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**SCIENCE AS A CRITICAL MODEL: THE FIELD
CONCEPT IN JOHN FOWLES'S *THE FRENCH
LIEUTENANT'S WOMAN* AND *THE MAGUS***

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ÖZET

Newton fiziğinin evrenin kurallarını kesin olarak açıklayabilme yetisine olan güveni, 20. yüzyılın başlangıcında kuantum fiziği ve görelilik kuramlarının ortaya çıkışıyla son bulmuştur. Bilimdeki bu dönüm noktası kaçınılmaz olarak felsefe ve edebiyat dahil olmak üzere birçok disiplini de etkisi altına almıştır çünkü bu gelişme Batı'nın, bilimin deterministik zeminine dayalı tüm değerler sistemini yıkmıştır. Süperpozisyon, dolanıklık, belirsizlik gibi devrimsel ilkeleriyle, kuantum mekaniği nesnelerin gerçek doğasını ve dış dünyayı kesin olarak açıklayabilme ihtimalini yok saymıştır. Gerçekliğin istikrarsız zemini aynı zamanda 60'lardan sonra popülerlik kazanan postmodernizmin ve postyapısalcılığın da odak noktasıydı. Epistemolojik ve ontolojik içerimlerin ve bilimsel paradigmaların daima dönemin edebi trendlerini etkilediği gerçeği göz önüne alındığında, hem 20. yüzyıl yazarlarının hem de edebiyat toerilerinin postmodernizm etkisiyle gerçeğin problemli doğasına odaklandığı görülmüştür. Edebiyat kuramlarında çeşitli kuantum ve görecelilik bazlı eleştiri modelleri öne sürülse de Katherine Hayles'in "alan kavramı" paradigma değişiminin kültür üzerine olan etkisini daha bütüncül bir yaklaşımla açıklamaktadır. Hayles'e göre

modern fizikle başlayan deęişim süreci, matematik, bilgisayar, bilim felsefesi, dilbilim ve edebiyat gibi farklı disiplinlerin eş zamanlı olarak ortak problemler üzerine yoğunlaşmasına sebep olmuştur. Hayles disiplinler arasındaki bu ortak kültürel yönelimi bağlantılılık ve özgönderim ile karakterize olan “alan kavramı” ile açıklamıştır. Bağlantılılık, batı metafiziğinin temeli olan atomizasyon, ayrıklık ve özne-nesne ayrımını ortadan kaldırırken, özgönderim gerçekliğın nesnel olarak açıklanmasının dilin betimlediğı sistemin ayrılmaz bir parçası olmasından dolayı imkansız olduğunu iddia eder. Hayles bu iki prensibe dayalı alan kavramının ışığında çağdaş romancıların paradigma deęişimi ile oluşan bu yeni gerçekliğe olan tepkilerini eserlerinde nasıl yansıttıklarını örnek okumalarla incelemiştir. Bu bağlamda, bu çalışma postmodern edebiyatın en önemli temsilcilerinden olan John Fowles’un ünlü romanları *The French Lieutenant’s Woman* ve *The Magus: A Revised Version*’da alan teorisinin içerimlerini yapısal ve tematik boyutta çözümlemeyi amaçlamaktadır. Tematik olarak ilgili romanların karakter, olay örgüsü ve dekorunda klasik fizikten modern fiziğe geçişin metaforik düzlemde yansımaları açıklanmıştır. Yapısal olarak ise yazar, metin, okur ve anlatıcı arasındaki bağlantı Hayles’in alan teorisinin Roland Barthes’ın “yazarın ölümü” ve Derrida’nın “metinsellik” ve “différance” terimleri ile birleştirilmesiyle yeniden kavramsallaştırılmıştır. Ayrıca alan teorisinin iki temel prensibi olan bağlantılılık ve özgönderimin postmodern edebiyattaki temsil sorunu ile olan paralelliğı bu iki romandaki anlatım teknikleri üzerinden incelenmiştir.

Anahtar Kelimeler: Paradigma Deęişimi, Postmodernizm, Postyapısalcılık, Kuantum Fiziğı, Görelilik Kuramı, Alan Kavramı, Bağlantılılık, Özgönderim, Gerçeklik Algısı, John Fowles, *The Magus*, *The French Lieutenant’s Woman*



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ABSTRACT

The Newtonian science's confidence for its ability to obtain knowledge was challenged with the emergence of quantum physics and theories of relativity in the early 20th century. This watershed in science inevitably prompted a number of disciplines including philosophy and literature since it destroyed the whole Western system of values that were based on the deterministic ground of science. With its ground-breaking principles including superposition, entanglement and uncertainty, quantum mechanics shattered the possibility of knowing the true nature of things and explaining the physical world. The unstable ground of the reality was also the focal point of postmodernism and poststructuralism, which gained popularity in post-60s. Considering the fact that the epistemological and ontological implications and scientific paradigms have always affected the literary trends of the period, both contemporary writers and literary critics who were heavily influenced by the poststructuralist and postmodernist theories focused on the problematic nature of reality. Although various critics have addressed the impact of quantum and relativity theories on literary works, Katherine Hayles's "field concept" provides a more extensive theorization of the concerning matter. According to Hayles,

the paradigm shift initiated by modern physics formed a common cultural matrix, which caused different disciplines such as mathematics, computing, philosophy of science, linguistics and literature to concentrate on similar issues simultaneously. Hayles explained this common cultural orientation among disciplines with "the concept field", which is characterized by interconnectedness and self-referentiality. While interconnectedness abolishes atomization, isolated systems, and subject-object dichotomy that are the fundamentals of Western metaphysics, self-referentiality implies that objective description of reality is impossible because language is an integral part of the system it describes. In the light of the field concept based on these two principles, Hayles examines how contemporary novelists responded to this new reality created by the paradigm shift with sample readings. In this context, this study aims to analyze John Fowles's two famous novels *The French Lieutenant's Woman* and *The Magus: A Revised Version* by demonstrating the implications of the field theory on structural and thematic level. The thematic analysis will focus on how the characters, plot and setting of the target novels metaphorically represent the transition from classical physics to modern physics. On the other hand, the structural analysis section deals with reconceptualization of the connection between author, text, reader and narrator by combining Hayles's field theory with Roland Barthes's "death of the author" and Derrida's "textuality" and "différance" terms. In addition, it explores the narrative strategies of the concerning works by examining the parallelism between the representation problem in postmodern literature and the two basic principles of field theory, interconnectedness and self-reference.

Key Words: Paradigm Shift, Postmodernism, Poststructuralism, Quantum Physics, Theory of Relativity, The Field Concept, Interconnectedness, Self-Referentiality, Perception of Reality, John Fowles, *The Magus*, *The French Lieutenant's Woman*

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INTRODUCTION

The question of reality has been a controversial and intriguing topic of research in literary studies, and critics and novelists have addressed this concern in different ways because the description of reality evolves in accordance with the philosophical and scientific trends of the time. Until the beginning of the 20th century, the prevailing idea determining the borders of reality was the Newtonian, in other words, classical paradigm, which had taken its roots from the Western metaphysical tradition dating back to ancient Greek philosophers. The basic assumptions of the Newtonian worldview are that the world is like a clock composed of isolated, detachable and stable parts and is governed by universal laws whose working mechanism can be conceived through deductive and inductive reasoning because they are causal, deterministic and common-sensual. Furthermore, since the observing and analyzing subject is strictly separated from the object, or the physical world, a sequential and logical description of objective reality is possible. These ideas were the backbone of scientific inquiry, and the philosophical and literary discussion were mainly centered around these presumptions for almost 200 years until the emergence of new physics in the early 20th century.

The anomalies that were detected in the fundamental principles of the Newtonian physics caused a revolution in the concerning field, but the shift was pervasive, exceeding the limits of physics, and other disciplines adopted a new mode of thinking because it affected the cultural matrix of the period thoroughly. The developments in physics after Einstein's theory of relativity and quantum mechanics appeared replaced the philosophical implications of the classical paradigm. This new reality is dynamic, fluid, wholistic and probabilistic contrary to predictable, fixed and absolute nature of the Newtonian worldview. Relativity theory proved that describing the physical phenomena from an objective frame of reference is not possible and that the matter and energy are the different manifestations of the same phenomenon. In a more radical way, quantum theory demonstrated that the subatomic particles are not solid matter that has a specific location in space and time but rather a probability wave, and they change their property of being a particle or wave depending on the act of observation. Thus, these two theories

imply that a rigid separation between subject and object is impossible since the observer is an active participant in the creation of reality and that matter is not solid, immutable, stable, indestructible as Newtonian scientists assumed. Moreover, absolute time and space in classical approach is replaced by the four-dimensional space time continuum, which showed that the reality is fragmented as the time and motion are relative, and the same phenomenon can be observed differently from different points of view. Since the world is now an indivisible whole having a dynamic structure where the components are in constant interaction, language that is based on causality, temporality, and linearity cannot describe this new mode of reality. These philosophical implications share a common ground with the poststructuralist and postmodernist theories in the same period because they focus on similar ontological problems, so the contemporary fiction is also a part of this paradigm shift.

Literary theory and works have responded to this transformation of ideas in various ways. This thesis will explain how the paradigm shift in science altered the basic assumptions about reality and how the contemporary novelists and critics reflected this change in thought in their works. A prominent figure who examined the impact of paradigm shift on culture, Katherine Hayles, and her “field concept”, which is based on the principles of interconnectedness and self-referentiality will be the focal point of this study, and John Fowles’s two postmodern novels, *The Magus: A Revised Version* (1977) and *The French Lieutenant’s Woman* (1969) will be analyzed thematically and structurally in the light of the implications of the field model.

In Chapter 1, the evolution of the reality concept will be discussed in detail within the scope of the notion of paradigm shift. As a term coined by Thomas Kuhn, it explains how the seemingly different disciplines are based on the same underlying assumptions. Starting from the ancient Greek philosophers, this section will sketch the foundation of classical paradigm and how its main principles affected the classic realist novel. Atomistic structure, subject-object dichotomy, self as a stable and fixed entity, absolute space and time, the existence of objective reality, isolated and detachable parts are the common points between the Newtonian science and classic novel.

Secondly, the modernist period starts in literature at the beginning of the 20th century that is parallel to the Einstein’s relativity theory. Since relativity does not totally

reject the objective truth, the problem of representing reality is more epistemological. As in the case of observers in relativity theory, the perspective of characters and narrators in the modern novel are fragmented. Every character presents the story according to his/her own subjective view, so the same story can be observed differently from different frames of reference. However, if the reader combines all the perspectives, it is possible reach the objective truth.

Thirdly, the connection between postmodern literature and quantum physics will be elaborated. The philosophical implications of quantum theory turn relativity's epistemological problem about reality into an ontological one. The fact that the observer is intertwined with the system it observes radically violates the subject-object division. In addition, language cannot describe mutually exclusive qualities of the subatomic reality as it works in either/or fashion. These assumptions are parallel to the poststructuralist and postmodern discussion of the possibility of an objective truth due to the instability of language. These ideas manifest themselves in postmodern fiction as unreliable narrators or open-ended stories.

The second sub-section will present the literary responses to the paradigm shift in science. It will especially focus on the theory books of the four notable critics: *The Cosmic Web* (1984) by Katherine Hayles, *Fiction in the Quantum Universe* (1992) by Susan Strehle, *Quirks of the Quantum* (2012) by Samuel Chase Coale, *Readings from the New Book on Nature* (1981) by Robert Nadeau. Each critic relates the literary works to the new physics theories in a different way. Strehle problematizes the categorization of postwar fiction since it is mainly divided into two as realist and antirealist. She argues that because the paradigm shift in science totally altered the reality concept, metafictional works which refer to their aesthetic qualities are directly categorized as antirealist, but in fact there is a third group, which is both self-conscious about its formal processes and refers to the outside world. She calls this midfiction as actualist fiction. Samuel Chase Coale, on the other hand, directly relates quantum physics to postmodernism because of their common features, such as their emphasis on metaphor and language as an improper medium to describe reality. Another critic, Robert Nadeau, compares the metaphysical implications of the classical and new paradigms and explains how relativity and quantum theories affected the modern novel as the Newtonian

worldview influenced the classical fiction. Finally, Katherine Hayles's field approach will be briefly introduced, but it will be expanded in the last sub-section.

The final section of Chapter 1 will provide a detailed discussion of the field concept of Hayles by explaining the scientific and mathematical models causing the formation of a common cultural matrix. According to Hayles, the paradigm shift in science was not confined to physics, but it transformed various disciplines including mathematics, computing, philosophy of science, linguistics and literature. Nonetheless, the interaction between the disciplines is mutual rather than a unidirectional cause-effect chain. She claims that two the distinctive characteristic of the field model of reality is interconnectedness and self-referentiality. While the former indicates that the objects, observer and physical phenomena are interrelated, rather than being isolated from each other, the latter signifies the inherent limits on the sequential and logical analysis of events because language is involved in the system it describes. After comparing the metaphors and implications of the classical paradigm with the new one, this section will outline how interconnectedness and self-referentiality manifest themselves in scientific and mathematical models.

Chapter 2 will examine *The Magus: A Revised Version* on thematical and structural level. The thematical analysis will explore the metaphors reflecting the new concept of reality that employs the implications of relativity and quantum physics and how these metaphors are symbolized through the main characters, plot and setting. Each character represents the shift in thought from classical paradigm to the new one in a certain way. While the protagonist Nicholas embodies the classical physicist at the beginning of the novel, Conchis stands for the quantum physicist who have mastered the principles of the subatomic realm. The women he encountered throughout his journey, on the other hand, mirrors the ungraspable and quirky quantum particles. In terms of setting, the classical and quantum dichotomy is well portrayed through London, the macrocosm in which the rules of the Newtonian physics operate and the island Phraxos, the quantum realm of probability.

The structural analysis will concentrate on the postmodern narrative strategies of the novel by connecting the principles of interconnectedness and self-referentiality to Derrida's notions of textuality and différance. The relationship between the author, text

and reader will be reconceptualized through interconnectedness as it undermines the subject and object division. The reliability of the narrators as the mediator of the meaning will be discussed with respect to the self-referentiality problem. The frame narratives and multiple texts that are embedded in the main story will be associated with both self-referentiality and interconnectedness.

In Chapter 3, the same format of thematical and structural analysis will be applied to *The French Lieutenant's Woman*. The analysis on the thematical level will trace the metaphors signifying the basic principles of the quantum and relativity theories. As in the case of the thematical analysis of *The Magus*, the subjectivity of the main characters, including Charles, Ernestina and Sarah will be interpreted as metaphors reflecting the concepts in new physics. The protagonist Charles's subjectivity is a solid and stable entity composed of norms, duties and responsibilities of the society he lives in, so his initial position belongs to the realm of classical physics. Similarly, his fiancée Ernestina depicts the classical realm due to her predictable nature and her obedience to rules and conventions. On the contrary, Sarah personifies the quantum realm with her mysterious and unknowable identity.

Finally, the structural analysis will foreground the postmodern narrative techniques of the novel which challenge the conventions of classic realist text, including mimesis, hierarchy of discourses and linear plot with a special emphasis on the narrator persona and the two alternative endings. These narrative techniques will be reconceptualized with regards to interconnectedness and self-referentiality principles of the field model.

CHAPTER 1: THE IMPACT OF NEW PHYSICS ON LITERATURE: THE FIELD CONCEPT

1.1.Paradigm Shift and the Evolution of the Reality Concept

Literature, science and philosophy seem to be intertwined throughout the history of mankind because they endeavor to understand and explain the human experience and its relation to physical world. In this respect, the question of reality is an important topic of research in all these disciplines since “the thinkers in any time share certain assumptions about the laws that govern their particular reality” (Bohnenkamp, 1989, p. 19). When the assumption that “a new mode of reflection in one area can inspire a range of new perspectives in others, forming connections across disciplines that influence generations of thinkers” (Gillespie, 1997, p. 598), the transformation of the concept of reality in accordance with the intellectual trends of specific periods is worth considering. One example can be the dominance of positivism when Newtonian physics appeared, or the popularity of the relativistic view of reality after Einstein’s theories. About the impact of scientific developments on the evolution of the notion of reality, Nadeau similarly argues that “many of the architects of what was fast becoming a revolution in scientific thought [...] were raising some formidable questions about the character of reality itself. They perceived, in short, that the revolution in physics seemed to be leading inexorably to a revolution in metaphysics (Nadeau, 1981, p. 3). Thus, to reach a satisfactory examination of the relationship between these three disciplines and how the concept of reality is shaped, it is crucial to use Thomas Kuhn’s (1962) concept of paradigm shift as a framework to trace the parallel developments in each discipline and detect the common intellectual trends.

In his *The Structure of Scientific Revolutions* (1962), Kuhn traces the history of science and challenges the conventional idea that science proceeds in a linear and continuous way. He rather detects an episodic pattern characterized by progress and shifts. He divides this process into three phases, which are pre-paradigmatic stage, normal science, and scientific revolution. According to Kuhn (1962), disciplines are not built on top of each other in a cumulative way, but by the collapse of the old one and the transition to a brand-new paradigm through the radical shaking of the basic concepts within the paradigm. Each scientific discipline has a pre-paradigmatic stage where

individual but not standardized studies are conducted. When scientists agree on specific concepts, theories and terminology about the field and form a standard approach, which he calls “paradigm”, “normal science” phase begins. In this stage, scientists simply receive the accepted concepts and try to solve the problems within the scope of the paradigm. He argues that in this stage, “the scientific community knows what the world is and looks like” (Kuhn, 1962, p. 5). However, at some point, the existing paradigm comes across with some “anomaly”, which begins “with the recognition that nature has somehow violated the paradigm-induced expectations that govern normal science” (pp. 52-53). Consequently, a scientific revolution occurs, and a totally new paradigm emerges when paradoxes and problems undermine the fundamental principles in the paradigm. It is this point where scientists are really critical about their theories, and scientific progress is achieved in those rare moments during what Kuhn (1962) calls “paradigm shift”.

During the normal science phase, phenomena are examined within the scope of a certain set of rules and principles, and other alternative explanations that do not fit this frame are considered invalid or ignored. This set of rules determines “mindset of a particular era” (Bohnenkamp, 1989, p. 19), and this means that paradigms actively shape the “intellectual climate” (Nadeau, 1981, p. 16) of the time, and the scientific and cultural “streams of inquiry flow in a similar direction” (Hayles, 1984, p.15) during this period. Since the notion of reality also evolves within the conceptual framework of the existing paradigm, when a shift occurs, the basic assumptions for the view of reality alters as well because paradigms are not absolute, timeless, and immutable.

In the light of Kuhn’s (1962) theory, this thesis will discuss the relationship between literature, science and philosophy and how the dominant paradigm of the period reveals the same underlying concepts in each discipline. It will also focus on the difference between the philosophical implications of the two major paradigms in physics, Newtonian and Post-Einsteinian (relativity and quantum mechanics), and how their approach to reality diverges. Finally, how the last paradigms in physics, the Einsteinian and quantum paradigm, affected the philosophical and literary works in the 20th century and how they were effective in the emergence of a new literary genre that literary critics call “physics fiction”, “actualist fiction” or “quantum fiction” will be the

focal point of this study.

The basic principles of Newtonian paradigm dates back to Ancient Greece, which forms the backbone of Western metaphysical tradition (Nadeau, 1981, pp. 19-20). Nature philosophers, such as Heraclitus, Plato, Aristotle, and Pythagoras attempted to explain the natural phenomena in the physical world through several postulates and included epistemological and ontological implications of the physical phenomena under the branch of “metaphysics”. The question of reality, the how the mind is related to the physical world, causality, substance, identity, and the essence of the objects were the main discussions in metaphysics.

The first main postulate of Western metaphysics is the idea that analytical mind is capable of discovering physical reality (p. 10), and this confidence derives from the main division between the subject and the object. The mind is the thinking subject, and it analyzes the outside world around it by positioning the nature as the object. The main instrument causing this division is language mechanism. The symbol-making animal categorized the world and used mythological thinking to create a meaningful pattern (p. 5). Myths helped them to make connections and create cause-effect relationship. This symbolic language shaped how early humans saw the world around them and made it possible to create myths, which was an attempt to describe the phenomena for ancient civilizations.

Although mythopoeic imagination was the prominent way of thought for a long time, Greek philosophers replaced this with abstract thinking and universal laws. Pythagoras and Plato were two important representatives of this tradition, and their contribution completed the metaphysics of reality leading to Newtonian physics (p. 23). They had few doubts about mind’s ability to uncover reality. They thought that perceived world was illusory, and reason was the only means to obtain the truth, which was in mathematical form (p. 23).

Newtonian assumption that atom is the building block of the substance also originated in ancient Greece. Philosophers like Parmenides, Leucippus and Democritus thought that reality consisted of fixed, unchanging substances and change was the combinations of unchanging forms (p. 22). For Parmenides, the fundamental life principle was unique, invariable “Being” unlike Heraclitus’s “becoming” concept (pp.

21-22). Thinking or naming shows the presence of something since it is not possible to talk about something absent. This proves the existence of a physical world outside the mind. Therefore, nothing changes because change requires things coming into existence or ceasing to be, but they already exist. The result is that since the infinite and indivisible One cannot change, the change the mind perceives is illusory. What survived from this idea is the indestructability of substance. This idea was supported by Leucippus and Democritus, and these philosophers combined Heraclitus' Becoming with Parmenides' unchanging Being. They thought that "Being" consists of unchanging substance (atoms), and through blending and separation, things are created in the changing world. These two are strict determinists and believe that every phenomenon has a necessity (p. 22).

Aristotle's ideas are similar to Plato's in the sense that there is a division between the immutable and transcendent and that matter has a nonmaterial essence. This dualism is seen in his mechanics of motion. In the cosmos beyond the moon, things are in continuous circular motion (p. 24). Aristotle explains the cause of this motion as the First Cause, and this exists outside the realm of things, like Judeo-Christian God. He became the supreme authority in physics in 12th century because it was both credible and was convenient with symbolic universe of language (p. 24). Nadeau argues that if this same belief was not the feature of Judeo-Christian cosmology, Copernicus, Galileo, Kepler, Newton, would not be base their theories on the ideas of Greek philosophers (p. 10).

The fact that abstract thought is more essential than objects composes the basic feature of Western philosophical thought (pp. 24-25). Although this separation is no longer observed in science, it made the first scientific revolution possible. Unlike Eastern philosophy, Western metaphysics believed that it could explain the nature of physical world (p. 25). They also did not doubt the reliability of their perceptions. Nature was present and understandable to their mind. Classification of the natural events was not metaphors, but actual descriptions. This confidence in the mind's ability to grasp the essence of things enabled the first theoretical advances in physics in 16th and 17th century (p. 25).

After the scholastic idea, which supported Aristotle cosmology because it was in

line with Christian cosmology, lost its influence and importance following the scientific revolutions initiated by Copernicus, Kepler, Galileo, and other Renaissance and Enlightenment polymaths, the reliance on mind and reason replaced divine revelation because they discovered that there were certain, immutable, absolute rules based on mathematics and geometry governing the physical world.

Copernicus challenged the geocentric model advocated by Aristotle and Ptolemy and offered heliocentric universe in 16th century (p. 25). Another prominent figure was Kepler who was the first one to look for a universal physical law based on terrestrial mechanics to understand it through mathematics (Holton, 1974, p. 69). He built a “bridge from the old view of the world as unchangeable cosmos to the new view of the world as playground of dynamic and mathematical laws” (Holton, 1974, pp. 70-71). Kepler described his mechanical worldview as follows: “I am much occupied with the investigation of the physical causes. My aim in this is to show that the celestial machine is likened not to a divine organism but rather to a *clockwork*” (as cited in Holton, 1974, p. 72, emphasis added). Based on this quotation, it is clear that the famous clock metaphor dominating the scientific inquiry until the 20th century dates back to Kepler’s philosophy. In this respect, Kepler’s work caused a dramatic change in Western man’s conception of physical reality (Nadeau, 1981, p. 27). He combined the celestial and terrestrial regions under certain universal physical force, and his motive was to “provide a philosophy or physics of celestial phenomena in place of the theology or metaphysics of Aristotle” (as cited in Holton, 1974, p. 76). In addition to Christian God, Kepler was influenced by the mathematical order offered by Pythagoras (Holton, 1974, p. 86).

