

A NEW APPROACH TO THE IDEA OF ENVIRONMENT IN THE LIGHT
OF
ZUREK'S EXISTENTIAL INTERPRETATION

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

DENİZ ÖLÇEK

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF ARTS
IN
THE DEPARTMENT OF PHILOSOPHY

SEPTEMBER 2012

Approval of the Graduate School of Social Sciences

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ABSTRACT

A NEW APPROACH TO THE IDEA OF ENVIRONMENT IN THE LIGHT OF ZUREK'S EXISTENTIAL INTERPRETATION

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September 2012, 74 pages

This thesis aims to contribute to ecocentric views by revising and criticising Callicott's conception of environment and ecocentric ethics that he develops in the light of ecology and the Copenhagen Interpretation of quantum physics. The thesis also aims to support the ecocentric point of view by suggesting a different approach to the conception of environment in the light of the Existential Interpretation.

Keywords: J. Baird Callicott, Philosophy of Environment, The Copenhagen Interpretation, Wojciech Hubert Zurek, The Existential Interpretation

ÖZ

ZUREK'İN VAROLUŞSAL YORUMU ÇERÇEVESİNDE YENİ BİR ÇEVRE ANLAYIŞI

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Yüksek Lisans, Felsefe Bölümü

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Eylül 2012, 74 sayfa

Bu çalışmada, Callicott'un yeni ekoloji ve kuantum fiziğinin Kopenhag Yorumu ışığında geliştirdiği çevre anlayışı ve çevremerkezcil etiği eleştirel biçimde inceleyerek ve aynı zamanda Varoluşsal Yorum ışığında çevre anlayışına yeni bir yaklaşım getirerek çevre merkezci görüşe katkı sağlamayı hedefledim.

Anahtar Kelimeler: J.Baird Callicott, çevre felsefesi, çevre merkezci görüş,
Copenhag yorumu, Wojciech Hubert Zurek, Varoluşsal
yorum

To Sema & Tefvik,

ACKNOWLEDGEMENTS

I wish to express my deepest gratitude to my supervisor Prof. Dr. Ayhan Sol for his guidance, advice, criticism, encouragement, trust and insight throughout the research.

I would like to express my gratitude to Prof. Dr. Hasan Ünder and Prof. Dr. Erdiñ Sazan for their helpful comments and suggestions during my thesis's defence.

I would also like to thank Assoc. Prof. Dr. Cem Kamözüt and Assoc. Prof. Dr. Samet Bağçe for their helpful suggestions, academic guidance, friendly support and trust.

I also wish to express my sincere thanks to my family and friends for their trustful support in every sense.

TABLE OF CONTENTS

PLAGIARISM.....	iii
ABSTRACT.....	iv
ÖZ.....	v
DEDICATION.....	vi
ACKNOWLEDGMENTS.....	vii
TABLE OF CONTENTS.....	viii
CHAPTER	
1. INTRODUCTION.....	1
2. CALLICOTT, ENVIRONMENT, QUANTUM THEORY.....	6
2. 1 Overlook at Callicott's Environmental Philosophy.....	6
2. 2 Callicott and the Copenhagen Interpretation (CI).....	12
2. 2. 1 What does the CI say?.....	12
2. 2. 2 Callicott's Interpretation of CI for non-anthropocentric Ethics.....	16
2. 3 The Philosophy of “Environment” and Physics.....	19
2. 3. 1 Callicott's Conception of Environment.....	20
3. ZUREK'S EXISTENTIAL INTERPRETATION OF QUANTUM THEORY, ENVIRONMENT & ECOCENTRISM.....	25
3. 1 Zurek's Existential Interpretation.....	25
3. 1. 1 Decoherence Programme: From Quantum to Classical...25	
3. 1. 2 Existential Interpretation: Einselection, Quantum Darwinism and The conception of Operational Environment.....	28
3. 2 Different Approaches to the Concept of Environment.....	36
3. 3 Zurek's operational definition & Ecocentrism.....	38
3. 4 Revisiting Callicott's account in the light of Zurek's model.....	40

4. SCIENCE, ECOLOGY & ETHICS.....	44
4. 1 Scientifically Informed Ecocentric Ethics?.....	44
4. 2 Ecological Thought and Ethical Implications in the light of the idea of Environment inspired by Zurek's Existential Interpretation.....	52
5. CONCLUSION.....	60
REFERENCES.....	64
APPENDIX.....	73

"A human being is a part of a whole, called by us universe, a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest... a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty."

Albert Einstein

CHAPTER 1

INTRODUCTION

Environment is an active whole which consists of inter-related centres of life, individuals and subsystems. However, it has been usually described as something passive and our interaction with it considered very limited and from an anthropocentric point of view. As we understand it as something passive, to be utilized and consumed most of the time, we often tend to forget the results of our attitudes towards it. Yet, this attitude of us leads to the environmental problems such as land degradation, ozone depletion, waste disposal incidents, greenhouse effect that we are facing today. We tend to forget nature has always been there whether humans exist or not, since we are capable of building our environment more and more, and leave a very small amount of humanly untouched or so called “natural” environment. However, what we built is also part of natural mechanisms even though it may not be explained solely in terms of naturalistic aspects.

In this thesis, I would like to start my investigation to formulate a new idea of environment by revising Callicott's account of organic conception of the environment and non-anthropocentric environmental ethics that he suggests in the light of Copenhagen Interpretation of quantum theory. Furthermore, I aim to supply some inspirational points from contemporary physics, specifically from Zurek's existential interpretation for this new understanding of environment which, I think, better fits in to the holistic description that Callicott aims to develop and supports ecological thought.

By investigating the idea of environment philosophically in the light of scientific theories, I humbly and indirectly aim to inform normative ethical

practices dealt by environmental philosophy to some extent. However, what I aim to do is philosophy of the concept of environment, instead of focusing naturalistic value theory contrary to Callicott's account (1989, 1999) in which he addresses the convergence between physics and ecology, and seeks metaphysical grounds for ecocentric ethics in this convergence.

By this way, a new understanding of nature and accordingly environment can be inspirational for ecological ways of thinking.

This new understanding of environment will aim to embrace:

1- both individualistic and holistic approaches,

2- the subject/object dilemma,

3- both causal (ecologic) and intentional views or global/local distinction,

under one umbrella, since our interaction with the environment is a multi-dimensional issue. Therefore, I aim not to preclude or give more weight on one of the views and concepts which seem to be opposing, such as causal and intentional. Rather, I aim to examine the concept in a wider sense, since I think seemingly opposing aspects of environment are complementary.

The ideas that I aim to introduce are relevant to many different disciplines, not just pure philosophy. Moreover, I will try to make links between different accounts and interpretations regarding environmental philosophy, philosophy of nature and science to revise the issue as widely as possible. Surely, I will not be able to go deeper in certain issues such as the ethical applications of this new perspective towards environment as much as needed. However, some of the questions that I do not deal with or that I mention briefly like intrinsic value, the problem of consciousness, the further link between values and facts etc. may be the centre of a future work.

Since it is a multi-dimensional issue, it was difficult for me to set the limits of my account most of the time. Though it will have a wide scope, some cornerstones for this investigation have been determined. The account of ecocentric environmental philosophy by J. Baird Callicott is one of my starting points which I found inspirational but problematic. While examining his account, I will critically revise his project of converging Copenhagen Interpretation of quantum physics and environmental ethics where he puts facts, values and knowledge production in the subjective realm. Callicott (1989, 168) addresses “Knowledge is a physical process” by using the Copenhagen Interpretation, so knowledge is in the eye of the beholder and relational. According to this interpretation the power of subjects/conscious observers to shape the reality is overrated which gloss over the objective reality and mechanisms of nature simultaneously observed by the observers. Also, in general the definition of the observer and whether it is a conscious being are not clear.

After criticizing some aspects of his theory in both epistemological and ontological extents, I suggest a holistic relational ontology for a new understanding of environment inspired by Zurek’s existential interpretation which actually aims to explain objective mechanisms of nature that we observe and which, I believe, can supply supporting points to ecocentric environmental philosophy in general. Moreover, as I shall examine Zurek’s definition of environment in Chapter 3, the environment has more influence than it is mentioned in the Copenhagen Interpretation. The objective mechanisms of nature that shape environment are the very same mechanisms that we use to contribute building that environment. We are using those mechanisms to build and actually what we built is becoming a part of environment like any other entity contributes as Zurek describes. It is just

that we are capable of changing it much more effectively due to our conscious activity and affecting its balance which in return causes several effects on our lives.

In my investigation, I avoid paying attention to justify any basis for obligatory attitudes and duties towards environment and accordingly to the realm of metaethics, as Callicott intended to do in his project. Rather, I hope to supply inspirational points to environmental ethical practices in the light of a scientific approach. The idea that science can contribute to our self-awareness is not new and is widely accepted, but it may not justify any obligation for certain ethical conducts. Unlike Callicott, what I aim to emphasize here is that science, specifically contemporary physics, can inspire environmental philosophy and its practices and I do not intend to claim any further. Yet, there has been mutual feeding between science and philosophy all the time, this feeding should not be exaggerated when it comes to moral philosophy. Because science does not provide positive ontology for objective values (Palmer: 2002), yet its aim is to be as objective as possible in its mission to understand reality. We are the ones who are able to create the positive attitude which, I think, means to be in accord with nature's mechanisms. To be able to be in accord with nature, we need to discover and rediscover what nature is which manifests itself in an environment, and I believe this is what science stands for. However, to make a person have a certain attitude towards nature is possible only if that person is persuaded to have that attitude. Therefore, without any internalization and awareness to act differently, there can be no change in practice.

I humbly hope to contribute to environmental practices and to help breaking the egocentric mentality and extending our perception. What I intend to emphasize is that we are part of the information production process

and we are part of nature, this continuous flow of energy and material, but this doesn't mean that we are the ones producing the reality and ruling the objective mechanisms of nature. To put the facts into subjective realm is not a reasonable interpretation.

Briefly, the merit of my criticism will be Callicott's interpretation of Quantum Mechanics and his application to environmental philosophy. His understanding of environment that he scientifically supports with the Copenhagen Interpretation undermines the objective facts and observables in the classical, everyday realm. I am not claiming that there is a final scientific world view which is the decoherence programme of quantum theory, specifically Zurek's position. What I would like to emphasize is that this interpretation can be inspirational to understand ourselves and our place in nature, and affect our interaction with the environment, our ecological and intentional involvement. Zurek's definition of operational environment actually is a kind of description of the reality and accordingly of nature. Therefore we see that these two concepts, namely environment and nature are mingled in his description. Accordingly, his account suggests an environment to be more than just a passive surrounding.

CHAPTER 2

CALLICOTT, ENVIRONMENT, QUANTUM THEORY

2.1. Overlook at Callicott's Environmental Philosophy

Due to his contributions for the creation of a new benign, favorable environmental worldview which includes a practicable environmental ethic, J. Baird Callicott has been one of the most important central figures in environmental philosophy. (Ouderkirk, 2002: 1) With his theories and ideas combining different fields, he played an important role in extending and clearing up former theories, provoking new perspectives and further discussions on the main conceptual, philosophical issues concerning environment and environmental ethics. Thus, he became an important pioneer during the development of environmental philosophy.

While developing his account of ecocentric ethics, starting from Leopold's core ideas, Callicott follows a multidisciplinary path to extend the Land Ethic and to build up his account of non-anthropocentric environmental ethics, specifically his intrinsic value theory and the conception of "extended self-interest" in his series of papers between 1982-1999. He revised Leopold's ethics in the light of the new ecology, Darwinian theory of evolution by natural selection and Hume's theory of moral sentiments. Moreover, he also introduced a new axiology to build ecocentric morality with the help of the developments in contemporary physics. Therefore, his account is based on two possible metaphysical foundations: Leopold's extended land ethic and the deconstruction of fact/value distinction in the light of the Copenhagen Interpretation of Quantum Theory. In his 1986 article "The Metaphysical Implications of Ecology", he introduced the conceptual convergence between ecology and physics for the first time and addressed that

they share the same metaphysical notions, before investigating the ethical implications for this convergence in his subsequent articles (Callicott, 1986).

Even though, the scope of this thesis is a part of Callicott's account in which he made some connections between physics, ecology and ethics, I find it necessary to give a brief overview of the early part of his account where he introduces his holistic ecocentric ideas in his Leopold-Hume-Darwin connection. Also, as the latter shares some common basis in the sense of embracing a holistic and evolutionary approach in some form that he has suggested in the first.

