EXPERIENCE AND SCIENCE:
EDDINGTON'S TWO TABLES PROBLEM

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ABSTRACT

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PhD in Philosophy

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The primary aim of this thesis is to analyze Eddington's 'two tables' problem. The analysis has been carried forward with respect to the framework Sellars provides: the manifest image and the scientific image. The only difference between the manifest image and the scientific image, according to Sellars, is the postulation of imperceptibles. This difference between the images has been criticized by the scientific antirealist position, constructive empiricism. After constructive empiricism is discussed, the dissimilarity between the images is examined in the context of the integration problem between psychology and neuroscience with respect to the positions, eliminative materialism and functionalism. Finally, the analysis rests on the constructive empiricist approach regarding the integration problem between psychology and neuroscience.

Keywords: The Manifest Image, The Scientific Image, Constructive Empiricism, Common Sense Realism and Psychology, Eliminative Materialism

ÖZ

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Bu tezin temel amacı Eddington'ın iki masa problemini analiz etmektir. Analiz, Sellars'ın ortaya koymuş olduğu aşikâr imge ve bilimsel imge kavramlarıyla sürdürülmüştür. Aşikâr imge ve bilimsel imge arasındaki tek fark, Sellars'a göre, gözlemlenebilir olmayan nesnelerin varsayımıdır. İmgeler arasındaki farkın bu şekilde ortaya konulması, bilimsel anti realist pozisyon olan kurucu ampirizm tarafından eleştirilmiştir. Kurucu ampirizm tartışıldıktan sonra, imgeler arasındaki farklılık, sinirbilim ve psikoloji teorilerinin karşılaştığı uzlaştırma problemi bağlamında incelenmiştir. Bu inceleme sırasında eleyici materyalizm ve işlevselcilik pozisyonları ele alınmıştır. Son olarak, kurucu ampirist yaklaşım, sinirbilim ve psikoloji teorilerinin karşılaştığı uzlaştırma problemi bağlamında, ortaya konmuştur.

Anahtar Kelimeler: Aşikâr İmge, Bilimsel İmge, Kurucu Ampirizm, Sağduyu Gerçekçiliği ve Psikolojisi, Eleyici Materyalizm

to Sinan Şencan (RIP)

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Chapter 1

Introduction

THE PRIMARY AIM of this thesis is to deal with the question, what is Eddington's 'two tables' problem? Sir Arthur Eddington says that theory of relativity and quantum theory make a big difference in our understanding of the universe. For him, these scientific events have "philosophical outcome" and present "the scientific view of the world" (Eddington 1928: vii). In evaluating the claims of these scientific theories, Eddington makes a distinction between the familiar world and the world as it is described by science based on two concepts: substance and emptiness. He defines substance as a type of solid reality and says that there is a vast difference between the familiar table as a type of solid reality and the scientific table which exists as mostly emptiness; electric charges moving with great speed. When dissecting matter into electric charges, Eddington posits that our everyday conception that gives rise to a type of reality turn into an illusion. In this respect, he mentions Ernest Rutherford whose atomic theory assumes void in the atom as the main challenger to the familiar world.

According to Eddington, the reason why such a difference arises between the familiar world and scientific world is because the raw materials of scientists do not belong to the familiar world. One may show a familiar table as a counterpart of a scientific table but there are no counterparts to electrons, quarks, etc. Moreover, Eddington says that defining what an electron is in terms

of the familiar world seems impossible. For example, Piercy Bridgman, who won the Nobel Prize in physics in 1946, says:

> the [quantum] theory is highly mathematical and it is well-nigh impossible to give an adequate outline of it in nontechnical language, but the one simple crude idea back of it all is that when we deal with very small things, such as atoms or electrons, the ordinary common-sense conception of things is no longer valid (1954: 33).

While Eddington sees electrons as fundamental constructs of science, otherwise A, B, C's or obscurely defined building blocks of physical theories, he still pays particular attention not to contaminate them with the definitions that belong to the familiar world.

In order to analyze the philosophical issues that Eddington puts forward, it seems important to delve into the philosophical distinction between primary properties and secondary properties. Basically, primary properties are determined as they play in mechanical explanations of the world. While, shape, extension, motion and rest etc. are primary properties, playing a particular role in mechanical explanations, secondary qualities such as color, taste, etc. do not. This perspective help make the distinction between the primary properties and the secondary properties important because the objects that quantum physics deals with have no counterparts in our experience. As we will see below, even mass does not seem to belong to the category of primary properties within the objects of quantum physics. Considering the classical distinction between the properties, all the properties are labelled as secondary qualities. Moreover, the contemporary primary properties such as isospin, spin, etc. do not have a correspondence in our experience.

In 1923 and 1940, Bertrand Russell deals with this issue. For him, the main consequence of the contemporary scientific developments is that things are not what they seem. Our experience has little resemblance with the objects we encounter in our daily lives. According to Russell, this consequence is not in accordance with the empiricist epistemology, knowledge from experience and with naïve realism, things being what they seem. The problem arises as to how to reconcile between the phenomenally propertied objects supposed by naïve realism and the objects of scientific theories offered by contemporary physics.

Wilfrid Sellars tries to find a solution for the philosophical issues Eddington raises when accounting for the status of the perceptible qualities of manifest objects. He develops the concepts of the manifest image and the scientific image. Sellars defines the familiar world as the manifest image and the scientific world as the scientific image. According to Mario De Caro,

> Sellars tried to understand the relation between the ways in which common sense and science respectively conceive of the world" with respect to "the relations between the "manifest image" (the world as it is understood by common sense) and the "scientific image" (the world as it is understood by natural science) (2015: 204).

According to Sellars, the difference between the images emerges because the latter postulates imperceptible objects and imperceptible principles in order to explain what is manifest in experience. Van Fraassen criticizes this demand of explanation and formulates his scientific antirealist position by the principle of "empirical adequacy", meaning essentially that what is important for scientific theories is to save the phenomena. Scientific theories are models to represent the nature. They are constructions to represent phenomena rather than discovery of some reality beyond the phenomena. This is the constructive part of the

constructive empiricism, with empiricism being the most noteworthy observation.

In contemplating Russell's remarks about empiricism and naïve realism above, van Fraassen's formulation of constructive empiricism within naïve realism or common sense realism is not surprising (van Fraassen 2003: 480-481). Van Fraassen deals with the problem of reconciliation by evaluating scientific theories as constructions and remaining in the manifest image.

The problem of reconciliation is important because it paves the way to formulate "new realisms". The claims of "new realisms" involve both the manifest image and the scientific image in tandem. Brain Ellis supports this when he writes:

> The new scientific essentialism thus promises to reshape the scientific image of mankind. It promises to do so in a way that will bring the scientific and manifest images of ourselves closer together, for it deals with one aspect of the apparent conflict between them by providing a scientific image of human agency that bears enough resemblance to its manifest counterpart for it to be taken seriously as telling us what human agency really is (2002: 143).

The same attitude is seen in Mario De Caro:

> In recent years some philosophers have developed new ideas in order to overcome the rigid, and unpalatable, alternative between common-sense realism and scientific realism. In this light, very interesting proposals have come from forms of naturalism that are explicitly based on an egalitarian attitude in regard to science and common sense. It is in that direction that, in my opinion, we should look for the most promising new forms of realism (2015: 205).

Moreover, the problem of reconciliation reverberates in discussions around the relationship between psychology and neuroscience. According to Patricia and Paul Churchland, while folk psychology represents the manifest image of mind,

neuroscience represents the scientific image. In this regard, the manifest image will be displaced by the completed neuroscience.

Patricia and Paul Churchland, the founders of the philosophy of neuroscience, take the position of eliminative materialism, which initiates the main discourse concerning the status of psychology. Their challenge against psychology - on the grounds that mature neuroscience will eradicate the concepts of common sense psychology - leads philosophers into the study of neuroscience. And further challenges the claim that "…it is possible to have a scientific psychology that vindicates commonsense belief/desire explanation (Fodor 1987: 16). The latter expects "that common-sense psychological concepts will provide the conceptual framework within which 'theories' of action, perception, and thought will derive" (Wilkes 1991: 16).

The discussions in the philosophy of neuroscience are mostly concerned with how explanations of a cognitive system should be done. Those who favor cognitive neuroscience say that there are multiple levels of explanation - autonomous from each other - from molecular pathways between neurons to neuronal pathways and to behavior. They are the "new mechanists". Alternatively, the reductionists who favor molecular neuroscience say that an explanation from molecular levels to behavior is possible and that the levels in between have a heuristic value. Even further and as of late, new mechanists have begun calling themselves the new functionalists and reductionists, like Bickle, eliminativists. I will also deal with these with respect to the problem of reconciliation.

I examine Eddington's 'two tables' problem in the second chapter. Van Fraassen's constructive empiricism is the subject of third chapter. The reverberation of Eddington's 'two tables' problem as it occurs in the discussions about the relationship between psychology and neuroscience is the subject of fourth chapter. At the end of the fourth chapter, I propose a constructive empiricist approach regarding the relationship between psychology and neuroscience.

Chapter 2

Eddington's Two Tables Problem

Eddington's differentiation between the objects of everyday experience and the objects of scientific theories, by saying that the raw materials of physics do not belong to the familiar world, leads to questions regarding the distinction between primary and secondary qualities.

A fundamental problem of analyzing the raw materials of physics, such as isospin, spin, etc., is that they do not resemble anything in our everyday experience. Russell shows this to be a problem for both naïve realism and empiricism and in both cases, it is the problem of reconciliation.

Wilfrid Sellars examines the problem with the concepts of the manifest image and the scientific image. The manifest image represents common sense worldview and the scientific image represents the world as it is described by scientific theories. The problematic difference between the two images arises because the scientific image involves imperceptibles and principles that belong to them merely to explain the manifest image. This is a main motive in the formulation of constructive empiricism as an antirealist position since van Fraassen rejects completely the demand of explanation by means of imperceptibles.

2.1 Familiar Table and Scientific Table

In 1927, Arthur Eddington gave Gifford lectures in the University of Edinburgh from January to March. His subjects were the theory of relativity and quantum

theory. He says that "[m]y principal aim has been to show that these scientific developments provide new material for the philosopher. I have, however, gone beyond this and indicated how I myself think the material might be used" (vii). In 1928, these lectures are published as a book with the title "The Nature of the Physical World". There, Eddington says that "Yes; there are duplicates of every object about me – two tables, two chairs, two pens" (1935: ix). In the case of two tables:

> One of them has been familiar to me from earliest years. It is a commonplace object of that environment which I call the world. How shall I describe it? It has extension; it is comparatively permanent; it is coloured; above all it is *substantial*. By substantial I do not merely mean that it does not collapse when I lean upon it; I mean that it is constituted of "substance" and by that word I am trying to convey to you some conception of its intrinsic nature. It is a *thing*; not like space, which is a mere negation; nor like time, which is – Heaven knows what! But that will not help you to my meaning because it is the distinctive characteristic of a "thing" to have this substantiality, and I do not think substantiality can be described better than by saying that it is the kind of nature exemplified by an ordinary table.*"* (1935: ix).