Galileo developed the mechanics of motion in 17th century, and his first law of motion marked the beginning of classical physics (Koyré, 1968, p. 95). He was also an advocate of Pythagorean mathematical idea and Plato, so “the formulation of postulates and the deduction of their implications precedes and guides the recourse to observation” (Koyré, 1968, pp. 42-43) for him. He applied this new scientific idealism through free fall, which was a significant leap in science because it violated Aristotelian physics (Nadeau, 1981, p. 29). For Galileo, the real is geometrical, so it is the result of determination and measurement (Koyré, 1968, p. 95). He asserted that there was something more in the realm of reason than the ones revealed in nature, and human

mind was capable of discovering these immaterial mathematical forms (Nadeau, 1981, p. 30). As a result, Western man confronted with a “conception of the universe as a vast *machine* within which man is buffeted about by forces that have no regard whatsoever for his central place and importance” (p. 30, emphasis added), and the idea that the only role of Judeo-Christian God is the First Cause damaged anthropocentric universe (p. 30). This way, the divorce between man and nature occurred, and the most responsible philosopher for this divorce is Descartes (p. 31).

Descartes strictly divided mind and body, subject and object through his Cartesian theory (Hayles, 1984, p. 31). Descartes reached the conclusion that the universe is governed by immutable laws, and mathematics is “the key that unlocked the secrets of the universe” (Nadeau, 1981, p. 31). He formulated “metaphysical dualism”, which was the result of his desire to find a logical proof for his idea that mathematical forms are eternally true (Nadeau, p. 31). He thought that there must be a division between mind/geometrical form and all other aspects of nature that resides in perception, which led to the concepts of “the *res cogitans* and the *res extensa*, the thinking mind and the physical object” (Hayles, 1984, p. 31). Subjective activities like perception and imagination are “phantasm unrelated to anything outside themselves” (Nadeau, 1981, p. 32). To solve this dilemma, Descartes thought that thinking substance was more real, which results in his “famous *cogito ergo sum*” (p. 32). At this point, it can be concluded that the only thing remaining in the absence of all substance was the thinking mind which was the only way to be sure about the existence of the self. Consequently, Cartesian Dualism maintains that mind can “use the mathematical idea to arrive at a wholly objective description of the behavior of material objects” (p. 32), in other words, physical reality.

The systematic examination of physics as an independent field escalated after Newton’s theories concerning gravity and motion. With classical physics, the connection between atomism and Pythagorean mathematical idea became more vital (p. 33). Like Galileo, Newton also thought that objects were composed of indestructible particles, so the combination of these two ideas strengthened the idea that physical reality was contained in mathematical idea (p. 33). He felt that if the scientist could represent these laws in mathematical form, he could reach the final truth about the

material world (p. 33). Since Newton's laws were highly predictive of the results, the mathematical ideas were the key to unlock the secrets of the universe (p. 33). He was also very obsessed with searching for a unifying structure (Manuel, 1968, p. 22). Newton argued that "our business is with the causes of sensible effects" (Newton, 1803, p.10); for this reason, experimental verification is mandatory. Principles like mass and gravity are not "occult qualities, [but] general laws of nature" (1704, pp. 351,377). The task of the investigator is to uncover general laws and not to concern himself with ultimate causes of these laws (Nadeau, 1981, p. 35).

There are two important concepts in his physics: First, "absolute, true and mathematical time, of itself, and from its own nature, flows equably without regard to anything external", and "absolute space, in its own nature, without regard to anything external, remains always similar and immovable" (Newton, 1803, p. 7). As can be clearly understood from Newton's remarks, time and space are separate and absolute. Second, motions detectable by senses are relative motions in relation to absolute time. When the absolute time and space concept of Newton is combined with Cartesian division of Descartes, one of the prevailing principles in Newtonian paradigm (Hayles, 1984, p. 42), becomes the subject-object division and the isolated and atomized structure of the universe. Matter, physical phenomena and the observer are separate and can be analyzed individually (pp. 9-10), which brings forth the mechanized worldview. When the idea that the universe obeys certain mathematical laws and works in "clockwork" fashion prevailed (pp. 16-17), a rationalist, empiricist, positivist attitude started to determine the atmosphere of scientific and philosophical works (p. 38). Thus, this reliance on reason and mind went beyond science and became a part of philosophy as Vanderbeke suggests: "The eighteenth century saw a multitude of attempts to extend Newton's mechanics into spheres traditionally reserved for metaphysical theories and to describe the human rational and emotional faculties in strictly materialistic terms based on causal relationships" (2011, p. 192). With the emergence of classical physics, it was understood that phenomena can be explained through "natural laws" which are abstract, immutable and mathematical. Applying these rules enabled the scientist to trace causal connections between phenomena that produced predictable results. Throughout the history, Western man believed that he could accurately perceive the world.

Newtonian laws were representations of the common sense, and they allowed prediction of the results (Nadeau, 1981, p. 37). Absence of negative reaction is logical when it is thought that Newton's physics was a manifestation of the same metaphysical assumptions in the symbolic. Natural law as transcendent absolute is a natural consequence of Western morality, and it is also appropriate to the dualist conception of Being assimilated from Greeks (p. 37). Change as the recombination of unchanging things and ontological dualism in Greek philosophy are reinforced in Newtonian physics (p. 37). Identity as atomized substance is a part of classical physics as well, so it was not a threat to the idea of self as fixed and static identity (p. 38). Newtonian paradigm and controlling symbolic mirror each other because they are both built on Western metaphysical tradition (p. 38).

As can be clearly understood from Nadeau's remarks, it can be concluded that reality evolved into a much more mechanical, experimental and rational direction through Newton's theories. In this respect, both the dualistic structure and the discourse concerning the immutable laws of the universe inevitably affected literature because it reflects everything related to culture including the perception of reality. Regarding this issue, Vanderbeke points out the parallelism between classical physics and literature as follows: "almost all literature until the present day is firmly grounded in a mechanistic worldview, as that is the physics which may give narrative meaning to our experience" (2011, p. 193). Bohnenkamp further specifies the impact of science on literature: "The development of the novel as a literary form seems to have paralleled the rise of the Newtonian and Darwinian paradigms" (1989, p. 23). According to Strehle, "realist fiction represented the Newtonian cosmos, in all its causal continuity" (1992, p. 15), and she draws attention to *The Rise of the Novel* (1957) in which Watt theorizes the appearance of the novel genre. He bases his theory on the intellectual climate of the time and argues that the early novelists, Defoe, Fielding and Richardson produced their works as a result of the conditions of the period (p. 9). He notes that the works of these three novelists were "not sheer accident, and that their geniuses could not have created the new form unless the conditions of the time had also been favourable" (1957, p. 8).

The defining characteristic of the novel which differentiates it from early prose works, says Watt, is realism (1957, p. 10). The principles put forward by philosophical

realism enabled the novel to form a separate genre from other prose forms. Unlike romances with supernatural elements, the novel reflects the individual experiences of people in a "realistic" way. "The novel's realism does not reside in the kind of life it presents, but in the way it presents" (p. 11). French realists claimed that what made their works different from other idealist forms was that they were "the products of a more dispassionate and scientific scrutiny of life" (p. 11). Thus, the distinctive feature of the novel for French realists is "the problem of the correspondence between the literary work and reality it imitates" (p. 11).

Watt (1957) argues that this raises an epistemological problem that should be addressed by philosophers as realism in philosophy is different from the common usage (p. 12). Unlike scholastic realism that uses abstractions or universals, modern realism is related to particulars, concrete objects of sense and perception (p. 12). Just like modern philosophy, the novel rejected the classical and medieval realism that favor universals. However, according to Strehle, the word "universals" can be misleading since Newtonian science also makes use of universal laws. For this reason, she makes a distinction between these two types of universals by saying, "while [early novelists] did away with universals in a theological sense, they simply replaced those with scientific universals" (Strehle, 1992, p. 15). Watt (1957) further notes that modern realism maintains that the truth can be discovered by the senses and that this tendency "has its origins in Descartes and Locke, and received its first full formulation by Thomas Reid in the middle of the eighteenth century" (1957, p. 12). These philosophers, on the other hand, formed their concepts depending on the way Newtonian physics explained the universe (Strehle, 1992, p. 15). Because Newton's paradigm is built on the argument that the universe operates within the framework of certain fixed rules, "the faith in absolute, mathematical time and space, in causality, in objectivity and certainty became the new universal principles relied on unawares by realist fiction" (p. 15).

In classic realism, the success of a work was closely related to how accurately it represented the objective reality of the outside world. Since the precise rules of the universe and the reality of the physical world was not questioned, narrators in realist novels were omniscient, God-like, capable of describing everything about characters and events. Unlike postmodern novels, readers never suspected the accuracy of the plot

or the reliability of the narrator in realist novels because the narrator provides a detailed portrait of the motivation of the characters, and the plot has a conclusive result. Having suspension of disbelief, the reader is hypnotized by the mimesis and representative qualities of the novel and was persuaded that the story is realistic just like people of that period who never questioned the notion of physical reality. Everything people sensed through their five senses and perceived through their logic and mind looked so real that it was absurd for them suspect the existence of an objective reality. Since the scientific theories and philosophical approaches of the time defined the reality in a deterministic way, culture and literature evolved in accordance with those assumptions.

However, in the early 20th century, “physicists began to realize that the closed and wonderfully precise mathematical scheme that is classical physics is not the complete and final picture of physical reality” (Nadeau, 1981, p. 10), and this led to a paradigm shift in science. The deterministic Newtonian science was severely undermined first by Einstein’s theory of relativity and then quantum mechanics (Bohnenkamp, 1989, p. 21). When the theory of relativity revealed that time which previously thought to be absolute and independent was actually a fourth dimension intertwined with the three-dimensional space and that it is relatively determined by the observer’s point of view for the entities slower than the speed of light, a new, subjective and relative view of reality penetrated into the experience of scientists (p. 21-22). A fragmented view of reality replaced the notion of objective, absolute, immutable space-time accepted for 200 years.

Thus, in disciplines such as literature, art and philosophy, subjectivity and relativity, in other words, the examination of the same phenomenon from different perspectives, started to be popular at the beginning of the 20th century (p. 23). This change in scientific inquiry reflected itself through literary modernism because “the death of the one heralded the death of the other (p. 23). Modernist writers, such as Virginia Woolf and James Joyce demonstrated this new notion of fragmented reality through stream of consciousness technique (pp. 24-26). In a modernist novel, each narrator reflects the same event from a different perspective. Picasso’s painting and sculpture are perfect examples to understand this fragmented style (Coale, 2012, p. 32). His famous Chicago sculpture has two different shapes when the observer changes the perspective. It looks like a wavy-haired woman from one side and an Afghan hound

from the other side. In William Faulkner's *Absalom, Absalom!* and *The Sound and the Fury*, different narrators who are "trapped in [their] own consciousness" (Coale, 2012, p. 31) tell the story from four different points of view. Similarly, Wallace Stevens indicated in his famous poem "Thirteen Ways of Looking at a Blackbird" that it is possible to perceive a blackbird from thirteen different ways, and "each bird is seen relative to the angle of observation, whether optimistically as part of some romantic harmony in nature or fearfully as some shadowy creature stalking its prey" (Coale, 2012, pp. 32-33).

However, although Einstein provides a revolutionary idea related to the perception of reality, this change is only limited to epistemological scope (p. 40). In other words, the universe is again subjected to certain, deterministic, absolute and objective laws, but since human beings are slower than the velocity of light, they are destined to experience the world in a fragmented way. Nevertheless, if one can combine all the perspectives together, it is possible to reach objective reality, in other words, one "never doubts the existence of the bird in each of the thirteen sections" (Coale, 2012, p. 32). Within context of literature, if the reader can combine all the narratives, he/she can obtain the reality. This exemplifies how "modernism remains [...] faithful to Newton's vision" (Strehle, 1992, p. 17).

On the other hand, after quantum physics emerged, "there was a change from a paradigm that stressed questions about knowledge to a regime where questions about existence prevailed" (Jeha, 1998, p. 263). In other words, the epistemological problem turned into an ontological one (Coale, 2012, p. 36). While Modernism and the theory of Relativity problematize the way they obtain objective reality, quantum theory questions the existence of a deterministic, certain and objective reality, so it questions whether the bird is "dependent on our observation of it to be 'real'" (p. 32). In the early 20th century and before the theory of relativity, scientists thought that there is nothing left to discover and that the only thing to do is to deal with details (Maxwell, 1871, p. 244), but soon after quantum physics emerged as a new paradigm. Seen as a slight description problem, Newtonian physics could not explain blackbody radiation problem through the wave model of light, so Max Planck offered the particle model of light which indicates that the light is carried through discontinuous energy packets (Strehle, 1992, p. 11). Since

the double-slit experiments in the 19th century exposed that light behaved like a wave, the idea that light is emitted through energy packets called “quanta” was revolutionary (Nadeau 1981, p. 49), and the problem with blackbody radiation could be solved only through this model. However, physicists were supposed to support this discovery with other experiments. Einstein used particle model to explain photoelectric effect, which brought him the Nobel Prize in 1923. The dual nature of light behaving both like a wave and particle confused scientists because classical physics and logic working in either/or fashion for hundreds of years could not explain this contradiction (p. 49).

Dual behavior of light triggered further developments in physics. Not only light, but also the behavior of subatomic particles was examined, and when De Broglie performed double slit experiment with electrons which were considered particles at that time, he observed that electrons also created an interference pattern that was peculiar to wave model. Wave-particle duality marked the beginning of the metaphysical problems that quantum physics produce (p. 49). At first, physicists believed that problem with the interference pattern was the result of colliding electrons, so they decided to shoot a single electron at a time. However, the result was interference pattern again. In order to detect the path of electron, they placed a measuring device in front of the slit, but when physicist wanted to observe the behavior, the interference pattern disappeared, and only two bands appeared, in other words, wave function collapsed. The only explanation was that the electron interfered with itself (p. 53), which means that the particle is in superposition, in other words, it is everywhere in a cloud of probability (Hayles, 1984, p. 50).

Changing results depending on observation and measurement was an attack to the deterministic ground of science (Zukav, 1979, p. 135) in which reproducibility is achieved all the time. Thus, physicists concluded that “the world of the quantum, however, presents the observer with very different laws. Subatomic particles do not behave like objects in Newtonian space”. (Carter, 1989, p. 182). Atoms are not solid particles, rather they are virtual entities moving as a cloud of probability, and when they are observed or measured, this superposition collapses into a single reality.

The probabilistic nature of quantum realm rather than being deterministic gave rise to some philosophical questions. Is objective reality possible? Can virtual particles

be considered real? Does the observer create the reality? Is observer an active participant in the creation of reality? The answers to these questions are ontological quests (Nadeau, 1981, p. 3), and it is inevitable for philosophy and literature to reflect these concerns (Strehle, 1992, p. 8). The notion that physical reality is nothing more than an illusion is in line with postmodernism (Coale, 2012, p. 3). Not only superposition and virtual particles, but also other aspects of quantum physics triggered some philosophical questions such as Heisenberg Uncertainty Principle and the quantum entanglement.

The Uncertainty Principle proposes that the velocity and position of a particle cannot be measured with absolute precision. The more accurate the physicist detects the position of the particle, the more challenging it becomes to measure the velocity or vice versa. This uncertainty regarding the observation matter includes mutually exclusive qualities which Niels Bohr's complementarity principle offers (Strehle, 1992, p. 13). Variables such as wave and particle or velocity and position are examples of complementary qualities. This principle undermines the confidence that scientist felt through determinism and certainty which helped them to explain the working mechanism of the universe for centuries (Bohnenkamp, 1989, p. 20).

Another revolutionary principle, entanglement, suggested that two particles having a common origin can interact instantaneously no matter how far they are, which violates locality, one of the most essential principles of classical physics. This was unacceptable even for Einstein who was one of the founding fathers of quantum mechanics (Strehle, 1992, p. 11). Since the interaction was faster than the velocity of light which is the ultimate speed limit in the universe that cannot be exceeded, Einstein called it "spooky action at a distance" and argued that there were "hidden variables" that were not discovered yet to explain the phenomena in quantum realm in accordance with the principle of locality. Quarreling with Bohr by saying "God does not play dice with the universe" (as cited in Bohnenkamp, 1989, p. 22), Einstein maintained that the universe conformed to stable, immutable and absolute rules, and that he was against any explanation questioning the objectivity and locality of physical laws. Nonetheless, Bell's Theorem and Aspect's experiments proved the validity of entanglement after 1960s, and Bohr won the debate against Einstein regarding problematic nature of

objective reality.

All these discoveries led to the destruction of strict the border between reality and fiction (Herbrechter, 2011, p. 525), and the trust for objective reality was undermined in an irreversible way. It is not a coincidence to observe a simultaneous correspondence between postmodern and quantum theories (Oppermann, 2015, p. 91). As it is indicated earlier, the paradigm shift in science affects philosophy and literature. For modern man, science has been the best frame of reference for explaining the physical reality (Coale, 2012, p. 4). If natural sciences introduce elusive concepts like uncertainty, indeterminacy, entanglement, and virtuality through quantum physics to describe the universe, the perception of reality also inevitably alters in social sciences (Vanderbeke, 2011, p. 193).

Similarly, postmodernism deconstructs the dualistic approach and binary oppositions that classical Western philosophy employs, and it regards the reality as fiction and textual. Just like complementary qualities, it includes all the conflicts within itself, and the line separating fiction and reality blurs. It is not possible to see a linear and chronological plot, and a conclusive ending is not observed (Salami, 1992, p. 25). These novels make the reader question the reality through unreliable narrators. Multiple endings and a pluralistic approach characterize postmodern novels. A radical skepticism overwhelms the novel, and the reader suspects the distinction between subject/object, narrator/reader, and reality/fiction. Just like the way the observer changes the result of the experiment, the reader also becomes an active participant in the meaning-making process (Bohnenkamp, 1989, p. 23). Instead of a hierarchical order of author, narrator, and reader, all these elements contribute to the creation of the text with a wholistic and unifying approach. Here, the position of the physicist and the author are very similar because through postmodernism, the author is stripped of its authority and privileged position and becomes the part of the text like the reader. In short, “traditional fictional elements like plot, character, motivation, even meaning, change or recede, much as in modern physics the accustomed underpinnings of Newtonian reality collapsed” (Bohnenkamp. 1989, p. 23)

In conclusion, this section has explained how the notion of paradigm shift has played a key role in the evolution of the concept of reality in science, philosophy and

literature. Newtonian paradigm and its basic principles including determinism, common-sense, subject-object dichotomy, atomization and causality laid the ground for philosophical realism of Descartes and Lock and classic realist novel. In this paradigm, the mind and the physical world are strictly separated, and mind can understand the working mechanism of the universe through reason. In addition, since the observing mind is detached from the phenomenal world, an outside frame of reference exists, which enables the existence of objective reality. In a similar fashion, classic realist novel aims to reflect the human experience in an objective way, and its reality concept takes its roots from Newtonian paradigm. However, after the paradigm shift in science at the beginning of 20th century, the fundamental assumptions of classical physics were replaced by the groundbreaking principles of quantum mechanics and the theory of relativity. While Einstein's relativity is closely related to the literary modernism, quantum theory is more in line with postmodernism.

1.2.Literary Responses to the New Paradigm: Quantum Fiction

Although natural sciences and humanities seem to have no common ground and have totally different methods, the interest for building a bridge between these two branches has become appealing for the contemporary academic community. On the other hand, this idea became popular only after late-60s because as C.P. Snow noted in his lecture, natural sciences and humanities are strictly separated, and there is almost no communication between them (1959, p. 2).

With the emergence of postmodernism, however, the border between them is transgressed, especially by the social sciences, and “becomes more porous than vigorous” (Oppermann, 2015, p. 87). Coale indicates that “science is the metanarrative of our age” (Coale, 2012, p. 4), and since postmodernism rejects all the metanarratives, it also problematizes the border and hierarchical order between sciences and humanities. When “scientific theories, no less than literary theories and literature, are social constructions that reflect the prevailing concerns of culture” (Hayles, 1989, p. 317) rather than a solid fact, humanities have integrated the terminology of scientific theories into their fields “to breach the gap between science and the humanities in an effort to find many areas in which each overlaps with the other in terms of theoretical perspectives” (Coale, 2012, p. 12).

Interdisciplinary studies pave the way for the application of theories in mathematics, physics, biology, chemistry and many other disciplines to social sciences including literary studies. In literary criticism, there has been an abundant increase in interdisciplinary studies especially after 1980s. When the concepts in science were reflected in literary works, literary theory also started to explore the concepts of science and to examine their metaphorical meanings in literary texts. Quantum physics, chaos theory, relativity and evolution have been used as a way of reading literary texts because “twentieth-century physics and fiction have developed parallel perspectives on reality” (Kinch, 2006, p. 290)

The theories in modern physics including Einstein’s theory of relativity and quantum mechanics have attracted the attention of literary critics especially after the popularity of contemporary American novels which integrated concepts from these theories. “Such ideas as relativity, uncertainty, paradox, irony, undecidability,

indeterminism, virtuality, and retroactive causality have seeped into the culture and have subsequently been adopted by the literary world, especially by the modernist, deconstructive and postmodernist critical perspectives” (Argyros, 1990, p. 34). Wright similarly argues that “over the last twenty-five years a number of British novelists have appropriated for figurative use selected features and concepts from the ‘New Science’ such as quantum mechanics, parallel and alternative worlds theory, notions of subatomic contention and putative reality, and the physics of time. (1996, p. 221). Critics have analyzed how the new theories in physics have affected contemporary novel and how it is related to postmodernism as “the two fields have become so similar that concepts from physics can help us understand the form and content of modern fiction”. (Kinch, 2006, p. 290)

Although there are individual attempts for creating a “quantum poetics” (Carter, 1989, p. 178), it is not possible to observe serious “systematic attempts to situate critical theory within the major developments of twentieth century science” (Argyros, 1990, p. 34). Critics adopt different terminology and approaches to the similar concern for the impact of new physics on the contemporary fiction, so “there is no consensus on the form that this new critical inquiry should take” (Kinch, 2006, p. 291). While Susan Strehle calls this genre “actualist fiction”, Bohnenkamp prefers the term “physics fiction”. Another popular term is “quantum fiction”, which first appeared after Vanna Bonta’s novel *Flight: A Quantum Fiction Novel* published in 1996 and Charles Platt’s book *Loose Canon* (2001). Since this genre includes scientific concepts, it is necessary to distinguish it from another similar genre, science fiction. Within this context, Platt argues that science fiction novels use a traditional narrative structure, and the scientific base is limited to the content, whereas quantum fiction employs a unique plot structure enables an active participation of the reader. (p. 74)

Not only the term but also the conceptual framework of the new genre is developed differently by the critics. While some critics advocated the idea that paradigm shift in science changed the intellectual climate of the time and that literature is influenced by this trend, some others established a direct connection between postmodernism and new physics. Another approach is the reconceptualization of reality by the scientific advances in the 20th century and how it shaped the categorization of

contemporary fiction. Moreover, the scientific theories involved in the literary criticism varies as well. Some

There are several critics addressing the impact of these scientific theories on contemporary fiction, but this thesis will mainly focus on the works of four critics: *The Cosmic Web* (1984) by Katherine Hayles, *Fiction in the Quantum Universe* (1992) by Susan Strehle, *Quirks of the Quantum* (2012) by Samuel Chase Coale, *Readings from the New Book on Nature* (1981) by Robert Nadeau. These literary scholars attempt to formulate a poetics for the new emerging genre of “physics fiction” and interpret the novels of contemporary American writers such as Thomas Pynchon, John Barth, Don DeLillo, Vladimir Nabokov and Joan Didion in the light of Post-Einsteinian Physics. In each of these works, this correspondence between physics and literature is developed in different ways.

In *Fiction in the Quantum Universe* (1992), Susan Strehle argues that contemporary fiction cannot be simply divided into two as realist and antirealist fiction and that there is another genre between these two, which is both metafictional and mimetic (p. 6). She maintains that the concept of reality changed after the paradigm shift in science (p. 7), so this “midfiction” is wrongly labelled “antirealist” (p. 6). Thus, she calls this new genre which both represents the real human experience and refers to its own fictionality “actualist fiction” (p. 6). She analyzes the novels of Thomas Pynchon, Robert Coover, Margaret Atwood, William Gaddis, John Barth and Donald Barthelme as the examples of actualist fiction.

Regarding the categorization of fiction, Strehle claims that “according to conventional aesthetics, fiction aims either at the realistic representation of life or at the antirealist exploration of artistic processes” (p. 1). This reveals that fictional choices operates on the binary logic of either/or, which is the working mechanism of perception as well (p.1). Because of this dualistic approach, 19th century realist fiction minimized the aesthetic elements and focused mainly on the mimetic representation (p. 2). On the other hand, modernism initiated a “purification of art” through progressive elimination of human elements, and fiction especially focused on textual and intertextual issues after the emergence of poststructuralist and deconstructive theory (p. 2). However, Strehle notes that this “constricting binary logic of realism and antirealism has reduced fiction’s

rich double interest in both art and life to a single dimension for many readers and critics” (p. 2).