While tracing back the Land ethic to Hume's moral theory and underlining its link with Darwin's conception of ethics, Callicott aims to show that "the conceptual foundations of Leopold's Land Ethic, the modern paradigm of environmental ethics provide, on Humean grounds, for a direct passage from the perceived facts that we are natural beings and that we belong to a biotic community to the principal values of the land ethic" (Callicott, 1989: 118) As Leopold's Land Ethic is the departure point that gives a kind of a definition of ecocentric environment and one of the fundamentals of Callicott's account of ecocentric ethics, it is appropriate to begin examining briefly its core notions.

Aldo Leopold makes an extension by defining a holistic account in which he sees the land as a community to which humans also belong, not as a commodity belonging to us. According to his ethical point of view, we should regulate our practices in order to preserve the integrity, stability and beauty of the biotic community (Leopold, 1949). In his words:

The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land...[A] land ethic changes the role of Homo Sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such. (Ibid., 1949: 204)

Leopold also embraces Darwin's evolutionary understanding of ethics by emphasizing that "All ethics so far evolved rest upon a single premise: that the

individual is a member of a community of interdependent parts” (Ibid., 1949: 203). Therefore, his land ethic also has an evolutionary character as well as holistic features. According to Callicott, Leopold’s conception of ethic which can be summarized as “a limitation on freedom of action in the struggle for existence” and “a differentiation of social from anti-social conduct” and his understanding of the origin of ethics which is “the tendency of interdependent individuals or groups to evolve modes of cooperation” lies, quite clearly within the tradition of biological thought about ethics that began with Darwin (Callicott, 1982).

Leopold uses Darwin’s evolutionary understanding of ethics in his work. Moreover, Callicott claims that it has also relation with Hume’s theory of moral sentiments indirectly, since the theory of moral sentiments is the source of Darwin’s account of morality. Callicott revises Leopold’s land ethic in this scheme and begins to build up his theory of intrinsic value for biotic wholes. However, he fails to succeed his attempt since the conceptual unity at a metaphysical level does not provide guarantee for a unified ethical theory according to some philosophers such as Cheney (1992, 1993), Warren (1993) and Fieser (1993). As Fieser summarizes Callicott's indirect correlation of Hume’s moral sentiments with the theory of evolution below:

Interpreting Hume's theory in the light of Darwinian natural selection, Callicott argues that the spectator's moral sentiments were naturally selected in a social environment which permitted and facilitated growth in the size and complexity of society. Callicott stresses that these naturally selected moral sentiments can be triggered by things other than human moral agents, given the right education. (Fieser, 1993: 172)

Briefly, Leopold brings in the importance of wholeness of nature and the concept of biotic community into environmental philosophy with evolutionary approach. We can also find the similar idea of wholeness in Deep Ecology which also addresses interdependence between organisms within ecosystems and that nature functions as a whole with its separate parts affecting each other (Naess,

1973). However, these philosophies do not particularly give either an explanation for intrinsic value problem in nature, i.e. metaphysical foundations for moral considerability of nature, or ethical implications of their approach. Indeed both of them, namely Leopold's Land Ethic and Darwin's evolutionary ethics, lack a theory of value which Callicott himself wanted to explore and find metaphysical foundations for environmental ethics.

After making the correlation between Hume's theory of moral sentiments, Darwin's evolutionary ethics and Leopold's land ethic, Callicott introduced his version of a holistic environmental ethic in which biotic communities, ecosystems are morally considerable and individual aspects are pretty much neglected for the good of the community. Since ecological thought has historically been holistic and the study of ecology examines the relations of organisms to one another and with their environment (Callicott, 1989: 87), the ethics which consider these relationships for the well-being of biotic communities is crucial. In this regard, some individualistic sacrifices can be made; such as reducing the population of white-tailed deer in order to maintain the integrity and stability of the rest of the biotic community (Leopold, 1949; Callicott, 1999: 70). In this regard, sacrificing individual organisms, also including individual human beings is a requirement for the good of the rest of community. According to Tom Regan (1983) this point obviously leads to environmental fascism. Also, Frederick Ferre (1996) and Kristin Shrader-Frechette (1996) pointed out this sense of the land ethic as a moral outrage. This may not be the intended conclusion. However, to avoid this in land ethics, we should reconsider individualistic ethical principles as well as holistic ones.

This has been pretty much the first phase of his account where he investigated grounds for intrinsic value theory for whole environment with its human and non-human entities in which intrinsic value emerges within human beings driven by evolutionary forces and addresses well-being and importance of communities more than individuals that create some problematic points. In the second phase of his attempt to find metaphysical foundation for environmental

ethics, he examined the issue of moral considerability of non-human entities in the light of Copenhagen Interpretation of Quantum Physics where he addressed the collapse of subject-object distinction and of fact-value dichotomy where he relates the collapse of these two. By subjectifying objects and addressing the world as an extension of subject with his conception of “extended self-interest” he also aims to overcome the criticism of eco-fascism and to supply individuals an important place again.

He basically suggested two metaphysical perspectives as a possible foundation for *ecocentrism*¹. His attempt was to show that, in order to have a prevailing ecocentric environmental ethic, intrinsic value should exist in some form. He built up his account of intrinsic value and his postmodern worldview in different stages. Searching for a ground to justify a moral concern for environment and to extend and deepen land ethic by finding metaphysical foundations for it, Callicott aimed to draw a *scientifically informed* picture of morality. His theories have been informed by evolutionary biology, ecology and physics — specifically the Copenhagen Interpretation of Quantum Physics that made his account multi-folded. Therefore, Callicott played an inspirational role in relating different branches of scientific theories into his account in environmental ethics. Amongst his works, I will primarily take both of his 1985 essay “Intrinsic Value, Quantum Theory and Environmental Ethics” and 1986 essay “Metaphysical Implications of Ecology” into consideration as a departure point of my work. I think scientific theories can supply a great deal of insight to environmental philosophy (and vice versa) and also to the ethical theories (in an indirect way), therefore in that sense I find interesting how Callicott related

1 As Stan J. Rowe describes that : “The ecocentric argument is grounded in the belief that, compared to the undoubted importance of the human part, the whole ecosphere is even more significant and consequential: more inclusive, more complex, more integrated, more creative, more beautiful, more mysterious, and older than time. The "environment" that anthropocentrism misperceives as materials designed to be used exclusively by humans, to serve the needs of humanity, is in the profoundest sense humanity's source and support: its ingenious, inventive life-giving matrix. Ecocentrism goes beyond biocentrism with its fixation on organisms, for in the ecocentric view people are inseparable from the inorganic/organic nature that encapsulates them. They are particles and waves, body and spirit, in the context of Earth's ambient energy”. (Rowe, 1994: 106-107)

scientific theories, particularly Quantum Physics with environmental philosophy as well as moral philosophy. Accordingly throughout this chapter, I would like to revisit the way Callicott made use of scientific theories, specifically the Copenhagen Interpretation of Quantum Physics in his postmodern ethical view, how he described the link between Quantum Physics and environmental philosophy, particularly environmental ethics and to criticize that this link does not support the ecocentric point of view.

One of Callicott's main concerns was to show that environmental ethics does not only need metaethical ground, but also a metaphysics before all else (Callicott, 1986). He argued that contemporary science (physics as well as ecology) enfolded and engaged a new ontology which was able to question the self-centered individualism that variety of modern ethical theories were based on and this ontology enfolds a new basis for holistic ethics (Larrère, 2002: 151).

To emphasize, it is not my main concern in this thesis to tackle with either the question of intrinsic value² or the moral considerability of whole environment including non-human entities. However, Callicott's ideas during his investigation for intrinsic value theory supplied me departure points to express my perspective linked with wholeness, inter-dependence shaping the environment, evolutionary approach and contribution of quantum theories³ with whose support I hope to advert some favorable ethical implications as well. Thus, I will leave this discussion here and begin critically examining the second metaphysical foundation based on Quantum Theory that Callicott offers and draw some conclusions in the following section that is the central concern of this thesis.

During my revision and criticism, I shall try to present a consideration of Callicott's account, especially his ideas connecting ecology, environmental ethics

2 'Intrinsic value' is being used in at least three different senses that are: (1) as a synonym for non-instrumental value which an object has for the sake of itself, (2) the value an object has solely in virtue of its 'intrinsic properties', which an object has depends solely on its "non-relational" properties, (3) as a synonym for 'objective value', i.e. value that an object possesses independently of the valuations of valuers. (O'Neill, 1992: 131,132)

3 Though there are two commonly used mathematical formalisms of quantum theory, the interpretations make the theory multi-dimensional.

and Quantum Physics as detailed as possible. I will pretty much follow the similar route that Clare Palmer followed in her essay “Quantum Physics, 'Post Modern Scientific Worldview' and Callicott's Environmental Ethics” as I would like to make an overview and criticism on similar points partly discussed in her paper. Differently, I shall not deal with the question whether the idea of a general postmodern scientific worldview exists in detail. The points I will generally be concerned are as follows:

1- Questions concerning his interpretation of Quantum Physics, particularly the Copenhagen Interpretation (CI) and of whether subject/object dichotomy is deconstructed.

2- Whether his point of view in the light CI supports ecocentric view of environment and accordingly ecocentric ethics.

3- Whether it is legitimate to read up from scientific work into philosophy/ethics in the way Callicott does (Palmer, 2002: 173).

4- Question concerning the holistic concept of environment and nature which he described in the light of ecology and CI.

2.2. Callicott and the Copenhagen Interpretation (CI)

2.2.1. What does the CI say?

What is an observer? What is the role of it during measurement process? What is the difference between being a subject and being an observer? What does it have to do with our attitude towards environment anyway? While examining some mainstream interpretations of quantum theory and Callicott's use of CI, my focus will be mainly on these questions and I will also tackle with the questions whether an observer is necessarily a subject and whether CI can supply good basis for ecocentric approach as Callicott suggested in this section.

Since the quantum theory has been contributed by many remarkable scientists in its history of development, its formalism has been reshaped and their

correlation with experimental data has been interpreted in different ways over the years after the idea of quantum for the first time emerged with Max Planck's new formulation of black body radiation in 1900. With the important physical and mathematical contributions by many other important scientists such as Einstein, Heisenberg, Born, Dirac, Bohr, Schrödinger and Von Neumann it has become the most successful theory so far in the history of physics and it changed and is still shaping our understanding of reality and accordingly of environment.

The first attempt to interpret its mathematical scheme with experimental results was done by mainly Max Born, Neils Bohr and Werner Heisenberg. Although these physicists never completely agreed on the way we are supposed to understand its formalism, this interpretation is known as "the Copenhagen Interpretation" regarding the similarities. It is the first and one of the most well-known interpretation of the theory and many other important physicists of that time had contributions to this interpretations by either supporting or criticizing it.

Born was the one who made the first step to investigate the physical meaning of the quantum theory by introducing the probability interpretation of the wave function which describes the state of all particles and waves. Then, Heisenberg (1927) discussed the limitation on the simultaneous measurement of certain classical variables and derived the *Uncertainty Principle* named after him which addresses the disturbance created on the system measured by the observer during measurement process. Moreover, he attempted to explain the meaning of classical concepts such as causality and determinism in Quantum Theory. Later on, Bohr introduced his theory of *complementarity*⁴ which is based on this principle and which he decided to make the central component of his interpretation during the discussions with his collaborator Heisenberg. Eventually, the so-called Copenhagen Interpretation emerged which still remains as one of the most dominant philosophical views of Quantum Mechanics (Mehra, 1973).

4 It is the principle defined by Bohr which says that although the wave picture and the particle picture are mutually exclusive, they are not contradictory, but complementary. (Baggott, 2004: 106)

According to Heisenberg's Uncertainty Principle, the value of complementary variables (such as position-momentum or energy-time) cannot be measured simultaneously with complete precision. This situation refers to the Quantum Measurement Problem and it was first mathematically described by John von Neumann. (1955) I shall tackle with this problem in detail in the following chapter.