On the other hand,

> Table No. 2 is my scientific table. It is a more recent acquaintance and I do not feel so familiar with it. It does not belong to the world previously mentioned – that world which spontaneously appears around me when I open my eyes, though how much of it is objective and how much is subjective I do not here consider. It is a part of a world which in more devious ways has forced itself on my attention. My scientific table is mostly emptiness. Sparsely scattered in that emptiness are numerous electric charges rushing about with great speed; but their combined bulk amounts to less than a billionth of the bulk of the table itself. There is nothing *substantial* about my second table. It is nearly all empty space (1928: x-xi)

Among others, Eddington places great emphasis on substantiality. He defines substantiality as "the type of solid reality" (1935: x). He says that "the intrinsic nature of substance [is] to occupy space to the exclusion of other substance"

(1935: x). On the other hand "... in dissecting matter into electric charges, we have travelled far from that picture …" (1935: x). Thus, for the most part, Eddington's main rationale in distinguishing the familiar table and the scientific table is based on two concepts: substance (solidity) and emptiness (void) as he says that "... there is a vast difference between my scientific table with its substance (if any) thinly scattered in specks in a region mostly empty and the table of everyday conception which we regard as the type of solid reality ..." (1935: x).

Eddington says that "the revelation of the void within the atom gives the abrupt jar to those who think that things are more or less what they seem" (1935: 13). According to him, substantiality as the type of solid reality is "one of the greatest of our illusions" (Eddington 1935: 10). In this regard, although Eddington is known as the astronomer whose observations provided the first evidences in favour of Albert Einstein's general theory of relativity, he regards Ernest Rutherford, not Einstein, "as the real villain of the piece" (Eddington 1935: 13).

> When we compare the universe as it is now supposed to be with the universe as we had ordinarily preconceived it, the most arresting change is not the rearrangement of space and time by Einstein but the dissolution of all that we regard as most solid into tiny specks floating in void. The revelation by modern physics of the void within the atom is more disturbing than the revelation by astronomy of the immense void of interstellar space" (Eddington 1935: 13).

Rutherford's atomic theory overturned Thomson's model in 1911. Unlike Thomson's atomic theory, Rutherford's theory assumed that a major portion of the atom is empty. In order to portray the void (emptiness), Eddington says that

"bringing together protons and neutrons without void, human body would only be detectable with a magnifying glass" (Eddington 1935: 14).

According to James Ladyman:

> To understand the philosophical issues raised by Eddington's two tables we must again return to the scientific revolution, and to a philosophical distinction between two types of property that was employed by many of the great thinkers who pioneered the modern scientific outlook, namely that between *primary* and *secondary* properties (or qualities) (2002: 132).

2.2 Primary and Secondary Qualities

Peter Ross says that "Galileo, Descartes, and Hobbes presented early versions of this distinction; Boyle and Locke were prominent among those who developed later versions" (2015: 535). According to Galileo, secondary qualities consist of tastes, odors, colors, and so on for he says that ''tastes, odors, colors, and so on are no more than mere names so far as the object in which we place them is concerned, and that they reside only in the consciousness'' (1623: 274). As Michael Jacovides points out, "Locke's work may be taken as an elaboration on that theme" (2007: 127). Lisa Downing says that Locke invented the terminology of the distinction as primary and secondary qualities (2009: 98). The differences between the primary and secondary qualities may be listed as follows:

> 1. Primary qualities are explanatory; secondary qualities are not deeply explanatory.
> 2. Ideas of primary qualities resemble something in bodies; ideas of secondary qualities do not.
> 3. Primary qualities are not dispositions; secondary qualities are dispositions to produce ideas in us.
> 4. The genera of primary qualities are inseparable from bodies; the genera of secondary qualities are separable.

> 5. Primary qualities belong to bodies as they are in themselves; secondary qualities do not.
> 6. Primary qualities, with the possible exception of some sorts of velocity, are real beings; secondary qualities are not (Jacovides 2007: 103-104).

Locke along with other mechanical philosophers held primary qualities to play a fundamental *explanatory*[1] role in a science of matter" (Ross 2015: 409). In other words, primary qualities are conceived as the explanatory tools to explain secondary qualities. James Ladyman says that the clock analogy is useful in describing the explanatory role primary qualities play:

> [T]he clock has inner workings and this mechanism produces the outer appearance of the clock; similarly, the gold has an inner structure that gives rise to its appearance. The goal of natural philosophy is to understand the inner mechanisms responsible for what we observe (2002: 133).

In this respect, primary qualities are held to be the true properties of matter while secondary properties are explained away. Since the secondary qualities can be explained away, they resemble nothing in the object unlike the primary qualities. Secondary qualities' existences are due to the fact that the configuration of matter with the lightening condition cause us to perceive the way we perceive the secondary properties. They are the powers or dispositions of the configuration of matter. Thus, they do not belong to matter or to the configurations of matter as they are in themselves. Primary qualities, however, belong to matter as their own existential properties. This also explains why primary qualities have the explanatory value and how secondary qualities are explained away.

[1] Italics is mine

Downing says that "Locke has taken his distinction between primary and secondary qualities directly from what he regarded as the best physics of his day" (2009: 104). In other words, if Locke would have lived in our day, he would have defined the primary qualities in accordance with the best scientific theories. In this respect, "[primary qualities] might, for example, include qualities unfamiliar from sense perception, say, spin or charm" (Downing 2009: 104). The same suggestion of primary qualities including the "properties deemed fundamental by current science" is put forward by A. David Smith (1990: 253). Smith suggests that "what we need to retain from the seventeenth century is the essential connection between the notion of what is primary and that which is explanatorily and physically basic in our representation of the physical world" (1990: 253). This is the "reform[ist] current usage of the term 'primary quality'…because the contemporary philosophical interest in the distinction consists of the question whether or not colours, unlike shapes, are perceiver dependent rather than the explanatorily fundamental physical qualities…" (Ross 2015: 409). "It is familiar fact that those features of the manifest world which play no role in mechanical explanation were relegated by Descartes and other interpreters of new physics to the minds of the perceiver" (Sellars 1963: 29). Today,

> [n]one of the primary properties of matter listed by Locke and other corpsucularians are now regarded as true properties of the ultimate constituents of matter. Even mass is now regarded as a secondary property produced by the 'rest mass' of things in a certain frame of reference. The only candidates for primary properties that physical science now ascribes to things, such as charge, isospin, spin, 'colour-charge', and so on, lack any counterparts in our experience, so we can hardly say the sensations they produce in us resemble them (Ladyman 2002: 144).

In another word, what we have now as the primary properties belong to the scientific table. Locke's distinction is not applicable today because his distinction was based on the properties of the familiar table. According to Eddington, the reason why Locke's distinction between the primary and secondary properties is not applicable today is the following:

> Until recently there was a much closer linkage; the physicist used to borrow the raw material of his world from the familiar world, but he does so no longer. His raw materials are aether, electrons, quanta, potentials, Hamiltonian functions, etc., and he is nowadays scrupulously careful to guard these from contamination by conceptions borrowed from the other world. There is a familiar table parallel to the scientific table, but there is no familiar electron, quantum or potential parallel to the scientific electron, quantum or potential (1928: xi).

Ladyman draws the similar lines when he says that ... [h]ence, although there is an everyday counterpart to the scientific table, there are no everyday counterparts to the 'electric charges' that compose it. So, do both tables really exist? If so, what is the relationship between them?

Wilfrid Sellars discusses the philosophical issues Eddington raises in the name of "Eddington's 'two tables' problem". He discusses "Eddington's 'two tables' problem" with the concepts of the manifest image and the scientific image. The manifest image is formulated as the familiar world or as the world of common sense and the scientific image as the world described by science.

Sellars is important in these discussions because he is regarded as one of the main philosophers in developing "the classic statement of scientific realism" along with Putnam and others (Ladyman 2012: 158). Moreover, Mario De Caro says that "[t]he main sources of inspiration for the rise of [scientific] naturalism

have arguably been the philosophies of Quine and Sellars" (2015: 203). "What is even more interesting here, however, is the role Sellars plays in the development of contemporary naturalism" by examining "the relation between the ways in which common sense and science respectively conceive of the world" (De Caro 2015: 203).

> [Scientific] naturalism has inherited from Quine and Sellars a "puritanical" ontological attitude, as Stephen Stich (1996, 199) called it, according to which only scientifically acceptable phenomena are real. And this attitude explains the present multitude of naturalization projects that concern the features of the common-sense world, such as persons, minds, tables, colors, qualia, free will, intentionality, normativity, and responsibility (De Caro 2015: 205).

In addition, Sellars has an organic relationship with the characters of the subject of this thesis. Sellars, as one of the leading scientific realist philosophers, alternatively plays a considerable role in the formulation of the contemporary *anti*-realist philosophy of science, i.e. constructive empiricism, as precursor to those who would found this new alternate approach.

Bas van Fraassen, a student of Sellars, introduces constructive empiricism in a book with the title *The Scientific Image* in 1980. "The title of this book is a phrase of Wilfrid Sellars's, who contrasts the scientific image of the world with the manifest image, the way the world appears in human observation" (van Fraassen 1980: vii). In a personal communication, van Fraassen said that he first encountered with the discussion of the scientific image and the manifest image while he was a doctoral student, and his interest was alive since then. Moreover, I think it is no coincidence that Patricia and Paul Churchland have put the folk psychology and neuroscience as a comparison of the two

dichotomies in a resemblance of "the manifest image and the scientific image", respectively. While folk psychology represents the manifest image of mind, neuroscience represents the scientific image of mind. Jay Rosenberg's article "Fusing the Images" conveniently commences the fusing of the many brilliant minds layered within this analysis:

> I first met Sellars in 1963, when I arrived at the University of Pittsburgh to begin my doctoral studies. Sellars himself had just come to Pittsburgh from Yale, along with Nuel Belnap and Jerome Schneewind – Alan Anderson would follow in 1964 – and with Kurt Baier, Adolph Grunbaum, and Nicholas Rescher already in residence, the Pittsburgh philosophy department was just coming into its full flourishing.
>
> As luck would have it, this exceptionally gifted faculty found itself confronted in the early-and mid-sixties by an unusually talented group of doctoral students, including, besides myself, Brian Skyrms, Ernest Sosa, Bas van Fraassen, Michael Dunn, Richard Burian, Lois Goble, Paul Churchland, and Patricia Smith (later Churchland). This group supplied the core membership for what can best be described as an extraordinary counting seminar – offered from trimester to trimester, to be sure, under nominally different titles, course numbers, and descriptions – whose shifting topics were determined primarily by the philosophical problems that happened to have engaged the attention of its instructor, Wilfrid Sellars (1990: 3-4)

These connections may not be at first perceptible when dealing with the problem of reconciliation between the manifest image and the scientific image. Prior to the precedent set by these aforementioned evaluations, the reconciliation between the scientific and manifest images was never perceived as needing much consideration.