Antirealist fiction, as Strehle notes, rejects external world because its reality is questionable (p. 3), and it “exposes the fictionality of reality” (Federman, 1975, p. 7), so it does not share the realist fiction’s concern for reflecting the human experience. This division is also observed in contemporary criticism as well, and Strehle stresses critics’ tendency to “bring the metafictional paradigm to bear on groups of contemporary novelists” (p. 3). As a result, many literary critics tend to see postmodern narratives as metafiction, in other words, a fiction designed to comment on its own textual/linguistic processes (p. 3). They consider that all contemporary writers abandoning realism give up on using reality as well, but contemporary fiction departs from realism without abandoning reality (p. ix). However, the concept of reality “is no longer realistic; it has more energy and mystery, rendering the observer’s position more uncertain and involved, than the solid, rocklike overlook from which the realist surveyed a stable world” (p. x). This reality concept takes its roots from quantum universe in which space and time are not separate, predictable and absolute, and narratives are not placed within fixed poles that guided realist fiction (p. x). Although contemporary writers want to discover the textual qualities of fiction and deliberately displaced realism, their purpose is to understand what is “real” better (p. x). Also, their fiction contains the elements of actual world like history, politics and science. Rather than choosing between art and actuality, contemporary novelists pursue both in fiction (p. x).

According to Strehle, these novels are different from other metafictional narratives. (p. 5) The authors such as Pynchon, Atwood, Barth, Coover, Gaddis and Barthelme not only deal with reality, but also with metafictional qualities. These writers, however, are not metafictionists because they affirm both art and the real world (p. 5). They combine realism and metafiction and create an original literary stance. Therefore, for these writers, it is necessary to create a new category, and Strehle calls this “actualism” (p. 6), a term is derived from Heisenberg’s distinction between “actual” and “real” (p.7). Strehle bases her theory of actualist fiction on the paradigm shift in science at the beginning of the 20th century, and she argues that the concept of reality has changed in almost every discipline because of the developments in modern physics (p.

7). To explain the mutual interaction between science and art, she argues that “changes in physical theories inspire changes in a culture’s general attitudes, and art both responds to and shapes these assumptions” (p. 8). James Mellard exemplifies the impact of science on fiction by saying that the novel remained the same because there was no change in the interpretation of the reality in physics, but novel altered when the new physics emerged (1980, p. 30).

This new approach to reality within the context of new physics, notes Strehle, is not stale like Newtonian science, but it is active and dynamic, so in literature, actualism develops in postmodern fiction (p. 7). The combination of actualist fiction and contemporary physics regards human relation to the external world as discontinuous, statistical, energetic, relative, subjective and uncertain, and these terms reflect the transformation of Newtonian/Realistic paradigm (p. 8). From Newtonian perspective, reality is ordered by absolute space/time/motion, objective methodology, and it is also determined by causal laws, provides certainty, discovers deterministic and identifiable relations among the properties of nature (p. 8). However, in new physics, space, time, and motion are relative and interrelated, and there is no privileged frame of reference for determination (p. 9). In subatomic realm, reality is discontinuous and quantized. It is energy, not matter, and the behavior of subatomic particles is indeterminate, which means that it cannot be predicted by the causal laws, but by statistics and probability (p. 9). Limited by Uncertainty Principle, the new physics acknowledges subjectivity (p. 9).

Nadeau, on the other hand, provides a metaphysical and philosophical perspective. He notes that the metaphysical implications of new physics influence contemporary novel just the way Newtonian physics impacts realist novel. He studies the novels of a group of contemporary writers including John Fowles, John Barth, John Updike, Kurt Vonnegut Jr., Thomas Pynchon, Don DeLillo and Tom Robins within the scope of new physics. The fact that John Fowles is among the writers reflecting on the developments in science is worth considering as it is the focal point in this thesis, and his position as a quantum fiction writer will be discussed in the last section of Chapter 1.

Another writer who builds a bridge between literature and science is Samuel Chase Coale. In his book, he directly connects quantum theory and postmodernism by focusing on their common concepts such as discontinuity, nonlinearity, nonlocality and

randomness. He also underscores how these two theories emphasize the representation problem in language. The metaphorical nature of quantum is another similarity between literature and scientific discourse for him. Furthermore, he claims that modernism is the literary and philosophical counterpart of Einstein's relativity as the problem is epistemological while postmodernism and quantum are paired because of their focus on ontology.

Finally, Katherine Hayles gives a detailed explanation of the field theory and how it triggered the paradigm shift in various disciplines simultaneously in her *The Cosmic Web*. She argues that the language problem, which is one of the central concerns in postmodern and poststructuralist theories and contemporary fiction, is related to the self-referentiality problem in physics, mathematics, philosophy, and computing which appeared with the paradigm shift in science. She applies the principles of field theory to the novels of Robert M. Pirsig, D.H. Lawrence, Vladimir Nabokov, Jorge Luis Borges and Thomas Pynchon. Although each critic provides a different perspective to the relationship between new physics and literature, all share the same concern of relating these two disciplines and creating a poetics of it.

1.3.Field Concept in Scientific Models

One of the earliest literary scholars who theorized the connection between new physics and literature is Katherine Hayles. In *The Cosmic Web* (1984), she argues that the paradigm shift in science at the beginning of the 20th century formed a cultural matrix characterized by “interconnectedness” and “self-referentiality”. This change in the scientific inquiry was reflected in several disciplines including mathematics, physics, computing, philosophy of science, linguistics, and literature. She calls this common attitude in the formulation of a new mode of reality “field model” and uses the metaphor “cosmic web” to describe it. Her theory is centered around the assumption that modern novel also draws from this cultural matrix and focuses on the notions of unity and limitations to describe reality.

Hayles defines and explains her specific use of the term “field model”, and the two fundamental principles, interconnectedness and self-referentiality, recapitulating the core of this theory. Since Copernicus, Hayles argues, Einsteinian paradigm is “the most important conceptual revolution” (1984, p. 9) in physics. However, although this revolution has a wide range of effects on culture, the discussions are limited to physics. Hayles uses the term “field concept” to identify the impact of paradigm shift on culture and analyzes “its various manifestations in the models of physics and mathematics, theories of philosophy and science and linguistics, and the structures and strategies in literary texts” (p. 9). However, Hayles’s field concept is different from the formulations in science. Her concept utilizes some aspects in different models that characterize 20th century view in general.

One of the focal points of field concept is that everything is “interconnected”, and this idea manifests itself best in modern physics. Unlike Newtonian physics, which considers physical objects separate and events happening “independently of one another and the observer” (p. 10), the field concept forms a picture of reality in which objects, events and the observer are entangled. They belong to the same field, and the characteristic of each is dependent on the others. The other quality in field concept that appears in several disciplines including literature is self-referentiality. Based on subject-

object dichotomy, language creates the illusion that objects and events are independent, but since field model premises that every element forms an unbreakable unity through a “mediating field” (p. 10), language also becomes an indivisible part of this web, and it turns into an instrument producing paradoxes since every statement “refers to every other statement, including itself” (p. 10). This self-reflexivity problem emerged as a result of field concept is also addressed in contemporary fiction.

Field model also challenges the one-way relationship between cause and effect. When Hayles builds a relationship between the modern novel and field theory, she does not imply a direct and causal flow from science to literature, in other words, she does not say that the former “caused” the latter. She rather assumes a network of closely related disciplines, so when a change occurs in one of them, the same happens in others simultaneously. Therefore, she claims that “Literature is an imaginative response to complexities and ambiguities that are implicit in the models” (p. 10). In short, rather than a unidirectional influence, field model offers a mutual interaction.

After sketching the conceptual framework for the field model, Hayles specifies how paradigm shift in science modified the basic concepts of reality. Through quantum mechanics and relativity, a revolutionary world view emerged, and this shift in thought was not limited to physics. Many disciplines including mathematics, computing, philosophy and literature were “infected by the quantum mechanical virus” (Kinch, 2006, p. 290). In this new worldview, the dominant metaphors for describing the nature of the field concept are “‘cosmic dance’, ‘network of events’, and ‘energy field’” (Hayles, p. 15). What these metaphors indicate is that reality does not consist of stable, discrete and detachable parts, it is rather an indivisible whole composed of parts that are in a constant, dynamic and harmonious relationship. Unlike a detached one, the observer is an active participant in the system. Hayles summarizes the qualities of this model as “its distinguishing characteristics, then, are its fluid, dynamic nature, the inclusion of the observer, the absence of detachable parts, and the mutuality of component interactions” (p. 15).

Hayles continues by examining how the new paradigm diverges from the Newtonian worldview. The classical paradigm regards matter atomistic, which means

that the objects are separate and independent of each other and can be subdivided and analyzed until the immutable and stable essence called atom appears. These objects are positioned in an empty Euclidean space and flow in a unidirectional and absolute time. The interactions between the objects are determined by causal, common-sensual and deterministic laws (p. 16). Another important quality of Newtonian universe is the rigid split between subject and object. The existence of the world is not connected to the conscious mind of the observer, so the subject is not involved in the physical phenomena but just describes the objective reality. The interesting fact about this is that thinking patterns of human perception is so parallel to this Cartesian division that one never suspects the possibility of an alternative reality (p. 16). In his *Collected Papers on Metalinguistics* (1952), Benjamin Whorf relates the naturality of Newtonian model to the language structure of Western culture. Indo-European languages also depend on subject-object dichotomy, causality, absolute space and time (pp. 3-8).

To clarify the impact of the conceptual revolution on culture, Hayles compares the metaphors reigning the old and the new paradigms (pp. 16-17). With the emergence of quantum field theory, Newtonian model evolved toward a different direction. Isolated and solid “particle” concept in classical mechanics is replaced by dynamic and interrelated “field” notion (p. 16). Particle is more like the concentration of energy in a specific area in the field. Humanities also integrated these new set of metaphors into their discourses. A simple comparison between 18th century rationalism and 20th modernism reveals how the metaphors of these two periods differ (p. 17). The old paradigm used “clock” metaphor to describe the working mechanism of the universe. The observer can easily detach the component parts, analyze them individually and reattach them again. In brief, the idea that “the whole is equal to sum of its parts” (p. 17) prevails in this model, and there are also some indirect implications of this presumption. The world has a static structure like a machine, and when it is set in motion, it works without any intervention, and the underlying principles are determined by rational and causal processes.

Hayles presents 19th century Romanticism as a deviation in thought and compares its metaphors to 18th century rationalism relying on Hans Eichner’s (1982) theory. Rather than a mechanized clock universe, Romanticism identifies the world as a “living

organism”, and this metaphor appeared in different branches of culture as well (Eichner, 1982, pp. 8-30). The dynamism of this organic structure replaced the stable categories of 18th century rationalism. “Taxonomy yielded to evolution in biology, poetics to history in literary theory, and mimesis to a literature of interiority” (Hayles, p. 17). Deductive and inductive reasoning had been enough to interpret the mechanic world, but when the quality of being “alive” was added, one must use “imagination” as well to make sense out of this complex unity. It is possible to dissect and unite a machine, but a living organism loses its living force if it goes through the same process. Therefore, Romanticism premises that the whole is greater than the sum of its parts (p. 17). This way, dance metaphor in 20th century is more in line with living organism metaphor since both accept the idea that the whole cannot be reduced to the collection of its parts, and reality is not solid and mechanic. On the other hand, Hayles argues that there are significant differences between field model and Romanticism in their approach to reality; for example, Romanticism attributes dynamism to living force while field theory explains it through the impossibility of an objective and universal reality (p. 18).

Although Eichner regards the assumptions of 19th century Romanticism as a deviation from the ongoing positivist perspective from the 18th century to 20th century (p. 24), Hayles disagrees this view by claiming that 20th century scientific approach is far from being the descendent of the classical paradigm, so it is closer to Romanticism since their philosophical implications are more similar to each other (p. 18). Unlike rationalism, both of them resist causality, atomization, subject-object dichotomy, and the immutable structure of matter.

Another point showing the continuity between these two periods is the presumption that there are “inherent limits on sequential, logical analysis” (p. 19). Hayles asserts that there are three reasons showing the impossibility of describing the universe in an objective way (p. 19). The first cause derives from the fact that language is not a suitable medium to provide the expression of an objective reality because it is an indivisible part of the field. If it is used to describe the internal cause-effect relationships between the events, it again encounters restrictions since the structure of language is based on unidirectional causality. The flow is always from cause to effect. However, the problem is that cause and effect occur simultaneously in the field universe, so the

interaction is multidirectional, which is a phenomenon that language cannot describe. The second problem is about the dynamic nature of the system. The field is in constant motion, and analysis is only possible through the interruption of the movement, but when this happens, it violates the basic principle of dynamism, so a satisfactory description of the field model cannot be achieved. Finally, the lack of an objective frame of reference puts serious limitations on the interpretation. Since each point of reference will be inside the field, there will always be a blind spot where the observer misses some parts of reality. According to Hayles, scientific and mathematical models are also incapable of providing a complete picture of reality (p. 20). The limitation is inherent, not because of the insufficiency of the instruments but because language is also inside the system.

The philosophical implications of the new paradigm is significant because it does not only explain how the universe works, but also how the intellectual mind interacts with it (p. 31). In order to get full grasp of the scope of the field model, it is crucial to understand its difference from the classical paradigm. As indicated before, Newtonian model is characterized by subject-object dichotomy, which is the division between the thinking mind and the outside world. Although this model strictly separates the observer and the thing that is observed, relativity and quantum theory demonstrate that this division is arbitrary, and in some cases it not possible to disregard the interference of the observer with the system (p. 31).

The methodological implications of the collapse of Aristotelian logic after the emergence of field theory emphasizes the antinomies produced by the logical and sequential analysis of individual units (p. 32). When human mind regards nature as a separate object distinct from the observer, the world is already divided into two as subject and object. When the universe becomes the object for the subject observer, he/she applies a reductionist approach by classifying, categorizing and analyzing. In short, human mind attempts to “rationalize” the world around it, and this reduces the world into collection of parts. Since objects are distinct, classical paradigm allows individual and sequential analysis of these units, and this method renders consistent results within the scope of the paradigm (p. 32). However, when the whole is included in the part, this analysis produces paradoxical situations, and “field concept has the

effect of revealing the inherent limitations in sequential analysis” (p. 32).

Hayles begins to explain this self-reference problem by giving specific examples from different disciplines, and the first example is the revolution in mathematics after Gödel’s Incompleteness Theorems (1931). In 1920s, as a result of the endeavor to apply the principles of classical paradigm to every discipline, a celebrated formalist mathematician, David Hilbert wanted to found a logical ground for mathematical theories (pp. 32-33). This way, he was going to show that mathematics is not contradictory. Hilbert thought that he can formalize mathematical theories by forming and manipulating a language through which all the terms, definitions and parameters are determined (p. 33). However, the problem is that this language has the power to make statements about itself, which causes some paradoxes, or in Douglas Hofstadter’s (1979) terms, “Strange Loops”.

Strange Loops refer to statements which create recursive patterns, and they are ambiguous, in other words, they are neither true nor false (p. 34). For instance, one writes a statement called A. If the statement A is “This statement is false”, it turns into an infinite loop of reference. If one accepts the statement A true, then the statement itself is false, but if the statement A is considered false, then the statement itself is true. Since they refer to each other endlessly and offer no solution, this type of self-referential statements commenting on themselves “are inherently undecidable” (p. 34). The Hilbert program tries to dodge this problem by excluding the language from the system, in other words, making a “separation between the theory and the theory-as-object” (p. 33). Nonetheless, Gödel proved that it is impossible to avoid these Strange Loops in his “Formally Undecidable Propositions in Principia Mathematica and Related Systems” published in 1931. Hofstadter summarizes how Gödel’s theorems work:

Gödel had the insight that a statement of number theory could be about a statement of number theory (possibly even itself), if only numbers could somehow stand for statements... And this coding trick enables statements of number theory to be understood on different levels: as statements of number theory, and also as statements about statements of number theory. (1979, p. 18)

The second level Hofstadter mentions produces Strange Loops. One may solve this recursive pattern by turning these ambiguous statements into axioms, which will

create a new theory, but in this case, there will be new paradoxical statements, so it is an endless process. Thus, Gödel proposed through these theorems that an axiomatized theory is either inconsistent or incomplete (p. 35). If it is complete, it will produce self-referential paradoxes like these, but one can eliminate the paradoxical statements in order to avoid contradiction. This time, however, the system will be consistent but incomplete since it does not involve all the statements. All in all, the philosophical implication of Gödel's Incompleteness for Hayles is that "any theory that is not demonstrably false cannot be demonstrated to be completely true" (p. 35). This way, the attempts for formulating a deterministic ground for mathematics failed, and this paved the way for "uncertainty" as the defining characteristic of the new mode of reality.

Hayles also states that indeterminacy is not confined to mathematics. It is also a central problem in computing theory known as the Halting Problem, a term coined by Martin Davis (1978). In 1936, Alan Turing proved that a computer program which can be used to determine whether all other programs will stop cannot exist because of self-reference problem (p. 36). If one designs the program H to tell whether program P will stop or not by using P as the input, H will give a consistent result as yes or no. However, since the program H is designed to determine "all" other programs, H includes itself as well. Thus, Turing used proof by contradiction method to show that program H can never exist. He assumed that H is placed within another program D, which always gives the opposite result. In other words, If H says the program will halt, D will loop, or if H says the program will loop, D will halt. Therefore, when D is given to H as the input to show whether D will continue to run, the program will form a Strange Loop because When H tells D halts, D loops, but when H tells D loops, D halts. This way, H which is designed to give the correct answer all the time gives contradictory results, so the existence of such a program that is capable of deciding everything is impossible.

Like Gödel's Incompleteness Theorem, the Halting Problem also puts rigorous limitations on the determinacy, linear analysis, and classical logic (p. 36). Davis comments on this inherent restriction by saying that "we are not saying simply that we don't know how to solve the problem or that the solution is difficult. We are saying: *there is no solution*" (1978, p. 255). Hayles concludes that the self-reference problem characterizing these two disciplines results from the field notion that the medium of

analysis is an inseparable part of the system (p. 36).

For Hayles, another discipline exposed to the revolutionary transformation initiated by field theory is the philosophy of science (p. 38). After the achievements of Newtonian mechanics, scientific studies were conducted according to the principles of positivist view, which championed a mechanical perspective regarding the description of physical phenomena. To provide an unambiguous portrayal of reality, positivists argued that language should be free from contradictions and metaphysical assumptions, which means that knowledge should be obtained only through empirical and logical means (p. 38). Hayles detects three important criteria of statements that have “cognitive significance” in scientific discourse: being based on observation and theory, and the relationship between these two should be in accordance with logical terms (p. 38). All other methods outside these characteristics are not worth consideration for positivism. However, the attempt for matching scientific discourse to Newtonian view in philosophy of science like the Hilbert program failed because field concept revealed that it is impossible to separate the theory and the language describing it.

Hayles mentions three important figures who revolted against the “received view” (Suppe, 1977, pp. 6-56), positivism in other words, in philosophy of science. The first scholar who pointed to the problematic relation between the observation and theory is N. R. Hanson (1958). He claimed that a rigid separation of subject and object is not possible, so an objective interpretation of the events by an independent observer is nothing more than an illusion. He indicated that “what we see depends upon our cultural, scientific and linguistic contexts” (Hayles, p. 38). Experimental results are the not pure procession of the sensory data because perception is shaped by patterns intrinsic to the language and culture of the individual. Another scholar emphasizing the subjective nature of scientific inquiry is Thomas Kuhn (1962). Inside the paradigm, he argues, the scientist unquestionably accepts a set of ideas that are determined and verified by the earlier experiments and theories. Even if there are facts that contradict the paradigm, the scientist ignores them as long as the paradigm is successful and sufficient in describing phenomena. The shift occurs only when the fundamental principles of the paradigm shatter. Like Hanson, Kuhn (1962) also implies the involvement of the intuitive processes in the description of reality. Finally, Michael

Polanyi (1964) introduces the term “tacit knowledge” to refer to nonverbal and intuitive information which guides the scientist to the convenient experiments among hundreds of useless and time-wasting theories.

What unites these three scholars, Hayles asserts, is the idea that it is not possible to make a clear and exact separation “between the objective facts and subjective reactions” (p. 39). Intuitive agents lay underneath what seems to be objective and scientific knowledge. Thus, observation cannot be detached from the scientist who is under the influence of some cultural and linguistic factors. This prevents the creation of “an objectively exact language” (p. 40) that is free from intuition and subjective observations. Self-reference problem also supports this assumption because there is no outside reference point to evaluate the validity of linguistic structures because language is also intertwined with the field. Upon the paradigmatic crises following Gödel’s Theorems, the Halting Problem and the developments in the philosophy of science, concepts such as self-referentiality, indeterminacy and the ambiguous relationship between subject and object became the dominant parameters in the description reality, which brought language problem into focus.

The last and the most noteworthy discipline contributing to the creation of field model of the universe for Hayles is physics (p. 43). Causal, deterministic and mechanistic worldview offered by the classical physics was challenged after Einstein published two seminal papers, The Photoelectric Effect and The Special Theory of Relativity, in 1905. While the former used the particle model of light to support Max Planck’s theory that energy is quantized, the latter transformed the basic concepts of physics such as energy, matter, time, length and the speed of light. Almost a decade later, Einstein extended the scope of Special Relativity by including accelerating systems and theorized General Relativity, which provided a more satisfactory explanation concerning spacetime and gravity. These radical changes reconceptualized not only the basic doctrines of physics, but also philosophical assumptions about what reality is.

Hayles argues that Maxwell and Einstein contributed to field theory by reforming the concept of spacetime. (p. 44) Before Einstein, Maxwell laid the foundation for the

field model with his electromagnetism, which combined electricity and magnetism and proposed that physical reality manifested itself through a continuous field rather than material points, and this was a major breakthrough in the description of reality for Einstein. (Einstein, 1954, p. 262) Thus, Maxwell's field theory provided a strong alternative to Newton's "material points" or particle physics.

Contrary to the common belief, argues Hayles, relativity does not mean that "everything is relative" (p. 45), so there is a misconception about the implications of relativity. In fact, the first name Einstein chooses for this theory was "Theory of Invariance", which implies that physical laws governing the universe are immutable, and some variables should be relative to keep fundamental principles stable. Therefore, relativity is the result of Einstein's search for "logical simplicity" (Einstein, 1979, p. 21) and harmony among physical laws. Lanczos emphasizes Einstein's obsession for unity and harmony as "To him science did not mean the primacy of the experiment or the primacy of the theory, but the primacy of a deep reverence for the all-embracing lawfulness which manifests itself in the universe" (1965, 112). Although Newtonian mechanics was an attempt to explain the phenomena that ordinary man encounters in a common sensual way, Einstein privileged universal principles over everyday experience in the formulation of physical laws. Special and General Theory of Relativity are the manifestations of this endeavor.

Einstein theorized Special Relativity upon the anomalies he found on classical physics and Maxwell's theories. In a thought experiment, he conceived how a beam of light would seem for an observer travelling at the speed of light, and he realized that a standing wave would contradict the premises of electromagnetism since light has to propagate according to Maxwell. He, therefore, concluded that the same event is observed differently from different points of view (p. 44). In Special Relativity, Einstein had two main postulates. First, physical laws are the same for all inertial frames of reference. Second, the speed of light is constant. What makes this theory ironic is that certain quantities, such as time, mass, and length should be relative in order to maintain the invariance of light's velocity and universal laws of physics (p. 46). Einstein's discovery of relative time led to transformation of the classical description of absolute space and time. Time is added as a fourth dimension to the three-dimensional space, and

they together form the spacetime continuum. Minkowski points to the interconnectedness of space and time as, “space by itself, and time by itself, are doomed to fade away into mere shadows, only a kind of union of the two will preserve an independent reality” (1923, p. 75). Difference in perspective is the result of three-dimensional Cartesian space (Hayles, 1984, p. 46). When time constitutes the fourth dimension, the event appears the same for all vantage points. With four-dimensional space-time continuum, it is possible to preserve the invariant physical laws.