Since Heisenberg expressed the subjectivist flavor of his view as: "...what we observe is not nature in itself but nature exposed to our method of questioning." (Heisenberg, 1958: 32), his interpretation of Quantum Mechanics seems to be more subjective than Bohr's position. For Bohr, things do not have inherently determinate boundaries or properties, and even words do not have inherently determinate meanings. (Barad, 2003) The important point with Bohr's interpretation is that he also calls into question the distinction between knowing subject and known. He does not explore crucial ontological dimensions of his insights referring to the Cartesian distinction between subject and object but rather focused on epistemological problems. Nevertheless, he addressed the relationality of things and how some concepts cannot be well-defined in an abstract sense. As Barad addresses:

According to Bohr, theoretical concepts (e.g., "position" and "momentum") are not ideational in character but rather are specific physical arrangements. For example, the notion of "position" cannot be presumed to be a well-defined abstract concept, nor can it be presumed to be an inherent attribute of independently existing objects. (Barad, 2003:14)

Accordingly, Bohr defines reality as an intrinsic relation between substances and measurement is a special case of such a relation which constitutes a reality. (Hubner, 1971) This notion of relationality is still being kept by the contemporary quantum theories and interpretations.

Even though, there are common features with the interpretation of Bohr since they were both pointing the disturbance created by observer in measurement

process and wave function collapse⁵, they had disagreements about the details; for instance Heisenberg thought that quantum theory addressed the limits of what is measurable, whereas Bohr thought that it drew the limits for knowable (Baggott, 2004: 38). However, their main ideas were integrated under one umbrella as Copenhagen interpretation where they described a different kind of reality than the classically perceived one which was widely accepted in the world of science, a kind of reality which is shaped by observer's act.

In addition to this, with Born's probabilistic interpretation of the wave function, there seemed to remain no deterministic and causal interaction according to this paradigm. Also, since Heisenberg inferred the invalidity of causal laws in Quantum Mechanics from the fact that we disturb the object as soon as we make measurement and accordingly from the impossibility of determining some variables simultaneously, indeterminism and acausality are frequently associated with the Copenhagen Interpretation due this quantum measurement problem. The heart of CI is that as soon as a measurement made on a system, it randomly changes the outcome of the measurement and this is associated with wave function collapse. The experimental results interpreted in this way such as the ones from the double-slit experiments⁶ basically seem to threaten the Laplacean identification of determinism and the classical notion of causality. However, neither Heisenberg nor Bohr was able to explain the nature of this randomness properly. Also, the description of 'what an observer is' and the question of whether an observer is a device which we use to make measurement on an object or a subject with consciousness were not paid enough attention which later caused the popular speculative views. Therefore, the interaction between the observer and the system observed/measured conserved its mystery in this interpretation. Since this

5 Wave function collapse is the phenomenon in which a wave function that is initially in a superposition of many different possible eigenstates, appears to be reduced to one of those states after interaction with an observer (Neumann, 1955).

6 Double Slit Experiment is a famous experiment which demonstrates the fundamentally probabilistic nature of quantum mechanical phenomena. The original version which was done by waves is called Young's experiment. In the modern version, the experiment has been repeated by waves, different sizes of particles etc. to understand the wave-particle duality of matter. (Darling, 2007)

effect has been observed in quantum scale, Bohr even thought of everyday world domain and quantum domain as two separate domains.

Another problematic point is that because of the emphasis placed on the importance of the observer or observing instrument, the reality is described as dependent on the choices made by the subject making measurements with or without a measuring device. Thus, the Copenhagen interpretation is mostly understood as subjectivist and anti-realist at its core. However, Heisenberg also pointed out that although the Copenhagen interpretation is often confused with the idea that consciousness causes collapse, it defines an "observer" merely as that which collapses the wave function and here observer may not be a conscious entity. (Heisenberg, 1958; 137)

In summary, as a result of this interpretation, the objective properties of particles at micro level that we would like to determine are in fact the result of interactions between the observer and the object of study. Yet, it is capable of explaining some observational data in quantum level, however, it does not give explanation of the classical level that we experience and makes boundary between classical and quantum, between macro cosmos and micro cosmos.

2.2.2. Callicott's Interpretation of CI for non-anthropocentric Ethics

After having a short summary of the Copenhagen Interpretation's main ideas, now I shall turn back Callicott's ideas developed mainly in the light of this theory. Addressing the Leopold-Hume-Darwin link, Callicott realized that Hume's subjectivist value theory actually betrays the deeper intuitions of Leopold's essentially ecological and organic vision of nature even though it is consistent with Darwin's naturalistic ethics informed by the theory of evolution. He concluded that since the sharp Cartesian subject-object distinction is no longer recognized, the Humean fact/value dichotomy had been deconstructed and perhaps Quantum Physics could give a constructive paradigm, a metaphysical

base for an ecologically informed environmental ethic. (Callicott, 1989: 166) In this section, I shall try explaining the steps of how he came to that conclusion.

During his attempt to find metaphysical grounds for ecocentric environmental philosophy and intrinsic value as an important concept in the history of environmental ethics, Callicott searched for supporting points from contemporary physics in his 1986 article and used CI to support his ethical account. In his interpretation of quantum theory and specifically CI, he searched for the implications of CI for the ontology of values. In his words: “Perhaps quantum theory may serve as a constructive paradigm for a value theory for an ecologically informed environmental ethic, as well as an occasion for the deconstruction of the classical Cartesian metaphysical paradigm...” (Callicott, 1986: 166).

While claiming that physics and ethics are equally descriptive of nature (Callicott, 1986: 110), instead of subjectivist axiology which addresses *intrinsic value* as an intentional affection originating in consciousness and projected onto objectively value-free nature, he suggested a quantum theoretical axiology in which he addressed intrinsic value as a virtual value in nature actualized upon interaction with consciousness (Callicott, 1989: 170).

Being inspired by CI, since the observer has the ability to change the features of the object that he observes, he address that the *res cogitans* collapses into the *res extensa* which means the deconstruction of sharp Cartesian subject and object. (Callicott, 1982, 1985, 1986) He claims that fact/value dichotomy is also deconstructed since every time the observer makes a measurement to learn something about reality, he changes the object and in that sense becomes a part of the outcome. (Callicott, 1985, 1986) Since both facts and values are produced by human beings and the facts are part of subjective realm when they are being defined, it makes sense to say that there is no sharp distinction between them. Yet our values, accordingly moral actions, especially our environmental moral stance can partly be nurtured or shaped by facts. However, that does not mean that facts are as subjective as values, at least with scientific facts it is aimed to explain the

objective features of nature. The Copenhagen Interpretation which Callicott's deconstruction idea is based on addresses a reality where nothing is objective anymore and even more this interpretation gives the impression that everything is mostly shaped by the subject which leads to an extreme idealism which does not seem to support an ecological thinking which is objectivist approach in general.

By having this deconstruction, he aims to overcome Hume's dictum which says that an *ought* can never be derived from an *is*. Since based on CI, *is* and *ought* are not separable as a result of the subject involvement in measurement/observation processes which forms the reality and yet subject is not distinguishable from the object any longer, Callicott makes the interpretation that both fact and value are subjectively projected onto the world. Thus, as an extension of the rest of world, valuing self is a valuing world which means that we need to care about our environment for reasons of extended self interest. However, if I think of other entities as an extension of myself, when I help them, it means that I help them for myself, so they become an instrument for my own well-being as Palmer addresses this problem. (Palmer, 2002: 180) The idea of *extended self* interest that is being concluded with the holistic view of nature and the deconstruction of subject-object dichotomy is just one of the problematic points of Callicott's argument resulted from CI.

In an attempt to construct an ethic from the viewpoint of extended self, if this extended self supported with CI, selves, subjects become the main actors of the reality according to this interpretation. Another problematic point appears at this point in the sense of contradiction. He addresses the interdependence and inseparability of the parts of the cosmic whole and claims that the whole is more than its constituent parts and the parts can be sacrificed for the well-being of the whole. This idea gives a more important ontological state to wholes than parts, individuals, selves that lead the problem of eco-fascism. (Regan, 1983) He seeks for metaphysical grounds to support his point in CI which gives a subject-oriented description of nature and of environment which I think contradicts with the point

that wholes are ontologically more important which he introduces in the first phase of his discourse.

He partly overcomes this contradiction by suggesting the concept of extended self interest; the idea inspired by Alan Watts' "The world is your body":

"Nature is a unity, a whole, and the self, the "I" (mentally as well as physically construed), is not only continuous with it, but constituted by it. Nature and I are conceptually as well as metaphysically integrated". (Callicott, 1986: 273-74)

Hereby he addresses that the self is continuous with nature and also constituted by it and he points out that the Copenhagen Interpretation undermines the distinction between the perceiving self and the natural world as the object of our perception. "Accordingly, it makes perfect sense for me to directly value those collections, since metaphysically speaking I *am* those collections". (Feiser, 1993: 177) Even though it makes sense to put it this way, the Copenhagen interpretation here is not the right model that supports his idea of integrated Nature-I completely; because it leaves out the environment passive and does not emphasize the fact that the subject, the self, I, is also constituted by nature in an active environment.

2.3. The Philosophy of "Environment" and Physics

Even though sometimes they work in different scales - in the sense that physics has wide range of scale of study from infinitesimal particles to super galaxies and environmental philosophy deals much more with macro scale where social phenomena also occur, they have an intersecting interval where the issues they deal with intersect. As they are both concerned with the features of manifestations in different fragments of an environment, they have been affecting one another and feeding each other. The results obtained in physics leads to new philosophical investigations and give basis to new concepts to emerge. Therefore, it is a fact that there is a mutual bias, as it is in the case of science and philosophy

in general. Furthermore, until the end of the eighteenth century at least, the phrase “natural philosophy” was synonymous with physics. (Larérre, 2002: 153) There is a correlation between the developments in science and philosophical views emerged. One of the well-known example for this correlation is parallelism between classical physics and Cartesian thought.

In Classical Physics, environment is mostly treated as a passive surrounding and only the system under examination is considered as active and temporally changing/evolving. Moreover, the way Classical Physics examines a system is to isolate it from its environment and study it in idealized conditions, reducing some external affects such as friction. Also, in Cartesian worldview, environment was understood as something which preserve its structure through time, like the individuals did by preserving their essential natures, occupying definite spatial positions and there was only room for temporality of living beings regarding their life times. The interaction between environment and the individual had been defined with mechanisms which mostly attributed passive roles to either one or the other.

The emergence of theory of relativity, Quantum Physics, theory of evolution afterward started a new era of thought. In the early phases of quantum theory, specifically in the Copenhagen Interpretation, the active role of individuals, conscious observers, have been recognized as I reviewed in the previous section.

2.3.1. Callicott's conception of environment

Though Callicott focuses more on building a theory of environmental ethics, throughout his works he also presents his ideas about how environment can be defined in scientifically informed way. Following general features of quantum theory, specifically CI and New Ecology, Callicott describes a new concept of nature and of environment within this frame. During his investigation to find metaphysical grounds for ecocentric ethics and links between physics, ecology

and ethics, Callicott addresses that “ecology and contemporary physics complement one another conceptually and converge toward the same metaphysical notions” which are *holistic* and *relational*. (Callicott, 1986: 101) Thus, they draw mutually consistent and supportive abstract pictures of nature in its most elementary and universal, in its most complex and local manifestations. (Ibid., 1986: 102) From here, he developed a relational view of self and built up subjectivist ecocentric value theory. If I am reading up Callicott's ideas in the right way, he attempts to build a holistic picture of natural environment up on which he aimed to construct a new ethic.

I discussed in the previous section several points of his account misled by Copenhagen Interpretation which does not give an ecocentric, but rather a subject-centric picture of reality. Here, I would like to tackle further with the understanding of environment which he tried to develop that can be extracted from the totality of his ideas and why it is not matching with CI as well as his ethical account.