2.3 The Manifest Image and the Scientific Image

Sellars gives an example of a complex picture unity of which is comprehensible through studying its parts. In the same way, the task of philosophy, for him, is

to understand the scientific knowledge, produced by different scientific disciplines such as biology, physics, etc., in a unified manner[2]. In other words, scientific knowledge is expected to give a whole account of what there is and what there is not. His famous *scientia mensura*, the claim that "in the dimension of describing and explaining the world, science is the measure of all things, of what is that it is, and of what is not that it is not," represents his view about science (Sellars 1997: 83). The difficulty in arriving at unity is that one is

> confronted not by one complex many-dimensional picture, the unity of which, such as it is, he must come to appreciate; but by two pictures of essentially the same order of complexity, each of which purports to be a complete picture of man-in-the-world, and which, after separate scrutiny, he must fuse into one vision. Let me refer to these two perspectives, respectively, as the *manifest* and the *scientific* images of man-in-the-world (1963: 4-5).

In analyzing the images, the scientific image and the manifest image are both claimed to be complex and complete pictures. Both images are evaluated as "two conceptions, equally public, equally nonarbitrary, of man-in-the-world (Sellars 1963: 5). As such, the scientific image and the manifest image constitute a "crucial duality" (Sellars 1963: 4). Although the scientific image methodologically dependent on the manifest image simply because it is deduced from the manifest image,

> ... it purports to be a complete image, i.e., to define a framework which could be the whole truth about that which belongs to the image. Thus although methodologically a development within the manifest image, the scientific image presents itself as a rival image. From its point of view the manifest image on which it rests is an 'inadequate' but pragmatically useful likeness of a reality which first finds its adequate (in principle) likeness in the scientific image (Sellars: 1963: 5).

[2] The unity at arriving the scientific picture "is a task rather than an initial datum" (Sellars: 1963: 4).

Willem deVries says that "the scientific image presupposes the prior availability of the manifest image in terms of which we perceive things in the first place, but it is crucial … that the methodological priority … does not imply its substantive or ontological priority" (2016: 6). For Sellars, scientific ontology is prior to the ontology of the manifest image because he differentiates the ontology of the manifest image and the scientific image in a Kantian framework[3] which supposes the manifest image as the mere appearance and the scientific image as reality:

> As I see it, in any case, a consistent scientific realist must hold that the world of everyday experience is a phenomenal world in the Kantian sense[4], existing only as the contents of actual and obtainable conceptual representings, the obtainability of which is explained not, as for Kant, by things in themselves known only to God, but by scientific objects about which, barring catastrophe, we shall know more and more as the years go by (1968: 173).

Scientific realism is a claim that "successful scientific theories should be accepted as true (or, better, near true) descriptions of the world, in both its observable and unobservable aspects (Psillos 1999: 69). In this regard, it "involves a metaphysical commitment of a similar nature to Eddington's table

[3] Bruce Aune (1990) finds similarities between Sellars' images and Hume's two "systems of ideas" although Jay Rosenberg (2009) finds this comparison useful only in a very limited sense. For one thing, Hume has a skeptical attitude to which Sellars is unwilling.

[4] Ian Hacking says that "[t]here have been quite different traditions of interpretation about Kant's noumenal world of things in themselves. One holds that theoretical entities are Kant's things-in-themselves. I first find this in J.-M. Ampere (1775-1836), founder of the theory of electromagnetism. Deeply influenced by Kant, he could not tolerate the anti-realist impulses set loose on the world. He insisted that we can postulate noumena, and laws between them, to be tested in experience. This postulational and hypothetico-deductive method, said Ampere, is an intelligent investigation of the noumenal world. In our day the philosopher Wilfred Sellars holds a similar view" (1983: 99).

No. 2; electrons, genes and other unobservables are part of a mind-independent world" (Ladyman 2002: 138).

For Sellars, those unobservable objects constitute the noumenal realm. According to Robert Brandom, "Kant's construal between the phenomenal and the noumenal is reconstructed by Sellars to concern the relations between the descriptive resources of the manifest image and the descriptive resources of the scientific image" (2015: 59). Brandom says that "Sellars shaped his scientific naturalism as a detranscendentalized version of Kant's noumena/phenomena distinction" (2015:25). His detranscendentalized version of Kant's noumena/phenomena distinction, i.e. the manifest image and the scientific image, give rise to "the distinction between appearance and reality, not in a light epistemological sense, but in the ontologically weighty sense that is given voice by the *scientia mensura*" (Brandom 2015: 32). Despite opposition to Brandom's detranscendentalized version of Kant's noumena/phenomena distinction, semantic realism - to which scientific realism rests on its claims regarding the reality of the imperceptible entities - endorses the noumena/phenomena distinction:

> If semantic realism is adopted, then we have a straightforward answer to the question: what is the world like, according to a given scientific theory? … The answer is none other than that the world is the way the scientific theory – literally understood – describes it to be (Psillos 1999: 70)

Sellars says that "... the manifest image is, in an appropriate sense, itself a scientific image". What distinguishes between the manifest image and the scientific image is "the postulation of imperceptible entities, and principles

pertaining to them, to *explain*[5] the behavior of perceptible things" (1963:7). Thus "… what I have referred to as the 'scientific' image of man-in-the-world and contrasted with the 'manifest' image, might better be called the 'postulational' or 'theoretical' image" (1963:7).

"We make the first move towards the scientific image when we begin to postulate imperceptible things to explain the behavior of perceptible things" (deVries 2016: 6). In other words, the postulation of theoretical entities as the descriptive and explanatory resources of the scientific image succeeds "what is expressible using the descriptive and explanatory resources of the "manifest image" of the common-sense lifeworld …" (Brandom 2015: 2). The answer to Jay Rosenberg's question, how is it that scientific image can be authoritative on the manifest image? comes in play right at this point (1990). The authority is given to the descriptive and explanatory resources of the scientific image as these resources describe and explain the manifest image. The implication is that "the Manifest Image is necessarily incomplete[6] with respect to explanation – that it must admit fissures, ruptures, discontinuities which of their very nature admit no explanation within the terms of the image itself (van Fraassen 1999: 32). Given the authority of the descriptive and explanatory resources of the scientific image, which is to be, largely, theoretical entities over the manifest image, what is anticipated is the ontological shift from the objects of the framework of the manifest image to the objects of the framework of the scientific image.

[5] Italics is mine.

[6] I need to make a clarification here. Sellars defines the manifest image as complete. Van Fraassen's emphasis on the incompleteness of the manifest image is due to the fact that the manifest image does not have the resources scientific theories have, i.e., imperceptible entities to explain itself.

"The initial challenge of the scientific image was directed at the manifest image of inanimate nature. It proposed to construe physical things "… as systems of imperceptible particles, lacking the perceptible qualities of manifest nature" (Sellars 1963: 26). According to Bruce Aune "[t]he key difficulty is that the distinctive features of manifest objects are incompatible with a realist interpretation of scientific theories (1990: 540). It is for this reason that the ontological shift results in the distinction between noumenal reality, i.e. the reality of the scientific image and the empirical appearance, i.e. the manifest image. "Scientific theories, on this understanding, explanatorily "save the appearances" precisely by characterizing the reality *of which* the appearances are appearances" (Rosenberg 1990: 6).

Sellars discusses "the case of a pink ice cube" (1963: 26). According to him, the ice cube cannot have the property of pink colour while its imperceptible particles do not have the property being discussed:

> If an object is *in a strict sense* a system of objects, then every property of the object must consist in the fact that its constituents have such and such qualities and stand in such and such relations or, roughly, every property of a system of objects consists of properties of, and relations between, its constituents (Sellars 1963: 27).

In other words, if an object is composed of imperceptible particles which do not exhibit the perceptible qualities, then the object itself cannot exhibit the perceptible qualities "characteristics of physical objects in the manifest image" (Sellars 1963: 27). For example, Colin McGinn says that "(a) science actually denies outright that things are solid, and (b) common sense actually asserts that things are solid in precisely the sense in which science denies it" (1983: 123).

Alternatively, for Sellars, the claim (a) does not amount to say that things are not really solid. Rather the claim constitutes a challenge to the framework of the manifest image as a whole:

> It is the claim that although the framework of perceptible objects, the manifest framework of everyday life, is adequate for the everyday purposes of life, it is ultimately inadequate and should not be accepted as an account of what there is *all things considered* (Sellars 1963:27).

In connection with the above argument, Sellars says that since we perceive things as coloured, solid etc., this does not provide a challenge to the argument that "manifest physical objects are 'appearances' to human perceivers of systems of imperceptible particles". The reason is that the challenge "operates *within* the framework of the manifest image…" itself (Sellars 1963: 27-28). Since the manifest and the scientific images are two complete frameworks with their conceptual arsenals, it is meaningless to argue against one framework with the language of the other. To give an example, dispositionalist accounts of color regards colour "as a two-place relational property rather than a quantity" in order to prevent the exclusionary claims of the manifest image and the scientific image (Denkel 1995: 26).

> If this [dispositionalist account] is right, then science and common sense do not in fact conflict over the question whether objects are really coloured: science allows that objects are really (i.e. truly) coloured but denies that they are objectively coloured; common sense likewise holds that it is external things that have colour, but it does not make the mistake of claiming that this is an objective matter (McGinn 1991: 121).

For Sellars, what is needed is not an analysis of the manifest image and the scientific to make the incoherent claims disappear. Sellars' solution to the problem of reconciliation is "stereoscopic view" "where two differing perspectives on a landscape are fused into one coherent experience" (Sellars

1963:4). What Sellars tries to show is that common sense conception of things and scientific conception of things constitute two different ways of seeing the world. They are frameworks and particular claims of one framework should not be regarded as a falsifying instance of the other framework. On the other hand, Robert Brandom notes that Sellars himself tries to address why 'physical objects ... complexes of imperceptible particles' left us with the problem of accounting for the status of the perceptible qualities of manifest objects..." (Sellars 1963: 31).

> Another topic that loomed large in his corpus that we did not discuss, because I could see no productive way to do so, was his views about sensa. Particularly during the period when we spoke regularly, Sellars was concerned— I sometimes thought obsessed—with the question of what the scientific successor-notion might be to immediate phenomenal sensory experiences (his "sensa"). He [Sellars] had become convinced that the structural continuity of phenomenal color experience—the famous pink ice-cube thought experiment—could be leveraged into an argument that quantum mechanics could not be the form of the ultimate scientific description of reality. This was one motive for the development of his late ontology of pure processes (Brandom 2015: 15).

Sellars says that the term "image" makes it possible to transform "ways of experiencing the world into objects of philosophical reflection and evaluation" (1963:5). The manifest image and scientific image represent differences between experiencing the world in two different ways. The idea of the "one coherent experience" results from his views of the images as ways of experiencing the world.

> The distinction between observable and theoretical things is, Sellars argues in EPM [Empiricism and Philosophy of Mind], methodological rather than ontological. It concerns how we know about things, rather than what kind of things they are… Theoretical things are, by definition, ones we can only entitle ourselves to claims

> about by inference, whereas observable things are also accessible noninferentially. But this status is contingent and mutable, subject to historical development (Brandom 2015: 16).