In General Theory of Relativity, Einstein postulated that the invariance in physical laws is not limited to inertial reference frames, but it is also valid in accelerating systems (p. 47). This way, in addition to the reference frame, the type of motion is also considered to be arbitrary because both inertial and accelerating systems obey the same universal rules. Consequently, the concept of spacetime altered dramatically, and gravity is not defined as a mysterious force that affects objects from a certain distance but appears as a natural result of the spacetime structure (p. 47). Spacetime fabric, in other words, is warped around great masses, and this is what creates gravity. This shattered the classical notion of space as an empty container (p. 47).

In brief, while Special Relativity united space and time, General Relativity elaborates on gravity by connecting spacetime and mass. Through these two theories, Einstein modified basic assumptions provided by Newtonian mechanics (p. 47). Interacting systems replaced isolated systems in classical physics. Rather than the succession of absolute sequential moments, time is regarded as an inseparable part of a four-dimensional space. Space is not empty as Newtonian view imagined, but it is formed by matter, and Einstein’s famous $E=mc^2$ formulation shows the interchangeable relationship between energy and matter. This new and startling interpretation of reality has important philosophical implications in terms of field theory according to Hayles (p. 49). Relativity embraces a pluralistic view of reality because the laws of physics are the same for seemingly different events, and it implies that there are multiple ways of observing the same phenomenon from different points of view. There is no objective and outside reference frame for observation as human mind is always inside the system, so a God-like and privileged vantage point is impossible. While these theories provide a better and more unified formulation for the laws of physics, they show how partial,

fragmented, and contingent human perception is. Moreover, since the universe is an interconnected and interactive whole, classical dichotomies such as space-time, matter-energy and gravity-inertia are actually different manifestations of the same phenomena.

Einstein contributed to the field model by these radical theories; however, he did not accept the further implications derived from quantum mechanics because of his deterministic views regarding causality and objective reality free from perception although he is one of forefathers of it (pp. 49-50). Einstein detected the connection between the observer and the observation, but quantum physics emphasized this relationship more. For this reason, Hayles asserts that quantum is more related to self-referentiality problem (p. 48). Despite the differences in philosophical implications, quantum and relativity are similar in that both of them brought separate notions together and turned them into complementary but mutually exclusive quantities (p. 50). Just the way Relativity combined time and space, energy and matter, quantum united the notions of particles and waves. According to classical paradigm, particles are separate objects having a certain location in space and time. Waves, on the other hand, are nonlocalized oscillations spreading over space and can produce interference pattern. The distinction between these two phenomena was quite clear until Planck's and Einstein's discovery that light behaves like a particle in some cases, for instance blackbody radiation and photoelectric effect. In a similar fashion, electrons which are thought to be particles interfere with itself just like a wave. This marked the beginning of the debates among scientists about the dual nature of waves and particles (p. 50).

Heisenberg formulated wave-particle duality through Uncertainty Principle, which showed the inherent limitations to measure the behavior of particles. It postulates that position and velocity of a subatomic particle cannot be measured with equal precision (p. 51). When a photon is sent to detect the momentum of the particle, the photon's energy "disturbs" the particle, and the momentum changes. If a photon with less energy is sent in order not to disturb the particle, it will measure the momentum, but it will not be enough to define location. In short, if momentum is measured precisely, location will be less certain, and when the particle is accurately localized, momentum will be less precise. Just like the fragmentation of vantage points in Relativity, position and momentum are also mutually exclusive quantities that cannot be observed

simultaneously. Furthermore, in quantum mechanics, what the concept “particle” refers changed (p. 51). It is not a discrete entity with a particular location, but it is a probability wave, so it is different from the classical particle. This probability wave demonstrates where the particle possibly is.

Hayles claims that Uncertainty is revolutionary because indeterminacy does not occur as a result of insufficient measuring devices (p. 51). This uncertainty is intrinsic to the system, and it brings forth the observation problem. Scientist must interact with the system to observe it; however, during the interaction, the system is disturbed, so the result changes. The metaphysical implication of Uncertainty Principle is that a rigid separation between the subject and object is impossible (p. 51).

The question whether particles have determinate values before measurement became another crucial point in Uncertainty (p. 51). In classical paradigm, since reality is independent of the act of observation, there is no ambiguity concerning the values before and after the measurement. However, after Uncertainty showed that the method of observation changed the values, Heisenberg argued that it is a futile attempt to know the existence of a determinate reality before measurement. Heisenberg underscores how act of measurement turns potentiality into actuality by saying, “what we observe is not nature in itself but nature exposed to our method of questioning” (1958, p. 58). So, objective reality in Newtonian physics, “Ding an Sich” (a thing-in-itself) in other words, is replaced by Aristotle’s concept of “potential”. Before measuring, it is a probability cloud, but when it is observed, the wave function collapses, and only one version of reality occurs. During the observer’s interaction with the system, potentiality turns into actuality, so this actuality is a state between possibility and reality (Heisenberg, p. 41) as Strehle emphasizes in her quantum poetics. She even identifies novels integrating quantum reality as “actualist fiction”.

Although Heisenberg thinks that his use of Uncertainty Principle is the same as Bohr’s interpretation, Hooker explains in his analysis of Bohr’s philosophy that Bohr’s perspective is quite different (1972, p. 138). Bohr relates uncertainty to language problem rather than “disturbance” notion of Heisenberg. Bohr’s stance is more in line with poststructuralists and Wittgenstein emphasizing the impossibility of escaping the

limitations of language. Every attempt is like crawling under the net of language. So, the idea that “we are suspended in language” (Petersen, 1963, p. 10) epitomizes his approach to the concerning problem. His perspective provides a strong connection between the field concept of language and quantum field theory (Hayles, p. 52). Bohr also uses the term “quantum of action” to describe the indivisibility of the observer and the system.

Bohr also indicates that classical physics is not sufficient to describe the dual and complementary relationship between wave and particle since they are discrete notions working in either/or fashion (p. 52). Therefore, Bohr argues that scientists must adopt a new way of expressing the complementary relationship between particle and wave (p. 53). Either/or mindset does not fully reveal the reality offered by quantum universe. On the other hand, Bohr also accepts the impossibility of creating a new language for this new reality because classical concepts were designed according to the daily experience of human beings. He emphasizes that meaning derives from this subject-object division.

Bohr’s perspective is very similar to Whorf (1952) hypothesis stating that language shapes the perception of reality. For Bohr, speech is the result of this division because the one who speaks is different from the person or thing that is spoken. Language creates the illusion of viewpoint, but Uncertainty shatters this one-way perspective because it necessitates another viewpoint (p. 53). The problem emerges from the mutually exclusive nature of these viewpoints. On the other hand, subject-object division requires one location at a time. In classical view, if one side is chosen, the other part will always be missed, so a full portrait of reality is impossible to capture. If one wants to switch to the other viewpoint, he/she must sacrifice the previous reality provided by the former viewpoint. Bohr indicates that “we must, in general, be prepared to accept the fact that a complete elucidation of one and the same object may require diverse points of view which defy a unique description” (Hooker, 1972, p. 141). Although it looks simple to solve this problem by abandoning classical notions, any mode of expression that describes external reality will have this limitation. Even though Bohr does not directly refer to linguistic theories for these implications, it is possible to trace the same viewpoint by examining the structure of Indo-European languages. (Hayles, p. 54) In English, for example, there is a subject performing the action and an

object affected by it. This interaction takes place in a certain location in space and time. So, this kind of linguistic structure requires subject-object and space-time dichotomy.

For Bohr, being suspended in language, however, does not mean that scientific progress cannot be achieved (p. 54). He argues that progression is possible through realizing the fact that the viewpoint from which one looks determines the description of reality (p. 54). Bohr claims that the most fundamental notions are influenced by unnoticed assumptions, and even after careful consideration of these, there will be further unrecognized assumptions behind them (p. 54). He says, “the development of physics has taught us that...even the most elementary concepts...[are] based on assumptions initially unnoticed” (Hooker, 1972, p. 139). This perspective echoes Kuhn’s (1962) paradigm shift, Polanyi’s (1964) tacit knowledge and Hanson’s (1958) *Weltanschauungen* concepts that marked the 20th century philosophy of science because these theories also referred to the importance of cultural and intuitional processes behind the formulation of scientific theories. Consequently, the progress can be achieved not through ignoring the limitations caused by language, but through the careful analysis of them.

Hayles argues that modern novel is affected by the notions offered by the field model ranging from modernism’s fragmented point of view to postmodernist questioning of the existence of a “viewpoint”. (p. 55) Problems regarding shifting viewpoints, objective frame of reference, subject-object dichotomy are the main concerns of modernist novel. Similarly, self-reference problem is one of the defining characteristics of postmodernist novel. Therefore, a better understanding of the literary strategies of contemporary novel can be achieved through the analysis of underlying assumptions as Bohr recommends. Hayles also maintains that if there is a parallelism between literary and scientific models, then the limitations in scientific inquiry should be examined in literary strategies (p. 55).

The second of the main concepts in Hayles’s field theory, self-referentiality, poses a major problem in expressing this new reality. It is very difficult to create a language that can explain situations such as uncertainty and mutually exclusive but complementary quantities due to inherent limitations imposed by the quantum realm (p.

55). This difficulty especially manifests itself in the reconciliation of quantum and relativity theories (p. 56). Since both theories are successful in explaining the phenomena within their scope, it is impossible to exclude one of them. However, both theories have considerable differences that prevents a reconciliation. For example, quantum theory has the principles of uncertainty, nonlocality and probability while relativity is based on causality and locality. Contrary to quantum physics, relativity makes the deterministic nature of Newtonian physics even more precise by applying it to high speeds and masses (p. 56). Although locality is one of the main principles in Newtonian mechanics, gravity is an exception because this force is described as “action at a distance”, which means that it is not a direct force applied to objects, it is rather like a magical interaction. However, Einstein restored locality in the formulation of gravity through General Relativity. In his model, gravity implies a field, which is composed of subatomic particles called gravitons.

This incompatibility between quantum and relativity has led to the emergence of different theories in physics, one of which is hidden variables theory (p. 56). According to the entanglement principle of quantum physics, once two particles interact, an intervention made on one affects the other instantaneously even if two particles interacting with each other are as far from each other as space distance. Calling entanglement spooky action at a distance, Einstein rejects this interpretation because he recognizes light as the ultimate speed limit in space. Since he also advocates locality, he argues that some hidden variables provide this instantaneous communication.

Hayles emphasizes the two main characteristics of the field model, which are interconnectedness and self-referentiality. The latter problem is related to the difficulty in expressing this unified reality in a proper medium, and the difficulty of reconciling quantum and relativity theories is the most apparent manifestation of this language problem. “The uneasy alliance” (Hayles, p. 55) is the result of the fact that quantum theory relies on the principle of indeterminacy, probability and nonlocality while relativity is the extension of Newtonian determinacy and invariance to higher speeds and masses, which fosters causality and locality.

Difficulty of combining relativity and quantum led to different interpretations,

such as hidden variables theory. Bell's Theorem demonstrated that hidden variables theory's attempt for restoring causality does not explain the statistical outcomes of quantum mechanics. For this reason, non-local quality of quantum field, in other words, entanglement, was proved by Bell. One of the leading figures in hidden variables theory, David Bohm, combined relativity and quantum through "the notion of unbreakable wholeness", which he calls "implicate order". Implicate order replaces Cartesian system's emphasis on points with "field model" in which every part is connected to the other and the whole. (Bohm, 1978, pp. 90-91)

Although Einstein could not unite quantum and relativity, he knew that they were common in nature of matter as the concentration of field in specific regions of space. Field and matter are not separate entities. The perspective changed from the classical idea that the essence is composed of indivisible parts to the fact that the essence is an indivisible whole. The only problem is to find an adequate mode of expression to describe this reality. The limitation caused by language is inherent in this reality, so the novelist's struggle with language is parallel to scientists because both try to describe "a dynamic, mutually interacting field" (Hayles, p. 59) through a language which is "linear, fragmented and unidirectional" (p. 59).

CHAPTER 2: *THE MAGUS: A REVISED VERSION*

2.1. Thematic Analysis: Metaphorical Reflections of the Field Concept on Plot, Characters and Setting

Thematic analysis section aims to focus on the main concepts of the new physics and their metaphorical reflections on the characters, setting and the plot development of *The Magus: A Revised Version* (1977). The first part of the discussion will explore the connection of the main characters of the novel, namely the protagonist Nicholas, Conchis, Alison, and Julie/Lily to notions promoted by quantum theory. Secondly, the distinction between classical and quantum realm will be illustrated through the two settings in the story, London and the island Phraxos. Finally, Nicholas's journey for constructing an identity for himself through Conchis's godgame will be interpreted as the transformation of the scientist from classical paradigm to new physics.

The first part of the analysis on thematic level is centered around the characters in the novel and how they represent the main distinction between classical and new physics and their concepts. According to Nadeau (1981), The protagonist, also the narrator, shares the basic assumptions of Newtonian physicist: "Nicholas, like most of us, operates upon the erroneous assumption that the scientific method reveals the truth of nature in some absolute sense" (p. 70). It is clear from this remark that the absolutist attitude of the scientific method refers to metaphysics employed by the Newtonian paradigm. In this context, it can be deduced that Nicholas believes in the existence of objective reality, subject-object dichotomy, atomization, determinism and causality, and he draws a precise identity for himself at the beginning of the novel characterized by this atomistic approach:

I was born in 1927, the only child of middle-class parents, both English, and themselves born in the grotesquely elongated shadow, which they never rose sufficiently above history to leave, of that monstrous dwarf Queen Victoria. I was sent to a public school, I wasted two years doing my national service, I went to Oxford; and there I began to discover I was not the person I wanted to be. (Fowles, 1977, p. 15)

Salami (1992) claims that Nicholas's identity has already been shaped by the structures preceding his existence, including the Victorian norms of his parents, the legacy of British empire, and the burden of the World War II (p. 74). His Englishness,

middle class family, education at public school and Oxford and military background are the building blocks of his life that he cannot change. In this regard, it can be argued that the basic structures constituting his identity is composed of “discrete, indestructible substance that served in the Western metaphysical tradition to reinforce the notion of self as a separate, essentially immutable entity” (Nadeau, 1981, p. 39). It is also possible to observe the traces of causality, locality, and determinism of classical thought in his narrative. In addition to this historical and social determinism, he is also trapped by the unidirectional flow of time from past to present in causality. He wants to “reconstruct his own past experience” (Salami, 1992, p. 74), but in the classical realm, time and causality has one-way direction, always from cause to effect. Absolute space seems to be added as a separate dimension through the borders of country and the class he was born into. He is confined to the Victorian middle-class norms, whose vulgarity disgusts him.

According to Nadeau (1981), “Nicholas, initially at least, is unwittingly an absolutist and determinist. He is in many respects a smug Western intellectual complacent in the belief that his own set of laws and standards for human behavior is the only possible set” (p. 73). The rigid categorization in Nicholas’s mind can be interpreted as a reference to the Cartesian division between *res cogitans* and *res extensa*, in other words, the thinking mind, and the physical world. This dichotomy enables the Newtonian scientist, the subject, to analyze, categorize, and control the phenomenal world, the object. His “narrating consciousness is locked into the empiricist’s understanding of reality and the novel he narrates is written from within that selfsame empiricist worldview which its theoretical discourse contests, in the style of the entrenched, hard-edged realism privileged by that worldview”. (Wright, 1996, p. 231). The power to rationalize creates the illusion of objective reality, and this causes the assumption that mind, which is shaped by language, can know and describe the outside world. However, although everything is strictly defined in his mind, he is trapped inside the constructions of space, time, language and culture, which disturbs him (Salami, 1992, p. 74), and this desire for change can be read as the *anomaly* that the 20th century physicists felt during the paradigm shift. He wants to create a new metaphysics to reconceptualize his authentic self, freed from the confinements of the atomized reality.

From this perspective, Nicholas can be the representation of the Newtonian physicist, and his life can be a symbol for the chaotic transition from the classical paradigm characterized by conventions, rules, restrictions, determinism and objective reality to quantum realm, where uncertainty, probability, dynamism and flux reign. In this respect, his quest for his own identity is parallel to the early 20th century scientist's passion about discovering the universal truth.

His dissatisfaction with his current situation creates a crisis which is similar to the one experienced by the physicist due to the anomalies that could not be solved within scope of the existing paradigm. This struggle leads him to the paradigm shift, which can be interpreted as a metaphor for the fantastic world in the island of Phraxos, Greece, where he seriously questions the fundamental principles of reality and explores the realm of possibility, fiction, metaphor, superposition and uncertainty only to realize that there is no objective reality outside the textuality created by language (Nadeau, 1981, p. 72).

His guide on this route is Maurice Conchis, the magician, who can be interpreted as the representation of the quantum physicist embracing the revolutionary and startling implications of the subatomic realm because he, as Nadeau (1981) notes, reflects the notion of reality "as it is defined in the new physics" (p. 70). Conchis creates an alternative world, which is "a form of escape from reality" (Salami, 1992, p. 78), in his estate, Bourani, to teach Nicholas the fiction-making process so that he could achieve self-realization. This alternative world is not *realistic* and different from the quotidian reality (Salami, 1992, p. 79). This fantastic world can be interpreted as the quantum realm, where the classical notions of causality, locality, certainty and determinism do not work. "In the quantum universe there are 'countless alternative contenders for reality', all competing for existence" (Wright, 1996, p. 224) and virtual particles, so it is fictitious and metaphorical. Mutually exclusive qualities, like wave and particle can exist together, which can be interpreted as the juxtaposition of contradictory narratives of the characters. The border between subject-object or the observer and the thing observed is blurry. Conchis is not the author-God who creates the narrative on his own by creating a hierarchy of discourses (Salami, 1992, p. 95). Nicholas and the actors in Conchis's godgame, including Julie, June and Alison also participate in the creation of

this fictitious reality (Salami, 1992, p. 86). In short, Conchis seems to replace the classical notions with probability, non-causality, indeterminism, uncertainty, and interconnectedness.

The metaphorical dichotomy between London and Phraxos makes setting a significant part of the thematic analysis as it “juxtapose[s] determinate and indeterminate spatial worlds” (Wright, 1996, p. 221). London can be interpreted as the representation of the macroworld, where the rules of classical mechanic work, and the events there do not contradict the daily experience and reality perception of characters. On the other hand, the alternative world in Phraxos contains unrealistic elements. First, the identities of the characters are not clear, for instance, Julie plays three roles at once, like a quantum particle in superposition: Lily Montgomery as the psychiatric patient suffering from schizophrenia, the actress Julie Holmes working with the producer Conchis, and Dr. Vanessa Maxwell assisting the experiment of psychiatrist Conchis. Nadeau (1981) describes the confusion Nicholas feels about the confusing images Julie reflects as follows:

Since either-or categorical thinking is a feature of the Western mind that is not commensurate with the lesson from the new physics that all particulars exist in relation to and in some sense are every other particular, Nicholas is provided with some rather graphic illustrations of the extent to which this habit of mind distorts. (p. 74)

Lily’s paradoxical roles of patient and doctor are especially interesting since they resemble the mutually exclusive qualities that exist together but cannot be observed simultaneously, such as wave/particle or position/momentum in quantum reality. What makes this paradox unrealistic is the law of excluded middle in classical logic.

The masques and live performances are among the other unrealistic aspects of the alternative world in Phraxos. In the middle of an idyllic Greek island, actors and actresses perform mythological scenes with costumes or play the German occupation of Europe with the uniforms and weapons. In realist context, the audience would watch these in their seats in a stage. These fictional performances are like the activities in quantum realm where subatomic particles suddenly “appear and disappear” (Coale, 2012, p. 14), “collide billions of times a second with other such structures” (Nadeau, 1981, p. 40), or “leap from one stationary state to another as atoms randomly emit or

absorb radiation” (Coale, 2012, p. 6). In addition to the performative narrative, the quantum activity and subatomic particles, such as “‘electrons’ and ‘protons’ and ‘neutrons’ are *all metaphors*, images that we’ve created as if we had really seen them” (Coale, 2012, p. 6, emphasis added). Conchis often emphasizes the metaphorical nature of the masques in the novel, for example, after Nicholas reads *La Masque Francais*, a French book about masques that Conchis gives, Conchis tells him that “It is only a metaphor. But it may help” (p. 166). Critics, including Coale (2012, p. 6), Vanderbeke (2011, p. 200), and Oppermann (2015, p. 95) highlight the parallelism between literature and new physics through metaphors. Vanderbeke claims that “the most important aspect of linking literature and physics is the imaginative process” (2011, p. 200). Not only literary works and artists, but also physicists rely on metaphors and images, Oppermann notes, to describe the phenomenal world (2015, p. 95) because they “have an extraordinary power, not only to extend the thought processes of science, but also to penetrate into as yet unknown domains of reality, which are in some sense implicit in the metaphor” (Bohm and Peat, 1989, p. 41).

The creator of this metaphorical realm, Conchis, is the magus, who uses magic to create reality, but the magic he uses is fiction, so the only reality is in textual form (Salami, 1992, p. 88). The nickname magus has its origins from the Major Arcana deck of tarot, which depicts the journey of the Fool, the inexperienced youth “who must travel the circuit of cards through a calibrated progression out of ignorance and frivolity into enlightenment” (McDaniel, 1980-81, pp. 249-250). The Fool is the first card in the deck numbered as zero. The next card is the Magician, Le Sorcier, who helps the Fool on his quest for self-realization. In the novel, the reference to the Tarot myth is explicit. June tells Nicholas the origins of her and her twin’s nicknames, Rose and Lily: “There’s a card in the Tarot pack called the magus. [...] Two of his traditional symbols are the lily and the rose” (p. 477). According to Coale, quantum realm is closely associated with magic: “to many, quantum theory looks like magic, and here we can see the connections between it and the sorcerer’s, the writer’s techniques” (2012, p. 73). Within this context, it can be concluded that the conjuror and the magic are the metaphors for the quantum physicist and the phenomena in the subatomic realm. It was indicated earlier that Nicholas’s life is a journey from the stable ground of classical paradigm to the quantum

flux of uncertainty and probability, resembling the Fool's quest for knowledge. Just like the tarot cards, Nicholas is guided by Conchis the magician (Salami, 1992, p. 82), who can be the representation of the quantum physicist "giving [Nicholas] a lesson in the implications of the indeterminacy principle (Nadeau, 1981, p. 70) and new physics. Conchis's magic has the power to create reality through fiction, so he is a kind of novelist-God, which is often emphasized by Nicholas: "there was some fatal extra dimension in his objectivity, which was much more that of a *novelist* before a character than of even the oldest, most changed man before his own real past self" (p. 133, emphasis added).

Conchis seems to use several devices to practice his *magic*. The first strategy is the godgame, metatheatrical in other words. He creates mimesis for Nicholas so that he could question the notion of reality. Nadeau (1981) explains the function of the godgame as follows:

the several acts in the godgame which serve to illustrate the limits of rationality are consistent with the existentialist understanding of the role of reason in a cosmos that is not governed by rational forces...Nicholas is not encouraged to label all experience as fundamentally absurd because it evades rational definition, but rather to see that reason, like the new physicist's view of spacetime coordinates, is simply a metaphor used in describing a process that precludes definition in static terms. (p. 70)

He assigns different roles for both himself and the characters in his game. For instance, he introduces himself as a psychiatrist who treats the schizophrenic Lily. Contrary to this narrative, Lily persuades Nicholas that she is an actress, and Conchis is a producer. Conchis also arranges a fake death for Alison and tantalizes Nicholas using Julie to free Nicholas from the patriarchal conventions. All these events in the godgame are designed to create an illusion of reality (Salami, 1992, p. 84), which stands for the notion of objective reality, only to break it later. In other words, Conchis uses mimesis as a device to undermine mimesis again. However, it is ironic that he also underlines the fictionality of these events explicitly: "We are all actors here [...] None of us is what we really are. We all lie some of the time, and some of us all the time" (p. 404). Although Nicholas is warned throughout the godgame about the fictionality of the events in Bourani, he cannot suspend his disbelief and is possessed by the illusion of mimesis.

