per se*. On the contrary, 'understanding' is being made possible because of the presence of our assumptions and presuppositions – not because they are absent. A 'fusion of horizons' can only happen when there has been an exchange or change in the assumptions underpinning a certain mode of understanding the world. Therefore, when we want to understand something we should not aim to discard or pretend that we do not have or hold presumptions. We should rather aim to explicate³⁵ them or becoming aware of these assumptions, critically evaluate them and change them if necessary. "We started by saying that a hermeneutical situation is determined by the *prejudices* that we bring with us. They constitute the *horizon* of a particular present, for they represent that beyond which it is impossible to see. But now it is important to avoid the error in thinking that it is a fixed set of opinions and evaluations that determine and limit the horizon of the present, and that the otherness of the past can be distinguished from it as from a fixed ground. In fact the horizon of the present is being continually formed, in that we have continually to test all our prejudices. An important part of this testing is the encounter with the past and the understanding of the tradition from which we come. Hence the horizon of the present cannot be formed without the past. There is no more isolated horizon of the present than there are historical horizons. Understanding, rather, is always a *fusion of these horizons* which we imagine to exist by themselves. In tradition this process of fusion is continually going on, for the old and the new continually grow together to make something of living value, without either being explicitly distinguished from the other."³⁶

The second important point about Gadamer's notion of a 'fusion of horizons' is that it suggests that a totally new way of 'seeing' the world can emerge from such a 'fusion' between the different ways the world have been perceived or understood *before* the occurrence of the hereof. To comprehend the full impact and consequences of this idea it is necessary to again contrast it with the Hegelian notion of 'synthesis', which as suggested earlier signifies more of a 'merging' or 'blending together' of previously held views, the outcome of which is a compromise view of the world – still containing the assumptions, possibly even contradictory ones, of previously held viewpoints. Gadamer has much more in mind with his idea of a 'fusion of horizons'. What emerges³⁷ when such a 'fusion of horizons' takes place is indeed a fundamentally *new* way of seeing and understanding the world – not just a mere adding up of extant viewpoints and perceptions, but, instead, 'seeing' the world in ways not known before. In order for this to happen it is critically important that we do away with any fixed ideas or over-reliance on method in our thinking. To be able to understand something, especially in a new way, is not a foregone conclusion. If we want to understand the world differently we cannot through method assume to only understand what is already known more thoroughly. We need to know the limitations of our own methods of inquiry and, instead, having to adopt a fundamentally *openness* in our approach of questioning, which means admitting that we know that we do not know. This is, then, the only way that we stand a chance of discovering new ways of understanding the world and for us to be able to speak of a 'fusion of horizons' taking place between subject and object in open dialogue with each other. More will be said on this below under the heading "Fusion of Horizons: The Importance of Dialogue and the Disclosure of Reality".

³⁵ Michael Polanyi ... tacit -> explicit knowledge ????

³⁶ Gadamer, 1975, pp. 272 – 273.

³⁷ Introduce the idea that this new understanding of the world is an 'emergent property'???

Fusion of Horizons: Critique of the Subject <- > Object Partition

Since this notion of a 'fusion of horizons' has the potential to explain in more detail how the earlier transdisciplinary notion of new concepts, ideas and representations of reality emerging from a dynamic interplay between the processes of *resistance* and *non-resistance*, it is in our interest to go into this in more depth. From the point of view of systematically developing a transdisciplinary hermeneutics, it is very important to fully understand not only *how* the formation of new ideas work at the epistemological level, but also how such insight can help us to better understand the manner in which the unity of our knowledge can be achieved as 'fusion of horizons' at the level of a truly trans-disciplinary dialogue. However, before we analyze this in more detail it is important to first look into Gadamer's critique of the *subject <-> object* dualism which has dominated Western thinking so profoundly over the years. This will be informative in that it will give us an idea of what the 'fusion of horizons' is meant *not* to be. Consequently, this would be helpful to know what thought patterns should be avoided if we are not to repeat the very same binary / dualistic thinking which we are trying to overcome. Falling into such a trap is a perennial philosophical problem and if not consciously avoided will have some far reaching consequences for developing a transdisciplinary hermeneutics. Following Heidegger's thinking, 'subjectism' (Subjektivität) is the term that Gadamer uses to critique that tradition of thought which sought to locate the certainty of knowledge *in* the thinking subject – a tradition that started with Plato's believe in the 'reality' of the realm of ideas *separate* from the corporeal world. As we know, this central epistemological belief got usurped and transformed into, on the one hand, Kant's system of *a priori* thought categories as well as, on the other hand, by Descartes' ideas on the supremacy of *res cogitans* over *res extensa*, given the thinking subject's capability of producing the mathematical principles³⁸ underlying the corporeal world. In other words, the attempt to secure the certainty of our knowledge resulted in the ascendancy of the subject *over* the object. What started out with Plato as dancing images on the back of a cave, were transformed into and given transcendental (Kant) and mathematical (Descartes) status which increasingly was perceived as being more 'real' than the tangible world 'out there'.

Juxtaposed to this is what Gadamer refers to as 'objectism' (Objektivität) – that mode of thought which not only severely doubted and rejected the knowing faculties of the subject as the seat of the certainty for and of our knowledge, but also tried to replace this dubious certainty provided by the subject with an even more secure certainty – i.e. 'valid' and 'true' knowledge which can be verified only through scientific observation and experimentation. As we know, 'objectism' has its roots in Aristotelian thinking, but was refined and elaborated upon in great detail in the positivist and empiricist traditions by the likes of Berkeley, Locke and Hume. Although diametrically opposed in situating the locus of our knowledge and the methods to be used to acquire such knowledge, both subjectism and objectism share the unshakeable belief in absolutely certain knowledge. This separation of the subject and object has had far reaching consequences for the way that our thought patterns and knowledge systems have developed in the West. Not only has nature been *objectified* into an 'object' consisting of certain universal or mathematical laws (ontology), but the knowledge through scientific discovery (epistemology) of these laws became *subjected to* the needs and will-to-power³⁹ of the analytical and conquering subject. However, on either side of the

³⁸ Heidegger fittingly refers to Descartes thoughts as the 'mathematization of thought'.

³⁹ 'Will-to-power' is thought of here in negative sense to over-power, as defined by Foucault in his numerous writings on the intimate relationship between knowledge and power. However, this does not mean that the knowledge–power relation should only be imagined in negative terms. This relation also has a positive or productive side to it, in the sense that it produces knowledge. More will be explained on the importance of this positive-productive aspect of the knowledge – power relation under the heading "Fusion of Horizons: The Knowledge–Power Relation" (see p. 31).

subject <--> *object* divide, nature has lost its 'unity' or 'coherence' and became increasingly seen as some-thing to be exploited or tortured (Francis Bacon) until she 'reveals' her secrets in the name of 'progress' or 'development' of humankind.