So, how is it possible to claim that "the scientific picture of the world *replaces* the commonsense picture; a sense in which the scientific account of "what there is" supersedes the descriptive ontology of everyday life"? (Sellars 1997: 82). The answer seems to be that if the historical development of our physiology has made it possible to observe the theoretical entities postulated by science, we would observe the theoretical entities just the way science describes them. Since we are able to experience the middle-sized objects which does not resemble the scientific descriptions of the scientific objects, our experience is limited to the empirical appearance or inferential knowledge of unobservable entities. This generates a problem that has two aspects. First, "[t]he observational basis for science is then subjective and nonpublic; and it is hard to see how it can add rational support to conclusions about a fundamentally different, public domain of unobservable objects (Aune 1990: 541). Second, there seems to be an arbitrary selection by which experiences are limited to the empirical appearances and by which experiences are not limited to the empirical appearances. It seems that "[t]he principle of selection is contained within the [scientific] theory itself, and it is according to it that we decide what to treat in the perceptual world as relevant" (Denkel 1995: 43). For example, Hacking says that

> Experimental work provides the strongest evidence for scientific realism. This is not because we test hypotheses about entities. It is because entities that in principle cannot be 'observed' are regularly manipulated to produce new phenomena and to investigate other aspects of nature. They are tools, instruments not for thinking but for doing (1983: 262)

"But have we not, in all this, treated perception 'seriously', as a source of knowledge, as something that supplies us true information about reality?" (Denkel 1995: 43). In other words, "[h]ave we not made intensive and essential use of just those phenomenal properties the unreality of which is implied by the microphysical theory?" (Denkel 1995: 43). Denkel claims that relegating experience to empirical appearances makes scientific theories "non-empirical" (1995:46) This, in turn, seems to imply that scientific theories as "rationalistic systems" have the capacity to operate on empirical appearances. (Denkel 1995: 46).

2.4. The Problem of Reconciliation

The problem of reconciliation is formulated in different ways. For example, Peter Strawson formulated the problem as the following:

> Can we coherently identify the phenomenally propertied, immediately perceptible things which common sense supposes to occupy physical space with the configurations of unobservable ultimate particulars by which an unqualified scientific realism purports to replace them?' (Strawson 1979: 56).

In dealing with the question, Sellars enumerates three possible answers to the question of how to "evaluate the conflicting claims of the manifest image and the scientific image thus provisionally interpreted to constitute *the* true and, in principle, *complete* account of man-in-the-world" (1963: 25).

> (1) Manifest objects are identical with systems of imperceptible particles in that simple sense in which a forest is identical with a number of trees.
> (2) Manifest objects are what really exist; systems of imperceptible particles being 'abstract' or 'symbolic' ways of representing them.
> (3) Manifest objects are 'appearances' to human minds of a reality which is constituted by systems of imperceptible particles (1963: 26).

The first answer evaluates manifest objects and scientific objects as identical. The second takes for granted the manifest image and regards the scientific image as a construction rather than discovery. The third takes for granted the scientific image as a discovery beyond the manifest image which is construed as an appearance. As we saw in the discussions between the primary and secondary qualities, the first answer does not seem satisfactory; remember, as stated previously, even mass is now secondary property. The second and the third answers seem to make a choice between the manifest image and the scientific image, respectively.

"Much of Sellars' philosophical work can be understood as an attempt to show how the person-constitutive categories of the manifest image might be reconciled with or coherently added to the scientific image to produce a ''stereoscopic'' or ''synoptic'' image (Rosenberg 1990: 285). Sellars says that

> I suggested that the most fruitful way of approaching the problem of integrating theoretical science with the framework of sophisticated common sense into one comprehensive synoptic vision is to view it not as a piecemeal task … but rather as a matter of articulating two whole ways of seeing the sum of things, two images of man-in-the-world and attempting to bring them together in a 'stereoscopic' view (1963:19)

However, his solution represents a selective attitude: Dealing with the "problem of accounting for the status of the perceptible qualities of manifest objects", Sellars favors the scientific image (1963: 31). On the other hand, dealing with "the problems of accounting for the status of the *introspectable qualities* of thoughts" he thinks that "the conceptual framework of persons is not something that needs to be *reconciled with* the scientific image, but rather something to *be joined* to it" (Sellars 1963: 40). In other words, Sellars makes a difference

between matter and mind, and displays a selective attitude in evaluating the conflicting claims. In case of the former, Sellars favors the scientific image. In case of the latter, he favors the manifest image, to be joined to the scientific image (Sellars 1963: 40).

Whether his stereoscopic solution is adequate or not, the problem of reconciliation is representative of a very deep philosophical problem. Four years ago from Eddington's formulation of the familiar world and scientific world Bertrand Russell says that

> The problem is this: Every empiricist holds that our knowledge as to matters of fact is derived from perception, but if physics is true there must be so little resemblance between our percepts and their external causes that it is difficult to see how, from percepts, we can acquire a knowledge of external objects. The problem is further complicated by the fact that physics has been inferred from perception. Historically, physics started from naïve realism, that is to say, from the belief that external objects are exactly what they seem; on the basis of this assumption, they developed a theory which made matter something quite unlike what we perceive. Thus their conclusion contradicted their premise, though no one except a few philosophers noticed this. We therefore have to decide whether, if physics is true, the hypothesis of naïve realism can be so modified that there shall be a valid inference from percepts to physics. In a word: If physics is true, is it possible that it should be known? (1923: 213).

Bertrand Russell draws the similar lines in 1940 when he says that

> We all start from "naive realism", i.e., the doctrine that things are what they seem. We think that grass is green, that stones are hard, and that snow is cold. But physics assures us that the greenness of grass, the hardness of stones, and the coldness of snow, are not the greenness, hardness, and coldness that we know in our own experience, but something very different. The observer, when he seems to himself to be observing a stone, is really, if physics is to be believed, observing the effects of the stone upon himself. Thus science seems to be at war with itself: when it most means to be objective, it finds itself plunged into subjectivity against its will. Naive realism leads to physics, and physics, if true, shows that naive

> realism is false. Therefore naive realism, if true, is false; therefore it is false (15).

Russell's ideas above are highly reminiscent of a previously cited statement by Eddington: "the revelation of the void within the atom gives the abrupt jar to those who think that things are more or less what they seem" (1935: 13). In this regard, empiricist epistemology is in a complicated situation because "if physics is true there must be so little resemblance between our percepts and their external causes that it is difficult to see how, from percepts, we can acquire a knowledge of external objects" (Russell: 1923: 213). I think Russell makes an important point by associating empiricism and naïve realism. This seems to provide an insight as to why van Fraassen formulates constructive empiricism, i.e., an anti-realist position about science, in common sense realist discourse: "Description and assessment of both scientific activity and scientific product, as I characterize them, are carried out within that common sense realist discourse … in which constructive empiricism is formulated as well" (2003: 480-481). The problem of reconciliation seems to be a problem to empiricist epistemology which is based on the belief that things are more or less what they seem, i.e., naïve realism. For example, Darrell Rowbottom says that in order to arrive at an antirealist thesis about science:

> First, one must add the empiricist thesis that our primary means of becoming acquainted with things -both objects and the properties thereof- is sensory experience. Second, one must add that what we are acquainted with is limited in such a way as to render it impossible to comprehend or discuss (some aspects of) any truth behind the appearances (2011: 3).

The point is that "Eddington's 'two tables' problem" shows the fragility of *the status of everyday objects* which is a result of the fragility of the genuine

character of everyday experience or commonsense realism if scientific theories are to be interpreted literally. John Watkins says that

> Adopting or rejecting scientific realism may make a big difference to one's world-view, and so may adopting or rejecting common-sense realism; it therefore becomes an important question whether these two kinds of realism are mutually exclusive, as has often been supposed, so that one cannot adopt them both (Watkins 1996: 219).

> Nearly all those in the vanguard of the scientific revolution, such as Galileo and Boyle, together with their philosophical allies, such as Descartes and Locke, believed that the new science had overthrown the common-sense world-view: must not the world be essentially different from what it appears to be if it consists, in reality, of hard, massy, odourless, and colourless corpuscles, obeying only the laws of mechanics? Its apparent colours, sounds and smells must be subjective qualities projected by us onto external objects (Watkins 1996: 223).

What Russell calls naïve realism is formulated by Watkins as the common-sense world-view. According to Ladyman:

> Eddington distinguishes between the world of common sense and the world as it is described by science. The scientific description suggests that common-sense reality is an illusion, or at least that we certainly don't perceive the world to be anything like the way it is in certain respects. In the twentieth century, physics became increasingly abstract and removed from common sense. In particular, relativity theory and quantum mechanics made the scientific understanding of space and time and the nature of matter, respectively, remote from everyday experience. The description of the ultimate constituents of the table given by contemporary physics depends upon a lot of very difficult mathematics; it is not possible to understand the multidimensional worlds of quantum fields, 'superstrings' and the like without it (2002: 131).

In this regard, Denkel asks the question "is it consistent, in other words, to maintain scientific realism along with commonsense realism?" (Denkel 1995: 23). Denkel suggests that in order to avoid such considerations, VanFraassen's constructive empiricism is among the options (1995: 46).

Chapter 3

Constructive Empiricism

The Scientific Image (1980), where van Fraassen formulates constructive empiricism, deals with the question of what empirical science is according to an empiricist. Van Fraassen names his position constructive empiricism in order to indicate that "scientific activity is one of construction rather than discovery: construction of models that must be adequate to the phenomena, and not discovery of truth concerning the unobservable" (1980: 5). This explains the constructive part of constructive empiricism. The emphasis on empiricism in constructive empiricism is to indicate that it is an empiricist view of science. In other words, constructive empiricism is not a variety of empiricism, it is an empiricist view of science. The question of what it is to be an empiricist today is dealt with in *The Empirical Stance* (2002).

Van Fraassen says that "I shall argue for an empiricist position, and against scientific realism" (1980: 4). This makes it important to understand his definition of scientific realism. For him, scientific realism is not a variety of realism, it is rather a view of science that is intimately connected to metaphysical realism. Metaphysical realism is the realism of a natural-kind structure. "Stathis Psillos constructed a sustained, instructive, and convincing overall argument for a coherent scientific realism within metaphysical realism" (van Fraassen 2019: 20). The subject, then, will be among constructive empiricism and scientific realism as it is defined in this framework by noting that there are other forms of scientific realism, outside of the scope of this

thesis. In this respect, in the following, my aim is to examine constructive empiricism in light of how van Fraassen understands scientific realism and how his remarks have been getting attention in literature. For example, van Fraassen starts his book *The Scientific Image* with the dichotomy between empiricism and realism: "The opposition between empiricism and realism is old, and can be introduced by illustrations from many episodes in the history of philosophy" (1980: 1). And his dichotomy is presented by various philosophers as the following: Andre Kukla says that "[a]fter all, what derives antirealism is the empiricist sentiment that the deliverances of our senses are the source of all knowledge" (1998: 137). Moreover, this is not an observation limited to Kukla. Ladyman says that "[a]ntirealists about scientific knowledge are usually empiricists who oppose the way realists think science can go beyond experience and get at the real causes of things" (Ladyman 2002: 147). Anjan Chakravartty says that "[l]ogical positivism and logical empiricism lost their way, but constructive empiricism has emerged as the main empiricist rival to realism today" (2007: 16). It seems that when it comes to the realist interpretations of scientific theories, there will be an empiricist rival or vice versa. This helps to analyze what constructive empiricism is and the corresponding definition of scientific realism.