Another method Conchis uses as a part of his magic is telling autobiographical

stories, parables and masques. The function of all these devices is to demonstrate the fictionality process using a Chinese-box structure (Salami, 1991, p. 84). Within the frame narrative of the godgame to seduce Nicholas in mimesis, Conchis narrates other subtexts in which he mirrors the theme of the whole story (Salami, 1992, p. 85). These subtexts repeat the idea that all reality is just fiction (Salami, 1992, p. 84). Through these stories and parables, Conchis attempts to demonstrate an alternative form of reality which is different from the one envisioned by Newtonian science. Conchis approves the existence of alternative forms of reality as: "Verification is the only scientific criterion of reality. That does not mean that there may be realities that are unverifiable" (p. 235). To exemplify the new form of reality, which is more in line with new physics, he tells the story of Norwegian madman Henrik, who believed that he met God. Although this violates the rules of common sense, Conchis realizes that "He was not waiting for some certainty. He lived in it" (p. 308). As Nadeau (1981) notes, this confirms "the proposition that the real in human terms can be nothing more than our subjectivity based on conception of it" (p. 71). For this reason, Conchis concludes that "all our classifications and derivations, our etiologies, suddenly appeared to me like a thin net. That great passive monster, reality, was no longer dead, easy to handle. It was full of a mysterious vigor, new forms, new possibilities" (p. 309). Conchis's definition of reality, which includes the words "mysterious vigor, new forms, new possibilities" is in line with the aspects of the quantum realm because as Brian Greene (2004) remarks, it is a "fuzzy, amorphous, probabilistic mixture of all possibilities" (p. 112).

Another example echoing the idea that "all human perceptions are equally valid because the real as we now know it is inevitably subjective" (Nadeau, 1981, p. 71) is the parable "The Prince and the Magician". Conchis concludes the story saying that "there is no truth beyond magic" (p. 552). The magic is a metaphor he uses for textuality (Salami, 1992, p. 84) which echoes Derrida's words, there is nothing that is outside-text (1967, p.158). Textuality is mainly about the problematic nature of reality as a result of the unreliability of language (Bertens, 2014, p. 108), and this is highlighted by Nicholas as "I was having feelings that no language based on concrete physical objects, on actual feeling, can describe...I knew words were like chains, they held me back; and like walls with holes in them" (p. 239) Nadeau (1981) comments on Nicholas's experience

revealing the limits of language from the metaphysical perspective of new physics as follows:

The aspect of language that symbol system through which we constitute knowledge of the world which makes it an inappropriate vehicle for conveying this sense of communion with the whole is its representation of the world to consciousness in terms of discrete, mutually exclusive categories. Nicholas concludes, therefore, not only that language is ill-equipped to define a universe in which every entity exists in relation to and in some sense is every other entity, but also that all our speculations upon the character of fundamental reality in language can only "taint the description" of its actual nature. (p. 72)

This interpretation reveals the inherent limits of language to describe the universe, which is a "dynamic web of inseparable energy patterns" (Hayles, 1984, p. 19). Similar to Nadeau's remark, Hayles (1984) also underlines the idea that language is not a proper medium to describe reality because the new reality proposed by quantum mechanics and relativity is non-causal and dynamic, and also there is no exterior frame of reference to provide an objective perspective (pp. 19-20).

Moreover, the concept of textuality can be a metaphor for the quantum activities of subatomic particles because fiction is like virtual particles in superposition. According to John Bell, "[These particles] are like *literary fiction* in that they are free inventions of the human mind" (as cited in Gribbin, 1995, p. 220, emphasis added). Some particles exist for such a short period that their reality is questioned. Niels Bohr draws attention to this situation as follows: "Subatomic entities such as electrons have *no real existence*; they exist in a probabilistic limbo of many possible superposed states until forced into a single state by the act of observation" (as cited in Horgan, 1996, p. 81, emphasis added). Similarly, Nicholas often doubts the reality of the stories Conchis narrates. They are both real and unreal as Nicholas notes: "Every truth in his world was a sort of lie; and every lie a sort of truth" (p. 294). In this context, it can be concluded that as long as Nicholas believes, they are true. Their reality depends on the participation of Nicholas because these subatomic particles are created during the act of observation (Coale, 2012, p. 19), just like the reader produces meaning in the text. Through the interesting anecdotes from his life and parables, Conchis tries to show Nicholas that all reality is fiction, which is inherently uncertain and contingent (Salami,

1992, p. 83). There are direct references in the novel about the new form of reality that is based on new physics. For instance, during his experience in Bourani, Nicholas feels like “countless *nuclei* of hope suspended in a vast solution of *hazard*, a pouring out not of *photons*, but noons, consciousness-of-being *particles*” (p. 239, emphasis added). Towards the end of the novel, when Nicholas talks to Lily de Seitas about the psychodrama he experienced, she encapsulates Conchis’s vision of reality shaped by the new paradigm: “The basic principle of life is *hazard*. Maurice tells me that this is no longer even a matter of debate. If one goes deep enough in *atomic physics* one ends with a situation of pure change” (p. 628, emphasis added). It is evident from this expression that Conchis is heavily influenced by the metaphysical assumptions proposed by the new physics. The characteristics of this new reality is further developed in the novel: “The place of mystery in life. Not taking anything for granted. A world where *nothing* is *certain*” (p. 339, emphasis added). Lily de Seitas also emphasizes the contingency element in Conchis’s style: “in the godgame we start from the premise that in reality, *all* is *fiction*, yet no single fiction is necessary (p. 627, emphasis added).

In Conchis’s metatheatre, it is possible to see the traces of dynamism, fluidity and mystery of the quantum realm: “the action, the narrative was *fluid*, with only a point of departure and a fixed point of conclusion” (p. 404, emphasis added). The subatomic world is not stable, immutable and graspable as Oppermann (2015) notes: “Particles create and annihilate other particles, forces absorb and metamorphose with one another, and everything spins in and out of existence in a flash” (p. 89). A particle, for instance, is probability cloud, and it can be anywhere until it is measured. Moreover, this dynamism is impossible to catch, which makes it enigmatic and magical (Coale, 2012, p. 2). To explain the mysterious activities of the quantum realm, Heisenberg (1958) indicates that “there is no description of what happens to the system between the initial observation and the next measurement” (p. 21), and “the details in between are shielded from view” (Ford, 2004, p. 155). When the scientist attempts to observe this dynamic structure, fluidity and probability disappear.

Another function of the subtexts and the godgame can be destroying the strict border between the subject and object. Conchis seems to problematize this relationship through the godgame. He explains how his innovative drama eliminates this dichotomy:

“the conventional separation between actors and audience was abolished” (p. 404). In this new kind of drama, audience actively participates in the fiction-making process as Conchis indicates: “we are all actors here” (p. 404). In quantum physics, the observer’s participation changes the result of the experiment. If he/she chooses to measure the quantum activity, “matter remains in a state of suspended animation of unreality until an actual measurement or observation is performed. . . when it ‘collapses’ suddenly into reality” (Davies, 1980, pp. 13, 124), but if he/she does not interfere with the system, the superposition and the probability cloud are preserved. The observer, then, contributes to the creation of reality, unlike the passive and independent observer of classical physics. Consequently, Conchis uses art and fictionality as a means to help Nicholas to construct his own identity (Salami, 1992, p. 104). The process of fictionality will be discussed in detail in the structural analysis section, but it has thematic importance as well due to Conchis’s and his alternative world’s similarity to the quantum concepts.

On his route to quantum reality, women have a crucial role as they help Nicholas to abandon his former assumptions about reality shaped by the notions of classical paradigm (Nadeau, 1981, p. 74). The first figure he encounters is Alison, an Australian girl, whom Nicholas meets and has an affair with before going to Greece as an English teacher. Alison can be a metaphor for the physical world that Nicholas wants to discover. Together with Julie and the country Greece, she “is the ‘other’ against which masculinity defines itself” (Salami, 1992, p. 88). This can be parallel to the classical subject-object division in which the subject analyzes the object. Like his previous relationships, Nicholas manipulates this girl and treats her like an “object” as a result of his male supremacy mindset (Salami, 1992, p. 91), which can be interpreted as another component of his atomized essence. The relationship between Alison and Nicholas can be a reference to Cartesian subject-object division of classical paradigm. Subject is isolated from the physical world and has a separate mind which is able to analyze the other, physical world.

Before his fantastic experiences in Phraxos, he has sex with Alison in London. It was indicated earlier that Nicholas can be the metaphor for the Newtonian scientist who observes and studies nature, and London can be the quotidian realm where the laws of classical physics operate. The Newtonian metaphysical assumption that the thinking

subject has the ability to describe the objective reality (Nadeau 1981, p. 32) seems to give Nicholas the impression that he is capable of attaining the knowledge of physical world, which is personified by Alison. Nicholas's confidence about the certainty of objective reality comes from the fact that the macroworld operates according to the deterministic Newtonian laws (Nadeau, 1981, p. 73), and it is interesting that he has this assurance in London but not Phraxos because the former seems to represent the classical notions of objective reality, causality, determinism and certainty. After the sex, Nicholas loses all his interest in Alison as he discovered everything about her, in other words, he possessed her. His careless and almost arrogant attitude resembles the scientists of the early 20th century. Since they thought that there is nothing left to discover in physics (Maxwell, 1871, p. 244), they were confident about their ability to know the universe.

Another important character in Nicholas's journey is Lily/Julie whom he meets during the godgame. Just like Alison, she can be interpreted as a metaphor for the mysterious subatomic particles because she is "like the unattainable object in the modern physical world; her essence is indeterminate" (Bohnenkamp, 1989, p. 26). Although Nicholas's first reaction against Conchis's alternative world in Bourani and the characters within it is suspicion (Salami, 1992, p. 77), he begins to accept the weird and fantastic events, like masques, live performances and the Conchis's intriguing stories, which can be the representation of quantum phenomenal activities, and Julie is the most important part of it as she is the object he wants to discover. It is possible to detect the mystery element in Nicholas's description of Julie in many scenes in the novel: "naked enigma [...] forever unattainable" (p. 528). The metaphors he chooses for Julie clearly parallel the quantum realm. "Everything I had ever thought to understand about woman receded, *interwove*, *flowed into mystery*, into *distorting shadows* and *currents*, like objects sinking away, away, down through shafted depths of water" (p. 529, emphasis added). The probabilistic and fluid nature of subatomic particles are depicted through the metaphors including "flowing into mystery", "currents" and "sinking objects" and "deep water" because those particles are not solid, concrete and stable entities. Rather, they are probability waves, a current, flowing around the nucleus (Coale, 2012, p. 264). In superposition, the virtual particles are like "shadows" that cannot be measured and localized (Coale, 2012, p. 30) because as Gribbin (1995)

explains, “we *cannot* ever know what an atom is ‘really’. We can only know what an atom is *like*” (p. 186). Any attempt of scientist to observe this dynamic structure is dodged (Coale, 2012, p. 19), just like Julie who defers Nicholas’s advances to grasp her sexuality and the godgame’s reality (Salami, 1992, p. 94).

Both Alison and Julie are similar in that their sexuality is puzzling, and their reality is out of reach for Nicholas (Salami, 1992, pp. 91-93), but what distinguishes Julie from Alison is that she plays coy and increases the element of mystery by deferring the meaning behind both her own sexuality and the godgame (Salami, 1992, p. 94). Moreover, since Nicholas believes that Julie is a virgin, she triggers Nicholas’s masculine desire to explore and invade more (Nadeau, 1981, p. 74). He wants to be the first man to conquer the virgin land (Salami, 1992, p. 92), which has been interpreted as the quantum realm, personified by Julie. On the other hand, since he has sex with Alison before, he more or less satisfies his hunger to possess for a period of time, which causes Nicholas to ignore Alison until the end of the godgame.

Nicholas regards not only the female characters, but also Greece as a country, and the island Phraxos in particular, as an object to discover (Salami, 1992, p. 92). “What Alison was not to know [...] was that I had been deceiving her with another woman during the latter part of September. The woman was Greece” (p. 39). It was mentioned above that the setting also carries the traces of quantum metaphors and that Phraxos epitomizes the quantum realm. Nicholas has also been interpreted as the scientist subject who wants to know everything about the phenomenal world. Since nature has always been associated with women, he labels the charm of the island as a woman (Salami, 1992, p. 92). How he matches women with nature becomes more apparent when he says, “the body of the island [...] was virgin” (p. 50). Just like Julie’s virginity, the island’s unspoiled beauty grows his appetite for invasion and control. Nicholas’s passion to explore and possess is very similar to the hunger of the Newtonian scientist to obtain the universal laws and objective reality. As an example of how he relates women to territory that male power dominates, Nicholas says “to think of Alison in this woman’s hands. As one hears of a countryside one has loved being sold to building developers (p. 604). These lines show Nicholas’s irritation after his conversation with Lily de Seitas because he assumes that Alison is manipulated by Conchis and his

companions. He cannot tolerate Alison's alliance with them since he wishes to be the only master controlling her personality and sexuality.

By examining the parallelism between the women and Phraxos, it is possible to observe the hierarchical duality of Western idea in the form of two dichotomies: male/female and nature/culture. In Western metaphysical tradition, man and culture are privileged over woman and nature, and the former dominates the other for hundreds of years (Bertens, 2014, p. 112-113). This dualism is the result of the working mechanism of language in either/or fashion and its structure based on subject-object division (Nadeau, 1981, p. 74), which leads to atomization of concepts and hierarchy in classical paradigm. As previously mentioned, Nicholas personifies the scientist's desire to discover nature, and this can be combined with the man's desire to possess woman. On the other hand, it is important to distinguish between the classical and new physics approach. In the quantum realm, the border between the subject and object blurs, and scientist cannot fully picture the reality of the physical world due to the limits of language as a medium (Hayles, 1984, p. 41). Within this context, Derek Wright (1996) draws a parallelism between gender and the attitude of the scientist. He argues that:

“Male” Newtonian empiricist affects the godlike role of impartial, invisible observer, dissociated from and fatalistically absolving himself from responsibility for the world, while the “female” New Physicist believes herself and her consciousness to be, holistically, part of the nature she studies. [...] The “masculine” Old Physics is presented as impartial, exclusive, deterministic, presumptuously knowing, and single-minded; while the ‘feminine’ New Physics is participatory, self-inclusive, choice-oriented, humbly agnostic, and multiple in perspective. (p. 225)

The most elementary conclusion that can be understood from the passage is that while Wright matches Newtonian approach with masculinity, he associates the implications of new physics with femininity. The classical paradigm exercises power on nature by relying on the Cartesian division, which inevitably creates a hierarchy in which the subject is privileged over the object. “The invisible” and “impartial” observer is not part of the system he investigates, and he is more like a transcendental, a godlike authority. It can be further deduced that the Newtonian scientist is also sure about his ability to know nature through reason and experiment. This brings a reductionist view towards reality because the phenomena that do not fit into the criteria of positivism are

excluded. It is no surprise that these qualities are also the defining characteristics of the masculine discourse. On the other hand, feminine new physics challenges the subject-object dichotomy because it regards the observer as an indispensable part of the system. This advocates a wholistic and organic vision in which the whole is greater than the sum of its parts. Since no single theory or reality explains the universe, new physics espouses multiplicity of perspectives. Thus, it can be argued that the clash between the old and the new paradigm and their divergent attitude towards physical world is thematized through Nicholas's masculine treatment of Phraxos and the women around him.

Based on Wright's (1996) observation above, it can be argued that Nicholas has the pride of the classical physicist who thinks that he has the power to solve any puzzle. Nicholas chases after Julie, but she tantalizes him until the end of the experiment. When Nicholas finally has sex with Julie, which makes him believe that he solved the mystery, the illusion is broken as he perceives that everything was a game to trick him. The purpose of Conchis's godgame, which can be read as a metaphor for a quantum experiment, is "to break Nicholas out of this delimiting perspective without appeal to global abstractions or absolute criteria of judgement" (Nadeau, 1981, p. 73). These "global abstractions" and "absolute criteria" can be interpreted as the boundaries of the classical and masculine paradigm. In this regard, the trial scene can be understood as the beginning of the painful metamorphosis of Nicholas, shifting from classical to new reality. Nicholas's reaction to this revelation is violent because he feels humiliated and frustrated. In the trial scene, the psychiatrists express the pathological obsession of Nicholas towards women which are seen "both as desired objects and as objects which have betrayed him" (pp. 508-509). Conchis aims to liberate Nicholas from the conventions imposed by the patriarchal culture (Salami, 1992, p. 92), which has also been fortified by the notions of Western metaphysics, but this process is not a mild and smooth one. Nicholas is tortured through the pornographic film played by Julie. As a result of this, all his masculine fantasies about capturing woman and nature shatter, and he is ensured that these two entities are not objects under the investigation of the subject (Nadeau, 1981, p. 75). His position is similar to the scientists witnessing the unfathomable realm of subatomic particles. It is impossible to capture a full picture of

reality (Nadeau, 1981, p. 10).

Another attack to the hierarchical mentality of Nicholas comes from Alison (Salami, 1992, pp. 93-94). Even though Nicholas was convinced that Alison was totally under his control, Conchis's godgame turns this relationship into a dynamic and unpredictable one, resembling the quirks of the quantum realm. At the beginning of the novel, Nicholas takes Alison's love for granted and dominates her existence through his masculine discourse. He admits how he treats women in general early in the novel: "I contrived most of my affaires in the vacations, away from Oxford, since the new term meant that I could conveniently leave the scene of the crime" (p. 21). Moreover, Nadeau (1981) relates Nicholas's Newtonian absolutist perspective to his treatment of women as follows: "Nicholas's absolutism figures large in his inability to fully consummate the relationship with Alison". An example for his absolutist approach is seen in his narrative where he describes Alison as "waif-like, yet perversely or immorally so" (p. 23). This dichotomy of virgin and whore is the result of the "either-or categorical thinking [which] is a feature of the Western mind that is not commensurate with the lesson from the new physics that all particulars exist in relation to and in some sense are every other particular" (Nadeau, 1981, p. 74).

However, Nicholas's perspective towards Alison seems to alter during their trip to Mount Parnassus. When he is under the influence of the godgame in Bourani, he starts to discover the mysteries of the fictional world, which has been interpreted as the quantum realm above, and this seems to gradually transform his mindset. It can be claimed that Nicholas adopts a complementary approach to reality as a result of the magic of Conchis. The way he describes Alison, for instance, considerably changes: "young and ancient; innocent and corrupt; in every woman, all woman" (p. 264). Despite the fact that these notions are paradoxical and mutually exclusive in classical logic because of the either/or structure of language, the complementary nature of these qualities are intrinsic to the subatomic realm. A particle, for example, can be both wave and particle at once, and contrary to the classical logic, they are not paradoxical but just the different manifestation of the same phenomenon. Also, Nicholas draws a parallelism between Alison and all women, which recalls Hayles's (1984) idea that "the whole can be contained within the part, leading to the infinite regress of a part containing a whole

within which is contained the part” (p. 24). The part, which can be Alison in this context, is an indispensable component of the whole, and the whole, all women, is represented within the part. However, although Nicholas’s perspective changes to some extent, he continues to objectify and neglect her.

She later regains her importance for Nicholas after he is disappointed by the psychodrama in the trial scene, which can be interpreted as a nostalgia for the predictability and certainty of the classical realm: “Her special genius, or uniqueness, was her normality, her *reality*, her *predictability*; her crystal core of non-betrayal; her attachment to all that Lily was not” (p. 553, emphasis added). It can be deduced from this quote that what he misses is not the personality of Alison but what she represents in his mind. It seems that he wants to turn back to the comfort of the Newtonian paradigm, which is knowable and perceptible. It can be further argued that when the godgame ends, Nicholas shares the disillusionment that the classical physicists felt after they encountered the radical implications offered by the quantum theory. As Einstein puts it, it is “as if the ground has been pulled from under one, with no firm foundation to be seen anywhere, upon which one could have built” (1979, p. 45). Nevertheless, upon realizing her complicity with Conchis after he sees Alison in Athens and understands that she did not commit suicide, he irreversibly loses his confidence for both Alison and the principles of Newtonian reality:

I wanted to see her, I knew I wanted to see her desperately, to dig or beat the truth out of her, to let her know how vile her betrayal was. To let her know that even if she crawled round the equator on her knees I could never forgive her. That I was finished with her. Disgusted by her. As disintoxicated of her as I was of Lily. (p. 565)

Frustrated by the betrayal again, Nicholas turns back to London, which has been regarded as the symbol for the realm of classical physics, and he tries to solve what he experienced in Bourani. He traces the real identity of Conchis and Julie and wants to confront Alison. However, during this futile attempt to trace the enigma, he conceives that what he only needs is Alison. He finally “begin[s] to perceive Alison as an individual human being” rather than a resident of his consciousness shaped by “the either-or” (Nadeau, 1981, p. 75). Nadeau (1981) further indicates that Alison “is not Lily and Rose or virgin and whore, but a unique human being who, like all processes in

nature, defies final classification and description” (p. 75). From this viewpoint, it can be conceived that accepting her individuality leads him to notice her mysterious nature like a quantum particle: “She was mysterious, almost a new woman; one had to go back several steps, and start again; *and know the place for the first time*” (p. 650). This final comment of Nicholas can be understood as the encapsulation of the paradigmatic shift he experienced, a conversion from classical to quantum reality.

In addition to characters and setting, the story can also thematically represent the quest of the scientist whose greatest dream is to fathom the mysteries of the universe and reach the objective reality. Salami (1992) asserts that Nicholas’s journey is “quest for knowledge” (p. 82), and this journey can be related to the scientist’s route because they also try to understand how the universe works. Salami (1992) further indicates that this path is a circular one in which Nicholas turns back to the point he starts (p. 76), and it can be argued that this circularity is parallel to the scientist’s quest for knowledge. At the beginning of scientific inquiry, the world was unknown to him/her, but after that, symbolic language and reason created the illusion that the subject can analyze the universe as an object (Nadeau, 1981, p. 10). Classical mechanics premised that the mind could decipher the mathematical laws governing the universe (Nadeau, 1981, p. 31). Being in search of his own identity, Nicholas was also in a similar position as the scientist. In the novel, this journey is encapsulated in T.S. Eliot’s poem “Little Gidding”:

We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time. (p. 69)

However, just as the paradigm shift in science in the early 20th century with Planck’s discovery of quantization (Strehle, 1992, p. 11), Conchis’s godgame in Bourani reversed the direction of this quest (Salami, 1992, p. 75). As a result, it can be suggested that Nicholas experiences quantum reality characterized by probability, dynamism and interconnectedness through the enigmatic female figures Alison and Julie and the arcane land Phraxos. Contrary to the Newtonian certainty, predictability, and determinism, the subatomic realm offers uncertainty and contingency. Consequently, the pursuit of objective reality ends up in indecisiveness, which is the point where the scientist starts.

Both Nicholas (Salami, 1992, p. 78) and the modern scientist (Hayles, 1984, p. 36) realizes that the only thing they *know* is that there are inherent limits on the description of reality. The novel's circular setting of London-Phraxos-London, therefore, symbolizes the quest of knowledge from unknown only to turn back to unknown again (Salami, 1992, p. 76). First, Nicholas was confused about his atomized identity in London, and then he decided to reconstruct his reality through the puzzling games of Conchis in Phraxos, and finally he became more confused about both his identity and the world around him (Salami, 1992, p. 75). The only thing he could grasp was uncertainty (Salami, 1992, p. 83) as the new intrinsic principle of reality as in the case of new scientist who accepted the ambiguity and non-rational activities of quantum realm (Coale, 2012, p. 2).

In conclusion, the thematic analysis section has illustrated the main concepts of the new physics and their metaphorical reflections on the characters, setting and the plot development of *The Magus: A Revised Version* (1977). It has been found that Nicholas is the embodiment of the classical physicist who lives in the world of absolutes and that Conchis is the new physicist teaching him the basic assumptions of the quantum world. The women he encounters, namely Alison and Julie/Lily, have been interpreted as the mysterious subatomic particles. Another point that has been underlined is Nicholas's journey for constructing an identity for himself through Conchis's godgame since it has been interpreted as the transformation of the scientist from classical paradigm to new physics. Finally, it has been found that the two settings in the story, London and the island Phraxos are the metaphors for the distinction between classical and quantum realm.

2.2. Structural Analysis: Revisiting the Narrative Techniques in the Light of Interconnectedness and Self-Referentiality

This section will discuss the narrative form of *The Magus: A Revised Version* (1977) by referring to the two basic principles of Hayles's field theory, self-referentiality and interconnectedness, and their relation to the postmodern strategies, especially Derrida's notions of textuality and différance. The author, narrator, text and reader relationship will be reconceptualized in the light of interconnectedness. The section will also focus on the concept of narrator as the mediator of meaning in the text and the three narrators in the novel, Nicholas, Conchis, and the omniscient, and the reliability of their narratives will be problematized within the self-referentiality concept. Another point that will be addressed is the Chinese-box structure of the novel and multiplicity of texts in which the contradictory narratives and discourses are inserted into each other by referring to interconnectedness and self-referentiality

The first part of the structural analysis will be centered around the relationship between the author, text and reader with reference to Roland Barthes's "Death of the Author" (1968), Derrida's (1976) notion of textuality and différance, and Hayles's (1984) interconnectedness principle in the field theory. In order to draw a parallelism between these three theories, it is necessary to examine the distinction between the classical and new paradigms in both physics and literary criticism. In Newtonian mindset, observer, physical objects and phenomena are isolated systems, and their interaction with each other does not have a major impact on the results of the experiments, so they can be analyzed separately (Hayles, 1984, p. 31). This Cartesian division between the mind of the thinking subject and the physical world consisting of objects creates a hierarchy in which the subject rationalizes, classifies and describes nature in an objective way (Hayles, 1984, p. 32).