Fusion of Horizons: The Importance of Dialogue and the Disclosure of Reality

The crux of this techno-scientific thinking or instrumental reasoning⁴⁰ with its promise of certainty, argues Gadamer, has been the lack of *dialogue* between the subject and object and is, consequently, the complete anti-thesis of hermeneutical thinking. 'Understanding' can only happen in and through a true spirit of Socratic dialogue between the subject and object and where the subject does not 'interrogate' the object, but immerses and engages itself in and through a process of 'listening' and 'hearing', opening itself up for what the object has 'to say'. The notion of 'disclosure' is a pivotal one in this regard. If 'understanding' is to happen, the inquiring subject does not approach the object with a predisposition of 'mastery' over the object, so typical of analytical and reductionist thinking. For example: if we say the 'tree is green', it is not so much due to the inventiveness of the subject as it is what has been 'given' to the subject – over millions of years of evolution⁴¹ – and what the subject has learnt *from* the surrounding natural world, enabling the subject to describe it *as* this or *as* that. Allowing the object to dis-close itself, to *be* named *as* this or *as* that, is a fundamentally different approach to that of subjectism, asserting that the 'greenness' of the tree is in essence what already pre-exists in the mind as ideas (Plato), *a priori* thought categories (Kant) or mathematical principles (Descartes). To allow the object to disclose itself *to* the subject, the subject has to be fundamentally 'open' *to* the object. And, to be able to 'listen' and 'hear' what the object has 'to say', the subject not only has to be attentive to what *is* being said or disclosed – it also needs to ask the question what is *not* being said or disclosed – in other words, trying to go beyond what is 'given' and get a more thorough understanding of the wider context of relationships in which the act of disclosure is taking place. This fundamental 'openness', this ability to focus the attention simultaneously on what *is* said as well as on what is *not* said, says Gadamer, happens when the inquiring subject develops the ability to become aware of its own context or 'horizon of meaning' – i.e. becoming aware of its own assumptions and presuppositions, which inform and direct the process of inquiry and questioning into the 'disclosing' object. Critically important in this regard is that the subject does not interrogate the object with its so-called transcendental knowledge categories and concomitant methods, which the object can only affirm or deny. Instead, as a fundamental point of departure when approaching the object, the subject knows that it does not know, accepts the limitedness or finitude of its own knowledge, and in so doing allows the object to *disclose* itself in ways completely different to what has been known before.

Therefore, this 'openness', i.e. the ability to become aware of our own assumptions, is key to any act of understanding. It is in this sense that Gadamer asserts that there is no 'value-free' or 'pre-supposition-less' understanding of the world. We can never think of our understanding as a *tabula rasa* – as if we are 'free' of any presuppositions. Neither should we try and imagine that this is how any act of 'understanding' should be construed. As already mentioned, 'understanding' happens *because of* the presence of our assumptions – not because of their absence. Should we assume or aspire to any notion of a *tabula rasa* in order to explain how our understanding occurs, we would

⁴⁰ The works of Habermas, amongst others, give a detailed explanation of these concepts.

⁴¹ The 'greenness' of the tree did not only start over 4 billion years ago with the evolution of the blue-green algae and bacteria as the first forms of life on earth, but also culminated in the evolution of the complex physiology of the human brain and speech organs to be able to receive and articulate *through* language the frequency of the tree's light waves *as* 'green' waves. – Paul Ehrlich, *Human Natures*, pp. 139 – 163.

be making a serious mistake in our thinking. 'Understanding', any act of understanding, is made possible when we become aware of our assumptions and demonstrate a willingness to change these. The 'disclosure' of the object should not be associated with a notion of an 'empty' or 'passive' subject which merely 'receives' or 'takes in' what the object dictates *to* it in a linear or unilateral sort of a way. The object can only 'disclose' itself through a process of true questioning by the subject. "In all experience, the structure of questioning is presupposed. The realization that some matter is *other* than one had first thought presupposes the process of passing through questioning". And, "in order to be able to question one must will to know, and that means, however, to know that you do not know."⁴² This openness, literally to 'lay in the open' what we do not know, means that we can never through *method* assume that we only need to understand what is already known and to understand this more thoroughly. A 'fusion of horizons' can only happen when extant assumptions, tacit or explicit, about what is known and especially what is *not* known are laid out in the open. Only then does it become possible to speak of our horizons being 'fused' into a new understanding of the world. This is the crux of Gadamer's dialectical hermeneutics – 'understanding' occurs in a situation of open dialogue between the subject and object where the underlying ontological and epistemological assumptions and preconceptions of *what* (Sache) is being looked at and *how* we gain knowledge of the object is continuously being brought to the surface, critically evaluated and changed in order to 'see' and understand the world in a fundamentally new way.

Gadamer's notion of 'disclosure', which is neither subject- nor object-centred or dominated but, instead, comes into its own through dialogue between the subject and object shows some important similarities with Nicolescu's definition of 'reality'. Reality, as was illustrated earlier, can make itself known through both processes of *resistance* and *non-resistance*. Whilst at the moment still operating at the ontological-epistemological level, when read in concert these concepts of 'disclosure', 'reality', 'resistance' and 'non-resistance' have the potential in providing us with an enriched conceptual picture of how the coherence of knowledge emerges out of the interplay between both the continuity and dis-continuity in the structure of our levels of perception. When *opening* itself up in dialogue with the object, the subject allows itself to have its existing ideas, images and representations of 'reality' to be either resisted, when dealing with another level of reality, or confirmed (non-resistance) when dealing with a similar level of reality where there is a one-to-one relationship. The 'disclosure' is not merely a linear or smooth process without any conceptual turbulence, as it were. In so far as this disclosure is experienced *as* resistance images of conceptual 'battle' comes to mind. The contestation of ideas, concepts and theories associated with a fundamental change *from* a materialistic / mechanistic worldview, infused with concepts such as time, space, cause-effect, linearity, etc., *to* a relational / non-materialistic worldview, with completely different and new concepts and ideas such as global causality, non-linearity and reversibility (of time) etc. does not happen smoothly. Without wanting to over-dramatise the situation, it is perhaps closer to the truth to say that we are looking at something closer to or resembling a conceptual 'warfare' here as old worldviews and concepts are completely blown-up to pieces, only to make way for and be radically transformed into new ideas and worldviews. And yet, our knowledge of reality does not only emerge from this process of *difference*, *rupture* and *resistance*. This is merely the one side of the stick with two inseparable ends. The other end or side is that of *concurrence*, *confirmation* and *continuity* in our representations of 'reality'. In this zone of non-resistance the subject's ideas correspond with what has been disclosed *to* itself by the object. There is a meeting point between signifier and signified, between the subject and object. The subject-object relation cannot be reduced to either that of only difference / resistance or only concurrence / non-resistance. This would be to fall back into the irreconcilable binary positions posted by, as already mentioned, deconstructionism and idealism-romanticism respectively. To understand how this act of 'disclosure' can be both resistance *and* non-resistance, both continuous