3.1 The Dichotomy between Empiricism and Realism

Traditionally, empiricism is contrasted with rationalism and realism with idealism. Empiricism and rationalism are epistemological positions. Realism and idealism are ontological positions. As Russell pointed out above, the problem is that empiricism is in a complicated situation when naïve realism is

false. In other words, it seems not possible to claim that our knowledge comes from experience when there is little resemblance between our experience and the external objects, the subjects of our experience.

The relationship between epistemological positions and ontological positions can be represented in a vertical plane. Kukla says:

> Realisms and antirealisms can be divided *vertically,* by the tenuousness of the objects to which they allude… Consider the following sequence of existential hypothesis:
>
> 1. Sense-data, like "being appeared to greenishly", exist
> 2. The commonsense objects of perception – sticks and stones exist.
> 3. The unobservable entities postulated by scientific theories, such as electrons and unconscious mental processes, exist.
> 4. Timeless abstract entities such as numbers, sets, and propositions exist. (Kukla 1998: 3-4)

"[E]ach of the four hypotheses is logically independent of each other three" although defenders of (4) also defend (3) and (2) and defenders of (3) also defend (2) in most cases (Kukla 1998: 4). On the other hand, defenders of (1) differ in defending (2) and defenders of (2) differ in defending (3) as we will see in the case of constructive empiricism. Constructive empiricism defends (2) and ¬(3). The history of philosophy provides insights as to how constructive empiricism defends (2) but not (3).

British empiricists, Locke, Berkeley, and Hume say that what we perceive is not the external objects but the representations of them. For example, Locke says that the mind "hath no other immediate object but its own ideas" (1964: Book IV, I, I). Berkeley says that "… the objects of human knowledge, that they are either *ideas* actually imprinted on the senses, or else such as are perceived by attending to the passions and operations of the mind, or lastly,

ideas formed by help of memory and imagination…. (Fogelin 2005: 31). Hume says that "[a]ll the perceptions of the human mind resolve themselves into impressions and ideas" (1978: I, i, I). It is obvious that British empiricists defend (1) in the vertical plane. However, while Locke is willing to incorporate (2) in the ontological scheme of things, Berkeley, for example, is not. According to Locke, there are external objects which cause the ideas in our minds. On the other hand, the rejection of any form of external realism leads Berkeley to idealism. In this respect, Berkeley's position seems to be called empirical idealism. He incorporates nothing but sense-data in his ontology with the principle that "the objects of human knowledge are either ideas actually imprinted on the senses, or else such as are perceived by attending to the passions and operations of the mind" (1975: Part I, I). Empiricist epistemology solely with sense-data realism leads to idealism.

The other extreme at the vertical plane above "is represented by Plato, according to whom *only* abstract objects are real …" (Kukla 1998: 4). In other words, the only thing that exists independently out of the cognitive abilities of humans is abstract entities. Whether Plato denies the existence of what is manifest in experience is an open question. Kukla says that "[u]nlike Plato, contemporary Platonists don't assert that only abstract objects exist – all the contemporary Platonists that I know of are comfortable with both stones and electrons" (1988: 4). What is important here is that Plato tries to explain what is manifest in experience with respect to the abstract entities of which existence is independent of our knowledge. In this respect, Plato may be called as a rationalist realist since he assumes the objective existence of abstract entities, knowledge of which is possible through reason. In other words, there is a

rationalist epistemology with the realism of abstract entities through which an explanation of phenomena is sought.

In the vertical plane between Berkeley (1) and Plato (4), there are scientific realism (3) and commonsense realism (2). It may be objected that scientific realism involves (3) and (2). Kukla says that "scientific realism wins if it comes up with a persuasive proof that proposition 2 entails proposition 3… Similarly, scientific antirealism wins if it can be shown that proposition 2 entails the *negation* of proposition 3…" (1998: 8). Since (3) and (2) are logically independent of each other and there is no persuasive proof that scientific realism involves (3) and (2), it may be assumed that scientific realism and commonsense realism are distinct. The reason is that van Fraassen defends commonsense realism which "was foreign to much of the empiricist tradition" (van Fraassen 2003: 479). He says that "I wish merely to be agnostic about the existence of the unobservable aspects of the world described by science—but sense-data, I am sure, do not exist" (van Fraassen 1980: 72). In fact, van Fraassen says that "constructive empiricism is indeed set squarely within a common sense realism..." (van Fraassen 2003: 479).

As a defender of common sense realism, van Fraassen does not incorporate theoretical entities posited by scientific theories in the ontological scheme of things. Thus, empiricist epistemology with common sense realism leads to an anti-realist position regarding science. This framework is also consistent when it is compared to Stathis Psillos' understanding of scientific realism: There are "two broad philosophical traditions –an empiricist and a realist tradition- each

with an answer" to the question of how to understand unobservables (Psillos 1999:2):

> Broadly speaking, the empiricist tradition aims to show that theoretical discourse may be so construed that it does not commit to the existence of unobservable entities. The realist tradition, on the other hand, aims to show that a full and just explication of theoretical discourse in science requires commitment to the existence of unobservable entities (Psillos 1999: 2)[7].

3.2 The Agnosticism

> ... van Fraassen's view represents one of the most consistent expressions of common-sense realism, since it limits the scope of the knowable to what is directly observable and, accordingly, assumes an antirealist position with regard to science precisely insofar as it refers to unobservable entities (De Caro 2015: 202).

This is in contrast to scientific realism because according to Psillos:

> ... science can and does attain theoretical truth no less than it can and does attain observational truth, where by 'theoretical truth' we understand the truth of what scientific theories say about unobservable entities and processes, and by 'observational truth' we understand the truth of what theories say about observable entities (1999: xviii).

There are two concepts that I want to emphasize; theoretical truth and observational truth. Theoretical truth is the truth of scientific assertions about unobservables. Observational truth is the truth of scientific assertions about observables. "A realist non-epistemic account of truth, as well as its rival (anti-realist) epistemic accounts, understand truth-ascriptions in a *substantive* way, where truth requires truth-makers" (Psillos 1999: 224). An ontological reconstitution of the debate between common sense realist constructive empiricism and scientific realism embedded in metaphysical realism may be

[7] Psillos means scientific realism when he says realist tradition: "[f]or the purposes of this book, I take 'realism' to refer to *scientific* realism" (1999: xix).

realized if the discussion is reformulated as the discussion between common-sense realist thesis of constructive empiricism and metaphysical realist thesis of scientific realism. For constructive empiricism, there is nothing problematic about the observational part. However, the existence of unobservables is not welcomed.

The distinction between the observables and unobservables is put forward with respect to human physiology as a measuring apparatus:

> The human organism is, from the point of view of physics, a certain kind of measuring apparatus. As such it has certain inherent limitations – which will be described in detail in the final physics and biology. It is these limitations to which the 'able' in 'observable' refers – our limitations, qua human beings (van Fraassen 1980: 17).

In this respect, 'X is observable if there are circumstances which are such that, if X is present to us under those circumstances, then we observe it' (van Fraassen 1980: 16).

> So we know that, for example, the moons of Jupiter are observable because our current best theories say that, were astronauts to get close enough, then they *would* observe them. On the other hand, the best theories of particle physics certainly do not tell us that we are directly observing the particles in a cloud chamber. Analogous with the latter case is the observation of the vapour trail of a jet in the sky, which does not count as observing the jet itself, but rather as detecting it (Ladyman 2002: 189).

Grover Maxwell argues against the distinction between observables and unobservables, based on human physiology, because the distinction "is an accident and a function of our physiological make-up…" (1962: 14–15). However, van Fraassen says that "even if observability has nothing to do with existence (is, indeed, too anthropocentric for that), it may still have much to do with the proper epistemic attitude to science" (van Fraassen 1980: 19). In this

respect, there is a codependence between its ontological and epistemological commitments which is not surprising because they are conjoined as a result of empiricist position. Common sense realism provides the objects which are observable by means of the measuring apparatus, i.e., human physiology. Knowledge produced by the measuring apparatus is, in turn, analyzed in accordance with the objects provided by common sense realism. Beliefs in objects which are not sorted out in the list of the common sense realism are deemed to be the subject of metaphysics. Van Fraassen says that "[scientific] realism is (on my view) metaphysical" since it involves belief in the reality of unobservables (van Fraassen 1980: 8). In this respect, the existence of the observables and unobservables is provided by the metaphysical thesis of scientific realism.

The metaphysical thesis involves the claim that there is a mind-independent world of which existence does not depend on the observer. The emphasis on the mind-independent nature of the world makes scientific realism distinct from idealism or phenomenalism. However, the aim of the metaphysical thesis is not just to distinguish scientific realism from idealism or phenomenalism. The aim is to distinguish scientific realism from any other position, not realist regarding the unobservables posited by scientific theories. Realists claim that successful scientific theories as nearly true descriptions of the world are satisfied only by granting that "if the entities posited by scientific theories exist, they do so independently of us humans being able to assert, rationally accept, verify and the like, that they do" (Psillos 1999: 12). "Roughly speaking, scientific realism is the view that we should believe in the unobservable objects postulated by our best scientific theories" (Ladyman 2002: 129). This thesis also makes possible

to distinguish scientific realism and constructive empiricism because while both commit themselves to semantic thesis, i.e., the literal interpretation of best scientific theories, constructive empiricism does not commit itself to the metaphysical thesis.

Granting that both observables and unobservables exist independently of our cognitive abilities, *semantic thesis* enables us to say that assertions of scientific theories are true only in so far as they "discover and map out an already structured and mind-independent world (Psillos 1999: xvii). The reason is that semantic thesis requires a commitment to the literal interpretation of scientific theories. If a scientific theory refers to, say, an electron, then there is an electron or something resembling the electron in the world. Taken together metaphysical and semantic theses, we have the following:

> What makes an assertion about theoretical entities true, if it is true, is not any kind of evidence we might have for its truth, though such evidence is important in its own way to justify our belief in its truth. Rather, what makes such an assertion true is that it is indeed the case that the referred-to entities stand in the referred-to relations (Psillos 1999: 13).

On the other hand, constructive empiricism regards scientific theories as constructions rather than discovery. Thus, even if it takes scientific theories at face value, it is not the case that the referred-to entities stand in the referred-to relations. In other words, commitment to semantic thesis without the commitment to metaphysical thesis gives rise to agnosticism about the referred-to entities. For constructive empiricism, only the existence of the observables is welcomed because "... realists believe claims about things that transcend experience in addition to claims about observables…" (Chakravartty 2007: 15).

This may also explain why the first commitment of scientific realism, metaphysical thesis, is called metaphysical rather than ontological.

How, then, to appreciate constructive empiricism's commitment to the semantic thesis? Van Fraassen's response to this is that "[q]uestions of existence are questions about matters of brute fact, if any are, and philosophy is no arbiter of fact" (2017: 95). If scientists do their work as if theoretical entities exist, so be it. Philosophy is not interested in deciding whether electrons exist or not. "Whether electrons exist is no more a philosophical question than whether Norwegians exist, or witches, or immaterial intelligences" (2017: 95). Although assertions about theoretical entities may be true or false in its relation to referred-to-entities, one should remain silent in its evaluation. The epistemological thesis of constructive empiricism is only concerned with knowing what is apparent in experience:

> A person may believe that a certain theory is true and explain that he does so, for instance, because it is the best explanation he has of the facts or because it gives him the most satisfying world picture. That does not make him irrational, but I take it to be part of empiricism to disdain such reasons. (van Fraassen 1985: 252)

Van Fraassen, here, argues against the "inference to the best explanation argument". The "[i]nference to the best explanation, which is sometimes called as *abduction*, is the mode of reasoning that we employ when we infer something on the grounds that it is the best explanation of the facts we already know" (Ladyman 2002: 47). The no-miracle argument is also an instance of an inference to the best explanation (IBE).