Analogously, it can be argued that conventional literary criticism deploys the atomistic structure of the classical metaphysics. This is because it establishes a hierarchy between the author, text and reader (Belsey, 1980, p. 70). The text is merely a product of the author who determines all the devices and functions, arranges discourses and create the meaning of the text (Salami, 1992, p. 20). The author anchors an absolute and totalized truth to the text, and the reader is supposed to find the unified meaning

attached to the text as the passive consumer of it. The writer, therefore, is the ultimate authority, and the text is a closed circle of signs where “the meaning is determined, fixed, and inclined towards totalization” (Salami, 1992, p. 34) by the author. In this regard, it can be argued that this configuration evokes the clockwork model of the universe. The author resembles God creating the universe and setting the clock through universal laws. The author locks the text after entering the codes of meaning, and the only thing that the reader can do is to decipher the meaning that is hidden in the text. In this regard, the reader is like the scientist who attempts to reach the objective truth by decoding the mathematical laws governing the universe, but the role assigned to the classic reader and scientist is a passive and isolated one. However, on the other hand, “[postmodern] reader/observer is drawn into the work as a participant” (Bohnenkamp, 1989, p. 23) as they actively shape reality.

Nevertheless, parallel to the developments in physics, namely relativity and quantum theories, the philosophical implications of the relations between observer, phenomenal world and events were revised (Hayles, 1984, p. 41). Interacting systems and multiple ways of observation in relativity showed that there is no privileged vantage point to describe the reality (Hayles, 1984, p. 49). More radically, quantum mechanics foregrounded the observation problem in which the observer is an active participant in the creation of phenomena since it directly interferes with the system (Hayles, 1984, p. 51). Thus, both quantum and relativity rejected the strict border between the subject and the object, which was a serious attack to the atomistic and hierarchical order between the observer, objects and events (Hayles, 1984, p. 41). Hayles (1984) explains this shift in thought through the principle of interconnectedness which replaces atomized and discrete systems with dynamic and interacting ones (p. 19). In this model, the components of a system are closely linked, and an individual and sequential analysis of it is impossible (Hayles, 1984, p. 20). Since Hayles (1984) argues that this radical change is not limited to physics and constitutes a common cultural matrix, literary criticism is also affected by this transformation (pp. 22-23). Through poststructuralist theories, the hierarchies between the binary oppositions were deconstructed through the works of Derrida and Barthes, including the relationship between the author, text and reader (Bertens, 2014, 111). In his famous essay, “The Death of the Author”, Barthes

claims that author is not the transcendental signified or the final point to consult to find the meaning as the text has an autonomous position producing its own meanings (1968, p. 149). The reader, on the other hand, is stripped of his/her passive status and becomes an active participant in the creation of meaning (Barthes, 1974, p. 4). When poststructuralism is combined with Hayles's theory are combined, it can be argued that the author, text and reader are entangled and form "a field" where every component in the signification process contribute to the formulation of meaning.

In *The Magus*, Fowles challenges the traditional roles assigned to the author and the reader and rejects the hierarchy of discourses through the magus Conchis and his godgame (Salami, 1992, p. 95). It has been argued in the thematical analysis that Nicholas sets out his journey for self-actualization after realizing that his identity is merely a product of the middle-class Victorian society, which is a text he wants to reconstruct. In this context, the position of Nicholas is similar to the reader who needs to be free from the submissive role given by the conventional author (Salami, 1992, p. 86). When Nicholas steps in the alternative world in Bourani, which is the realm of textuality and fiction created by Conchis, he starts to learn about the fiction-making process by tracing the meanings of different and contradictory texts (Salami, 1992, p. 78). When the godgame is over, Nicholas revises his life as a passive collector of the traces left by a novelist-like god and notices how he was once trapped inside the borders created by the author:

all my life I had tried to turn life into fiction, to hold reality away; always I had acted as if a third person was watching and listening and giving me marks for good or bad behavior—a *god like a novelist*, to whom I turned, like a character with the power to please, the sensitivity to feel slighted, the ability to adapt himself to whatever he believed the *novelist-god wanted*. This leechlike variation of the superego I had created myself, fostered myself, and because of it I had always been *incapable of acting freely*. It was not my defense; but my despot. And now I saw it, I saw it a death too late. (p. 539, emphasis added)

It can be concluded from Nicholas's words that before the godgame, he personified the classic reader who is reduced to an inferior position. He summarizes the conventional reader's responsibility, which is "pleasing" the author by grasping the intention of him/her. He also associates the theme of freedom with the passive role of the reader as it can only interpret the text within the structures created by the author. On

the other hand, as Salami notes, Conchis is “the author’s surrogate and he represents the professional writer in so many ways” (p. 77). As the embodiment of the modern author (Salami, 1992, p. 77), Conchis teaches Nicholas to be an active reader of the texts and construct his own narrative so that he could achieve existential freedom and be the master of his text (Salami, 1992, p. 86). From this viewpoint, it can be argued that Conchis conforms to the new author notion of poststructuralists characterized by interrelatedness. Rather than positioning himself at the top of the hierarchy by dominating other characters, Conchis invites both Nicholas and the reader to formulate their own interpretation by active participation as “the goal of the literary work (of literature as work) is to make the reader no longer a consumer, but a producer of the text” (Barthes, 1974, p. 4). In brief, it can be concluded that the reader, characters, author and texts are intertwined.

Conchis is the novelist-god, in other words, the author, but his stance is different from the conventional concept of author because he grants freedom to the readers of his texts by instructing them the working mechanism of textuality (Salami, 1992, p. 81). Salami (1992) observes that:

Novel’s “mimetic” elements refer *not* to a quotidian reality but to other mimetic elements, to other fictional texts. Hence, the novel’s radical textuality is foregrounded: texts refer to other texts, signs to other signs, images to other images, and fictions to other fictions. The Magus is thus an ensemble of signs, images, texts, fictions and illusions that have *no* referential status. (p. 84)

Based on Salami’s observation above, it can be argued that by telling personal accounts, parables and preparing the stage for the godgame, Conchis teaches both Nicholas and the reader that reality consists of a web of signs whose meaning is derived not from the external world, but from differential relationship between them. The metaphor Conchis uses for this textuality, it seems, is “magic”. Some parables and stories he narrates mirror the godgame he designs for Nicholas. For instance, in “The Prince and the Magician”, Conchis tells the story of a prince who believes that there are neither princesses nor islands, but he later learns from a magician that his father lied him about the existence of islands and princesses and that his father is actually a magician. The prince finally understands that “there is no truth beyond magic” (p. 552). Magic can

be regarded as the symbol of textuality, which means that all truth is just a construction, and also this can be linked to Derrida's textuality and Hayles's field concept characterized by interconnectedness and self-referentiality. In the field view, things are connected "by means of the mediating field [of language]" (Hayles, 1984, p. 10). Conchis warns both Nicholas and the reader about the fictionality of reality which prevents them to get caught in the illusion of mimesis. In another story, Conchis recounts his encounter with De Deukans, which is a replication of the relationship between Conchis and Nicholas. During his interaction with De Deukans, Conchis tries to trace the signs left by him, but cannot reach the meaning just like Nicholas whose attempts are always deferred by other signs (Salami, 1992, p. 85).

Another important point that the new author challenges is the assumption that the writer reflects history in an objective way (Salami, 1992, p. 76). Conchis tells his memoirs of World War II, and their reliability is constantly questioned by Nicholas (Salami, 1992, p. 77). According to postmodernism, history is also a construction, not absolute truth (Salami, 1992, p. 42). Here, the idea of the author objectively reflecting the past events shatter since the identity of the author is also constructed by the cultural codes and ideologies of his/her society (Foucault, 1986, p. 119). This means that the former authority of the writer dissolves when he/she loses its position as the subject objectively describing the universe. When it is combined with the metaphysical assumptions of the new physics, it can be argued that both the reader and the author play a crucial role in the construction of these texts, resembling the quantum observer who interferes with the system and changes the outcome of the experiment as Heisenberg's Uncertainty presumes. While the author becomes a "product of the interplay among competing discourses and conventions" (Siegle, 1983, p. 128), the reader actively creates meaning through reading process. This is the point where the distinction between the subject and object blurs.

When the connection between textuality and field model of Hayles are further developed, it can be argued that not only the author and the reader, but also the text is an inseparable part of the field, which refers to Hayles's interconnectedness principle again. The novel provides various interwoven texts that are mostly contradictory to each other. However, they are not isolated narratives that both the reader and Nicholas should

interpret. As the representative of the reader, Nicholas should relate the multiple texts together to form his own version of reality since there is no absolute, unified or single meaning hidden inside the text (Salami, 1992, pp. 77-78). Every reading process leads to multiple interpretations, and this postmodern way of reading is analogous to quantum observation phenomenon and the superposition of quantum states. “While Newtonian physics tried to build a model of reality which is independent of the observer, quantum science reinstates the observer at the centre of the stage, involving him—or her—in reality in a fundamental way”. (Wright, 1996, p. 224). For instance, if he/she chooses to measure the system, the particles in superposition stop their dynamic motion and only one version of the quantum state appears; however, if the measurement does not occur, the wave function is conserved. This is the active role given to the observer and the integrating systems constitute the core of the interconnectedness concept of Hayles.

Similarly, in reading process, each reader can produce a different meaning, which in turn causes multiplicity of interpretations. The text is, then, according to Derrida is “a field of infinite substitutions in the closure of a finite ensemble” (1970, p. 260). This is akin to the quantum superposition in which the particles are not solid objects but rather a probability cloud consisting of virtual particles. The particle is not in a specific location, rather it is everywhere until it is measured. In this context, it can be argued that the infinite chain of semiosis functions the same. The text contains and allows an infinite number of interpretations, and when the reader stops the flow of signification, he/she can produce a temporary center for meaning (Bertens, 2014, 119). Nonetheless, this does not mean that the meaning is absolute or has a center. The meaning is arbitrarily constructed during the reading process, and it is temporary. Since there is no fixation, Derrida uses the metaphor “freeplay” to describe this flow of signification: “this movement of the freeplay [is] permitted by the lack, the absence of a center or origin” (1970, p. 288). It is also important that the meaning has no origin because it is an aspect intrinsic to the subatomic realm as well. The particles have no specific position inside the atom, rather they move in a probability cloud, and the observer measures the position, he/she finds only one of the possible positions the particle can stay. The word “freeplay”, on the other hand, resembles Hayles’s “cosmic dance” metaphor to describe the field theory because both the signification process and components of the field are in

a dynamic and fluid motion, and each element is in mutual interaction referring to each other through “harmonious and rhythmic patterns” (Hayles, p. 15).

Although Conchis wants to set both Nicholas and the reader free by allowing them to construct their own narratives, he also highlights the inherent limits on obtaining knowledge (Salami, 1992, p. 78), which can be linked to Hayles’s self-referentiality problem and Derrida’s concept of *différance*. Hayles (1984) argues that the new paradigm in physics altered the intellectual climate of 20th century (p. 15). Studies in mathematics, physics, computing, and philosophy of science demonstrated that a full description of reality is impossible because the medium that is used for analysis, language, is a part of the system (Hayles, 1984, pp. 9-10). When language becomes an object of analysis, it produces paradoxes as in the example of Strange Loop (Hayles, 1984, pp. 34). Gödel’s Incompleteness Theorem proved that formulating a mathematical system that is both complete and consistent is impossible because the language created to describe the system produces paradoxes and inconsistency, but excluding them results in incompleteness (Hayles, 1984, pp. 35). Similarly, Heisenberg’s Uncertainty Principle indicates that there are mutually exclusive quantities in subatomic realm that cannot be observed at once (Coale, 2012, p. 2). Since the observer disturbs the system during the act of measurement, only one of the quantities can be detected. For example, if the scientist wants to measure the momentum, it becomes harder to find the position of the particle or vice versa. These revolutionary theories show the undecidable nature of reality, and this is not because of insufficient tools but it is an inherent quality of the physical phenomena (Hayles, 1984, pp. 51).

A similar approach was embraced by poststructuralism and postmodernism. Derrida’s *différance* is a reflection of this undecidability in meaning because of the arbitrary and unstable nature of language (Bertens, 2014, p. 110). Saussure and other structuralists accepted that language is a system of signs in which the meaning is produced through the principle of difference (Bertens, 2014, p. 50). Also, each signifier has a stable signified, so there was no problem in meaning-making process. However, Derrida asserted that the arbitrariness characterizing the relationship between the signifier and the signified destabilizes meaning, and the meaning is constantly deferred by the following signs (Bertens, 2014, p. 111).

The narrator has a central importance in the act of narration because it is the mediator of messages and connects the reader, text and author together (Salami, 1992, p. 14). In this sense, the narrator can be parallel to language in field theory and measuring device in modern physics because both of them are the medium connecting the subject and object. The thinking subject needs a tool to interact with the outside world. This does not have to be in the form of articulation because even thinking process is possible through the grammatical structures of language as it actively shapes the structures and codes in the mind (Nadeau, 1981, p. 5). Likewise, the scientist uses some measuring devices to observe the physical phenomena, and they are the media that are necessary to get involved in the system. In literary works, the narrator provides a framework for story and arranges the narratives in a specific order. Furthermore, the narrator is the voice of the implied author, which helps it to determine the hierarchical order of discourses (Salam, 1992, p. 15). It is the vantage point through which the reader observes the events (Belsey, 1980, p. 30). In short, it can be concluded that together with the author, reader and the text, narrator also constitutes an important part of the field of literary work where all the components are intertwined through the principle of interconnectedness proposed by Hayles.

On the other hand, the new approach to the function of the narrator considerably diverges from the conventional description of it. This shift in perspective towards narrator can be linked to the revolutionary changes characterizing the new 20th century thought. The act of measurement has no effect on the physical phenomena that is observed in the classical paradigm, whereas relativity and quantum theories illustrated that the frame of reference should be taken into account during the experiment as it has a dramatic change on it (Hayles, 1984, p. 49). In relativity, time should be added as the fourth dimension to the three-dimensional space so that the seemingly different events can be interpreted according to the same universal laws (Hayles, 1984, pp. 46-47). However, since the mind cannot perceive the time as the fourth dimension as a result of the working mechanism of language, which is based on cause-effect relationship and unidirectional flow of time from past to present, the events look different from different vantage points (Coale, 2012, p. 31). Relativity, therefore, implies that there is no privileged or objective frame of reference to describe the physical phenomena, rather

there are multiple ways of observing the same reality (Hayles, 1984, p. 49). This new approach to observation has its influence on narrative theory and modern novel (Bohnenkamp, 1989, p. 23). The classic realist narrator who provides an objective perspective to the reader is replaced by multiple narrators who recounts the events from different points of view in modernist novels (Coale, 2012, p. 32).

Although relativity had provided a new perspective towards the act of observation, quantum theory revolutionized the basic concepts of it in a radical way. In quantum experiment, the observer is not a passive agent recording the physical phenomena, rather he/she is an active participant creating the reality during the observation (Hayles, 1984, p. 51). The choice for measuring the system breaks the dynamic structure of the subatomic realm, and a single probable state appears, but the wave function is preserved if the position or momentum of a particle is not measured. As a result, the observer and the measuring device have a vital role in the experiment as they have the power to change the outcome. This also creates an ontological problem concerning the description of objective reality as there is no distinction between the observing subject and the object that is observed (Hayles, 1984, p. 51). This interdependence of the observer, measuring device and physical phenomena demonstrates that they constitute a system as whole which Hayles (1984) calls “cosmic web” or “field” (p. 21).

This intertwined structure recalls Derrida’s textuality and theory of language which in turn generate the self-referentiality problem and the reliability of the narrator. As Derrida’s famous quote “there is nothing outside-text” (1967, p.158) indicates, an objective description of outside reality is impossible because language is the only medium connecting the thinking mind and the physical world, but the ground that the language is based on is not stable as there is no transcendental signified or an absolute truth that is linked to the phenomenal world. Structuralist had already accepted the arbitrary relationship between the signifier and signified, but they had never doubted the reliability of language since they had been confident that language effectively describe the physical world (Bertens, 2014, p. 105).

Nonetheless, the same efficient language also produces paradoxes if it self-reflexively comments on itself (Bertens, 2014, p. 105) as in the case of *Strange Loop* of Hofstadter. The problem, therefore, derives from the fact that language is also a part of

the system, and it can only be solved via an outside frame of reference, but there is no alternative medium to use except for language (Bertens, 2014, p. 106). This comprises the core of the self-referentiality problem: “Even language itself is self-referential, that is, it cannot refer to anything outside itself” (Salami, p. 102). Structuralists had never focused on this conundrum and excluded the fact that they are part of the system (Bertens, 2014, p. 106). Their attempt is similar to the mathematicians and positivist who endeavor to formulate a language freed from all contradictions to reach an objective description of reality (Hayles, 1984, p. 38).

Another problem with the language is that it seems quite natural for the language users because it is regarded only as a tool to describe “thought” that is prior to language. Human beings are sure that they are in direct contact with their “presence”, but for Derrida, this metaphysics of presence is nothing more than an illusion (Bertens, 2014, p. 107). He challenged this logocentric idea by claiming that language is not reliable and replaced structuralists’ principle of difference by *différance*, which refers to both differentiation and deferral in meaning-making process (Bertens, 2014, p. 109). Structuralists had proposed that meaning is derived through differentiation, which means that the signifier’s meaning is not related to referents in the outside world but its difference from the other signifiers. However, this language system has no direct connection with the real world. If there was a word that is totally based on an object in the physical world, it would be a fixed or absolute entity in the language. Thus, language would be connected to the real world. Nevertheless, since the realm of language and physical world do not touch each other, an objective view of reality is impossible because the only instrument to get access to the real world is the slippery language (Bertens, 2014, p. 111).

This instability is the result of two factors. First, the meaning depends on the difference between signs. For instance, in a traffic light system, red color means stop because it is not green or yellow. Each color gains its meaning from this system and carries the meaning of other colors, but this context does not fix the meaning. In a different context, the same words can bear a different meaning. For instance, even though red means “stop” in traffic, it symbolizes love when it is used with the word “rose”. As a result, Derrida argues that every word includes the traces of others:

each element appearing on the scene of presence, is related to something other than itself, thereby keeping within itself the mark of the past element, and already letting itself be vitiated by the mark of its relation to the future element (1996, p. 32)

Therefore, the signification process never stops, and words are never stable (Bertens, 2014, p. 109). Not only the preceding words, but also the following words will continue to modify the meaning. In other words, the meaning is always deferred, which is the second factor explaining the instability of language. Derrida calls this two-fold process of meaning-making “différance”, signifying both difference and deferral (Bertens, 2014, p. 109). This way, the relationship between the signifier and signified is not stable anymore as structuralists suggested. The signifier remains the same, but the signified shows inherent instability because the signified of that word refers to another signified in an endless way, which prevents definitive interpretation. The result is that there is no final meaning but just vagueness or “a determinate oscillation between possibilities” (Derrida, 1988, p. 148). The parallelism between the quantum theory and poststructuralism is highlighted through the metaphors used by Derrida to describe textuality, such as “oscillation” and possibilities” because undecidability is an essential part of the subatomic realm as well. While “oscillation” evokes the wave function and dynamism, “possibility” refers to the probabilistic and uncertain nature of the quantum world.

Derrida concludes that the spoken word is inherently contaminated and needs supplementation, but the supplementation found for speech needs further supplementation in an endless way (Derrida quoted in Culler, 2011, p. 12). This is similar to the Wigner’s friend paradox in quantum physics. This thought experiment was developed after the Schrödinger’s cat paradox, which was another thought experiment explaining the observation problem, that is the collapse of the superposition after the measurement. In Schrödinger’s cat experiment, a cat is placed inside a box with a mechanism that has 50% chance of killing the cat. Since the observer can collapse the superposition, or wave function, until the observer opens the box and see whether cat is dead or alive, the cat is in superposition, in other words, it is both dead and alive. In Wigner’s friend paradox, on the other hand, there is another observer measuring the system including both the cat and the first observer, which creates another

superposition. This is an infinite process because there will be one more observer observing the other observer who observes the cat inside the box. Consequently, this experiment implies that there must be an outside perspective to reach a definitive meaning.

This unreliability characterizing language is also closely related to the self-referentiality problem that Hayles remarks. The fact that language is also a part of the system it describes puts certain limits on the description of reality (Hayles, 1984, p. 32). In mathematics, Gödel's Incompleteness Theorem proved the impossibility of formulating a language free from all contradictions (Hayles, 1984, p. 35). As a result of the paradoxes that occur due to the language's ability to refer itself, a mathematical system that is both complete and consistent cannot exist. If the system is consistent after removing the paradoxical statements derived from the self-reflexivity of language, it is not complete as it excludes some of the statements. Likewise, if the system is complete, it will be inconsistent because of including the paradoxes.

This limitation for attaining the objective truth is also intrinsic to quantum theory through Heisenberg's Uncertainty Principle (Hayles, 1984, p. 51). Certain aspects of particles cannot be observed at the same time, such as wave/particle and momentum/position. If the observer tries to measure wave property, for instance, the particle form will be missed, but if the particle form is measured, the wave quality will be neglected. This uncertainty is not because of the insufficient measuring devices, but because it is an inherent quality of the system (Hayles, 1984, p. 51). Since the observer is an indivisible part of the system, there is no objective and outside perspective that can describe the full portrait of reality. On the other hand, language also fails to depict such reality since it is based on subject-object dichotomy. The grammatical structure requires a speaking subject and an object affected by it (Hayles, 1984, p. 53). It also functions in accordance with causality, temporality and spatiality. The cause precedes the effect in a unidirectional flow of time from past to present, and they occur in one location. For this reason, although language is a sufficient device for quotidian reality that operates on causality, absolute space-time and either/or logic, it cannot express the subatomic activity because it violates subject-object division and causality. Moreover, since it can only reflect a certain frame of reference and excludes the others, language works in

either/or fashion.

As mentioned before, the narrator shaped by this new concept of reality can be interpreted as the measuring device in quantum theory and language poststructuralism and Hayles's field concept. Rather than being an independent and isolated medium that the author uses to communicate the events to the reader, the new concept of narrator interferes with the story, and its perspective is neither an outside nor an objective frame of reference. On the contrary, its point of view is a part of the field, so it is unreliable like language. Gödel's Theorem, Halting Problem and Heisenberg's Uncertainty illustrate that when language makes statements about itself, it creates paradoxes that are inherently undecidable. Just like this, narrator's perspective is always inside the text.

In the *Magus*, there are three narrators: Nicholas, Conchis and the omniscient narrator in the last chapters. Nicholas narrates the frame story in which he reconstructs his own life story, and other texts told by other characters are inserted into his narrative. The position of Nicholas as the main narrator is important as he mediates these narratives to the reader. Conchis is the second main narrator whose texts are embedded in Nicholas's narrative, and his words are given in quotation marks. His narratives are both personal accounts and provide a sociocultural portrait of Europe during the World War 2. Finally, the omniscient narrator appears in the last chapter for a brief moment and comments on Nicholas's dilemma about his contingent future with Alison. The common point of all these narrators is that their narratives are "unreliable because they are deeply involved in the action of the story" (Salami, 1992, p. 77). In Hayles's terms, narrators are the inseparable components of the field, so they are interconnected. Furthermore, they also reflect self-referentiality problem since they are the mediating field connecting the other elements in the text including themselves.

The other stories told by other characters constitute a contradictory web of texts including the narratives of June-Julie sisters who has the main role of manipulating Nicholas by seducing him, Lily de Seitas's explanations about the godgame, Mitford's experience of Bourani, Foulke's pamphlets and false letters and newspaper extracts (Salami, 1992, p. 76). The main question is the reliability of these texts and narrators. Rather than forming a meaningful and absolute meaning, they imply multiple truths and impossibility of reading the events from an objective frame of reference.