In his new conception, the abstractive general concept of nature distilled from the New Ecology in the tradition of Leopold, Shepard, Morowitz and Naess. In this attempt he intended to overcome egoism with the moral psychology implicated by ecology and by addressing the interdependence of all entities in the light of both ecology and Quantum Physics. First, in the organic conception of nature implied by New Ecology as in that implied by New Physics, energy seems to be a more fundamental and primitive reality than material objects or discrete entities- elementary particle is, as it were, a momentary configuration, a local perturbation, in an energy flux or “field” and in this flux each higher level of organization cannot be reduced to the sum of its parts. (Callicott, 1986: 321) He actually aimed to oppose *atomic materialism* in which a composite body can ontologically be reduced to its simple constituents. As he addresses, Arne Naess (1973) suggests or inspires a “relational total field image [in which] organisms are [knots] in the bio-spherical net of intrinsic relations” (Callicot: 1986; 325). New Physics, especially Quantum Field Theory, also echoes this relationality between

entities and describes all entities being part of an interference pattern. Callicott addresses this organic notion as follows:

In the modern Western worldview, nature is pictured as a vast mechanism. The postmodern (and, in a sense, also post-Western) worldview is still very much in the gestation stage, and so cannot be as definitively characterized. But from all indications, nature will be pictured in the eventual consolidated postmodern worldview more as a vast organism than as a vast mechanism. In any case, it seems clear that in the emerging worldview, from the macro cosmic family of galaxies to the microcosmic dance of quanta, including the middle-size terrestrial environment we inhabit, nature is systemically unified by a hierarchy of internal relations. (Callicott, 1994: 198)

Another quality of the concept of nature emergent from Ecology and Physics is that it is *holistic*. No single entity can be thought of isolated from its environment. Contrary to the ontology implied in classical physics and previous biological theories, it was quite possible to separate an entity from its environment, in order to examine it. However, new scientific developments proved the opposite and undermined this view. Furthermore, in this web of relationality, each entity is what it is as a result of the relations it has with its environment. Callicott summarizes this point with the doctrine of internal relations saying that the basic idea is that a thing's essence is exhaustively determined by its relationships, that it cannot be conceived apart from its relationships with other things. He even goes further in claiming that the systemic wholes are logically prior to their component species. (Callicott, 1986; 326) Thereby, in his account he gives two main characteristics of nature that are inter-relational and holistic. It can also be said that nature manifests itself in environment with these characteristics.

In this structure when he places human entities, i.e. separable egos (Callicott: 1986), he gets inspired by Paul Shepards's notion of relational self in which Shepard suggests an alternative view of self to overcome egoistic approach as a center revealing itself as part of its surroundings. (Shepard, 1979) Callicott

incorporates this notion with the points he distills from the Copenhagen Interpretation regarding the deconstruction of subject-object distinction and puts forward an idea of enlightened self-interest as a supporting concept to justify moral behavior towards environment. As a consequence of having this enlightenment, every self can act more harmoniously with its surroundings where he/she recognizes himself/herself as an extension of it. (Callicott, 1986)

Yet, even though I think this idea can be a good approach to overcome our environmental problems, it should be revised in the light of new scientific developments. The Copenhagen Interpretation, by which he is inspired, gives an ill-defined notion of subjects as well as environment. Moreover, it doesn't even consider the role of environment, but just the role of subjects and observing devices where the disturbance created by their involvement defines the way the reality emerges.

Though it is addressed by ecology, the temporally changing, active character of environment *holistically* has not been described well from scientific point of view and paid attention as it deserved. The old rigid views mentioned are still in process in our daily lives, in our actions and support the tendency to forget the productive, evolving character of nature beyond our humanly concerns. Therefore, everything is shaped around human's existential temporality, our activeness and concerns which make us have instrumental attitude towards nature.

In the light of New Ecology and Quantum Physics, Callicott suggests a postmodern scientific worldview where he aims to find solution to this human-centered understanding. He addresses that there is a web of relationships between the parts which makes the whole emerge. Thus, actually neither parts nor wholes are ontologically privileged, but what mostly matters at the end is these relationships.

As Palmer sums up:

Callicott thinks that the postmodern scientific worldview (post-Einsteinian physics and recent work on evolutionary biology and ecology) will have a more organic than mechanic image of human

nature and indeed of nature as a whole. It will suggest that people are essentially connected to their environment, that they are viewed as “knots in webs” rather than as sharply differentiated objects. (Palmer, 2002 : 172)

In addition, the character of the reality/environment we are surrounded by cannot just be described as causal, intentional, local or nonlocal. However, it includes a little bit of each of these characteristics. I think Callicott has been aiming to give an embracing conception of nature and environment as well, but it did not succeed because of the metaphysical ground that he was searching for in the Copenhagen Interpretation.

The links between new physics, evolutionary biology, and ecology have much to offer to overcome anthropocentric approach and build a new ecological mind set to understand nature and accordingly the environment in a holistic sense without neglecting the importance of its subsystems. According to the recent developments in physics and biology that underlie the interrelated character of the systems (each living and non-living) and their environment, the isolated consideration of nature is no longer notable. Regarding this inter-relatedness, we need to understand its dynamics in a wider scope and to recognize its interrelated, evolving character. In this sense, contemporary physics is complementary to ecology and evolutionary biology and underlies that environment consists of temporal structures and has the ability to change the systems which are in relation with it and vice versa.

In the following chapter, I will be introducing Zurek's existential interpretation of quantum theory which I think can supply a better ontological view for our relationship with the environment and support the relational, holistic concept of nature which Callicott aimed to develop without undermining the position of individual entities, the active character of the environment as a whole and the objectivist essence of ecological thought.

CHAPTER 3

ZUREK'S EXISTENTIAL INTERPRETATION OF QUANTUM THEORY, ENVIRONMENT & ECOCENTRISM

3.1. Zurek's Existential Interpretation

3.1.1. Decoherence Programme: From Quantum to Classical

Before exploring Zurek's model in detail, I shall introduce the decoherence idea on which it is based. After the emergence of Quantum Theory which seems fuzzy and counter-intuitive most of the time, its relation with macro world, with our everyday experience, has not been considerably understood until the emergence of the *decoherence* idea. Especially in Bohr's interpretation, quantum domain and classical domain were understood as two separate realms. Moreover, it was not successful in explaining objective appearances that emerge out of superposed states in macro reality, and measurement process was interpreted solely observer-oriented. However, if Quantum Theory was a universal theory which is to explain everyday experience as well subatomic level, then it should have been embracing all the levels of reality even though it seems counter-intuitive to our perception.

Decoherence comes into view with aiming to fill this gap. The first form of the ideas was introduced in the Many Worlds/Relative State Interpretation of Everett in 1957 for the first time. However, the precise formulation of the decoherence program is presented in the early 1980s. Many other recent interpretations of Quantum Theory like the Many Minds Interpretation (Zeh, 1970), the Existential Interpretation (Zurek, 1993) and the Relational Interpretation (Rovelli, 1994) appear as based on this principle which is basically the mechanism that determines the interaction between a system and its

environment. During this interaction, there appears a probabilistic behavior of the system. The way the decoherence exponents deal with this probabilistic behavior and the measurement problem, and the way they define the role of observer is completely different from the preceding ones at this point. For instance, the Copenhagen Interpretation concludes that with the collapse of the wave function during the measurement, the system is seen in one of the possible states as it is mentioned in the previous chapter. It seemed to be disturbed by an instrument or a conscious observer that makes the measurement on it. Hence the wave function of the observed object/system which gives information of its physical state collapses into one state among all other possible states. However, the recent interpretations mentioned above find the collapse scenario unnecessary and take the wave function as universal which means that there is a wave function for the whole universe-not one function for each state- which shows its state at any moment. Accordingly through this universal wave function, an individual system evolves to its next states continuously in interaction with other individual systems. In this sense, it gives a much more holistic perspective of nature. There seems to be an occurrence of wave function collapse or in other words, the untangling of quantum states to produce a single macroscopic reality. (Schlosshauer, 2003)

When entanglements⁷ are generated between a system and its environment, this local coupling between them seems to be untangled from the universal whole-rest of the universe so to say- and forms its own local reality. This happens as a result of the wave function collapse according to the Copenhagen Interpretation. However, decoherence approach aims to explain how this kind of

⁷ Quantum entanglement is a physical resource, like energy, associated with the peculiar nonclassical correlations that are possible between separated quantum systems. Schrödinger coined the term 'entanglement' to describe this peculiar connection between quantum systems: "When two systems, of which we know the states by their respective representatives, enter into temporary physical interaction due to known forces between them, and when after a time of mutual influence the systems separate again, then they can no longer be described in the same way as before, viz. by endowing each of them with a representative of its own. I would not call that one but rather the characteristic trait of quantum mechanics, the one that enforces its entire departure from classical lines of thought. By the interaction the two representatives [the quantum states] have become entangled" (Schrödinger, 1935: 555).

local appearances take place and what is the classical limit for such observations in a holistic manner. Briefly, decoherence aims to describe “what happens when an observer make a disturbance on an object by measurement or by interaction in general”, the process that used to be called the collapse of the wave function (Anderson, 2001: 492) that is a term used by some interpretations like the Copenhagen Interpretation. Therefore, this principle abolishes the need for the collapse scenarios and accordingly the character of the role of an observer changes. Decoherence interpretations also more recently start to deal with the emergence of objective existence, i.e. classical world that we live in as we shall see in Zurek's interpretation.

The key idea that the program is built on is that a realistic quantum system can never be isolated and they are always immersed in the surrounding environment, continuously interacting with it. (Schlosshauer, 2003: 1) As Zurek addresses:

The idea that the “openness” of quantum systems might have anything to do with the transition from quantum to classical was ignored for a very long time, probably because in classical physics problems of fundamental importance were always settled in isolated systems. (Zurek, 2003: 71)

With the emergence of this idea, the quantum theory of classical reality, the environment that we perceive has started to develop in the 90s progressively. Especially Zurek’s idea of *einselection -environment induced selection* in other words- and Quantum Darwinism which will be tackled in the following section, have made significant contribution to the field and to the formation of the existential interpretation which is remembered also with his name. His view is one of the views in decoherence programme which basically deals with the classical, objective appearances in a reality which runs with quantum laws.

According to Zurek’s definition, decoherence is regarded as the mechanism which is central to understanding of the transition from quantum to

classical world. It destroys superselections which are basically the collections of possible states a system can be in. (Zurek, 2002) Accordingly, it provides a better theory to explain how our macro scale environment that we observe emerges out of all the possible states which has been once in superposition.

Now I will go deeper in his understanding of objective reality, nature's mechanisms and the role of both observer and environment during the formation of the macro reality which is perceived objectively in the same way by all observers.

3.1.2. Existential Interpretation: Einselection, Quantum Darwinism and The conception of Operational Environment

How does the reality objectively seen by all of us emerge despite our subjective interferences with it? Most importantly, why is the answer to this question important for environmental philosophy? Obviously, the environment we are surrounded with is our reality and despite our subjective experiences with it and our capability to change it, it is emerging in an objective way which is perceived by many observers in the same way. As we discussed, CI was not successful in explaining this objective environment-so called classical reality-in which we interact.

The existential interpretation which has been shaped by the contemporary physicist Wojciech Hubert Zurek aims to explain the emergence of objective reality out of quantum substrate. The Existential interpretation of Quantum Physics and new concepts along with it that we are about to discover is still leaving some important questions open. However, since its compatibility with experimental data is relatively higher, it can be considered as more successful than the previous ones.

The advantages of the model over CI is summarized below:

1- The Existential Interpretation presents a quantum mechanical explanation of how macro world appears. Bohr was setting a boundary between

classical and quantum realm, but Zurek denies the boundary and explains the role of the environment for the objective appearances of the states of the systems.

2- It takes decoherence as the main principle which aims to explain the emergence of objective reality perceived simultaneously by all observers. By this way, the anti-realist flavor of CI has been overcome.

3- It is one of the interpretations of quantum mechanics with universal wave function which describes the states and the evolution of the universe holistically. (Zweifel, 1974)

4- Furthermore, as Palmer (2002, 177) addresses, one might ask the more general question why scientific work at quantum level should be presumed to have any effect on how we understand the world of everyday experience. Since the existential interpretation aims to explain how everyday experience emerges out of quantum featured nature, it can be regarded as compatible with the macro objective reality. Therefore, it gives us another good reason to take it as a scientific model to explain the occurrences and the interactions at macro level.

As one of the contemporary interpretations of decoherence approach, Zurek's existential interpretation denies the reality of wave function collapse which occurs with the interaction between the observer and the system during the measurement, and simply claims that states evolve in a certain way without a collapse or a disturbance created by measurement. Hence, measurement is just another form of physical interaction and an observer is nothing but another physical system. Accordingly he points out that the idea of objective reality can still be preserved with this account which describes a universal wave function for the whole universe. Moreover, it aims to explain subjective and local appearances that may create the perception that everything happening around us is caused by our acts/observations/valuations -as derived by the Copenhagen Interpretation in a vague way- with decoherence approach. Therefore, it also aims to explain local occurrences as well as the universe as a whole and subjective perceptions as well as objective reality. In this way, we can still talk about the objective mechanisms

of this reality in a realistic manner. Therefore, this model is also in parallel with objective and causal aspect of ecological approach to the idea of environment.