The no-miracle argument is a "philosophical argument which aims to defend the reliability of scientific methodology in producing approximately true theories and hypotheses" (Psillos 1999: 76). It is formulated by Putnam as the following:

> The positive argument for realism is that it is the *only*[8] philosophy that does not make the success of science a miracle. That terms in mature scientific theories typically refer (this formulation is due to Richard Boyd), that the theories accepted in a mature science are typically approximately true, that the same terms can refer to the same even when they occur in different theories—these statements are viewed not as necessary truths but as part of the only scientific explanation of the success of science, and hence as part of any adequate description of science and its relations to its objects (1975: 73).

Scientific realism does not claim anymore that it is the only explanation of the success of science. Rather, scientific realism is the best explanation of that success.

Inferring descriptive success as the best explanation of the empirical success of a given scientific theory, scientific realists infer scientific realism's description of science as the best explanation of the overall success of science. While the former is called as the "local defense of scientific realism, the latter is called as the "global defence of scientific realism" (Ladyman 2002: 210-213).

No-Miracle Argument (NMA), also called as the ultimate argument[9], is the global form of inference to the best explanation where the explanandum is the overall success of science. In this respect, the epistemological thesis of scientific realism or its more general thesis rests on the idea that "accepting that

[8] Italics is mine
[9] It is due to van Fraassen (1980: 39)

successful scientific theories describe truly (or, near truly) the unobservable world *best explains* why these theories are empirically successful" (Psillos 1999: 69).

Scientific realists argue that "scientists offer explanatory arguments of this form all the time …" and "that it is part and parcel of science and its method to rely on ampliative arguments and explanatory considerations in order to form and defend rational belief" (Psillos 1999: 37). In other words, realists argue that it is reasonable to employ abductive reasoning because scientists use abductive reasoning. Using abductive reasoning, we can make ontological commitments to entities posited by a scientific theory because it is the best explanation of the empirical success. Further, when the subject-matter is the overall empirical success of science, we can defend scientific realism because it is the best explanation of science. Nevertheless, making ontological commitments to unobservables posited by a scientific theory based on the inference to the best explanation does not seem to be rationally compelling because it is deductively invalid. It assumes that if a scientific theory is descriptively successful, then it will be empirically successful. It is empirically successful, therefore it is descriptively successful. In a formal way, if p, then q, q therefore p. This is a logical fallacy which is called affirming the consequent (van Fraassen 1980: 19-20).

What is salient about the epistemic thesis of scientific realism is that it urges to accept a philosophical position about science based on the scientific practice

itself[10]. While inference of the descriptive success of a given scientific theory as the best explanation is in question, it is problematic to use it to defend scientific realism. In other words, while the local defence of scientific realism is not secured, the global defence of scientific realism does not make sense. "[I]n this light the explanationist defense seems a paradigm case of begging the question, involving a circularity so small as to make its viciousness apparent (Fine 1991: 82).

> [S]ince it is IBE involving unobservables that is in question in the realism debate, it is circular to appeal to the explanatory power of scientific realism at the meta-level to account for the overall success of science because realism is itself a hypothesis involving unobservables. Hence, it is argued that the global defence is question begging (Ladyman 2002: 218).

Psillos says that the no-miracle argument is not viciously circular because it is not "premiss-circular" (1999: 79). In other words, scientific realism as the best explanation is not presupposed among the premises to conclude that scientific realism is the best explanation. Rather, it is rule-circular (Psillos 1999: 80). The rule is to accept the truth of a hypothesis among others on the basis of the best explanation it provides.

> Then, by means of a meta-IBE, the argument concludes that the background theories are approximately true. Since these approximately true theories have been typically arrived at by *first-order* IBEs, this information together with the conclusion of the meta-IBE entail that IBE is reliable. So, the truth of the conclusion of NMA is (part of) a sufficient condition for accepting that IBE is reliable. NMA is clearly *not* premiss-circular (Psillos 1999: 80).

[10] The scientific practice IBE, or abduction, is a mode of reasoning that we also employ in our daily life. The point, here, is that it is accepted by scientific realists as a legitimate mode of reasoning because of its application in the scientific practice itself.

One may or may not argue against scientific realism on the basis of the definition that "NMA is a kind of meta-induction" not premiss-circular but rule-circular (Psillos 1999: 77). However, the issue is rather different now. "Someone who comes to hold a belief because he found it explanatory, is not *thereby* irrational. He becomes irrational, however, if he adopts it as a rule to do so, and even more if he regards us rationally compelled by it (van Fraassen 1989: 132). NMA has no normative force for an empiricist to be a realist about science.

Epistemic thesis of scientific realism or the ultimate argument, for that matter, does not convince an empiricist to be a realist about the unobservables our mature scientific theories posit when it says that we can know that our best scientific theories are true or nearly true descriptions of the world. In other words, van Fraassen's critique of IBE is a critique of the epistemic thesis of scientific realism. Moreover, his critique of IBE does not only include when it is employed in scientific practice, it also involves 'ordinary cases':

> I hear scratching in the wall, the patter of little feet at midnight, my cheese disappears—and I infer that a mouse has come to live with me. Not merely that these apparent signs of mousely presence will continue, not merely that all the observable phenomena will be as if there is a mouse; but that there really is a mouse (van Fraassen 1980: 19-20).

Constructive empiricism exists within the boundaries of commonsense realism and considers scientific theories as constructions rather than discovery, making no contest against the literal interpretation of scientific theories and arguing against the existence of the theoretical entities and the claim to know their existence. Philosophy is no arbiter of facts and agreement about the semantic commitment is due to the fact that it represents the way scientists work. It is not

a virtue of scientific realism to have commitment to semantic realism because constructive empiricism has also the same commitment. *"Science aims to give us theories which are empirically adequate; and acceptance of a theory involves as belief only that it is empirically adequate.* This is the statement of the anti-realist position I advocate" (van Fraassen 1980: 12).

Seeing the elaborate evaluations of van Fraassen dedicated to the commitments of scientific realism - metaphysical, semantic and epistemic - and its lack thereof commitments to constructive empiricism, the analysis moves to offer

1. Ontological thesis: There is a mind-independent world.
2. Semantic thesis: Scientific theories are to be interpreted literally with the caution that philosophy is no arbiter of facts.
3. Epistemological thesis: We can only know what is observable by means of human physiology as a measuring apparatus.

The three thesis belongs to constructive empiricism if and only if they save the status of the observables. Scientific realist commitment to unobservables is an ontological commitment that goes beyond experience. Since scientific realism's ontology involves unobservables, its epistemological commitment involves belief in the reality of unobservables. On the other hand, constructive empiricism, as a common sense realist position, accepts only belief in the reality of observables. All in all, the issue boils down to the status of the observables and unobservables because while constructive empiricism is formulated in commonsense realism, scientific realism is formulated so as to include the ontology of (mature) science. And, when left with the status of observables and unobservables, the issue further complicates itself in the fact

that the properties of scientific objects do not resemble anything in experience because “the content is in excess of what can be known” (Psillos 1999: 13).

Van Fraassen draws parallel lines between nominalists and Aristotelian realists, and scientific anti-realists and realists:

> Part of the motivation for the nominalist rejection of the Aristotelian realists' world of powers, properties, dispositions (made famous by Molière's *virtus dormitiva*) was epistemological. The observation of the phenomena did not point unambiguously to the supposed causal connections behind them. This problem exists similarly for the atomic hypotheses: the phenomena do not decide their truth or falsity, though they are perhaps better explained by one hypothesis than by another. Subsequent scientists’ intent on clarifying the philosophical basis of their discipline found it ever more difficult to reconcile their professed empiricism and antipathy to metaphysics with an unqualified belief in hypotheses that describe a supposed world behind the phenomena.

It is interesting that he associates empiricism and antipathy to metaphysics and juxtaposes them to the belief in a world behind the phenomena. Restricting what can be known does not appeal to a scientific realist because the excess-content is already within the framework. Its ontology is open-ended by scientific discourse. Scientific realism tries to convince us that if we do not believe in science regarding ontology, then what...? On the other hand, constructive empiricism tries to show that the content produced by common sense realism provides the appropriate epistemological attitude regarding science. In this respect, while constructive empiricism commits itself to the semantic thesis, it remains silent about the “excess-content” of scientific theories by restricting its ontology to the experience-based epistemology established within commonsense realism.

3.3 Van Fraassen on the Manifest Image and the Scientific Image

VanFraassen criticizes Sellars' distinctive feature of the scientific image; the postulation of imperceptible entities when explaining empirical appearances. And two consequences that follow from Sellars' understanding of the scientific image are first, "any explanation would involve postulating something real beyond or different from anything found in the manifest image" (VanFraassen 1999: 32), and second, the descriptive and explanatory resources of "the manifest physical phenomena" are "necessarily explanatorily incomplete" (VanFraassen 1999: 32). Both claims establish the basis of the superiority of the scientific image over the manifest image because of the superiority of the descriptive resources of the scientific image.

VanFraassen simply rejects the demand for explanation: "I have no sympathy with … uncompromising demand for explanation" (1999: 32). Since constructive empiricism limits the success of science to empirical adequacy, any attempt to explain the manifest physical phenomena in terms of theoretical entities falls flat. Since explanation is not given a place in the aim of science semantic realism does not amount to believe in the imperceptible entities of scientific theories. In other words, constructive empiricism does not leave the limits of commonsense realism by making the aim of science as empirical adequacy even if it construes scientific theories literally. Thus, descriptive and explanatory resources of the scientific image remain functionless while *the status of everyday objects* remains intact.

Even a minute suspicion about *the status of everyday objects* while making realist interpretations of physical theories gives rise to a scientific anti-realist thesis. Constructive empiricism and cognitive instrumentalism have this tendency as the most recent scientific anti-realist positions. Rowbottom's definition of unobservables by means of observables echoes this characteristic:

> It involves a denial of semantic realism insofar as this pertains to talk of unobservable properties, but not unobservable objects provided that these are defined in terms of observable properties or by analogy with observables. I call this position *cognitive instrumentalism* because it rests on the notion that we can only think of (and discuss) the unobservable in terms of the observable (Rowbottom 2011: 1202).

The main motivation of these anti-realist tendencies is the empiricist position both van Fraassen and Rowbottom take. The empiricist position they take assumes naïve realism or commonsense realism, at least for constructive empiricism. In this respect, scientific realism poses a serious threat to the ontological basis of scientific antirealist positions. For example, Denkel says that there is a clash between commonsense realism and scientific realism and "the clash between the perceptual and the microphysical descriptions of the nature of material things cannot be alleviated if both are interpreted realistically" (1995: 46).