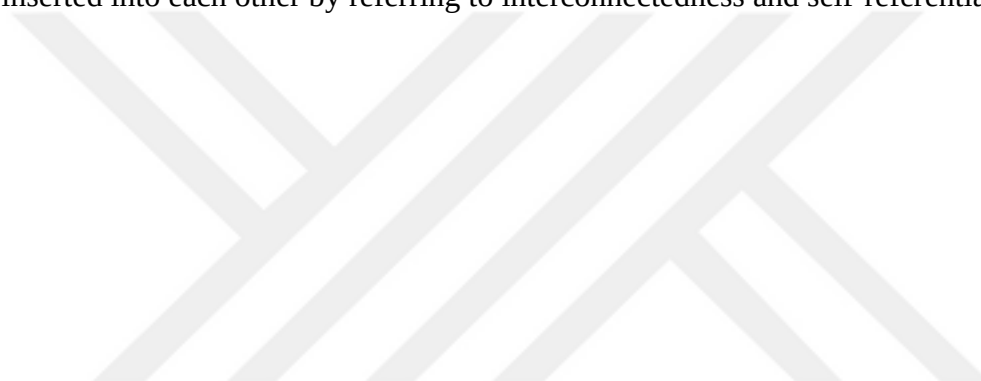
The multiple texts in the novel problematizes the border between fiction and reality (Salami, 1992, p. 77). In this context, it can be argued that these narratives are superpositions or probability waves in the quantum realm. They create an ontological skepticism about the reality because in the wave function, the texts are virtual particles located in a probability cloud, and during the act of reading or measurement, the wave function collapses and only a single particle with a specific location appears. In reading process, the reader stops the flow of meaning and interprets the text in a certain way eliminating other possible interpretations (Bertens, 2014, p. 111).

Both as a narrator and character, Nicholas suspects the objectivity of Conchis because he is more like a novelist producing fiction (Salami, 1992, p. 77). As a character, he questions everything Conchis tells and searches evidence about the events in Bourani. However, as a narrator, Nicholas is also unreliable since he is “deeply involved in the action of the story” (Salami, p. 77). This recalls Hayles’s self-referentiality problem because narrators form a mediating field connecting the characters, events, texts and the reader. However, since they are inside the system as in the case of language, their reliability is under question.

As mentioned earlier, Nicholas is both a reader and the critic of Conchis’s texts (Salami, 1992, p. 77), Nicholas rereads and reconstitutes these narratives and presents them to the reader as a narrator, whereas he is also unreliable since he cannot be detached from the text. Conchis’s position, on the other hand, is more reliable compared to Nicholas because he ironically uses fiction to undermine the reality of it (Salami, 1992, p. 77). He recounts many stories and designs the godgame to manipulate Nicholas’s life, but he does this to show that all reality is fiction, and there is no absolute and stable truth (Salami, 1992, p. 78). Moreover, by presenting the contradictory narratives whose meanings are deferred endlessly, Conchis shows Nicholas the limits of art by using art (Salami, 1992, p. 78). This ironical situation is similar to the use of language to reveal the boundaries of it. Bradbury highlights the role of the artist in this paradox: “It is in this sense that the book is a self-conscious inquiry into its own structure”. (1973, p.270)

In conclusion, this section has analyzed the narrative form of *The Magus: A Revised Version* (1977) by referring to the two basic principles of Hayles’s field theory,

self-referentiality and interconnectedness, and their relation to the postmodern strategies, especially Derrida's notions of textuality and *différance*. The author, narrator, text and reader relationship has been reconceptualized in the light of interconnectedness. The section has also examined the concept of narrator as the mediator of meaning in the text and the three narrators in the novel, Nicholas, Conchis, and the omniscient, and the reliability of their narratives has been problematized within the self-referentiality concept. Another point that has been addressed is the Chinese-box structure of the novel and multiplicity of texts in which the contradictory narratives and discourses are inserted into each other by referring to interconnectedness and self-referentiality.



CHAPTER 3: *THE FRENCH LIEUTENANT'S WOMAN*

3.1. Thematic Analysis: The Exploration of the Field Concept in the Subjectivity of Characters

Thematic analysis section aims to focus on the main concepts of the new physics and their metaphorical reflections on the characters of *The French Lieutenant's Woman* (1969). The first part of the discussion will explore the connection of the main characters of the novel, namely the protagonist Charles, Ernestina, and Sarah to notions promoted by quantum theory. Charles's journey for constructing an identity for himself free from the Victorian norms through Sarah will be interpreted as the transformation of the scientist from classical paradigm to new physics.

In his article which analyzes *The French Lieutenant's Woman* in the light of quantum theory, Jason Smith (1999) argues that the novel “offers a rare opportunity to explore the way that previous and current [scientific] paradigms are enfolded in attempts to define reality” (p. 92). Based on the parallelism Smith draws, the first part of the discussion will focus on the correlation between the subjectivity of Charles and the main principles of the classical paradigm, and the transformation of him after he interacts with the quantum realm, which can be associated with Sarah due to her mysterious and ungraspable nature. As an aristocrat in the Victorian age, “Charles is a character who is dominated by his social conventions” (Salami, 1992, p. 121). In the thematic analysis of *The Magus*, it has been argued that the identity of Nicholas reflects the atomistic perspective of the Newtonian metaphysics. In the same way, it can be claimed that Charles's identity is composed of unchangeable, fixed and stable essence, in other words, atoms. His ancestry, engagement with the upper middle-class lady Ernestina, amateur interest in paleontology, and dedication to Darwin's theory of evolution are atomistic structures that define his reality. The disciplines he is interested in are especially worth considering because of their deterministic and absolutist structure. In some parts of the novel, the narrator directly emphasizes the determinism in Darwinism: “Darwinism, [...] its deepest implications lay in the direction of *determinism* and behaviorism” (emphasis added, p. 114). Similarly, in Chapter 8, when Charles was contemplating on Darwin and Linnaeus, who were two significant figures in the

taxonomy of species, the narrator explicitly describes their determinist attitude towards science:

This principle explains the Linnaean obsession with *classifying* and *naming*, with *fossilizing* the existent. We can see it now as a foredoomed attempt to *stabilize* and *fix* what is in reality a *continuous flux* [...] he knew he was in a labyrinth, but not that it was one whose walls and passages were *eternally changing*. (emphasis added, p. 51)

In italicized expressions, it is possible to observe the basic assumptions of Newtonian physics. *Classifying* and *naming*, for example, are the processes implying the subject and object division because there is a conscious observer (subject) and the objects that are analyzed by this subject, which also contributes to the privileged position of subject over object. These terms also confirm that the thinking mind has the ability to analyze the abstract rules governing the physical world and that language is the proper medium to rationalize and concretize this phenomenal reality (Bertens, 2014, p. 118). In addition, the verbs *stabilize* and *fix* demonstrate the atomistic quality of classical physics because it is based on the premise that matter is composed of indestructible and immutable particles. This extract is also essential in terms of illuminating the contrast between the principles of new physics and classical paradigm through the perspective of the narrator. He uses the words *continuous flow* and *eternally changing* to describe the reality, which are in line with the concepts of quantum physics since they refer to the dynamic and fluid structure of the subatomic realm (Coale, 2012, p. 48).

It is necessary, however, to make a distinction between the narrator and Charles because the former is aware of the paradigm shift in science as Smith (1999) highlights: “the narrator’s sensibilities are post-nuclear and postmodern, which firmly commit him to uncertainty” (Smith, 1999, p. 101). However, Charles still seems to be under the influence of classical approach: “He knew that *nulla species nova* was rubbish; *yet* he saw in the strata an *immensely reassuring orderliness* in existence” (emphasis added, p. 51). With this quotation, it is clearly revealed that Charles acknowledges the implausibility of these theories to some extent, whereas he is loyal to his Newtonian mode of reality that is based on *orderliness*. In fact, both Charles’s and classical physicist’s inclination towards the stability and firmness in their perspective to reality is

based on the psychological comfort that this model offers. This comfort is “the luxury of supposing that a single reality existed, that the human mind had reasonably clear access to it, and that the scientists could explain” (Gleick, 1987, p. 243). In his nonfictional work *The Aristos* (1964), where he recounts his aphorisms about a variety of topics including science, Fowles refers to the traumatic impact of the shift in mind from classical to modern: “We all live in two worlds: the old comfortable man-centered world of absolutes and harsh world of relatives. The latter, the relativity reality, terrifies us; and isolates and dwarfs us all” (1964, p. 39). The narrator emphasizes this *reassurance* Charles feels even though he is aware of the fact that these theories have started to decay.

Moreover, Charles combines his Darwinist worldview with his aristocratic background, which this gives him an additional pride because he believes that he is the fittest by birth (Salami, 1992, p. 124). Since people are born into certain biological and social structures preceding them, their reality is deterministically constructed. In this regard, it can be argued that the narrator’s description of Charles reveals his Newtonian tendencies about the scientist’s arrogance on obtaining objective reality.

Unlit Lyme was the ordinary mass of mankind, most evidently sunk in immemorial sleep; while Charles the naturally selected (the adverb carries both its senses) was pure intellect, walking awake, free as a god, one with the unslumbering stars and understanding all. (p. 142)

In the socially stratified society, Charles is at the top of the hierarchy as he is from the ruling upper class, which ascends him to almost a god-like position (Salami, 1992, p. 124). Not only his aristocratic heritage but also his intellectuality separates him from the vulgar masses. The labels he attaches himself like being a gentleman, scientist, intellect all conform to the classical realm where everything is precisely defined. Also, since the subject and object are divided rigorously in classical metaphysics and since the subject has the ability to describe the physical world (Hayles, 1984, pp. 31-32), it can be claimed that Charles has obeys the Cartesian division of Descartes by positioning himself at the center and place other in the periphery. This categorization inevitably involves a hierarchical order as well, and from this viewpoint, Charles’s superiority mindset can be similar to the scientist’s confidence about their ability to describe the phenomenal world. In other words, Charles’s attitude resembles the pride that the

scientist enjoys at the beginning of the 20th century when they claimed that there is nothing new left to discover in physics, and “the only occupation which will then be left to men of science will be to carry on these measurements to another place of decimals” (Maxwell, 1871, p. 244).

At this point, it can be argued that Charles portrays the classical scientist, just as Fowles’s other existentialist hero Nicholas, and Charles is displeased about his life and identity like Nicholas as he complains about his British middle-class background at the beginning of the story. However, contrary to Nicholas, his feeling of imprisonment seems to be much worse than Nicholas because of his aristocratic inheritance and conservative and rigid Victorian norms. Therefore, it is more difficult for Charles to liberate himself from the roles, conventions and duties that the society imposes. In addition, Charles’s impulse for metamorphosis is slightly different from Nicholas, whose motivation is more rational and common-sensual. Charles tells Ernestina that the missing element in his life is romance and mystery: “I wish you hadn’t told me the sordid facts. That’s the trouble with provincial life. Everyone knows everyone and there is no mystery. No romance” (p. 14). This is the moment that can be interpreted as the trigger for the anomaly that the classical scientist felt during the paradigm shift. Ernestina senses this anomaly and knows that it is out of character, so she responds: “the scientist, the despiser of novels” (p. 14).

Charles’s absolutist approach can be the reflection of Fowles’s criticism of mechanical science. In *The Aristos* (1964), he criticizes the mechanical, positivist and common-sensual mindset of the Newtonian scientists who were influenced heavily by the Western metaphysical tradition, and he also demonstrates their hostile stance against the romantic and irrational perspective of fiction. In this comparison, Fowles (1964) privileges art over science since “Science is what a machine can or might do; art is what it will never do” (p. 145). The same idea was voiced by Hayles when she compares the metaphors of 19th century science to 18th century clockwork universe model and new physics in the 20th century. She argues that the mechanical view of rationalists was challenged by the Romanticist because they imagined the universe as a living organism, rather than a clock with detachable parts. (p. 17) They consider that the whole should be more than the sum of its parts because “if the world is a dynamic, living whole, it cannot

be entirely understood through reason alone. The mysterious essence of life requires for its understanding the sympathetic imagination” (Hayles, p. 17).

Fowles indirectly refers to this living force in universe and connects it to art as it is created through imagination as well, so he asserts that art is “a complex beyond science. It computes all the computers” (1964, p. 144). He disapproves scientists’ endeavor to rationalize art by saying, “This scientization of art, so characteristic of our age, is absurd” because it destroys “the inmost characteristic of art –mystery. For what good science tries to eliminate, good art seek to provoke –mystery, which is lethal to the one, and vital to the other” (1964, p. 145). The importance attached to the mystery element, its connection to art as an imaginary response to the reality concept are emphasized through the transformation of Charles from a classical scientist to a modern one by means of his quest of romance. Fowles despises classical scientists as he does not regard them “true scientists, [...] but technologists, or analytical appliers of it” (p. 147).

Instead, Fowles advocates dynamism in the nature by rejecting the solid and absolute classification, and any attempt to capture, name or fixate nature is “collecting them, attempting to own them” (1979, p. 34). In short, Fowles defends the idea that nature cannot be “disanimated, unsouled, by the manner in which we try to own it. When it is owned, it disappears” (1964, p. 90). This idea parallels Hayles’s analogy between the 19th century Romanticism’s emphasis on world as living organism and the 20th century metaphor of cosmic dance (Hayles, 1984, p. 17). Similar to Fowles’s statement, if nature is owned or stopped, it loses “the dynamic essence of the dance, for the static "patterns" never in fact existed as discrete entities” (Hayles, p. 20). This is also related to the problem of observation. The wave function collapses if the observer measures the system, and this way, superposition and probability cloud that contain all the possible configurations disappear, which shows only a single truth out of infinite possibilities (Coale, 2012, p. 19). Eventually, it can be concluded that Fowles leads his protagonists to get their freedom by rejecting the status quo whose implications are represented by the classical paradigm. It is also interesting that he initially constructs his main characters as rational and common-sensual, and they are in line with the classical scientist in this sense. However, after they encounter a new form of reality, which are generally represented by women figures, their metamorphosis starts, and they are forced

to discover the contingent, probabilistic and uncertain realm of quantum.

Charles is no longer satisfied with the predictability of the phenomena in the physical world, and this is best epitomized in his relationship with Ernestina (Salami, 1992, p. 121) who can be the symbol of the conventions of the classical paradigm. To appease this desire for fantasy and mystery, he constantly travels to exotic places, but after a certain time, “travelling no longer attract[s] him; but women [do]” (p. 74). His travels are an escape mechanism (Salami, 1992, p. 121), which resembles Nicholas’s case as he travels to Greece and enters into an alternative reality, which has been interpreted in the thematic analysis of *The Magus* as a metaphor for the quantum world. This can be read as a transition for Charles from classical Victorian setting into the spontaneous, random and unpredictable realm of the quantum physics. The person who seduced him to discover this new land is Sarah, who can be the representation of the quirky activities in the subatomic world.

Within this context, it is useful to contrast Ernestina and Sarah because it can be argued that these two women display the dichotomy between the classical and quantum and the dilemma of Charles who is torn between these two contradictory worldviews. Ernestina can be the representation of the principles of the classical realm due to her loyalty to order and convention. She is a “subjected being” with “her apparent total obedience to the great god Man” (p. 27). She is a traditional girl who knows her familial and feminine duties including the housework and childcare. Her behavior is restricted by the society in such a way that she is quite predictable. (Salami, 1992, p. 121). For this reason, it can be claimed that the certain, immutable and absolute rules of the Victorian society and puritanical morality draw the borders for her actions. Her submission to patriarchal system recalls man’s fantasy about taming and dominating nature (Salami, 1992, p. 131), so “to a man like Charles she proved irresistible” (p. 27). As mentioned earlier, Charles can be the embodiment of the Newtonian scientist who is confident that his rational mind can discover the absolute truth of the nature. Since nature and women are closely related entities, the classical scientist’s passion of controlling nature is analogous to man’s ambition to confine women to domestic context. In this sense, Ernestina is a perfect match for fulfilling Charles’s masculine fantasies.

It can be further argued that in addition to her stable and fixed role as a domestic

woman, her social status is also a significant component of her atomized subjectivity. Her class consciousness as an upper-middle class lady is what brings her and Charles together since he is the means that will help her family to climb the social ladder (Salami, 1992, p. 124). After learning Charles's loss of inheritance of Winsyatt, she scornfully says: "It's quite impossible that I should marry a mere commoner" (p. 227). The narrator explains her obedience to the expectations of her class as, "She cannot be blamed, of course; she had been hopelessly well trained to view society as so many rungs on a ladder; thus reducing her own to a mere step to something supposedly better" (p. 219). This reveals how people who are far from questioning their own identity and the society they are born into are deterministically shaped by the constructions preceding their existence. As a result, it can be deduced that the categories of class and gender and the social roles assigned to them reflect the rigid order and hierarchy that the atomistic perspective creates, which is a natural result of subject-object division. Furthermore, since they are absolute and fixed rules, it is really difficult to replace them with new concepts.

Although at first Ernestina is a woman Charles wishes to marry, "he began to feel sorry for himself—a brilliant man trapped" (p. 114). He gets tired of the predictability of her as she is "too conventional" and "only a woman. There were so many things she must never understand: the richness of male life, the enormous difficulty of being one to whom the world was rather more than dress and home and children" (p. 114). Nonetheless, it can be argued that after meeting Sarah, he decides to abandon this world of absolutes symbolized by Ernestina and his mundane relationship with her and explore the strange, spontaneous, chaotic, unstable, ungraspable, unknowable and uncertain quantum realm personified by Sarah.

Contrary to Ernestina, as Salami (1992) notes, Sarah's subjectivity is quite complex and undecidable because she resists all types of description, categorization and definition: "She seems a plural text with no singular meaning" (p. 127). Her identity is such an enigma that even she cannot comprehend it: "I am not to be understood even by myself" (p. 386). Rather than conforming to the norms of the society, she rejects the traditional gender roles (Salami, 1992, p. 131), which confine women to an inferior context by reducing them to be only a wife and mother and the institutions marriage and

religion whose function is to restrict and control the sexual activity of women via so-called virtues like chastity and virginity and secure these values through wedlock. She intentionally produces a false story that ruins her reputation as a single woman, and everyone knows her as “poor tragedy...The French Lieutenant’s...Woman” (p. 12) because they think that Sarah had an improper affair with a French lieutenant but dumped by him, but it is actually her construction so that she can gain her existential freedom by being an outcast. Therefore, she is proud to say “I am the French Lieutenant’s Whore” (p. 153).

In this respect, it can be claimed that Sarah challenges the atomized essence and the universal rules that are the building blocks of the classical reality. Just as the assumption that matter composed of discrete, detachable and stable parts was challenged by the implications of new physics (Nadeau, 1981, p. 11), Sarah also rejects any label, including gender, class or any role assigned to her by the society that are an attempt to define and categorize her (Salami, 1992, p. 126). The idea that universe is like a clock operating on certain and fixed mathematical and geometrical laws diminished after the probabilistic and relativistic aspects of the physical phenomena that were discovered through Post-Einsteinian physics (Coale, 2012, pp. 196-197). In a similar fashion, Sarah does not fit the Victorian society and the norms they impose.

Another aspect of her subjectivity that makes her a symbol of the subatomic realm can be her undecidability. Neither Charles nor the narrator can describe her as she portrays a murky, obscure and quirky reality as if she is not a real person, but only a metaphor (Salami, 1992, p. 127). For Charles, Sarah is a “living memorial to the drowned, a figure from myth” (p. 9). She is tried to be “constructed from a male perspective” (Salami, 1992, p. 127), which is also parallel to the viewpoint of classical paradigm, but since she does not fit any form of classification or analysis, her identity becomes a mystery that is impossible to solve. On the other hand, this is what makes her attractive for Charles, who has been interpreted as the representation of the classical physicist. For him, she is “remarkable young woman. And baffling. He decided that that was—had been, rather— her attraction: her unpredictability” (p. 165). For the scientists, quantum realm is also impenetrable, and when they attempt to measure the system to reveal its secret, its dynamism disappears, which means that it never allows any

conscious mind to conceive its working mechanism (Coale, 2012, p. 2).

Doherty relates her ambiguous character to the notion of textuality, being composed not of a single meaning, but plural texts. She is “an explosive proliferation of names” (Doherty, 1987, p. 53). In this context, the plural texts that create a web of signs referring to each other can be related to Hayles’s interconnectedness principle that she uses to describe the field model of reality. Rather than individual parts, the components of the system are in a constant and dynamic relationship, so even the metaphor she uses is a “cosmic dance” (Hayles, 1984, p. 15). As in the case of textuality and interconnectedness, Sarah’s subjectivity is the combination of different and even contradicting elements. During the meeting of Charles and Sarah in Exeter, for instance, the narrator admits that she can be “described only by *oxymoron*; *luring-receding*, *subtle-simple*, *proud-begging*, *defending-accusing*” (emphasis added, p. 296). Her paradoxical features resemble the complementary aspects of subatomic particles. For example, the fact that light is both a particle and wave, which are mutually exclusive properties, is quite confusing for human mind because as Carter argues, “human beings live in a world of processes, not of watertight distinctions between big and small, self and world, mind and matter” (Carter, 1989, p. 181). Both the scientist and the narrator have difficulty in describing this dual nature of subatomic particles. More importantly, a scientist who accepts the intriguing implications of the quantum realm is aware of inherent limits on measuring and describing the activities there (Hayles, 1984, p. 20). Correspondingly, the narrator reveals his inability to probe her inner self: “Who is Sarah? Out of what shadows does she come? [...] I don’t know” (p. 85). In fact, the narrator refuses to unveil her consciousness: “And I no more intend to find out what was going on in her mind” (p. 243). It can be concluded from this quote that although he is capable of disclosing Sarah’s reality, he denies this because he knows that there are certain limits on the description of reality. This theme will be fully explained in the structural analysis section where the narrative techniques of the novel are discussed.

Not only the narrator, but also Charles experiences a similar confusion about Sarah’s subjectivity: “all mystery and *love and profundity*, and the other a *half-scheming, half-crazed* governess from an obscure seaside town. He even saw himself coming upon her again—and seeing nothing in her but his own folly and delusion”

(emphasis added, p. 367). Since she incorporates these conflicting texts into her identity, Charles cannot separate fact from fantasy: “he became increasingly unsure of the frontier between the real Sarah and the Sarah he had created in so many such dreams” (p. 367). Sarah’s undecidability eliminates subject-object dichotomy in Charles Cartesian mind because he is not sure whether Sarah is a real entity in the physical world or a phantasm in his subjective reality.

After their sexual contact, through Sarah’s mysterious but inaccessible subjectivity, Charles is transferred into the quantum realm: “What he saw now was like a glimpse of another world: a new reality, a new causality, a new creation” (p 316). What can be understood from this quotation is that Fowles “emphasizes the unavailability of the quantum to quotidian reality”. (Wright, 1996, p. 228) The rules in the subatomic realm are quite different from the everyday reality which works according to the Newtonian physics. The reality in this new world is not causal, certain, deterministic, or predictable, but it is rather probabilistic, virtual, uncertain and random. Virtual particles which are in superposition suddenly appear and disappear in seconds, so it impossible to capture, measure and trace the motion of particles. Because they are ungraspable, they are more like metaphors rather than real entities:

Each particle leaves its own vapor trail in cloud chambers. We can trace the trail but never see the object. So then “electrons” and “protons” and “neutrons” are all *metaphors*, images that we’ve created as if we had really seen them. (emphasis added, Coale, p. 6)

Sarah’s existence creates a similar impression on Charles: “Indeed it was hardly Sarah he now thought of—she was merely the symbol around which had accreted all his lost possibilities, his extinct freedoms” (p. 288). Sarah is not only a woman for him, but she also metaphorically represents emancipation from all restrictions of the society since she presents a new reality where the strict universal laws of the classical paradigm do not work. The reality here is an indivisible whole in which contradictory element exist together, and the interactions are not causal but simultaneous.

The fact that Charles cannot fathom Sarah’s individuality split his subjectivity because of his contradictory desires (Salami, 1992, p. 122). He wants to conquer the nature as a scientist and women as a man as it a battle “about possession and territory” (p. 387), but he simultaneously wishes to continue his quest for solving the mystery of

these two. His agony is the result of his irreconcilable and mutually exclusive ambitions. While he loves Ernestina's submissiveness, he also aspires Sarah resisting all the conventions of the society. However, if Sarah was predictable and knowable like Ernestina, he would not desire her because he is after the romantic notion of mystery. Charles's case is in fact hopeless and resembles the dilemma of the quantum physicist because there are certain complementary qualities that cannot be observed at the same time, such as wave/particle or position/momentum. This refers to ultimate limits of describing the reality.