Decoherence does not clearly illuminate the measurement problem and the nature of the interaction between subjects and objects yet. However, it points out and justifies that, although there is a classical-quantum limit because of which we have a tendency to perceive and interpret things subjectively, there is a macro world observed simultaneously by many observers in the same way. Therefore, if a measurement done by any observer on an object was to disturb the object's state, we wouldn't be able to have a common reality or an environment with objective appearances. Otherwise, the common environment we share would have been nothing but a subjective perception or imagination of someone. However, every involvement of subjects is nothing but any other physical interaction contributing to form the objectively observed environment.

Accordingly, as one of the essential pillars of the existential interpretation, Zurek gives an operational definition of objective existence of physical states -the objectively observed environment so to say- which addresses that the observers can make simultaneous observations without making perturbation in the classical states. (Zurek, 2000, 2001, 2002, 2003) For this reason, this interpretation can be also named as the quantum theory of *everyday life*.

The properties that Zurek defines for an operational objective environment/reality should have:

- i) simultaneously accessible to many observers,
- ii) who should be able to find out what it is without prior agreement
- iii) who should arrive at a consensus about it without prior agreement. (Zurek, 2004: 1)

Here “operational” addresses that all the elements of the reality operates and interacts in a way that the objective environment emerges as a result of all the

operations between these elements. In a different manner, the concept of operational environment has been dealt also by Herbert L. Mason and Jean H. Langenheim (1957) and by G. G. Spomer (1973) which can both supply inspirational points. However, they analyze the concept in more organism-based manner concerning operational interaction between an organism and its local environment. Therefore, they give more limited sense for the term.

Mason and Langenheim, in their paper where they make language analysis of the concept of 'environment', attempt to clarify our understanding of this concept as employed in Ecology. They describe the environment as organism-directed, organism-spaced and -timed which makes environmental relations asymmetrical since directly significant to the organism which is just organism-centered view of the term. (Mason; Langenheim, 1957: 334) Similarly, Spomer, in his 1973 paper where he examines the terms “interaction” and “environment” in an operational sense, gives a definition of an organism's operational environment as the sum total in space and time of all external sources and sinks for operational factor relative to organism which is in essence, the portions of an organism's environment with which it interacts directly by carrying on exchanges. (Spomer, 1973; 202) However, in these senses, environment just becomes a passive medium where environment is defined through the operability occurring as a result of the interaction between organism and physical phenomena that enter a significant relation with the organism. In this sense, the definition of environment becomes organism-oriented. To the contrary, Zurek's operational definition goes beyond the relation between organism and physical phenomena, and it embraces all the interactions at different levels and fragments of physical reality as well as the relations between organisms and physical phenomena. Furthermore, environment is not taken as a passive medium but an active, information storing and selecting medium where objectively observed occurrences take place.

When we come back to the role of observer, similar to CI or in Everett's relative state interpretation, in Existential Interpretation Zurek's observer is an active one as well since it emphasizes the idea that no system can be closed.

However, it is not physically more active than its environment as implied in the Copenhagen Interpretation. The observer has the power to affect and change everything that he interacts with, but to the extent that he is just another physical system. Yet, whether this interaction occurs consciously or not, the character of the interaction is the same. Therefore it doesn't matter whether an observer is a conscious being or a measuring device in terms of the laws of physical interaction. At this point, Zurek has a physicalist approach to the problem of consciousness and he also claims that decoherence, or more to the point, his idea of environment induced selection, applies to our own “state of mind” as well. In his words:

I shall examine the idea that the higher mental processes all correspond to well-defined, but at present, poorly understood information processing functions that are being carried out by physical systems, our brains. Described in this manner, awareness becomes susceptible to physical analysis. In particular, the process of decoherence is bound to affect the states of the brain: Relevant observables of individual neurons, including chemical concentrations and electrical potentials are macroscopic. (Zurek, 2002: 21)

In this physicalist manner, it can be interpreted that the involvement of the consciousness, accordingly the intentional act, becomes just another physical interaction in the frame of this model.

Thus, whereas CI suggests that the observer is the key element which destroys the superposition of states and makes the observed object have one outcome, EI basically puts decoherence mechanism instead that destroys superposition of the possible states and gives the observer, moreover to the consciousness a less significant role just like any other physical system. In effect, environment actively induces a super selection according to information stored, that prevents certain superpositions from being observed. Thus only states that survive this einselection process can become the part of objectively observed reality (Zurek, 2002). Accordingly the observer just perceives things indirectly by

interacting with the states observed just like any other system and contributing to the selection process of the whole environment.

Briefly, in EI, the observer has the power to change the reality, to affect the outcome to some extent but what he observes objectively, i.e. simultaneously with other observers is as a result of the information storing in the fragments of environments. What we observe is being selected among many possible quantum states. He calls this process *einselection*, i.e. *Environment induced selection* where he applies the idea of natural selection from the theory of evolution to the selection of the pointer states -or manifested states so to say- of the physical systems. The core idea of this process as he describes it is that observers- especially human observers- never measure anything directly as it has been thought. Instead: “ most of our data about the Universe is acquired when information about the systems of interest is intercepted and spread throughout the environment” (Zurek, 2002; 22).

Taking information and its transfer as playing a key role in the universe, as he suggests, points out an environment which makes monitoring by preferentially recording the information about the states which are manifested in the environment. He states that “any correlation is actually a registration, any quantum state is a record of some other” (Ibid., 2002: 22) , and 'conscious observer' can be treated as just another physical system with its own quantum states. (Ibid., 2000, 2001) He calls this process “the monitoring of the environment” in which it acquires information about the system selectively and monitors it. (Ibid., 2002: 22) This constitutes what the observer observes at the end, however, what is being constituted and manifested in the environment is the result of the interactions and information deposits in that environment itself. Information deposits form up when any information about any kind of system is being stored in the environment and according to this deposit, the state of that system at any time is being selected.

In this interpretation —yet Zurek prefers to name what he is doing as description- what is being presented in a completely different way is the concept

of environment and its role during the emergence of objective properties perceived by all observers. He attributes a different role to the environment to maintain the explanation of our daily classical experiences and a less significant role to the observer which deflates its exaggerated importance. Therefore, observer is just another physical system in Zurek's theory. He also understands consciousness in physical terms, so that the mental processes, specifically our awareness of definite outcomes, are essentially physical. However, he does not give the last word to the consciousness like Eugene Wigner (1961) does (Zurek, 2002: 20).

The objective properties of a system defined occur with the process of einselection according to which the observers-especially human observers- never measure anything directly and instead, environment does the selection.

Zurek defines the role of einselection as follows:

The view that seems to be emerging from the theory of decoherence is in some sense somewhere in between two extremes. Quantum state vectors can be real, but only when the superposition principle- a cornerstone of quantum behavior- is "turned off" by einselection. Yet einselection is caused by the transfer information about selected observables. Hence, the ontological features of the state vectors- objective existence of the einselected states- is acquired through the epistemological "information transfer. (Zurek, 2002: 22)

Furthermore, in the papers "Objective Properties from Subjective Quantum States: Environment as a Witness" and " Environment as a Witness: Selective Proliferation of Information and Emergence of Objectivity in a Quantum Universe" that he wrote with Harold Olivier and David Poulin, they describe the active character of environment and the importance of information deposit. In their words:

In our analysis, the environment is promoted from a passive role of a reservoir selectively destroying quantum coherence to an active role of amplifier selectively proliferating information about the system. We show that only preferred pointer states of the system can leave a redundant and therefore easily

detectable imprint on the environment. (Ollivier; Poulin; Zurek, 2004: 1)

As stated, what makes the environment as seen by many observers is that through the redundant spreading of information –which is the fact that some observables of the system can be independently "read-off" from many different fragments of the environment. This process is the key to the emergence of objectivity that is the essential ingredient of classical reality. They describe the environment as a communication channel through which observers learn about physical systems that underscore the importance of *Quantum Darwinism* which is, analogous to natural selection in biology, “a selective proliferation of information about the "fittest states" chosen by the dynamics of decoherence at the expense of their superpositions – as redundancy imposes the existence of preferred observables”. (Ibid., 2004: 1) Ollivier, Poulin and Zurek also demonstrate in their article that the only observables that can leave multiple imprints in the environment are the familiar *pointer states* singled out by *einselection* for their predictability. By this way, many independent observers monitoring the environment will therefore agree on properties of the system as they can only learn about *preferred observables which are the selected states of the system by the environment*. Briefly, the selective spreading of information leads to appearance of an objective "classical reality" in an operational sense. (Ollivier; Poulin; Zurek, 2005)

As presented, this model attributes a completely active character to the environment as well as its observers who—as is almost always the case—discover the state of the system indirectly by examining a fraction of its environment and find out only about the corresponding pointer observable. Many observers can act in the same way independently and without perturbing the system. Eventually, they come to an agreement about its state. In this operational sense, the states observed by these different observers exist objectively. However, as Healey addresses, “The existential interpretation, rather giving us a metaphysically

complete picture of reality, focuses on the relationship between the observer and the 'facts' perceived.” (Healey, 1998: 93)

3.2. Different Approaches to the Concept of Environment

Before going deeper in this investigation and searching for supporting point for Callicott's account in the light of Zurek's existential interpretation that I think scientifically informs ecocentric views, I shall begin with examining how environment is defined in its general, conceptual sense and what the general views regarding this term are. There seems to be a rough distinction as *natural* and *built* environment. Whereas first one refers to nature without the effects of human activity, the latter means the environment built by humans which can also be called the cultural environment. As nature and natural environment are conceptually and physically correlated and close notions, they can be mixed up and it becomes sometimes difficult to make a distinction between them, especially in common daily use of the terms. However, I shall not go further in the discussion about the difference between the definitions of these two and simply accept that environment is the medium where *nature manifests itself* and where parts interact with each other. It can also be defined as the medium where culture manifests itself. However, during this work I will consider culture as an extension of nature and its mechanisms since humans are part of nature, therefore the natural-built distinction is ambiguous.

Among philosophers, the views on the idea of environment are generally exposed in two opposite accounts, that are the causal/ecological and the intentional. They both indicate *relationality*, although the character of the relation they define differs. In the ecological view, the causal nature of environment is considered and the relation between living and non-living entities defined in terms of causal interactions, whereas the intentional view defines environment as a field of significance for conscious organisms. (Sol, 2005) Yet, they seem to be completely different accounts, I think, they are complementary to each other since

they explain different forms of relationality between both human and non-human entities.

Environment, which is called *milieu* in French, is often defined etymologically as surroundings, “to some extent everything that encompasses each and all of us” (Young, 1986: 86) which “presupposes something to be surrounded”. (Ingold, 1992: 41) Cooper, however, warns us that something to be surrounded does not mean geographically or geometrically that addresses just proximity or mean a circle around the subject with a short radii. (Cooper, 1992: 168) Biologically and ecologically, there is no sharp distinction between a living thing and its environment (Cooper, 1992). Moreover, according to the recent theories of physics, there is no distinction between anything at all and everything including living and non-living entities exists in an interacting environment where information flows continuously.

Environment can also be categorized as natural and built environment, since it is more than we can define as surroundings for sure. It is something social, cultural, economic as well as natural. The part that we are building/changing is related with our social, cultural, technological and economic structures. Thus, it is defined in terms of all natural and social surrounding features and processes. This distinction actually refers to ecological and intentional views about the definition of environment regarding the relation between the entity and its environment. Whereas ecological view defines it as a causal system (Mason & Langenheim, 1957), intentional view defines it as a field of meaning for a conscious living entity (Cooper, 1992). The advantage of the first one is that it does not demand consciousness for the organism to be envired, but the latter warrant no environment for non-conscious beings, even though it supplies an intimate relation. If we consider only human beings as intentional beings, then intentional view leads us to a complete anthropocentric definition of environment. For Cooper(1992), mammals as well as human beings can have fields of significance by investigating their own environment, localizing their food and danger. Therefore his intentional view is not restricted to human beings. It is

not conceivable to accept a complete causal point of view since it deals more with physical interaction between living entities and their environments. For instance Mason and Langenheime defines environment operationally by taking into account only the notions of space, time and causality. They describe this *operational environment* as organism-directed in which individual organism's spatial, temporal and causal relations are important to determine its environment. (Mason & Langenheime, 1957: 331) However, this definition is limited since ecological relations require a more holistic point of view. (Young, 1986) Moreover, this spatio-temporal environment is being affected by the intentional acts of humans, which makes it partly being *built* with technical, cultural, economical appliances.

As I agree with Dower (1994), the idea of environment, besides being a field of significance, consists of causal influences on the state of an entity, which can still be explained in relational terms. Therefore, both of its causal and intentional features can be embraced. Nevertheless, when we perform an intentional act in/on an environment, the consequences appear in a causal way.