⁴² Gadamer, 1975, pp. 344 – 345.

and dis-continuous, at the same time, it is necessary to re-imagine the multi-dimensionality in the structure of the levels of reality as well as levels of perception. On one level, 'disclosure' signifies resemblance and concurrence between the object and the subject's representations, laying the foundation for valid and truthful knowledge. Yet on another level, reality 'discloses' itself through showing the complete opposite side of itself, completely different where the concepts and representations linked and associated to the previous level of reality are entirely dis-similar. However, the *new* concepts, images and representations, borne out of contestation manage to enter their own zone of non-resistance and, in so doing, succeed in providing accurate representation of the new level of reality in question – representing yet another layer of valid and truthful knowledge. Such, then, is our enriched understanding of the multi-dimensional notion of 'disclosure' and, if looked at in terms of the logic of the included middle, this notion can be justified and defended on formal logical grounds.

Fusion of Horizons: Understanding and the Role of Assumptions

Now that we have a more thorough understanding of how the dynamic process of a 'fusion of horizons' occurs *as* 'disclosure' at the ontological-epistemological level, we can return to and explore in more depth the said role and function of assumptions and pre-suppositions in the act of understanding. As already mentioned the temporal / contextual character of our understanding dictates that our understanding of the world can never be 'pre-supposition-less'. However, it was also said that this impossibility of 'value-free' understanding does not render the very act of understanding unattainable. On the contrary, understanding occurs because of and when there has been an exchange or change in assumptions between the subject and object. In other words, when the processes of *resistance* and *non-resistance* of our ideas are in motion the assumptions underpinning are our ideas is what comes into focus. Our ideas of the world and ourselves in the world are never 'pure' or 'un-tainted', but are always infused with assumptions of various kinds – as will be explained in more detail later. However, if it is true that understanding happens because of the presence, not their absence, of assumptions, what is of particular importance from our point of view of developing a transdisciplinary hermeneutics is to examine how our enriched insights developed and gained at the ontological-epistemological level can be brought across to deepen our understanding of what happens at the level of interdisciplinary dialogue. In other words, what has been said so far in general about the subject–object relation needs to be translated and brought into the context of the various disciplines coming together in pursuit of sustainable solutions to complex problems. To be sure, 'the subject' having been focussed on thus far in our discussion does not only refer to the individual level of inquiry into the object, but can also refer to the inter-subjective or collective levels of inquiry. The question, therefore, is: when the different disciplines come together to engage with complex problems (the object), what exactly, then, happens when there is resistance and non-resistance to our ideas? More specifically, what happens when some of those deep-seated assumptions underpinning our disciplinary ideas have surfaced to the level of self-awareness? How do we go about dealing with them once we have become conscious of our own disciplinary assumptions? Is the hermeneutical ideal in a trans-disciplinary context attainable? In other words, can the *resistance* coming from fundamentally different assumptions underlying our disciplinary views and ideas of the world be the starting point of developing a shared, trans-disciplinary understanding of our troubled world and what needs to be done to solve the *polycrisis* facing us? Is the multi-dimensionality and multi-referentiality of our ideas around 'reality', 'disclosure', 'resistance', and 'non-resistance' etc. strong enough, or, have we developed them strong enough to assist us in imagining the unity of our knowledge as a trans-disciplinary 'fusion of horizons'. Or, do we need to go back to the proverbial drawing board?

Assuming that what we have developed conceptually so far has sufficient substance to proceed with our task at hand, the next step would be to further explore the potential of the notion of a trans-disciplinary 'fusion of horizons' as a means to better understand how to deal with assumptions that have reached the level of awareness. Not all our assumptions are of the same kind and may deserve different responses when they have been surfaced. This question will be returned to later once the inputs of Thomas Kuhn have been considered in more detail. What is of particular relevance to our discussion here is how to deal with surfaced assumptions specifically at the ontological-epistemological level. These would be assumptions that are underpinning our tacit or explicit understanding of the nature of reality (the object) and how we gain knowledge of the latter which are in need of radical change. If we do not change these assumptions, we would not be able to 'see' reality differently, or 'see' another completely different side or 'level of reality'. Unchanged assumptions would result in a situation of binary opposite viewpoints of A vs. non-A with very little, if no, possibility of a 'fusion of horizons' taking place. Such unchanged assumptions would in fact prohibit a 'new', trans-disciplinary understanding from emerging, with no new ideas and concepts with which to identify another level where solution(s) might be situated. The earlier example of the role and function that certain materialist assumptions played in the Copenhagen interpretation of quantum physics is once again a good case in point. How do we deal with these types of assumptions which seemingly *only* work in the direction of resistance with no prospect of entering into the zone of non-resistance? Clearly, the possibility of a trans-disciplinary understanding to emerge depends on how we deal with ostensibly mutually exclusive presuppositions.

Fusion of Horizons: Suspension of Assumptions

These are rather complex questions and evidently cannot be answered in a simplistic manner. However, the ideas developed by the quantum physicist, David Bohm, may contain some very important pointers in the right direction. Bohm shares, I believe, very similar ideas to those of Gadamer on *dialogue* and how *shared understanding* emerges when there is an exchange of assumptions between those engaged in a dialogue. Like Gadamer, he believes that 'understanding' is never presupposition-less and should, consequently, never be construed as 'value-free'. For Bohm, 'understanding' also occurs because of the presence of our assumptions – not because they are absent. However, he offers some important further insights on how we can deal with these assumptions of ours when in dialogue with others. He suggests that rather than trying to discard or suppress our assumptions, we need to 'suspend'⁴³ them. In this act of 'suspension' we not only become aware of our assumptions, but we also refrain from either voicing them or acting upon them. It is not to deny their presence. Instead, it is more about keeping them in abeyance whilst we create the thought-space to allow other thoughts or ideas to come to the fore. In other words, it is developing the ability to hold many points of view in suspension, whilst our primary interest is in the creation of a new, trans-disciplinary understanding. In short, suspending an assumption does not mean ignoring it, but rather 'holding it in front of us' ready for exploration.