While van Fraassen explores the ways "to think about life without a worldview, life without world pictures," instead of the discourse of the manifest and scientific images, his proposal involves antirealism about science (1999: 31). DeVries who admires Sellars' distinction writes:

> Sellars' distinction … captures something important: the developments in science do challenge in fundamental ways the received conception of the world. Recent developments in science

> and medicine have forced us to rethink many of our beliefs about the origin and demise of persons, for instance.
>
> We could hold on to Sellars's distinction but revise our construal of the two images. We could, for instance, think of the scientific image primarily as a framework for human activity, rather than as a product of human activity (DeVries 2012: 14).

The issue is to fit "together ... the common sense conception of physical objects with that of theoretical physics". (Sellars 1963: 19) Another aspect of the issue is to fit "together of the common sense conception of man with that of theoretical psychology" (Sellars 1963: 19).

> It is worth noting that we have here a recurrence of the essential features of Eddington's 'two tables' problem—the two tables being, in our terminology, the table of the manifest image and the table of the scientific image. There the problem was to 'fit together' the manifest table with the scientific table. Here the problem is to fit together the manifest sensation with its neurophysiological counterpart. And, interestingly enough, the problem in both cases is essentially the same: *how to reconcile the ultimate homogeneity of the manifest image with the ultimate non-homogeneity of the system of scientific objects* (Sellars 1963: 35-36).

"[I]n the processes of postulating imperceptible entities … we do not simply add more of the same kinds of things already believed in to our world-view, we add new kinds of things and sometimes, new kinds of concepts" (DeVries 2016: 6). According to Sellars, "the scientific image fails to provide a point of view [of the concept of personhood] outside the manifest image from which the latter can be evaluated" (1963: 28).

In his stereoscopic view, Sellars has decided to leave behind the common sense conception of physical objects. On the other hand, he has decided to put in the scientific discourse a commonsense conception of man. His views about the

abandonment of the common sense conception of the physical objects seems to be at best objectionable in a degree in that "[w]e need a coherent ontology, fit for science and accommodating commonsense, a worldview in which we can rest in peace (VanFraassen 1999: 49).

Sellars is telling of a theory about science which can be accounted for, for the most part, as a form of scientific realism. The most important aspect about it is that it carries a metaphysics constructed upon what scientific theories tell about the world. It is no coincidence that Churchland named his article Eliminative Materialism. In Churchland's article Sellars' project has been carried one step ahead in "some form of eliminativism, an alternative that some of his students adopted and some of his critics thought Sellars was committed to, but which never held any real attraction for Sellars" (deVries 2012: 5). Paul and Patricia Churchland, Sellars students, assume, not only, that commonsense conception of physical objects is explainable by the imperceptibles of physical theory but also commonsense conception of personhood. Sellars' stereoscopic vision which brings together the imperceptibles of physical theory and the commonsense conception of personhood is replaced with the eliminative vision which eliminates all constituents of commonsense. Similar to the narrative within which was produced a new and clearly defined commitments for constructive empiricism, the analysis moves to demonstrate how there too exists the problem of reconciliation between theories of psychology and neuroscience and applies the constructive empiricist approach to offer a view that allows that same problem a separate solution. Eliminative materialism simply claims that folk psychological concepts are to be displaced by the concepts of mature neuroscience (Churchland 1981). And, neuroscientists claim

the same thing. For example, Lisa Barrett says that “what if the phenomena we want to explain—emotions, cognitions, the self, behaviors—are not just the subject matter of the human mind, but are also the creations of that mind? What if the boundaries for these categories are not respected in the very brain that creates them?” (2009: 327). These and related topics will be the subject of the next chapter.

Chapter 4

Common Sense Psychology and Neuroscience

In this chapter, a constructive empiricist approach is elaborated regarding the "irreconcilable codependence", as Eric Hochstein puts it in his article: Giving up on convergence and autonomy: Why the theories of psychology and neuroscience are codependent as well as irreconcilable (2015). To tie the discourse of the manifest image and the scientific image into the domain of psychology and neuroscience it is important to recognize the unique concomitance. The likeness shines forth when closely examining vivid discussions concerning the relationship between psychology and neuroscience with respect to the problem of reconciliation. The vividness of the discussion can be accounted for with relatively late developments in brain studies. However that may be, "the ways in which common sense and science respectively conceive of [cognition rather than] the world" offers me the chance to discuss the problem of reconciliation from an entirely different perspective and discipline (De Caro 2015: 204).

Psillos says that "[t]he revolt against logical empiricism in the early 1960s took as one of its most important tasks that of uprooting the alleged dichotomy between theoretical and observational terms" (1999: 21). In the same way, Worth Boone and Gualtiero Piccinini say that:

> The cognitive revolution of the 1950s is most often juxtaposed against the behaviorist program it supplanted. By contrast with behaviorism's methodology and metaphysics, which is widely assumed to reject the postulation of cognitive states and processes, cognitive science explicitly postulates internal cognitive states and processes to explain intelligent capacities (2016: 1511).

The question “what” regarding the method of sciences such as physics plays a role on the question “how” to do the sciences about mind such as psychology. In other words, the shift from logical empiricism to scientific realism as to how to interpret theoretical entities, resulted in the transition from the behaviorist program to cognitive science. In this respect, the revolt against logical empiricism and the behaviorist program seems to have the same attitude: the postulation of imperceptible entities by means of which what is manifest in experience is to be explained. Cognitive science, “developed between the 1950s and the 1970s”, proposed “a neat division of labor” in the postulation of cognitive states and processes (Boone and Piccinini 2016: 1510-1524). “On the one side stood psychology … on the other side stood neuroscience… Explanations at these two levels were considered distinct and autonomous from one another” (Boone and Piccinini 2016: 1510). As an important figure in the cognitive revolution, Fodor makes clear the nature of the explanations of cognitive science: “We have no reason to doubt that it is possible to have a scientific psychology that vindicates commonsense belief/desire explanation” (1987: 16). In other words, explanations of psychology resort to common sense in postulating cognitive states and processes. Thinking about the autonomy principle between psychology and neuroscience, commonsense belief/desire explanations seem to be a main source in providing imperceptibles, i.e., the postulation of cognitive states and processes in explaining cognitive phenomena.

Common sense seems to be a main source because the autonomy of the commonsense belief/desire explanation is based on what is known as multiple realizability, the thesis that propositional attitudes (or psychological states)

cannot in principle be reduced to physical states. They are the functional states of which explanation is irrespective of the physical constituents that implement those very functional states.

The postulation of cognitive states and processes based on commonsense belief/desire explanations constitute exactly what is objected to by eliminative materialism (1981). Eliminative materialism defends the view that the postulated cognitive states and processes based on common sense are not legitimate because they are not in accordance with the language of neuroscience. Eliminative materialism urges to take into account neuroscientific studies in explaining cognition. In this respect, the discussion between eliminative materialism and functionalism is about the theoretical entities postulated in explaining cognitive phenomena. Eliminative materialism like functionalism is a heuristic position delineating which theoretical entities should be included in explanations of cognitive phenomena.

According to Hochstein (2015), it is not solely eliminative materialism that favors scientific image over the manifest image. John Bickle's and Carl Craver's interpretations of the explanations in neuroscience, for example, also favor the scientific image. Bickle and Craver are important because they develop philosophical positions concerning the relationship between psychology and neuroscience, with molecular neuroscience and cognitive neuroscience, respectively. In this regard, eliminative materialism has two camps: those who favors molecular neuroscience and those who favors cognitive neuroscience. Technical discussion occurs between them as to how

many levels are there in the neuroscientific explanations of cognitive phenomena and how to interpret the relationships between the levels[11].

Hochstein calls the position who favors the scientific image as "the convergence position" (2015: 135). As neuroscience and psychology develop reciprocally, this development will evolve into the displacement of psychology. Hochstein's "the autonomy position," favoring the autonomy of psychology, is the opposite (2015: 135). His preferred solution to the problem of reconciliation is "irreconcilable codependence" (2015). He says that "[i]t is the very tension between the irreconcilability of these different theories [of psychology and neuroscience], and their required codependence, that drives scientific practice forward" (Hochstein 2015: 136).

The problem of reconciliation begs for a solution, as James Klagge notes, "if folk psychological concepts and purposes would wither because of the advance of neuroscientific knowledge, this raises the value question of how best to manage the risk of that harm" (1989: 333). Harm is made possible by the absence of concepts such as the self, rationality, etc. To adopt mechanism seems "to plunge into the abyss, since the concept of personhood stands at the very center of our conception of ourselves and our place in the universe" (Stich 1983: 242). This is why Sellars chooses to join the concept of personhood into the scientific image itself.

Reconciliation is an attempt to ease the tension between common sense understanding of how things are and scientific understanding of how things are.

[11] To see the levels of the explanations, see figure 1, p. 83.

Regarding matter, this tension arises between common sense realism and metaphysical realism, in discourse between scientific realism and constructive empiricism. Regarding mind, this tension arises between functionalism and eliminative materialism when trying to reconcile between psychology and neuroscience. Despite a continuum of attempts made reach to it, reconciliation may never be obtained as Arda Denkel notes in his adoption of common sense realism saying, "the sacrifice of the commonsense perceptual view will undermine the empirical character of science itself … (1995: 42). Denkel may have said the same thing" against the claim that "both principles and the ontology of that [common sense] theory will eventually be displaced, rather than smoothly reduced, by completed neuroscience (Churchland 1981: 67). The reason is that common sense does not provide a real object of study to neuroscience. Neuroscience "discards and disregards what is manifest in experience …" (Denkel 1995: 43).

4.1 The Convergence Position

Materialism is the view that "there is only one substance, namely matter, and that there is no immaterial soul beyond the body because the human mind is no more than the product of matter in motion …" (Ladyman 2002: 133). Eliminative materialism is

> the thesis that our common-sense conception of psychological phenomena constitutes a radically false theory, a theory so fundamentally defective that both principles and the ontology of that theory will eventually be displaced, rather than smoothly reduced, by completed neuroscience. Our mutual understanding and even our introspection may then be reconstituted within the conceptual framework of completed neuroscience, a theory we may expect to be more powerful by far than the common-sense psychology it displaces, and more substantially integrated within a physical science (1981: 67).

It is called eliminative materialism because the main motivation behind the thesis is that the ontology based on common sense psychology should be eliminated. The ontology should be eliminated because it does not fit with the neurophysiological counterpart. The ontology attributes propositional attitudes in order to account for the movements, i.e. the behaviors of cognitive systems. Moreover,

> ... understanding a cognitive system in terms of what it believes, intends, and desires, can only be informative if we assume that the system will act in accordance with the rational connection between those mental states… Yet this idealization puts these psychological theories at odds with many theories employed by neuroscientists (Hochstein 2015: 139).