3.3. Zurek's operational definition & Ecocentrism

As it is explained in Section 3.1, the properties that Zurek defines for an operational objective environment/reality should be: i) simultaneously accessible to many observers, ii) who should be able to find out what it is without prior agreement, and iii) should arrive at a consensus about it without prior agreement. Once again, here "operational" addresses that the elements of the reality operates and interacts in a way that the objective environment emerges as a result of operations between all these elements of it. (Zurek, 2004)

When we want to position Zurek's description of operational environment among these views mentioned in the previous section, it generally fits in a causal type definition. Nevertheless, since Zurek points to the physical character of consciousness and points out that any observer, even subjects with consciousness, can be considered as physical systems (Zurek: 2002), to some extent, intentional

acts can be examined in physical, causal frame as well. I do not intend to say that intentionality can solely be defined under physical terms, since it is a question of philosophy of mind whether it has non-naturalistic aspects as well. However, intentional definition is partly overlapping with causal view since the mental state, i.e. brain's activity can be explained by decoherence principle as well. Accordingly the gap between intentional views and causal views can be bridged with this approach.

So, what is the epistemological or ontological privilege of Zurek's position in supporting an ecocentric approach to environment? First of all, most of the interpretations of QT is incompatible with common-sensically perceived macro world. However, Zurek's model is based on the decoherence principle which aims to explain the classical reality emerged out of quantum substrate. Events at quantum level seem to be completely different from events in the everyday experience, and what Zurek aims to do is to explain the classical appearances with quantum theory, accordingly to extend the theory in order to explain all kinds of phenomena occurring at all levels and to explain why they are different. So basically he is doing the quantum physics of the classical world, whereas in the Copenhagen Interpretation, quantum and classical are pictured as two different realms.

A second important aspect of it is that the observer, whether conscious or not, becomes just another physical system in the environment which plays a role as important as any other system. It spreads the center of dependence in an environment to each and every system. Accordingly it supports ecological attitude towards it in a wider ontological scale, both local and nonlocal levels where appear objects and events in different fragments of the environment in relation with all other parts of the universe . Thus, in its core idea, the model embraces both individualistic and holistic occurrences since it is able to explain the relationality between parts and wholes, and how they interact in this operational environment.

Finally, it also supports the deconstruction of subject/object dilemma addressed by Callicott (1986, 1989, 1994). As we have seen in CI, it is interpreted that such deconstruction occurs as a result of the measurement process where observer disturbs the observed, where subject claims to be changing the object. However there have been some gaps in this interpretation regarding what is meant by an observer, what a subject is and what the role of consciousness is as we have seen in the previous chapter. Thus, the meaning of this deconstruction has not been fully explained.

Zurek's definition of environment embracing all different levels of reality, giving less significant role to the conscious self in this reality and attributing the environment as a whole an active role as well as all its parts constituting it, can supply the basis for Callicott's account and help develop a scientifically informed ecocentric ethics.

3. 4. Revisiting Callicott's account in the light of Zurek's model

In Chapter 2, I have presented the notion of relational and holistic idea of environment that Callicott developed throughout his work in the light of organic conception of nature inspired by Leopold's idea of biotic community, Shepard's relational self, Morowitz's field-ontology⁸ and deep ecological view of Naess and the Copenhagen Interpretation of quantum theory. Once again, the critical point in his account has been that even though his description of nature and accordingly of environment is compatible with ecocentric views, CI does not supply the proper scientific support that he has been aiming to provide for his theory.

Quantum theory generally supports the idea of relationality of all parts in the universe. However, the interpretations of it differ in their ontological and epistemological description of nature. CI suggests an ontology where the reality loses its objective essence and everything becomes observer dependent as we

⁸ Morowitz, Harold J. (1972) *Biology as a Cosmological Science*, *Main Currents in Modern Thought* 28: 156.

discussed and in this sense, things in an environment exist in virtue of being sensed or experienced by a subject or an observer. Therefore, it underlines mainly the active character of the observer without succeeding to give an adequate description for what the observer really is. While interpreting the Copenhagen Interpretation to support his ecocentric point of view, Callicott (1986) addresses the deconstruction of fact/value distinction and put both fact and value in the eye of the beholder where he glosses over the objective reality and mechanisms of nature simultaneously observed by the observers. Eventually, this leads us into a weak anthropocentric understanding since the formation/emergence of the reality is mainly dependent on observer -here, observer is being used synonymous with subject or a conscious being.

Furthermore, Callicott interprets CI to emphasize that there is no more distinction between facts and values, and they both belong to the realm of subject. However, with the concept of an extended self, he aims to overcome subjectivity and claims that selves are continuous with the environment. However, in his quest to combine quantum theory with ecological thinking (Callicott, 1986: 109), since he makes this combination with a subjectivist interpretation of the theory which is already problematic to explain the role of the subject Callicott distances himself from the core idea of ecology which is far from being subjectivist. Through his investigation to build up a theory of intrinsic value and ecocentric point of view for environmental ethics, he ends up in a subject oriented account where object is melted within subject during the interaction between subject and the object. However, if all subjects change their surroundings one at a time in each of their measurement, there would be no common reality or environment to observe simultaneously.

Zurek's interpretation is a scientific model that is more promising for Callicott's quest of finding scientific basis for ecocentric views, since it gives a definition of objective environment where subject is just like any other physical system. (Zurek, 2002) Now I shall continue with addressing some complementary

links between Callicott's notion of environment based on an analogy between ecology and physics, and Zurek's model.

First of all, in both of the descriptions information and energy flow is essential. In this energy flux or field, Callicott describes individuals, organisms as momentary configurations, patterns or local perturbations. (Callicott, 1986) In Zurek (1998; 2002), this refers to information accumulated in the environment that makes individual, phenomena or any physical state appear in the way it appears. This flow of energy and information supplies the inter-relatedness of every component of the reality or environment where all the operations between all human and nonhuman entities take place.

Secondly, Callicott presents a holistic view of environment where it is not possible to conceive of an entity in isolation from its environment and a thing's essence is determined by its relationship with the rest of the universe and it cannot be conceived as apart from its relationships with others. (Callicott, 1985;1986; 1999) Quantum theory has been giving the idea of relationality of everything as not a single entity can be thought as isolated from the rest of the universe. (Mehra, 1973) This idea is in the core of quantum theory and not new at all. However, before the universal wave function was introduced by Hugh Everett (1973) in his PhD Thesis, every system or entity had its own wave function. Therefore the introduction of the universal wave function is, I think, a complementary mathematical element of the idea of the inter-relatedness of all parts which is also essential in Zurek's theory, since Everett's Relative State or Many Worlds Interpretation was pretty much the departure point of his theory (Zurek, 1998; 2002).

Finally, Callicott aims to supply scientific foundations for ecocentric point of view in environmental philosophy and he could not find these foundations in CI, because he ends up in a subject-centric position even though he aims to build up an ecocentric account. Zurek's operational environment model supplies an active concept of environment where subjects become part of the physical systems which affect the environment and also being affected by it. It still leaves

some major questions about the role of consciousness open, however, it is a theory which points out and emphasizes once again the idea that humans are not the center of the environment surrounding them, though we are highly capable of shaping it.

CHAPTER 4

SCIENCE & ECOCENTRIC THOUGHT

4.1. Scientifically Informed Ecocentric Ethics?

One of the central concerns of environmental philosophy has been to introduce an adequate value theory in order to justify moral actions towards nonhuman aspects of nature. Therefore, one of the aims of the environmental philosophy, specifically environmental ethics, is to understand the different types of values in nature, to define the moral considerability of both human and nonhuman entities, and to examine our environmental concepts, terms and policies in a deeper sense. Callicott's aim was to introduce metaphysical foundations inspired by New Ecology and New Physics to build up a value theory for non-human entities. Therefore, he aims to introduce a form of naturalistic ethics and a concept of value which can be derived from facts, since the fact/value dichotomy is deconstructed.

Whether there is any kind of value in nature as an end in itself, not just because it serves human ends, is among the main questions that environmental ethics are dealing with. This value which has been often called intrinsic value is basically understood as the opposite of instrumental value. However, its senses have wider range than suggested by this simple statement. John O'Neill summarizes the term in three basic senses including the non-instrumental one as such (O'Neill, 1992: 131,132):

1- Non-instrumental value which means that an object has it in the sense of being an end in itself. However, if it is as a mean to other ends, then it means it has instrumental value.

2- The value which depends on the intrinsic, non-relational properties of the object as employed by G.E. Moore.

3- An objective value that an object possesses independently of any valuing subject.

Some environmental philosophers assert that to define an objective intrinsic value is a crucial matter to define non-anthropocentric environmental ethics. Taking the term as a synonym to non-instrumental is actually inherent in all accounts defending the necessity of intrinsic value concept. G.E. Moore, for instance, defines the term in a non-natural way and believe that this value solely depends on non-relational properties of an entity and he claims that any naturalistic theory of inherent or intrinsic value commits *naturalistic fallacy* which addresses that the term 'good' in the sense of intrinsic value is indefinable (Moore, 1903). I believe that if the value theory goes outside of the natural world, it will have a speculative metaphysical ground which will put the value concept into an inhuman, transcendental position, which does not seem profound, since the value is something completely made/ produced by human consciousness.

The third sense of the term ends up with a speculative metaphysical ground, since we are not able to test it. However, it is defended by many environmental philosophers. For instance, Rolston is one of the relentless defenders of the need to define the intrinsic value objectively. Among other philosophers, Attfield (1983), Taylor (1981,1983) and Deep Ecologists (Devall and Sessions 1985) are also attracted to this idea. Rolston (1982: 145) claims that there are both objective and subjective values in nature. By subjective he means, depending on personal judgment and difficult to get consensus on; whereas by objective he means, values obvious to all or publicly demonstrable. He points out that every genetic set is a normative set programmed for survival and there to be beyond in every organism and in this regard all organisms actively defend their lives for what it is in itself (Ibid, 2010: 132). He defines his account of intrinsic value in the light of these points. In this regard, his definition is close to Taylor's biocentric account since both emphasize that each organism has a telos or an end in itself with good of its own which means that they are intrinsically valuable and this fact generates duties. Taylor (1986) also builds up his biocentric

environmental ethics on this basic idea which is actually Kantian at its core. However, Kant (1959) attributes moral considerability to humans solely in his ethical perspective, whereas Taylor and Rolston extend the limits to all organisms. Kenneth Goodpaster introduces the same kind of account for non-anthropocentric environmental ethics: “Life is intrinsically valuable and thus that all living moral beings should be granted moral considerability” (Goodpaster, 1978).

There are also some dissenters who do not believe in the necessity of such an objective definition to build up a profound basis for non-anthropocentric ethics. Even some completely neglects the concept. For instance, according to Norton, a non-anthropocentric environmental ethics based on intrinsic value to defend nature does not have any difference in practice from an anthropocentric approach, if the human interests are considered broad enough. In his convergence hypothesis, he claims that if we take into account the interests of future generations as well as of present societies broad enough, respect for human beings is quite enough to preserve nature. Since, in his view both anthropocentric and non-anthropocentric environmental ethics is claimed to prescribe the same personal practices and public policies, they “converge” (Norton, 1991). As a result, all values are instrumental, yet this does not mean that we should not care for nature. This kind of environmental pragmatism is based on an idea that “value is never found in the object itself as a property” (Rolston: 1982; 126). It also rejects the means-ends distinction and opposes the fixed, final ends. Accordingly, pragmatists are against the first value argument which assumes that when we trace means back to ends, we find an ultimate, objective value. It is one of the subjectivist accounts of value theory. However, as Weston emphasizes, it is not necessarily anthropocentric by saying that “Even if only human beings value in this sense, it does not follow that only human beings have value; it does follow that human beings must be the sole or final objects of valuation.” (Weston, 1996: 285). Therefore, it still leaves the door open to a weak anthropocentric point of view and ecological morality.

Many other philosophers such as Routley (1973), Rolston (1982), Regan (1981) and Callicott (1989, 1999) underline that objective or subjective, if nature lacks intrinsic value, the ethics will only turn into human ethics and consideration of environment will solely be about management of the natural resources. According to Tom Regan (1992), inherent value must be either a property of an inherently valuable natural entity or grounded in its actual properties and it must be objective, independent of any valuing consciousness. His position opposes environmental pragmatism completely. Also, he criticizes that limiting the class of beings which have inherent value to the class of living beings seems to be an arbitrary decision. Taylor's biocentric view covers all life forms (Taylor, 1992). However, the environment does not only consist of living entities.