This idea has a lot of value for developing our transdisciplinary hermeneutics. Being able to deal with our assumptions through this act of 'suspension' not only helps us to comprehend the multi-dimensionality of the process of 'understanding', but also helps us to know whether we are in an inter-, multi- or transdisciplinary mode of understanding of the world. As for the latter, I will return to this in more detail once Kuhn's ideas on the role and function of 'paradigms' in scientific communities have been discussed. Suffice to say here that the notion of 'suspension' allows us to not totally discard with certain assumptions as they may very well still be 'true' or 'valid' when

⁴³ David Bohm: see his entire work, *On Dialogue*, but for the act of 'suspension' see specifically pages 73 – 83.

dealing with a particular 'level of reality'. On the other hand, if another fundamentally different 'level of reality' is being encountered and requires a radical revision or change in ideas, the 'suspension' of assumptions enables the emergence of a fundamentally new understanding of this different level of reality. In so doing, we allow 'reality' to 'resist' our extant ideas and to 'disclose' itself to us in more than one facet or dimension, whilst, at the same time, not discarding with those other assumptions underpinning fundamentally different ideas. Needless to say, being able to simultaneously suspend and/or change the assumptions supporting our ideas about the world is a key element for the trans-disciplinary 'fusion of horizons' to materialise. Knowing that the assumptions supporting their particular disciplinary bodies of knowledge are kept in abeyance, the different disciplines can enter into dialogue with each other in an *open* manner that would create the necessary intellectual space to seek fundamentally new ideas, concepts and representations with which to explore the discovery of other 'levels of reality' from which to look at the world and its complex problems. Creating this intellectual space also means that it allows the different disciplines to openly express what is *not* known from the vantage and methodological viewpoint(s) of all those disciplines engaged in dialogue with each other. Creating this open intellectual space through the act of suspension can be seen as a crucially important 'forerunner', as it were, to entering the zone of non-resistance. In this open space, the disciplines in dialogue with each other can explore fully and freely any new ideas, based on radically different assumptions, knowing that the disciplinary positions from which they have entered into the dialogue has been put in abeyance. However, once they have satisfied themselves that 'reality' provides no more resistance to their new images, ideas and representations and that the latter, based on fundamentally new sets of assumptions, are indeed offering a new, accurate and truthful representation and understanding of reality, then, from this perspective of the zone of non-resistance, can they all look back to their respective and original positions and decide on their 'validity', 'accuracy' and 'truthfulness' etc. And, they may indeed decide that their 'old' concepts are perfectly valid and accurate with respect to their engagement of another dimension of reality or the object. However, the contradictions encountered at that level can only be solved from the vantage point of the newly discovered 'level of reality' and with the newly coined concepts and ideas as well as their underlying assumptions. Such, then, is what can be achieved with the Bohmian idea of a suspension of assumptions – creating a much needed intellectual space for a open and rigorous exploration of new ideas until the participants to this trans-disciplinary dialogue has reached sufficient consensus that there is no more resistance to their ideas – namely that, indeed, for now at least, a 'fusion of disciplinary horizons' have been reached.

Fusion of Horizons: the Role of Paradigms

Knowing now how the act of suspension can assist us in holding onto assumptions supporting different ideas and representations of different levels of reality and perception, we are now in a better position to advance our understanding not only on the range of assumptions we may encounter in our scientific as well as non-scientific endeavours, but also to expand our understanding as to their origin, role and function on our thought-processes and knowledge-systems. Gadamer's assertion that our understanding of the world always occurs *within* a certain 'tradition' or 'horizon' of understanding shows some significant similarities with Thomas Kuhn's ideas on the presence and role of 'paradigms' in scientific communities. 'Paradigms', according to Kuhn, are those broad conceptual and methodological presuppositions shared by every scientific community, embodied in their standard examples of 'normal science', and which exercise a significant influence on the way a specific scientific community would define what are legitimate questions to ask, what types explanation are sought and the types of solutions that are considered to be acceptable. "Some accepted examples of actual scientific practice – examples which include law, theory, application and instrumentation together – provide models from which spring

particular coherent traditions of scientific research"⁴⁴. The important point, from our perspective of a transdisciplinary hermeneutics, is that this notion of 'paradigms' in science confirms the presence and force of our assumptions and perceptions of the world on our 'scientific inquiry' into what has been 'understood' or 'framed' as legitimate questions and problems.

The fact that paradigms have a certain 'moulding' effect on our assumptions of the world and the methods of enquiry and study considered to be acceptable should not be seen as 'deterministic' in the sense that it prohibits thinking 'outside' a paradigm. As we know, scientific 'revolutions' do happen when there has been a fundamental change in the way the world, and inquiry into the world, has been understood. These revolutionary changes in the history and philosophy of science have been associated in Kuhn's thinking with rapid, discontinuous breaks in the thought-patterns and knowledge-systems embodied in certain prevailing scientific paradigms. Again, the said example of a change from the static and mechanistic Newtonian view of the world to a completely different, dynamic and relational worldview of quantum physics is a case in point here of such an abrupt change. This is consistent with the central notions of a transdisciplinary hermeneutics which we are trying to develop here, namely that the 'discontinuous breaks' in our paradigmatic thinking about reality relates to the complex, multi-dimensional structure or 'levels of reality' and 'levels of perception'. As was mentioned earlier, the discontinuity in the concepts and laws between one level of reality and another is of such a nature that they cannot be used to understand each other – i.e. one level *in terms of* another level. However, this complementarity between some of the key notions of transdisciplinarity and that of Kuhn's allows us not only to better understand the paradigmatic nature of the shifts and changes that happen when 'reality' has 'resisted' and 'disclosed' itself in a fundamentally different way to what was known and assumed before the decisive break in our knowledge. Also, as such a paradigm change or shift implies a deeply profound and wide-ranging change in our total view of the world, a change in 'Weltanschauung', we are encouraged to examine the full extent of not only the ideas that undergo such change, but also the sets of assumptions on which these ideas are based. The question in this regard is: if a paradigm is so wide-ranging and decisive, what constitutes a paradigm? What range and sets of assumptions would typically make up our paradigmatic understanding of the world and the effect this has on our disciplinary thinking and praxis?