To conclude, this section has examined the main concepts of the new physics and their metaphorical reflections on the characters of *The French Lieutenant's Woman* (1969). It has been found that Charles is the symbol of the classical physicist who is confined to the borders of the absolute universal laws of Newtonian paradigm. It has also been shown that his fiancée Ernestina is the representation of the classical realm. Sarah, on the other hand, has been interpreted as the metaphor for the mysterious and unattainable quantum realm. Charles's journey of forming his subjectivity free from the Victorian norms through Sarah has been regarded as a reference for the transformation of the scientist from classical paradigm to new physics.

3.2. Structural Analysis: Reconceptualization of Narrative Strategies through the Field Concept

In this section, the narrative strategies of *The French Lieutenant's Woman* (1969) will be analyzed in the light of the field model. The metafictional aspects of the novel, which is especially emphasized through the self-conscious narrator persona, will be examined in relation to the self-referentiality problem proposed by Hayles. This section will also examine the connection of the field model to the postmodern narrative techniques that violate the hierarchy of discourses and linear plot.

At the beginning of the novel, the narrator acts as if he is a conventional Victorian narrator who creates the illusion of mimesis, in other words, he makes the reader think that the story and the characters inside it are real, but in Chapter 13, he reveals that it is just fiction:

This story I am telling is all imagination. These characters I create never existed outside my own mind. If I have pretended until now to know my characters' minds and innermost thoughts, it is because I am writing in (just as I have assumed some of the vocabulary and "voice" of) a convention universally accepted at the time of my story: that the novelist stands next to God. He may not know all, yet he tries to pretend that he does. (p. 85)

To understand the motives of the narrator for creating and undermining this illusion, it is useful to contrast the conventional and contemporary literary trends. As mentioned earlier in the theoretical background section, the classic realist novel takes its roots from the philosophical implications of the Newtonian science (Strehle, 1992, p. 15). As early as the ancient Greece period, philosophers advocated the premise that there is a phenomenal world because the mind cannot imagine something that does not exist (Nadeau, 1981, p. 22). Furthermore, Western metaphysical tradition trusts, in Derrida's words, "the metaphysics of presence", which suggests that there is an authentic self that is not affected by the outside world, and language is a useful medium that connects the subject to the physical reality (as cited in Bertens, 2014, p. 112). After Descartes's Cartesian theory consolidated this division of subject and object, the idea that thinking mind can analyze the physical world by using deductive and inductive reasoning constituted one of the most fundamental principles of rationalism and realism, which prevailed until the 20th century (Nadeau, 1981, p. 31). The logical result of these

theories is the assumption that there is an objective reality outside the mind, and mathematical formulations can decode the universal laws governing the universe.

Because of the deep-seated belief in the existence of objective reality, early novelists considered that novel can provide an “objective representation of the world of everyday reality and all those who inhabit it” (Watt, 1957, p.80). As the narrator explicitly indicates, he writes in classic realist form, in other words, in “a convention universally accepted at the time of [his] story: that the novelist stands next to God” (p.85). As discussed in the structural analysis of *the Magus*, the classic author is the supreme authority in the text who creates and anchors the meaning, so it has been indicated that it is like God creating the universe and setting its static and mechanical laws. Nonetheless, after the subject-object border is transgressed through the implications of quantum and relativity and postmodern rejection of the hierarchy of discourses, Barthes proclaimed “the death of the author” (1968) as the narrator also affirms: “I live in the age of Alain Robbe-Grillet and Roland Barthes; if this is a novel, it cannot be a novel in the modern sense of the word” (p. 85). Since the narrator attempts to create the illusion of a Victorian novel, he needs to deploy the conventions of the classic novel, but the fact that he self-consciously reveals the fictionality of the story and that he is writing in a modern age simultaneously undermines the convention of the genre he chooses and breaks the mimetic illusion (Salami, 1992, p. 116). For this reason, it can be concluded that this style poses serious questions about the nature of reality and its objective representation in fiction, which constitutes one of the central problems in both the postmodern fiction and scientific models.

As Auerbach argues, the reality that is represented in fiction is “incomplete, consciously simplified, superficial, [and] a pleasantly stylized reality” (1974, p. 411). It can be argued that the idea of mimetic representation is very similar to classical conceptualization of the physical world because the orderly universe working through some mathematical laws represents just a small section of reality as the Newtonian rules operate only in the macroworld but not in subatomic realm (Coale, 2012, p. 63). On the other hand, poststructuralism and self-referentiality concept of Hayles premise that since the perception is shaped by the limits of language, human mind can only process the reality that it can reflect (Hayles, 1984, p. 41). Therefore, it can be concluded that

language can allow a “stylized reality”, which means that a full description of reality is impossible because it works in either/or fashion and causality. Hayles epitomizes this incomplete picture of reality through Heisenberg’s Uncertainty Principle: “because of the Uncertainty Relation, this viewpoint will always result in an incomplete and partial description” (Hayles, p. 53). Gödel’s Incompleteness Theorem also emphasizes the impossibility of obtaining consistency and completeness simultaneously because “if they are not inconsistent, then they will be incomplete, in the sense that they will contain statement which cannot be proven to be true under their axioms” (Hayles, 1984, p. 35)

Not only the new scientific theories, but also the postmodern approaches radically question whether it is possible to represent reality (Oppermann, 2015, p. 91). Considering also the fact that *The French Lieutenant’s Woman* is a historical novel problematizing the distinction between historical facts and fiction (Salami, 1992, p. 108), it is essential to compare the self-referentiality problem Hayles proposes and Linda Hutcheon’s (1988) notion of “historiographic metafiction”. Hutcheon defines this narrative mode as “novels which are both intensely self-reflexive and yet paradoxically also lay claim to historical events and personages” (p. 5). Her theory is based on the assumption that both history and fiction are constructed by the human mind, so they must be considered as texts, rather than absolute truth or the representation of this absolute truth:

They have both been seen to drive their force more from verisimilitude than from any objective truth; they are both identified as linguistic constructs, highly conventionalized in their narrative forms, and not at all transparent either in terms of language or structure; and they appear to be equally intertextual, deploying the texts of the past within their own complex textuality. (p. 105)

As Hutcheon (1988) stated in the passage above, historical accounts are not texts that are objectively recorded, but rather they are constructed through its writer’s careful selection of discourses. However, this does not mean that the writer intentionally manipulates the objective facts. The problem is that such an objective truth cannot exist because it necessitates an outside perspective, which is impossible because of the inherent limitations of language, which recalls Derrida’s concept of *différance* and self-referentiality. As relativity and quantum theories implied, reality is composed of fragmented points of view that cannot be obtained simultaneously due to the causal and

linear structure of the language (Hayles, 1984, p. 59), and since all the vantage points are inside the borders of language (Hayles, 1984, p. 34), everything is inside the text, in Derrida's words, there is nothing outside-text (1967, p.158). Languages or structures, on the other hand, are unreliable because the meaning-making process is characterized by *différance* (Bertens, 2014, p. 108). The meaning is produced through a never-ending deferral process, so the text is "always unfolding just ahead of the interpreter, unrolling in front of him or her like a never-ending carpet whose final edge never reveals itself" (Hawthorn, 1998, p. 39). This way, it can be concluded that history is also a construction because it is also inside the web of signs, so the meaning is derived from the field rather than an objective or absolute truth. This contributes to the idea that history is a text, so it cannot represent an outside reality, which makes the mimetic representation of historical facts impossible.

Salami (1992) compares the classic realism's narrative technique to The French Lieutenant's Woman, and he argues that "it articulates a formidable modern critique of the former's hierarchy of discourses...Fowles has strongly problematized this principle through using and abusing, locating and dislocating, and ultimately installing and subverting it" (p. 21). An important device for undermining the hierarchy of discourses in the novel is the narrator because he rejects "the omnipresent, omnipotent Victorian [novelist] god who dominates every text in his narrative" (Salami, 1992, p. 118). The following commentary that the narrator suggests about the authority of the writer is essential: "The novelist is still a god, since he creates...what has changed is that we are no longer the gods of the Victorian image, omniscient and decreeing; but in the new theological image, with freedom our first principle, not authority" (p. 86). The narrator, thus, gives freedom to both the characters and the reader. In other words, he advocates "the freedom that allows other freedoms to exist" (p. 86).

When it comes to the characters, the narrator intentionally refuses to describe the inner motives, future actions of the characters, he does not try to control their behavior. For instance, he describes Charles's meeting with Sarah as follows: "But whether it was because she slipped, or he held her arm, or the colder air, *I don't know*, but her skin had a vigour, a pink bloom, that suited admirably the wild shyness of her demeanour" (p. 104, emphasis added). The narrator "claims that he does not know the reality of the

inner lives of his characters” (Salami, 1992, p. 21). In a similar manner, he admits that he does not know the inner world of Sarah: “Who is Sarah? Out of what shadows does she come?... *I don't know*” (p. 85, emphasis added). Another example is the narrator’s rejection of controlling his characters’ behavior. In Chapter 13, he says: “When Charles left Sarah on her cliff edge, I ordered him to walk straight back to Lyme Regis. But he did not; he gratuitously turned and went down to the Dairy” (p. 86). He further explains his intention: “the idea seemed to me to come clearly from Charles, not myself. It is not only that he has begun to gain an autonomy; I must respect it, and disrespect all my quasi-divine plans for him” (p. 86). Moreover, the narrator does not have an absolutist approach about their characters’ future actions. By providing two alternative endings for both Sarah and Charles, the narrator shows that these characters have freedom to choose between different actions, which can change the course of the event. In one ending, Charles rejects being friends with Sarah and leaves, but in the other, they are reunited. A slight change in Sarah’s attitude turns the plot upside down.

The examples given above have demonstrated how the narrator violated the hierarchy of discourses by rejecting any single, totalized truth. This can be linked to the self-referentiality problem in the field model and the concept of textuality because they are based on the assumption that there are certain limits on the description of reality due to the structure of language. While poststructuralism explains the unreliability of language through the concept of *différance*, self-referentiality principle of Hayles focuses on the language problems that emerge in physical and mathematical theories, especially, Gödel’s Incompleteness Theorem and Uncertainty Principle in quantum theory. In fact, poststructuralism can be related both to interconnectedness and self-referentiality. Interconnectedness is based on the idea that the universe is composed of interlocking parts rather than isolated and discrete units. This is similar to textuality which is based on difference principle because textuality suggests that the linguistic signs derive their meaning from their difference from the other signs in the system. The concept of *différance*, on the other hand, can be associated with self-referentiality because “meaning is never captured but always deferred” (Salami, 1992, pp. 26-27). Thus, reaching a single and final truth is impossible, which is quite similar to the description problem of the field model. The language works in either-or fashion, and it

only allows causal and linear connections. As a result, language cannot describe, for instance, Uncertainty Principle since wave and particle state of a subatomic particle are mutually exclusive. Additionally, the observer cannot measure position and momentum simultaneously, which proves the limits of sequential analysis. The same problem is observed in Gödel's Incompleteness Theorem through Strange Loops, which create paradoxical statements because language is inside the system.

Another point that should be addressed about the hierarchy of discourse is that the narrator of the French Lieutenant's Woman gives freedom not only to the characters, but also to the reader. Salami (1992) argues that "Indeed having known the 'reality' of the characters more than the narrator, the reader...becomes the producer of meanings in this non-hierarchical narrative" (pp. 21-22). By presenting two alternative endings for the reader, the narrator wants the reader to participate in the creation of meaning. This can be linked to Barthes's "death of the author" concept in which "the reader becomes more important than the author, whose authority and domination is irretrievably overthrown" (Salami, 1992, p. 33). Since the text is autonomous and does not allow its author to anchor a final signified, the reader produces meaning during the act of reading. This, in turn, can be linked to the interconnectedness principle. Hayles (1984) argues that the paradigm shift in science destroyed the Cartesian subject-object dichotomy because quantum theory demonstrated that the observer is an active agent in the creation of reality. Unlike the Newtonian paradigm in which the observer, object and measuring device are independent systems, in quantum physics, these systems are entangled. For this reason, the participation of the observer changes the reality that is observed.

It has been indicated earlier that the narrator does not know the inner lives of the characters. Salami (1992) argues that "The reader thus chooses between the *outer* and the *inner* lives of the characters" (p. 21). In this context, it can be argued that the two options that the narrator offers shows the limits of description that Hayles (1984) highlights in her field model. Complementary aspects, such as particle-wave or position-momentum are mutually exclusive, so it is possible to observe only one of these states. The position of the reader here resembles the quantum observer: "What Fowles achieves, then, is to put the reader (though no doubt an Ideal Reader) into the position of Ultimate Observer" (Smith, 1999, pp. 102-103) The narrator provides two mutually

exclusive options, inner or outer description, and the reader chooses between them. It should also be noted here that one of the complementary pairs cannot be directly observed. If the observer wants to measure the wave function, it collapses, so the decision of not observing preserves the wave property of the subatomic realm. Similarly, the narrator cannot describe the inner lives of the characters because they are ungraspable like the wave property.

The last narrative technique violating the conventions of the classical novel is the subversion of the linear plot. According to Salami (1992):

In the classic realist text the discourses are arranged in a linear disposition. But Fowles's novels demonstrate no such linearity, and instead they offer a horizontal movement generated by a multiplicity of texts...But in the...horizontal narrative, the movement of discourses is not historical or vertical; it is *circular, coextensive, and coterminous* in a manner where texts *march together, collide, then rebound* to advance again along the same front. (p. 22, emphasis added)

Salami (1992) further indicates that “Unlike the classic realist text, the modernist text is no longer interested in the traditional cause and effect sequence of events, neither in narrative closure, nor in resolving plots (p. 23). Based on Salami's observations above, it is possible to draw some analogies between the postmodern narrative strategies and the field concept of Hayles. While Hayles explains why language is not a proper medium to describe the dynamism of the quantum universe, she refers to the problems caused by the linearity of language that moves from cause to effect (Hayles, 1984, p. 19). In the quantum realm, “every cause is simultaneously an effect, and every effect is also a cause”. (Hayles, 1984, p. 20), so language based on linearity and causality fails to describe the new reality proposed by the new physics.

As a result of the developments in new physics, namely quantum and relativity theories, it was understood that the astronomic and subatomic systems do not operate on causality and linearity of the Newtonian perspective. However, the working mechanism of the language remains the same. In this structure, “time was handled as though it consisted of a succession of universal moments, there was never any ambiguity about the order of events. Hence causality could be unidirectional and absolute” (Hayles, 1984, p. 42). Because poststructuralism and postmodernism radically question the reliability of language, modern novel also questions the linear plot structure.

According to Salami (1992), “The French Lieutenant’s Woman certainly undermines the linear movement of texts by constant intrusion of the modern narrator into his Victorian narratives and by his provision of three alternative endings” (p. 22). Smith (1999) directly connects the non-linear plot to quantum theory’s violation of causality: “Fowles constructs in his narrative a split time line - based upon popular quantum mechanics - that results in two outcomes to two very different series of events rather than two outcomes to the same series of events” (p. 92). The concrete examples of the violation of the linear time in the novel are the intrusion of the narrator as a character and the moment he shows two alternative ending by reversing the time using his watch. The modern narrator living in “the age of Alain Robbe-Grillet and Roland Barthes” (p. 8) breaks the causal and chronological sequence of history and enters the Victorian setting as a character. In fact, the narrator explicitly refers to the relativistic time: “Time was the great fallacy; existence was without history, was always now, was always this being caught in the same fiendish machine” (p. 179). As a result, these narrative techniques have much in common with the metaphysics of the new physics.

To conclude, in this section, the narrative strategies of the novel have been analyzed in the light of the field model. The metafictional aspects of the novel, which is especially emphasized through the self-conscious narrator persona, has been examined in relation to the self-referentiality problem proposed by Hayles, which reveals the inherent limits on the description of reality because the language that is used to describe the system is also an indivisible part of it. This section has also found that the two other important aspects of the classic realist novel, namely hierarchy of discourses and linear plot are violated by the self-conscious narrator and that this postmodern strategy is closely linked to Hayles’s field concept, characterized by interconnectedness and self-referentiality.

CONCLUSION

The concept of reality altered in a revolutionary way after the paradigm shift in science at the beginning of the 20th century. The philosophical implications of the quantum and relativity theories undermined the basic assumptions of the preceding Newtonian paradigm. This transformation of thought, however, exceeded the limits of science and shaped the intellectual climate of the period. In fields as various as physics, mathematics, computing, philosophy of science, linguistics and literature, the atomistic perspective of the classical mindset was replaced with the dynamic and interacting field concept. While Newtonian worldview is based on stable, detachable and discrete components, subject-object division, causality, determinism and absolute space and time, the field concept describes reality as an indivisible whole composed of interlocking parts. Hayles identifies two important principles of this field model of reality: interconnectedness and self-referentiality.

The classical paradigm is fundamentally based on a strict division of subject and object, so the conscious mind of the observer is detached from physical events and objects, which are also discrete entities. Therefore, the subject is not involved in the phenomena but just describes them in an objective way. Moreover, the underlying principles governing the universe are rational and causal, and mind can easily comprehend these common-sensual laws because the medium it uses, language, also operates according to subject-object dichotomy, causality and absolute spacetime. However, Hayles's interconnectedness disapproves this atomistic perspective. Quantum and relativity theories demonstrated that an objective frame of reference describing the physical events is not possible as the time is relative, and the observer is an active participant in creating the reality. Additionally, mutually exclusive aspects of the subatomic particles can coexist, which violates the law of excluded middle. Thus, reality is no longer composed of isolated, indivisible, indestructible and fixed components, it is rather probabilistic, undecidable, dynamic, fluid and ungraspable. The metaphor for describing this new reality can be a cosmic web in which all the components are interrelated including the observer.

The self-referentiality, on the other hand, refers to the impossibility of describing such a dynamic form of reality. Linear, causal and sequential analysis characterizes the

working mechanism of language, and it also works in either/or fashion. On the contrary, in quantum realm, a cause can be an effect, and an effect can be a cause simultaneously, and Heisenberg's Uncertainty Principle reveals that complementary properties of subatomic particles cannot be measured with equal precision. This means that there are certain limits on the description of reality. The main reason of this is the fact that the medium of description, language, is also a part of the system, and when it makes statements about itself, paradoxes or Strange Loops that are inherently undecidable occur. This limitation problem was observed in mathematics and computing as well. Gödel proposed through his Incompleteness Theorem that mathematical systems cannot be both complete and consistent. Since they include self-referential statements violating the consistency of the system, excluding these inconsistencies will make system incomplete, which produces a similar result to the one in the Uncertainty Principle. The Halting Problem similarly indicates that a computer program to decide whether another program will stop or run forever cannot exist because that program will loop if it attempts to repeat the process for itself. The self-referentiality problem, then, is not due to the inadequacy of the measuring devices but rather intrinsic to the reality.

Since the poststructuralist theories also underscore the slippery nature of language by focusing on the paradoxes it produces, this thesis has examined the postmodern narrative strategies in *The Magus* and *The French Lieutenant's Woman* from a broader perspective by combining Derrida's *différance* and Hayles's self-referentiality principle in the structural analysis sections of these novels. Poststructuralism presumes that language is a system consisting of the differential connections between the signs, and these are not naturally linked to the outside world, which makes language an arbitrary sign system. Because the meaning is produced through processes of difference and deferral, signification process never ends as each sign refers to the other in an endless way. The only medium that links the conscious mind to the physical world is language, but it is unreliable, which makes reaching the absolute truth impossible. This is the inherent limit that Hayles's self-referentiality problem addresses in the field model of reality.

This thesis has demonstrated that the narrative strategies of the two novels successfully deploy the principles of interconnectedness and self-referentiality proposed

by Hayles. In *The Magus*, the relationship between the author, text and reader have been reestablished by combining Roland Barthes's "death of the author" concept and Derrida's "deconstruction" and "textuality" with interconnectedness. Conventional literary theory builds a hierarchical relationship between the author and the reader as the former is the creator, and the latter is the passive consumer, which is in line with the Western metaphysical tradition since it separates the subject from the object and privileges it over nature. Nonetheless, after the advances in physics replaced the implications of the previous paradigm, the border between subject and object blurred, which initiated the skepticism towards all types of hierarchies including the one between the author and the reader. There is a parallelism marking Barthes's proclamation of the author's death, Derrida's deconstruction of binary oppositions and the active role of the observer in new physics. Moreover, text gained an autonomous position rather than being just an object since the meaning is produced during the reading process, which highlights the role of the observer in the creation of reality as can be seen in quantum experiments.

Another important connection between postmodern narrative and the field concept have been built through narrators. Just as the language is the medium of description, so the narrator is the mediator of meaning in a text. Therefore, the reliability of the narrators is seriously questioned because of the self-referentiality problem. The narrators in the novel are also the characters, so they are deeply involved in the narratives they recount. The fact that language is the part of the system it describes creates paradoxes and Strange Loops according to the field concept, and it is also the main concern of poststructuralists as they regard language as a slippery medium.

Finally, the Chinese-box structure of the novel and the multiple contradictory narratives embedded in the text refer to both self-referentiality and interconnectedness because these cannot be analyzed in isolation. Their meanings are derived from the other texts rather than reaching a transcendental signified with an absolute meaning. Fowles wants the reader to trace the signs and create the codes of meaning temporarily, but he simultaneously undermines this because the attempt to reach a single truth is futile because the meaning is constantly deferred. This instability of the text recalls self-referentiality problem because it is based on the idea that logical and sequential analysis

is impossible due to inclusion of language to the system.

This study has also illustrated the same concepts of the field model in the structural analysis of *The French Lieutenant's Woman*. The metafictional qualities of the novel are reflected by a self-conscious narrator, and this represents the principles of interconnectedness and self-referentiality. What connects metafiction to the field concept is the fact that the self-reflexive structure of the language prevents the objective description of reality, which makes the mimetic representation only an illusion. Furthermore, there is no objective vantage point to describe the reality since the observer is always an integral part of the system. The intrusion of the narrator and the revelation that the story he tells is a fiction are means to break suspension of disbelief or the mimetic illusion. The two alternative endings, on the other hand, correspond to the act of observation in quantum physics. The text which is in superposition collapses until the reader chooses one of the alternating endings.

In addition to the concepts of the field model what have been explained in detail in the structural analyses, the thematic analyses of the concerning novels have explored the metaphorical representations of the paradigm shift in science and its basic assumptions and principles. With its characters, plot and setting, *The Magus* symbolizes the transformation in the scientific inquiry that is a switch from the common-sensual Newtonian physics to the quirky realm of the quantum theory. The plot symbolizes the journey of the protagonist Nicholas from the classical assumptions about the reality to the uncertain and unpredictable implications promoted by the new physics. Nicholas symbolizes the Newtonian scientist who categorizes and rationalizes both his subjectivity and the women around him until he encounters Conchis, the magician, or the novelist-god teaching him the fundamentals of the quantum realm through his godgame. Creating an alternative reality in the Island of Phraxos, Conchis embodies the quantum physicist as he arranges all the experiments characterized by uncertainty, probability and dynamism. The women Nicholas meets stand for the subatomic particles that cannot be traced. They are inherently unknowable and ungraspable. Setting is another element showing the contrast between the classical and quantum worlds. While London refers to the quotidian reality that is ruled according to the mechanic rules of the Newtonian physics, the fantasy world in Bourani is a metaphor for the unrealistic and

unfathomable quantum realm.

Similar metaphors have been identified in *The French Lieutenant's Woman* as well. The main character in this novel resembles Nicholas in the sense that they both represent the classical physicist because of their atomized approach to reality. Charles's attitude towards science, his personal relationships, lifestyle and even his own identity are defined by the stable and absolute rules as in the case of Newtonian world. His traditional fiancée Ernestina personifies the implications of this world of absolutes due to her obedience to social order. However, after his interaction with Sarah, Charles meets the mysterious quantum realm. Since Sarah does not fit the Victorian norms of the society and rejects any kind of classification based on gender or class, she encapsulates the chaotic, dynamic, and impenetrable subatomic realm.

In conclusion, this thesis has demonstrated that there has been a close relationship between science, philosophy and literature, and the paradigm shift in science at the beginning of the 20th century had an enormous impact on various disciplines including literary studies. This study has also shown that the field concept of Hayles has been one of the most extensive and effective critical responses to this shift in thought, and it has combined the implications of the field model with poststructuralism and postmodernism. Finally, this work aimed to prove that John Fowles's two novels *The Magus* and *The French Lieutenant's Woman* deploy the concepts in new physics on thematical and structural level within the framework of Hayles's field model of literature.

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