Aldo Leopold, the founder of the land ethic, makes an extension by defining a holistic account covering all land -including soil, mountains, rivers etc. in which he sees "the land as a community to which humans belong, not a commodity belonging to us". (Leopold, 1949) According to his ethical point of view, we should regulate our practices in order to preserve the integrity, stability and beauty of the biotic community. Foreword to *A Sand County Almanac*, Leopold states: "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." (Ibid. 1949: viii) Without dealing with the definition of intrinsic value, Leopold brings in the importance of wholeness of nature and the concept of biotic community into environmental philosophy. Then, as it is introduced in detail in Chapter 2, his follower J. Baird Callicott revises his views and introduces his account of intrinsic value for collective entities, in other words, ecosystems in which he interprets Leopold's ethics in the light of Darwinian natural selection and Hume's moral sentiments theory. Moreover, he also attempts to introduce a new axiology to build ecocentric morality with the help of the developments in Contemporary Physics. Therefore, his account is based on two possible metaphysical foundations, one of which is the holistic view based on

Leopold's extended land ethic and the latter is the one based on the Copenhagen Interpretation of Quantum Theory.

Even though I do not intend to neglect the importance of the concept of intrinsic value completely, I think that in order to build up a profound basis for ecocentric ethics and to affect human behavior, there is no necessity to define an objective intrinsic value theory as some scholars like Rolston who aimed to introduce an objective value theory.

While searching for metaphysical grounds of ecocentrism, Callicott has been interpreting the implications of quantum theory for the ontology of values and for a new axiology of environmental ethics. The question is whether science, specifically quantum theory can say anything about the values. Whereas science is after objective truths about reality and aims to present a picture of value-free nature, some ethics aim to answer the question of objective goodness which shapes our way of behaving. Furthermore, their methodology and direction are quite different. Science and natural philosophy that are distinguished from moral philosophy, have always been in close contact, even they have been synonymous until the end of eighteenth century. While indicating this point, Larrère also underlines that "in 'natural philosophy', there is 'philosophy', not just science". (Larrère: 2002: 165) Even though their methodologies and purposes are different, there has been certainly a mutual feeding since with scientific developments, new worldviews and perceptions emerged and influenced the way people act. Though science cannot impose ethical obligations, I think it can be used as a guideline to act in harmony with our environment and shape our decision making processes, since it helps us to understand the character of nature of which we are part and it can certainly affect our way of acting.

Within the modern worldview, as Callicott addresses, Descartes' firm distinction between object & subject is one of the cornerstones constituting the metaphysical foundations of modern science which undermines the relationality between subject and object, and sets a boundary. This Cartesian way of thinking is also related with the classical physics. As Anthony Quinton addresses:

In that conception (the Newtonian) the world consists of an array of precisely demarcated individual things or substances, which preserve their identity through time, occupy definite positions in space, have their own essential natures independently of their relations to anything else, and fall into clearly distinct natural kinds. Such a world resembles a warehouse of automobile parts. Each item is Standard in character, independent of all other items, in its own place, and ordinarily unchanging in its intrinsic nature. (Quinton, 1985: 52)

With the emergence of contemporary scientific theories and branches including relativity theory, quantum physics, theory of evolution and ecology, there appeared to be a new scientific worldview — a so called paradigm shift. As Grey points out: "First, Copernicus effectively displaced humanity from the physical center of the universe. A few centuries later Darwin pointed out that humanity occupied no biologically privileged position" (Grey, 1993: 463). Then relativity theory and quantum theory has shaken the foundations of Cartesian conception of subject/object distinction.

Capra addresses this web of relationality and our place in it as subject observers:

A careful analysis of the process of observation in atomic physics has shown that subatomic particles have no meaning as isolated entities, but can only be understood as interconnections between preparation of experiments and the subsequent measurement. Quantum Theory thus reveals a basic oneness in universe. It shows that we cannot decompose the world into independently existing smallest units. As we penetrate into matter nature does not show us any isolated 'basic building blocks', but rather appears as a complicated web of relations between the various parts of the whole. (Capra, 1975: 68)

In this sense, this view can also be analogous to the inter-relatedness in social reality. Yet, quantum theory seems to be far away from everyday life process, Hayward points out that:

The key idea here is that as nature has undergone processes of increased differentiation and complexity, accompanied by a growth in subjectivity and capacity for experience, specifically human values have emerged not as a radical departure but as part of a continuing development of the process. I think this is a potentially fruitful idea connecting specifically human values in an evolutionary continuum with the rest of nature. It thereby promises to reconcile dualistic oppositions and provide a basis for a unified view of the human place in the world. (Hayward, 1995: 37)

Science affecting our perception of nature and affecting the way we act has been Callicott's point of departure, if I interpret his quest in a right way. As he presents, for a scientifically informed non-anthropocentric environmental ethics, he searches for metaphysical supporting points in science and aims to relate them to his ethical proposals. He departs from the point of view that science is “epistemologically privileged”. Furthermore, he addresses that there are dominant scientific worldviews to describe the way of interpreting the world that are dominant within the scientific community at any particular time (Palmer, 2002: 172). Also, as I have briefly tackled, he argues that contemporary science (physics as well as ecology) “enfolded, involved, or engaged” a new ontology which provides a new basis for a new holistic ethics (Larrère: 2002). He claims that as the dominant postmodern scientific worldview, namely quantum theory -specifically his interpretation of the Copenhagen Interpretation- also ecology and theory of evolution which address similar notions, will supply a new axiology for non-anthropocentric ethics.

Even though as Palmer (2002) questions that exactly what state this worldview is in is not clear and whether a scientific postmodern worldview exists, I think, science is still in an epistemologically privileged position to help us increase our awareness about the reality/environment that we live in. It may not work properly every time since it is another human construction but it is being fed by our systematic interaction with nature that we are in. Similar to and inspired by Callicott, what I aim to emphasize here is that science, specifically contemporary physics, can inspire environmental philosophy and its practices. However I do not

aim to give an account of intrinsic value. Yet, there has been mutual feeding between science and philosophy all the time, this feeding should not be exaggerated when it comes to moral philosophy especially. Because science does not give positive ontology for objective values (Palmer: 2002), yet its aim is to be as objective as possible in understanding reality. My point is that it can give a direction to our understanding of nature and ourselves and our place in this interrelated universe. I also do not intend to introduce a value theory. However, I think that, to some extent, *is* influences *ought*. Though identifying the good in terms of scientific facts may cause naturalistic fallacy, without defining good according to a reliable reference we may end up in a vague ground. Yet, even though Moore (1903) supports non-naturalistic ethics, he is not able to give a substantial definition of goodness. I think, good can be defined depending on the context and since nature gives us a context that we live in in the widest sense, it may supply us referential points to decide what a good act is.

We are the ones who are able to create the positive attitude, which means to me is to be in accord with nature. To be able to be in accord with nature, we need to discover and rediscover what nature is, and I believe this is what science stands for. However, to make a person have certain attitude towards nature is possible if only that person is persuaded to have that attitude. Therefore, without any internalization and awareness to act differently, there can be no change in practice.

I believe that our changing perspective and awareness is shaping the way we value our surrounding and, in order to change our perspective and increase our awareness concerning the impact we are making on our environment, we essentially need more knowledge about our environment and both formal and non-formal⁹ education in society which helps individuals to have these kinds of

9 Non Formal Education (NFE) has been defined as any intentional and systemic educational enterprise (usually outside of traditional schooling) in which content is adapted to the unique needs of the students (or unique situations) in order to maximize learning and minimize other elements which formal school teachers deal (Kleis, Lang, Mietus & Tiapula, 1973: 6). Learning is based on interactive activities and shaped by students needs. Every activity is followed by an evaluation of the process in the group that includes the facilitator/trainer and participants.

knowledge. Yet, science as a reliable tool to gather knowledge about nature can help to change our perspective towards our environment. That is why I defend that science can obviously affect our behavior and can inform ethics. I do not intend to claim a complete naturalistic position, since I am aware that ethics are created by human consciousness which may have non-naturalistic aspects as well from a different, dualistic point of view as Chalmers (1995) criticizes the complete physical explanations of mental experience. However, the impact of scientific developments on our behavior is quite significant.

4.2. Ecological Thought and Ethical Implications in the light of the idea of Environment inspired by Zurek's Existential Interpretation

Here in this section, I hope to contribute Callicott's quest of informing ecocentric ethics scientifically by using the idea of environment inspired by Zurek's Existential model. The reasons that I prefer to have this model as a basis has been introduced in the previous chapter. I also endeavored to address some complementary links between Callicott's notion of environment based on an analogy between ecology and physics, and Zurek's model. After identifying the unifying aspects of the new axiology of environment, I briefly aim to explore its link with ecologic thinking and its possible ecocentric ethical implications.

Once again, the Existential Interpretation presents a quantum mechanical explanation of how macro world appears. It takes the decoherence as the main principle which aims to explain the emergence of objective reality perceived simultaneously by all observers and by this way, the anti-realist flavor of CI has been overcome. It is one of the interpretations of quantum mechanics with universal wave function which describes the states and the evolution of the universe holistically. Furthermore, as an answer to Palmer's (2002, 177) criticism, since it aims to explain how everyday experience emerges out of quantum featured nature; it can be regarded as compatible with the macro objective reality.

So far, these are the reasons that I find this model inspiring and a good starting point to describe environment in a wider sense with all its aspects. Accordingly I believe his theory supports an idea of environment which more or less embraces both individualistic and holistic approaches, the subject/object dilemma, both causal (ecologic) and intentional views or global/local distinction, that have been central in creating the gap between naturalistic/causal views and intentional views defining the environment.

The model embraces both individual and holistic aspects of environment, since it defines it in the way that all parts contribute to the formation of an operational, interrelated reality. Here subjects are just regarded as any other physical system of the reality. Yet the theory underlines a holistically running universe, it also considers the local differentiations and perturbations which shows off the individual and subjective features of the entities. In this manner, it doesn't present too rigid a holism like Deep Ecology movement, as Wood (2003: 229) warns us concerning this danger of the movement which leads to eco-fascism.

Secondly, it supports the deconstruction of subject/object dilemma addressed by Callicott (1986, 1989, 1994). In CI, it is interpreted that such deconstruction occurs as a result of the measurement process where observer/subject disturbs the observed, object. Taking CI as a basis, in Callicott's description of the interaction between the subject/the self and the environment is explained as subject-oriented. Here the self refers to conscious beings. This interpretation of CI does not supply strong support to ecocentric views. Perhaps it doesn't lead to antropocentrism directly, however it leads to a self-centrism instead of ecocentrism as Callicott aims to. Accordingly, this also contradicts with Callicott's aim of overcoming ego-centrism or self-centrism. However, Zurek's definition of environment embraces all different levels of reality and gives a less significant role to the conscious self in this reality. The environment as a whole becomes an active mechanism in itself as well as all its parts constituting it. Furthermore, unlike the CI, in the Existential Interpretation, Zurek defines an operational objective environment/reality which is simultaneously accessible to

many observers, who should be able to find out what it is without prior agreement and who should arrive at a consensus about the objects/phenomena observed without prior agreement (Zurek, 2004).

We can still talk about the objective mechanisms of this reality in a realistic manner along with the fact that values are subjective structures in our classically perceivable world and yet, facts are produced by conscious subjects as well though they address and are in touch with objective reality. Indeed, scientific facts are meant to be the descriptions of objective reality concerning objective mechanisms of nature which are independent of human consciousness. Therefore, yet they are being acquired through human consciousness which is the source of intentionality, their investigation has an objective orientation and it doesn't mean they are ultimately defined from a subjective point of view. Moreover, in reaching objective facts about nature the investigation we make is a social practice as each intentional subject is not an isolated system and affect one another. Also each intentional subject is in relation with the rest of the universe. Therefore our relation and relationality with both human and non-human entities of the reality are very essential in our definition process of facts. By this way, we testify the objectivity and validity of our ideas and factual theories concerning our environments. On the other hand, our act of valuation is the product of consciousness and social interaction. However, to testify a validity of a moral value has different processes than testifying scientific facts and its validity is mostly being measured by the social consensus. Since the fact/value dichotomy as a challenging subject of philosophy needs more attention I do not take the discussion further in this work.