Although not intending to propose an exhaustive list or a full range of probable assumptions encountered in any paradigmatic change, it is, nevertheless, possible to identify at least the following eight areas or domains where assumptions are strongly shared amongst the participants of scientific as well as non-scientific communities:

- **Cosmological** – assumptions that are based on our views of the world or universe. For example, assumptions about the *stasis* of 'reality' (the object) could have their origin in a static Newtonian worldview in which the universe is seen to be a 'fixed' entity, operating, as it were, according to universal laws in a machine-like fashion. By contrast, assumptions about the *dynamism* of 'reality' may have their origin in a *relational* view of the universe which is always changing, continuously expanding⁴⁵ and possibly even contracting.
- **Ontological** – assumptions about the being or 'is-ness' of 'reality' (the object). In a machine-like world 'matter' is thought of as substance, with tangible, corporeal characteristics, whereas in the relational world of quantum cosmology and physics, 'matter' is not necessarily the final building block of 'reality', but, rather, non-materialist 'energy' or 'information' fields.

⁴⁴ Thomas Kuhn: *The Structure of Scientific Revolutions*, p.10.

⁴⁵ According to Stephen Hawking: "The discovery that the universe is expanding was one of the great intellectual revolutions of the 20th century" – *A Brief History of Time*, p.42.

- **Epistemological** – assumptions about nature, acquisition and generation of our knowledge of the world. In a static, Newtonian worldview the *subject* is not only separated from the *object*, but the former can gain absolutely certain knowledge of latter. The only question is whether the locus of such certainty is situated in either the subject (idealism) or the object (positivism / empiricism). The possibility of an continuously 'open' dialogue between the subject and object in which knowledge is an emergent property and which is never fully or absolutely certain⁴⁶ is unthinkable from either of these two epistemological positions at loggerheads with each other from *within* the Cartesian subject–object chasm.
- **Logical** – assumptions about what the internal or logical coherency of our knowledge statements about the world. In the one-dimensional Newtonian worldview, restricted to only one level of reality, the dominant logic is that of the excluded middle. This means that observed phenomena in the macro-physical level of reality cannot be A *and* non-A at the same time and our knowledge statements about such phenomena should obey this rule. However, in the relational quantum worldview the logic of the included middle is a distinct possibility where things can be understood as being A (wave) and non-A (particle) at the same time. Consequently, our knowledge statements and language describing the world, at least from the perspective of another level, can include references to the included middle.
- **Theoretical** – assumptions about the nature and status of our theoretical knowledge. In a static worldview with absolute certain knowledge the status, role and function of our 'scientific' theories and models will be seen very differently as opposed to the dynamic worldview of quantum physics in which the principle of the fundamental uncertainty of our knowledge is accepted. In the static worldview with it's absolutely certain knowledge, theories and methodologies are elevated to assume 'objective' scientific status as the supreme form of knowledge above all other forms of knowledge. On the other hand, in a relational world our knowledge is an emergent property, emerging from a complex web of relationship, including the complex unity of the subject – object relation, with the implication that our knowledge is never absolute certain and complete. if 'reality' and our knowledge hereof are perceived as inherently dynamic and never complete or final, it, then, follows that our theoretical and methodological endeavours are also finite and can never assume the rather audacious direct representational status offered by Newtonianism.
- **Methodological** – assumptions about what methodologies to follow to acquire the type of knowledge that is assumed. Methodologies are not to be confused with methods. They provide the rationale or justification for the path, the plan or strategy to be followed to acquire the knowledge required. They will also provide the grounds for the disciplinary boundaries, what falls 'inside' or 'outside' the focus area of a discipline. Once these questions have been agreed upon by the disciplinary participants, only then will the choice be made over the 'appropriate' methods to be used. For example, in clock-work or machine-like view of the world with its static universal laws in which the subject and object have been separated from each other as the *loci* of absolutely certain knowledge, the methodologies to be used for the 'extraction' of such certain knowledge would be to seek the control or domination of either the subject over the object (idealism / subjectivism) or, alternatively, of the object over the subject (positivism / empiricism). Such 'combative' methodologies are vastly different to those participative or dialogic methodologies decided upon in a relational worldview where the inseparability or complex unity of the subject–object is emphasised and postulated and in which the act of observation by the subject changes *what* is being 'seen' or 'observed'.

⁴⁶ As conceptualise in Heisenberg's ideas on the 'uncertainty principle' in our knowledge of reality.

- **Anthropological** – assumptions about humankind’s position in the world. In a machine-like world in which humankind and nature are considered to be separate from each other, can give rise to perceptions of Man’s⁴⁷ dominant position in the world. This perception can, in turn, lead to further anthropocentric perceptions such as that we are occupying an ‘empty’ world – i.e. a world in which the scale of human economic activity is sufficiently small relative to the scale of the Earth’s ecological system that its impact is inconsequential. On the other hand, in the relational worldview where everything in the universe is fundamentally interconnected, an image of the world as a ‘full’ world emerges in which humankind is only but one, certainly not the dominant one, of the interconnected elements and where the relation between and impact of human economic activity and on the Earth’s ecological system is of major significance.
- **Axiological** – assumptions about our value-systems. For example, in an instrumental-anthropocentric worldview the satisfaction of humankind’s materialistic needs, even at the expense of other forms of life on earth, is considered as of ‘value’ and gives rise to social, economic and technological theories with which to justify this position. On the other hand, in a relational-biocentric worldview humankind is seen to be an integral part of smaller and larger cycles or systems of life and although the satisfaction of human needs are still important, it should not be pursued at the expense the other forms of life on which its own existence ultimately depends – i.e. what is considered to be of ‘value’ in this view of the world, is the principle of ‘simultaneity’ or ‘complementarity’ between all forms of life on earth. The social and economic consequences of such a relational value-system are indeed far reaching as we have to change our economic language, concepts and logic from the prevailing growth dominated ideas associated with the satisfaction of materialistic needs only to new economic ideas and language where we seek the satisfaction of our *fundamental human needs* in ways and means that not only averts the destruction of other forms of life, but actually affirms or sustains these other forms of life.⁴⁸

The abovementioned list of examples of the categories and types of assumptions is certainly not an exhaustive list. The purpose, as said, with listing these examples is merely to bring into focus the type of assumptions that may constitute our paradigms and to not only make ourselves aware of their presence and influence on our paradigmatic thinking when engaged in interdisciplinary dialogue, but, at the same time, to bring to mind the fact that we can consciously influence and change our paradigms. Paradigms are not fixed or reified mental ‘structures’ which in a deterministic way dominate our thinking. The above are examples of the tacit dimension of paradigms which are to a large extent taken for granted by a shared community of scientists or non-scientists. The extent to which we become critically aware of this tacit side of our shared and un-questioned thinking do we develop a self-reflective capability to change our thought-patterns when engaged in a process of interdisciplinary dialogue. However, if our intention is for this dialogue to assume a trans-disciplinary character, it becomes increasingly important to realise that this tacit dimension of our paradigmatic thinking is not confused with the what has been referred earlier at the ‘zone of non-resistance’. When in trans-disciplinary dialogue the dynamic interplay of

⁴⁷ ‘Man’ not in the gender sense of word, but in the generic meaning of the word referring to the humankind’s perceived position on earth – which includes both men and women.

⁴⁸ Space prohibits us from going into this aspect in too much detail as it translates into alternative economic theory and praxis. The reader is, however, advised to consult the work of Manfred Max-Neef, *Human Scale Development*, in this regard. In this work of his he develops an important concept of ‘synergic satisfiers’ which refers to those important economic processes and policies which we can choose to develop and pursue to satisfy our fundamental human needs in ways and means that preserve and sustain other forms of life on earth.

resistance and non-resistance are at work, simultaneously. For this to happen it is essential to open ourselves to the resistance of 'reality' – i.e. to allow the *object* to resist our ideas and the assumptions on which they are based. In the context of trans-disciplinary dialogue it means becoming aware of the presuppositions on which one's own set of shared ideas are based and opening these up for change. As we have seen this process of becoming aware of the principles of one's own paradigmatic thinking, which may result in having to change the way we think, can happen via the all important act of *suspension*. Through this act of suspension all the participants involved in a trans-disciplinary dialogue can put their ideas and assumptions in abeyance and create the intellectual space necessary to rigorously pursue radically new ideas and assumptions before consensus is reached that a new body of valid and truthful knowledge has been founded. However, for this to happen, for the new ideas to enter into the 'zone of non-resistance' it remains absolutely necessary for all extant paradigmatic ideas and their assumptions to be surfaced, to be brought to the level of individual and collective self-awareness. In this way, then, does it become possible for us to start imagining how a 'fusion of disciplinary horizons' can emerge out of the current situation of highly fragmented disciplines and sub-disciplines – i.e. envisaging how current disciplinary boundaries can be transcended to yield new, transdisciplinary understanding and knowledge of our troubled, unsustainable world.

Needless to say, that such a 'new' transdisciplinary understanding of *what* is being looked at can only emerge simultaneously and collectively from *all* the disciplines in dialogue with each other. The onus to question, suspend and change the range of the assumptions mentioned above can never be weighing down on one particular discipline *only*. Each participative discipline must open itself up to question and *be* questioned, to want to suspend and *be* suspended, to want to change and *be* changed. To be sure, the transdisciplinary approach is not one of an interrogative will-to-power of the 'object' by a 'subject' equipped with ideas, concepts, methods and methodologies guaranteed to yield absolutely certain knowledge of and gaining control *over* the object. The transdisciplinary approach is, rather, one of 'openness', 'hearing', and 'listening' carefully to *what* the object has to say or disclose – admitting also what is not known and making sure that it not only asks the question of what *is* being said, but also of what is *not* being said. The meaning and intention of this approach is captured more accurately by the notion of 'rigour'. It is only through a 'rigorous' questioning, suspending and changing of the said assumptions by all the participating disciplines, individually as well as collectively, that *what* is being engaged with will be allowed to 'resist' extant ideas and to 'disclose' itself to us in all its multi-dimensional complexity. The 'rigour'⁴⁹ involved in the paradigm shift from Newtonian to quantum physics serves yet again as a good case in point in here, illustrating what it takes for 'reality' to 'disclose' a fundamentally different facet or level of itself. Questioning, suspending and changing the assumptions underlying the extremely well-entrenched Newtonian worldview came through not only posing the 'right questions'⁵⁰, but also turning questions completely around⁵¹ in an attempt to solve the contradictions facing the

⁴⁹ Although it must be said that the 'rigour' of this particular debate may have tested to the utmost limits or even have succeed in crossing the boundaries of what is normally understood by 'rigorous debate'. Referring to the nature of this debate, Heisenberg uses the term 'violence' more than once to depict how heated these debates really became – Heisenberg, *Physics and Philosophy*, pp. 145 - 160.

⁵⁰ "What were these questions? Practically all of them had to do with the strange apparent contradictions between the results of different experiments. How could it be that the same radiation of that produces interference patterns, and therefore must consist of waves, also produce photoelectric effect, and therefore must consist of moving particles? Again and again one found that the attempt to describe atomic events in traditional terms of physics led to contradictions" – Heisenberg, *Physics and Philosophy*, p.38.

⁵¹ "The final solution was produced in two different ways. The one was turning the question around. Instead of asking: how can one in the known mathematical scheme express a given experimental situation? the other question was put: is it true, perhaps, that only such experimental situations can arise in nature as can be expressed in the mathematical formalism? The assumption that this was actually true led to limitations in the use of concepts that had the basis of classical physics since Newton. One had learnt that the old concepts fit nature only inaccurately" – Heisenberg, *Physics and Philosophy*, p. 44.

Copenhagen group of scientists inquiring into the deepest levels of the structure and being of matter. In the end, it took "a quarter of a century to get from the first idea of the existence of energy as quanta to a real understanding of the quantum theoretical laws. This indicates the great change that had taken place in the fundamental concepts concerning reality before one could understand a new situation"⁵².

Fusion of Horizons: the Knowledge–Power Relation and Production of New Levels of Language

To be sure, what is at stake here is the point made earlier that what is needed for a new 'level of reality' to be identified is the formulation of an entirely new language – i.e. words, concepts, ideas, images and representations – without which the so-called new 'level' will simply remain illusive and will most certainly not be able to serve its purpose of being the locus or vantage point from which to 'see' the resolution of apparent contradictions we are being confronted with. It was also mentioned earlier that this formulation of such a new language is not necessarily a 'smooth' process and could at times be associated with the equivalent of a conceptual 'warfare'. In order to understand the intricacies of the 'rigour' involved here, it may be useful to look at this from the point of view of the intimate relationship between *power* and *knowledge*. Michael Foucault has provided us with an in-depth analysis of this particular relationship, the detail of which we cannot go into at this point. However, what is of particular relevance for our discussion is his notion that power is not only repressive / subversive, but it is simultaneously productive / affirmative. Explaining why it necessary not to reduce our conceptions of power to the negative notions of repression and domination only, he argues that the positive, productive side of power can be linked to the production of knowledge and discourse. "I believe that this is a wholly negative, narrow, skeletal conception of power ... if power were never anything but repressive, do you really think that one would be brought to obey it? What makes power hold good, what makes it accepted, is simply the fact that it traverses and *produces* things, it induces pleasure, *forms of knowledge, produces discourse*. It needs to be considered as a productive network which runs through the whole social body, much more than a negative instance whose function is repression"⁵³. The importance of 'thinking the complex' here about the repressive *and* productive aspects of power in this manner may help us to think through the 'rigorous', and at times even 'violent', aspect of the debate around the formation of a new language with which to conceptualise a new 'level of reality'. In order to 'produce' this new language it is necessary to 'suppress' the old concepts, ideas and representations. However, although there is definitely an element of domination of the 'new' *over* the 'old' necessary here, we do not have to accept or associate the nature of such suppression or domination with extreme notions of complete 'annihilation' or 'excommunication' from the ongoing trans-disciplinary dialogue altogether. The old language, with its old ideas, concepts and images, which has been suppressed to make way for the new language has not been 'demolished' or 'deconstructed' in a way that they have become completely meaningless. 'Suppression' here means that they have merely been 'restricted' to a particular 'level of reality' where they still exercise their original validity and truthfulness. In this way, it becomes possible to acknowledge the productive presence of the knowledge–power relation in a transdisciplinary hermeneutics. It, the knowledge–power relation, can be seen as the driving force or 'energy' in the dynamic interplay between the resistance and non-resistance of our ideas and in so doing contributes positively to the production of new knowledge, whilst, at the same time, suppressing or restricting 'old' areas of knowledge to the levels of reality most closely associated with those bodies of knowledge.