Briefly, I think our intentional relationality as well as the physical one with our environment take place with the mechanisms of nature as well; perhaps not solely completely in naturalistic terms but to a great extent. Therefore intentional act has also naturalistic character that is part of a simultaneously observed objective environment. Zurek (2002) points out that the consciousness

which is the source of intentionality should be explained by physical explanations of decoherence principle as well, as I introduced in the previous chapter.

Thus, in Zurek's objective environment, conscious subjects and their acts can be defined in terms of decoherence process, specifically in terms of the idea of environment induced selection which points out the holistic, active, relational character of the environment with all its conscious and non-conscious aspects. Also, in Zurek's interpretation observer, whether conscious or not, becomes just another physical system in the environment which plays a role as important as any other system. It spreads the center of dependence in an environment to each and every system. Accordingly Zurek's model explain this relationality in a non subject-oriented manner with emphasizing the objective character of environment which can supply a convenient basis for ecocentric thought in a wider ontological scale.

As Alan Watts addresses: "Every individual is an expression of the whole realm of nature, a unique action of the total universe" (Watts, 1973: 13) which is a summarizing statement of Zurek's interpretation. Thus, in its idea it also supplies that, the model embraces both individualistic and holistic occurrences since it is able to explain the relationality between parts and wholes, and how they interact in this operational environment.

Finally, Zurek's description of operational environment among these views mentioned in the previous section generally fits in a causal type definition. Nevertheless, since any observer, even subject with consciousnesses can be considered as physical systems (Zurek: 2002), intentional acts can at least be partly explained in physical, causal terms as well. Accordingly it suggests a bridge for the gap between intentional views and causal views.

To summarize, the merit of my criticism is the re-interpretation of Quantum Mechanics done by Callicott and the link he makes with environmental philosophy. His understanding of environment is too much subject oriented and undermines the objective facts and observables in the classical, everyday realm. I do not conclude that there is a final scientific worldview which is the decoherence

program of quantum theory, specifically Zurek's position. What I would like to emphasize is that this interpretation can be inspirational to understand ourselves and our place in nature, and affect our interaction with the environment, our ecologic and intentional involvement. Zurek's definition of operational environment actually is a kind of description of the reality and accordingly of nature. Therefore we see that these two concepts, namely environment and nature, are mingled in his description. Therefore, his account suggests an environment more than just a surrounding.

Then, where do we go from here? What is the link of these ideas to ecologic thinking and furthermore ecocentric ethics? As Warwick Fox once argued, ecology and certain interpretations of quantum theory provide structurally similar or analogous representations of terrestrial organic nature and cosmic micro physical nature respectively. (Fox, 1984; Callicott, 1985: 166) Due to the notions they both address such as relationality and inter-dependence among all entities in nature, they both have a holistic approach. However, they do not give much of a description concerning place of individuals and selves.

While Callicott makes links between implications of quantum theory and ecological thinking, aiming to overcome too rigid a holism and describe the participation of the selves in an environment, he suggests the notion of extended self. By this way he describes individuals as continuous with the rest of the environment. (Callicott, 1985: 172) Shepard also addresses this point as such:

Ecological thinking ... requires a kind of vision across boundaries. The epidermis of the skin is ecologically like a pond surface or a forest soil, not a shell so much as a delicate interpenetration. It reveals the self ennobled and extended rather than threatened ... because the beauty and complexity of nature are continuous with ourselves... The self is a center of organization, constantly drawing on and influencing the surroundings, whose skin and behavior are soft zones contacting the world instead of excluding it. (Shepard, 1969:2)

As we are unified with nature and extensions of it, Callicott addresses that since self is intrinsically valuable, he goes further to say that nature is intrinsically

valuable (Callicott, 1985:174). I find the extended self notion very complementary with the ideas of ecology and quantum theory indeed and I do think that it is a good basis to decide for ecocentric ethical choices and actions, since the conscious self is the starting point of acting. I also think that for ecocentric way of living, how we perceive and understand our environment has more essential role than having an intrinsic value theory.

Callicott starts with extending Leopold's Land Ethic which supplies an organic, holistic view of the environment and he aims to find metaphysical foundations for the value of nature in itself in the light of his interpretation of CI. However, we have seen that even though the aspects, such as interconnectedness, interrelatedness, importance of relationality in nature he has been addressing supported by general contemporary approach in Quantum Physics seem to be the general features of nature in all levels, by interpreting CI, Callicott has a subjective orientation and the subject, the self, the ego becomes extraordinarily important in the formation of environment and reality in a wider sense. Therefore he loses the spirit of ecology which has an objective orientation in the sense that treating all human and nonhuman entities equally and pursuing each of their participation. Accordingly CI that he has selected to support his point is not enough to support what he has been aiming for; that is to define a holistic view of nature and environment. Furthermore, the support he seeks in CI is not sufficient to develop a sense of morality as an extension of individual self-interests. Because it is based on CI which is the subject oriented interpretation of Quantum theory that he has been using. Therefore it leads to a subject centered view of environment and underestimating objective character of it.

However, Zurek's model of active environment and emergence of reality is much more appropriate to Callicott's aim of addressing a holistic ontology to support ecocentric views and ethics, as it underlines the activeness of the environment as a whole. It also addresses the observers, even subjects (observers with consciousness and intentional act) as just another physical system interacting with the rest of the fragments of reality. In that sense, it can give much more

adequate basis to build up the fundamentals of a scientific stand point for ecocentrism and to increase the awareness that nature, the universe, runs holistically with the fact that all parts are included in the process of creating this reality and all parts are being shaped by the rest of the environment in return which shows the active role of the environment.

Without a qualm, there is still a long road to a quest of deriving *ought* from *is* and justifying moral actions, since the questions about consciousness, choice and whether a causal system gives rise to how something should be, in relevance with how it simply is, are here to stay. However, with this metaphysical basis, I believe we might develop an ecocentric extension of ourselves to our environment and we can start developing the right attitude and use our tools and technologies in a wiser way. As Alan Watts summarizes the core of the issue:

The problem of man and technics is almost always stated in the wrong way. It is said that humanity has evolved one-sidedly, growing in technical power without any comparable growth in moral integrity, or, as some would prefer to say, without comparable progress in education and rational thinking. Yet the problem is more basic. The root of the matter is the way in which we feel and conceive ourselves as human beings, our sensation of being alive, of individual existence and identity. We suffer from a hallucination, from a false and distorted sensation of our own existence as living organisms. Most of us have the sensation that "I myself" is a separate center of feeling and action, living inside and bounded by the physical body—a center which "confronts" an "external" world of people and things, making contact through the senses with a universe both alien and strange. (Watts, 1973: 12)

In order to overcome this feeling of separation from the rest of our environment, we need to rediscover our place in it and “We need to learn in new modes of ethical holism what organic interconnectedness means for human persons” (Ferré, 1994: 232). The harmonious right action towards our environment comes from the right perspective, and the right perspective comes with learning more about how nature operates in an environment. In this learning

process, science has a great role. Thus, it is no surprise that it shapes our axiologies too. Accordingly, the existential interpretation of quantum theory is quite promising in the quest to contribute to the scientific basis for an ecocentric perspective.

CHAPTER 5

CONCLUSION

In this thesis, by revising Callicott's account of non-anthropocentric environmental philosophy and his conception of environment that he developed in the light of Copenhagen Interpretation and New Ecology as the departure point of my work, I endeavored to address the ill-matching points with his aim of giving an ecocentric description of environment (and account of ethics) resulted from CI. I also endeavored to develop a new understanding of environment combining the seemingly opposite but complementary aspects of the definition of environment such as individualistic/holistic, causal/intentional, objective/subjective etc. in the light of Zurek's existential interpretation which can be a scientifically informed stand point for ecocentric world view and also for the relevant moral philosophy for several reasons I argued throughout my work.

To sum up, what Callicott has aimed was to extend Leopold's Land Ethic which supplies an organic, holistic view of the environment and to find metaphysical foundations for the value of nature in itself in the light of his interpretation of CI. We have seen that since the aspects such as interconnectedness, interrelatedness, importance of relationality in nature he has been addressing supported by general contemporary approach in Quantum Physics, they seem to be the general features of nature in all levels. However, the CI that he has selected to support his point is not enough to support what he has been aiming for; which is to define a holistic view of nature and environment . Furthermore, his arguments are not sufficient to develop a sense of morality as an extension of individual self-interests based on the subject oriented interpretation that he has been using. I discussed that CI and his interpretation of it does not support ecocentrism.

However, Zurek's model of active environment and the emergence of reality is much more appropriate to Callicott's aim of addressing a holistic ontology to support ecocentric views and ethics, as it underlines the activeness of the environment as a whole. It also addresses the observers, even subjects (observers with consciousness & intentions) as just another physical system interacting with the rest of the fragments of reality. In that sense, it can give much more adequate basis to build up the fundamentals of a scientific stand point for ecocentrism and to increase the awareness that nature, the universe, runs holistically with the fact that all parts are included in the process of creating this reality and all parts are being shaped by the rest of the environment in return which shows the active role of the environment. Moreover, one of its significant aspects is that it adapts the evolutionary approach into all levels of physical reality, not just biology by bringing the idea of *environment induced selection* or *einselection* forward. Despite the fact that einselection is not a metaphysically complete picture of reality, unlike most of the interpretations of QT that are incompatible with common-sensically perceived macro world – which corresponds to the environment we live in, Zurek's existential interpretation supplies a model for how the classical reality emerges.

Apart from its advantages, the still developing model of Zurek does not have much to say about the role of consciousness, accordingly the meaning of subject yet. Generally, it is still an on-going process to find connection between the interpretation of quantum theory and the inquiry into the nature of consciousness. The main point in his model as suggested by a physicalist perspective is that the place of conscious observer is as ordinary as any other physical system interacting with its environment.

Once again if we emphasize what aspects are mentioned and underlined for a new understanding of environment in the light of this interpretation; the seemingly opposite aspects of different definitions of environment are all partially right and complementary to each other, first of all we have the opposition of individualistic and holistic understanding and both levels are as necessary as the

other. Also we have causal/ecologic and intentional views which environmental philosophers defend one or the other, or try to find an agreement in between.

It can be criticized that a holistic, global understanding of environment can give us no idea of home and moreover, as Almond claims, making people citizens of everywhere makes them rootless citizens of nowhere (Almond, 1990: 102). However, to get too much localized and to see only the tip of our shoes obviously does not help either, since we end up in being interested in saving only our “field of significance” (Cooper, 1992), being more ego-centric, family-centric or community-centric. For sure actions can be expressed in locality, but for integrity and harmony, a more comprehensive approach is undoubtedly needed.

During my investigation, even though I gave a short introduction concerning possible ethical implications of my ideas, unlike Callicott I did not deal with the question of intrinsic value which I think is an unanswerable metaphysical question and I avoided making a *direct* link for an axiology based on science and ethics. Therefore this question has been left open. I did not address ethical conducts that can be directly derived from the scientific, experimentally supported interpretations that I have been introducing, since nature is value-free. However, science can give a new ontology and useful epistemological insights and can help persons to understand their environment, themselves and their place in it in a broader sense. Therefore, I think we can count on it as a useful tool to increase our awareness and justify our behavior whether it is in harmony with our environment in the sense of not being harmful but constructive. Once Copernican Revolution showed the earth was not at the center of the universe. Furthermore, the developments in physics, specifically Zurek's einselection model tackled here, addresses that humans are not at the center of reality and the whole operational environment — reality so to speak, works and occurs in the way it is observed simultaneously by all observers with all interaction between the human and nonhuman elements of it. Zurek's model explain even conscious subject's relationality in a nonsubjective manner with emphasizing the objective character of environment which supplies a convenient basis for ecocentric thought in a

wider ontological scale. This conclusion supplies us scientifically informed ground for ecocentric thinking.

Finally, even though we are just another physical system due to the existential interpretation and just one of the many centers of life, we cannot underestimate the effective role of our consciousness. It cannot be neglected, since it gives us a certain responsible role and ability/power to shape things with our intentions. As it is once summarized in these words: “with great power comes great responsibility.” (Lee & Ditko, 1962)

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APPENDIX



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YAZARIN

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TEZİN ADI (İngilizce) : A NEW APPROACH TO THE IDEA OF ENVIRONMENT IN THE LIGHT OF ZUREK'S EXISTENTIAL INTERPRETATION

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1- Tezimin tamamı dünya çapında erişime açılsın ve kaynak gösterilmek şartıyla tezimin bir kısmı veya tamamının fotokopisi alınabilir.

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