⁵² Heisenberg, *Physics and Philosophy*, pp. 44 – 45.

⁵³ Foucault, *Power/Knowledge*, p. 119.

However, for as long as there is still a prevailing attitude of 'interrogation', implying an all conquering will-to-power or instrumental domination *of* the world (the object) *by* the subject, it remains impossible to associate the transdisciplinary approach with this position. Instrumental cosmological-ontological and epistemological assumptions underpinning or used to justify such an interrogative methodological attitude, namely that the machine-like world with its static universal laws is there for the 'taking' by humankind, is needless to say an approach which can hardly be associated with the thinking and praxis of a transdisciplinary hermeneutics. Trying to find sustainable 'solutions' to the *problematiques* facing us today within such a 'combative' approach will not only prove to be an impossibility, but will result in perpetuating the very problems we are trying to solve⁵⁴. If we are to succeed in finding durable solutions to these vexing problems, paradigmatic ideas of power, infused and justified by assumptions of domination as an end in itself, need to be rigorously questioned and changed. Following and applying the aforesaid ideas of the knowledge–power relation here, it could be argued that the starting point for transforming this negative and suppressive conception of power would be to replace its own internal logic of the 'excluded middle' with that of the logic of the 'included middle'. Therefore, in so doing, we will allow ourselves to better understand and work with the productive side of the power–knowledge relation, which, in turn, will allow us to become involved in the 'production' of what Heisenberg has referred to as different 'levels of language'. Although not using the term 'levels of reality' explicitly, it would appear from what he is saying that these 'levels of language' are related to different ontological conceptions of a multi-dimensional structure of reality. At the macro-physical level, this is a precise language using classical concepts such as matter, space, time, cause etc. whereas at the atomic or sub-atomic level these concepts become less precise and resemble more the Aristotelian notion of 'potentia', with the result that: "it is not a precise language in which one can use normal logical patterns; it is a language that produces pictures in our mind, but together with the notion that the pictures have only a vague connection with 'reality', that they represent only a tendency toward 'reality'".⁵⁵

This overall concept of different 'levels of language', produced by the knowledge–power relation, is of particular significance from our perspective of wanting to substantiate the key notion of a 'fusion of disciplinary horizons'. The complexity of the planetary crises we are facing is of such a nature that they straddle different levels of reality. As both natural and social systems are inextricably intertwined, involved and affected we are facing *problematiques* never confronted before and, as mentioned, a mono-disciplinary response to these problems is insufficient. What is needed and warranted is a trans-disciplinary approach which is not only capable of 'thinking the complex', but which is also capable of developing a new language with new words, concepts and images with which to understand the complex problems under consideration. As we are dealing with complex social–ecological systems problems not only do we have to anticipate that a new language with new ideas, concepts and representations are necessary, but we will equally have to anticipate that such language may contain both exact and probabilistic words, notions and ideas. As these social–ecological systems problems span different levels of reality, which in itself has given rise to a notion of two irreconcilable 'cultures' (C P Snow), it is highly likely that a new language capable of 'seeing' (thinking) and 'dealing' (praxis) with all the different levels of reality involved in this dynamic, will have to be a mixed type of language – containing *both* exact and non-exact words and notions as well as *both* higher and lower levels of certainty. However, rather than jumping to a foregone conclusion, instigated by the logic of the excluded middle, that such a language will be fraught with contradictions, we would need to be able to continuously 'think the complex', apply the logic of the included middle whilst, at the same time, being rigorously involved in the questioning, suspending and even changing of the assumptions of the language we are busy constructing. In short, this is indeed 'messy', perhaps another word for 'complexity', and we will

⁵⁴ We are again reminded here of Einstein's words, namely that we cannot solve problems *within* the mindset that created these problems in the first place.

⁵⁵ Heisenberg, 1959, p.156.

have to learn to live and work within such a dynamic environment where, most certainly, the exclusive usage of old Newtonian language, concepts and demands for absolute certainty will not work. Such then is the meaning of the term 'fusion of disciplinary horizons' when having to solve complex social–ecological systems problems where the development of a new language capable of dealing with these problems will not only have to reflect and respond to the 'messiness' of the *polycrisis* we are being confronted with today. Moving between levels of reality and crossing disciplinary boundaries, whilst looking for solutions to man-made planetary-scale problems, threatening our continued stay on earth, perhaps can only produce a dynamic language containing both exact and non-exact, both precise and probabilistic words and images. And, perhaps the only difficulty with this is overcoming our own assumptions and expectations that we can only have and deal with an exact and precise language, yielding absolutely certain results. However, if the *problematiques* we are looking at are not merely 'objective' natural phenomena 'out there', but involves ourselves, having to face up to the devastating consequences of our own actions, the picture of a 'fusion of disciplinary horizons' as an uncontested process with an exact, crystal clear language should hopefully have made way for a more dynamic, complex and even 'messy' one. Although our aim is a unified transdisciplinary understanding of the world, grounded in a notion of the 'unity of knowledge', it would be naïve to assume that we can arrive at this with a new 'transdisciplinary language' intact, shielded from and unaffected by the 'Sturm und Drang' of the situation we have created for ourselves.

Fusion of Horizons: Complementarity between Interdisciplinarity, Multidisciplinarity and Transdisciplinarity

From a completely different angle, however, we may also have to admit that not all the *problematiques* confronting us need or warrant a paradigmatic or fundamental shift in our understanding. It is foreseeable that certain problems may only warrant inter- and/or multi-disciplinary ex-changes of theoretical and methodological assumptions. Not all problems are complex problems warranting fundamental changes in ontological-epistemological assumptions and ideas. Certain problems, complicated as opposed to complex problems, may only warrant an ex-change of extant methodological ideas and usage of methods. However, this does not imply, in turn, an absence of a rigorous process of questioning and suspending of ontological and epistemological assumptions. On the contrary, this rigorous awareness and testing of the abovementioned range of assumptions should be present in any act of transdisciplinary understanding when a number of different disciplines enter into a dialogue with each other with the clear intention of finding sustainable solutions to complex problems. It does mean, however, that after such testing of assumptions has taken place, that the changes considered to be necessary reside predominantly at the theoretical and methodological levels – not necessarily at the ontological and epistemological levels. In this way, then, it becomes possible to understand how inter-, multi- and transdisciplinarity can all co-exist as legitimate forms of knowledge production. It is not so much a questioning for the sake of questioning or a changing of ideas for the sake of changing them as it is an acceptance of and commitment to allowing the 'polycrisis' we are being confronted with today to 'disclose' itself in its full multi-dimensional complexity. To repeat what was said earlier, the planetary problems of global warming, energy, water, waste, poverty, violence etc. cannot be solved from a single disciplinary point of view. It needs the co-existence of all forms of disciplinarity – the simultaneous working together of inter-, multi- and transdisciplinarity. To be sure, we need to remind ourselves that we are under no obligation to be in the transdisciplinary mode all the time. All forms of disciplinarity have their place and role and function to fulfil. "Disciplinarity, multidisciplinarity, interdisciplinarity, and transdisciplinarity are like four arrows shot from but a single bow: knowledge"⁵⁶. However, where the production of new,

⁵⁶ Nicolescu, 2002, p.46.

transdisciplinary knowledge of the world is needed, we need to be cognizant of the fact that this may only be arrived at through truly 'fusion of disciplinary horizons' where the intentional transcending of disciplinary boundaries through 'open' and 'rigorous', yet 'tolerant' questioning, suspending and changing of extant assumptions as well as the production of new 'levels of language' is at stake. In so doing we create the intellectual space and conditions for the much needed emergence of a new, transdisciplinary understanding of our troubled world. And, it is from within this holding space of complementarity that we are in a position to employ all forms of disciplinarity to help find long-term, sustainable solutions to the *problematiques* posing a serious threat to our stay on the planet.

Conclusion

The complex problems associated with the unprecedented levels of fragmentation and separation, cannot be solved from *within* fragmented knowledge systems. For the first time in the human history are we dealing with complex social-ecological systems problems on a planetary scale which cannot be solved from a mono-disciplinary point of view. Global warming, currently receiving huge amount of public attention is one example to illustrate this point. Global warming in its current manifestation is not a natural phenomenon. Is it human-made, brought upon ourselves through human economic activity, again unprecedented levels of production, consumption and waste or pollution, with serious long-term consequences. But to say that global warming is human-made is too generic, too abstract, removed from the dynamics of the planetary context. Global warming, in its current format, is the outcome of a form of human or social fragmentation between the rich Northern societies and the poor Southern ones. But not only does global warming originate from a human fissure, it will also impact and exacerbate this very fissure through its anticipated devastating consequences. Expert opinion is clear that it will be poorer countries of the South who will be hardest and first by the two-pronged sets of consequences, excessive flooding (e.g. in areas like Bangladesh) and severe droughts (e.g. in Africa). New York, London and Paris will not be the first places to experience the consequences of their own indulgent economic activities – although in the long run no place on earth will be spared from some of these devastating consequences. However, the consequences of global warming may not stop at exacerbating current levels of poverty only. Questions are already being asked about further consequences of global warming. What new forms of poverty can we anticipate will be created by global warming, beyond existing poverty levels? For the first time in human history are we dealing with problems where human activity is interfering with nature in a way and on a planetary scale which, in turn, turns itself back onto the human level through either intensifying current social problems, or creating new ones. To try and picture this global catastrophe the image of a vicious circle or a giant snake eating itself by its own tail comes to mind. And, as mentioned in the introduction, global warming is not the only 'big' problem we are facing. We are again reminded by Edgar Morin that we are facing a *polycrisis*. Whilst the human-created global warming is making its presence felt, what other planetary ecological-system *thresholds* are we about to cross, or have we already crossed – only to cause irreversible damage to their proper functioning to support all forms of life, including ours, on the earth? The proverbial jury is out on this and the many research reports appearing on this question indeed make for chilling reading.

Such is the complexity of the problems we are facing today where the man–nature, social–ecological relations have become so interwoven that any 'solution' proposed, and based on assumptions, ideas or images of a Cartesian *subject* <--> *object* partition or a post-modern notion of social re-constructionism, will be *resisted* by the complex nature of these problems. At best, short-term technical solutions might be found, at worst these short-term technical solutions

becoming part of and even exacerbating the long-term problems. In the wake of the challenges we are facing it is difficult to see how these positions will be able to sustain themselves. What we do know and realise though is that the unity of our knowledge, the overcoming of the disciplinary divide, has become a prerequisite for meeting the challenges of tomorrow. However, this does not mean having to fall back onto pre-modern mystical or anti-modern romantic ideas of 'direct' access to or knowledge of reality. The complex unity of the transdisciplinary object and transdisciplinary subject provides a credible alternative option. Whilst affirming the mediated nature of the subject-object relation, through language, images and representations and for which we need an alternative formal logic of the included middle to understand the complexity of this unity, transdisciplinarity offers us a different ontological-epistemological position from which to develop a hermeneutics which is capable of conceptualising *how* the overcoming of the disciplinary divide can be achieved. Through an ongoing process of trans-disciplinary dialogue the disciplinary participants to this dialogue manages to question, suspend and change the assumptions on which their respective disciplinary paradigms have been, tacitly or explicitly, built and constructed. In this process the power-knowledge dynamics is positively and productively at work as new words, concepts and ideas, in fact a new language, has to be formulated to identify new vantage points, levels of reality, from which the complex, multi-dimensional face of world and its problems can be looked at. However, there is no meta-vantage point from which all other vantage points or levels of reality can be understood in a transcendental or *a priori* way. However, this does not, in turn, imply that there is no 'overall' coherency or complementarity in our understanding and knowledge of reality. What it does mean is that this complementarity / coherency, the basis for the possibility of the unity of our knowledge, is an emergent property of an ongoing process of trans-disciplinary dialogue in which the pieces of this complex, multi-referential puzzle gets woven together piece by piece, not in ab-stract or isolation from the planetary context, but always in response to the latter as an interpretive-engagement with the *problematiques* of the day.

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