Hochstein goes further to predict how the elimination process of "the rational connection between those mental states" will happen writing: "As neuroscience and psychology improve and change over time, the theories and models of both domains will slowly co-evolve together, each undergoing alterations and changes until they converge on a single unified theory of cognitive behavior" (Hochstein 2015: 135, 139). According to Hochstein, "many philosophical arguments for the reduction of psychology to neuroscience, or the elimination of psychology in favour of neuroscience, can likewise be folded into this general project of convergence" (2015: 137). The general project of convergence also involves "more recent theories of convergence that base their accounts on the mechanistic nature of explanation in the life sciences (Hochstein 2015: 137). In a nutshell, those who favor the scientific image over the manifest image of mind may be grouped as eliminativists, reductionists such as John Bickle and "'the new mechanists' such as [William] Bechtel and [Carl] Craver" (Peter Marshall 2009: 118). Reductionism, here, should be

understood “as the idea that lower-level mechanisms are explanatorily privileged” (Piccinini and Craver 2011: 284)

Lately, Bickle calls his position “eliminativist” with a little ‘e’ in order to contrast it with Churchlands’ “Eliminativism” with capital ‘E’ (2014: 134). And, “new mechanists”, Piccinini and Craver, reformulate functional analyses into mechanistic explanations (2011), thus transferring the autonomy thesis of functionalism into explanations of cognitive neuroscience since they favor multi-level understanding of a cognitive system. In the following, I will analyze eliminative materialism, Bickle’s e-eliminativism and new mechanists’ functionalism.

4.1.1 Eliminative Materialism

Eliminativists are “pessimistic about the prospects of reduction” (Churchland 1981: 72). This is because “folk psychology is a radically inadequate account of internal activities … too defective to win survival through intertheoretical reduction (Churchland 1981: 72). The pessimism can be seen among the neuroscientists as well. Lisa Barrett asks:

> What if the phenomena we want to explain—emotions, cognitions, the self, behaviors—are not just the subject matter of the human mind, but are also the creations of that mind? What if the boundaries for these categories are not respected in the very brain that creates them? (2009: 327-328).

For Barrett,

> ... it is a brute fact that the brain contains neurons that fire to create mental states or cause actions and this occurs independent of human experience and measurement. It is not a brute fact, however, that this neuronal activity can be easily classified as automatic processing or controlled processing; that some ‘‘islands’’ in the brain realize

> cognitions whereas others realize emotion; or even that the self, or goals, or memories live in specific parts of the brain (whether in a local or distributed specific, unchanging network) (2009: 329).

"Then we end up arguing about whether the amygdala is the brain locus of fear, whether dopamine is the hormone for reward, or whether the serotonin transporter gene (5-HTTLPR) is the cause of depression" (Barrett 2009: 330). As a practicing scientist, she asserts that emotion categories such as anger, sadness, etc. are observer-dependent psychological categories because "perceiver independent measurements of faces, voices, bodies, and brains do not clearly and consistently reveal evidence of these categories" (Barrett 2009: 328)[12]. Barrett calls this *emotion paradox* (2006b). She proposes that valence (pleasantness) can be a building block of the emotional life (Barrett 2006c: 35). She says that it may also not be respected by the brain, but it is certainly better respected than anger, sadness etc.

The studies by Barrett and her colleagues may have been construed as an elimination at work. They are then apparent practitioners of the philosophical position, eliminative materialism. As an important addition to what practicing neuroscientists do, "*[p]hilosophy of neuroscience*, a now-recognized field of academic philosophy, very much began with the Churchlands (Bickle 2014: 237). In this framework, reductionists and mechanists are merely two different considerations to understand how neuroscientific explanations of the mind should be.

[12] Barrett also refers to the following articles to defend her position: Barrett, 2006a; Barrett & Wager, 2006; Barrett, Lindquist, et al., 2007.

4.1.2 Reductionists and Mechanists

Eliminative materialism is construed in different ways by mechanists and reductionists. Both locate eliminative materialism on their opposite sides. Bickle, for example, quotes the following paragraph to say that Patricia Churchland favored multi-level explanation in neuroscience:

> Fine-grained detail has accumulated concerning such things as the molecular structure, location, synthesis, blocking agents, and enhancing agents of the various neurochemicals, but there is still nothing remotely resembling a comprehensive *theory* of what they do or of how the known psychological effects result from tinkering with them… Until we have higher-level concepts to describe what configurations of neurons are doing, we have no means of bridging the gap between molecular descriptions and molar ["systems-level"] descriptions (1986: 82).

Bickle's inference from this passage is the following:

> Philosophers of neuroscience have followed Churchland's lead. They have virtually ignored developments in cellular and molecular neuroscience over the past two decades and have instead sought "psychoneural links" at the levels of neuronal regions, ensembles, their connectivities, and their "systems" properties and dynamics (e.g., Bechtel, Mandik, Mundale & Stufflebeam, 2001) (Bickle 2006: 414).

The reductionists favor molecular neuroscience to explain the behaviors of a cognitive system. The mechanists favor levels that allow molecular neuroscience, for example, to deal with the parts that compose one level of the overall system. The real issue between those positions is the concept of level, constituting the neuroscientific explanation of a cognitive system. For example, "if the eliminativist approach implies that cognition itself—and all "cognitive" theoretical posits, such as representation, computation, or information processing—should be eliminated", then the solution is "antithetical to cognitive neuroscience" which is favored by new mechanists (Boone and

Piccinini 2016: 1514). In other words, these positions can be differentiated by the levels they favor and by deciding which behaviors of a cognitive system can be explained.

Daniel Stoljar and Ian Gold name reductionists as those who defend the view that "mental science is biological neuroscience, where biological neuroscience is intended to include only those sciences traditionally regarded as part of neurobiology, roughly: neuroanatomy, neurophysiology and neurochemistry" (1998: 111). This is also called "the stronger thesis" (1998: 111). "[T]he weaker thesis … holds that mental science is cognitive neuroscience…. intended to include the vast family of sciences … including both biology and psychology" (Stoljar and Gold 1998: 111).

Stoljar and Gold say that the rationale behind the biological neuroscience can be put forward as follows:

> Since the brain is of a piece with other biological phenomena, it seems reasonable to suppose that it can be explained just as they are; and since much of the realm of the biological can be explained with reference to cells and functions, it is plausible that the same will be the case with the mind. That is, the mind will be explained with reference to the cells of the brain (1998: 114).

Reductionists such as Bickle, for example, try to explain a cognitive system exactly in that fashion. For example, he tries to explain memory[13] consolidation by means of a neuronal process called "long term potentiation" (LTP). Mechanists, or those who favors cognitive neuroscience, on the other hand, regards LTP as one level in the explanation of memory consolidation. The

[13] To see the modern taxonomy of memory, see figure 2, p.84.

difference between reductionists and mechanists is made clear when understanding explanations of memory consolidation in biological neuroscience and cognitive neuroscience differ. Further revealed is the practical aspect of the problem of fitting "together the manifest sensation with its neurophysiological counterpart", "a recurrence of the essential features of Eddington's 'two tables' problem'…" (Sellars 1963: 36).

4.1.3 Long Term Potentiation (LTP)

The story goes back to 1953 when the patient, Henry Molaison, suffering from epilepsy, had medical surgery which involved bilateral removal of the medial temporal lobe.

> Consequent to this procedure, H.M. showed a profound anterograde amnesia which has persisted essentially unchanged. The retrograde amnesia is now restricted mainly to the year before his operation, and there is no general intellectual loss or deficit in attention span. (Corkin 1968: 255).

> For example, H.M. could retain a three-digit number for as long as 15 min by continuous rehearsal, organizing the digits according to an elaborate mnemonic scheme. Yet when his attention was diverted to a new topic, he forgot the whole event. In contrast, when the material was not easy to rehearse (in the case of nonverbal stimuli like faces or designs), information slipped away in less than a minute. These findings supported a fundamental distinction between immediate memory and long-term memory (what William James termed primary memory and secondary memory) (2008: 7).

He describes his psychological state as "constantly waking from a dream and everything looking unfamiliar" (Andersen et al. 2007: 13).

Stark emphasizes the massive significance of the case H.M. for neuroscience when he writes, "it would be almost impossible to begin a discussion of the role

of hippocampal region in human memory without considering the patient H.M." (2007: 550). It was observed that H.M. could acquire new skills but could not remember learning them (Milner, 1962). "This demonstration provided the first hint that there was more than one kind of memory in the brain and suggested that some kinds of memory (motor skills) must lie outside the province of the medial temporal lobe" (Squire 2008: 7). The medial temporal lobe[14]was the region removed in the surgery and "includes the amygdala, the hippocampus, the entorhinal cortex, and the surrounding parahippocampal and perirhinal cortical areas" (Gazzaniga et al. 2002: 319). "As a result of the effects on H.M., as well as subsequent animal studies confirming the original findings, it has been proposed that the hippocampus functions to create long-term memories from short-term ones" (Stoljar and Gold. 1998).

"Studies in the hippocampus beginning in the 1970s have also revealed a striking form of synaptic plasticity known as *long-term potentiation* (LTP)" (Bechtel 2008: 74). The definition of the synaptic plasticity depends on the proposition which "has come to be called *Hebb's postulate* or *Hebb's rule* (Stoljar and Gold 1998: 123):

> When an axon of cell A is near enough to excite a cell B and repeatedly or persistently takes part in firing it, some growth process or metabolic change takes place in one or both cells such that A's efficiency, as one of the cells firing B, is increased (Hebb 1949: 62).

"Thus an electro-chemical event in the A-B synapse brings about a change in the strength of that synapse, that is a change in the efficacy of A on B. This synaptic plasticity is what links LTP to Hebb's rule" (Stoljar and Gold 1998: 125).

[14] To see the formation of hippocampal system, see figure 3, p. 85.

"Long-term potentiation quickly became a popular experimental target when the "molecular wave" began washing over neuroscience two decades ago (Bickle 2006: 416). Bickle says "molecular wave" because he defends the reduction of mental phenomena to a molecular level. The reduction here does not involve, however, the reduction of the folk psychological concepts. It solely involves the following:

> • intervene *causally* at the level of cellular activity or molecular pathways within specific neurons (e.g., via genetically engineered mutant animals, as in the case study described in the previous section);
> • then track the effects of these interventions under controlled experimental conditions using behavioral protocols well accepted within experimental psychology (Bickle 2006: 425).

As a reductionist, Bickle attributes to "higher level investigations and explanations" a heuristic role which play *no* role in the explanations of behavior once they have completed their heuristic role (Bickle 2006: 428). Their heuristic role will be to isolate "the relevant neuroanatomy and the candidate cellular and molecular mechanisms…" (Bickle 2006: 428).

In contrast, the new mechanists who favor cognitive neuroscience regard the explanation of molecular neuroscience as forming a level in the mechanism of the memory system. They do not consider the higher-level investigations and explanations as having only heuristic value; rather, for them, a cognitive system should be studied in levels. For mechanists, cognitive neuroscience studies

> ... nervous systems using many techniques at many levels. They study how cortical areas and other neural systems contribute to various cognitive capacities, how the capacities of those systems are explained by the operations of the neural subsystems that compose them (columns, nuclei), how networks and circuits contribute to their containing systems, how neurons contribute to networks and circuits, and how subneuronal structures contribute to neuronal capacities. Analyzing systems across such varied levels involves coordinating

> techniques ranging from molecular neuroscience and genetics to neurophysiology, neuroimaging, mathematical analysis, computational modeling, and a wide range of behavioral tasks. (Boone and Piccinini 2015: 1515).

In this respect, memory consolidation cannot be explained only by the molecular process called LTP. Rather, the explanation should involve the gross anatomy of the hippocampus because "[t]he hippocampus has a highly distinctive neuroarchitecture that provides suggestive clues as to how it might be capable of such dissimilar memory encoding operations" (Bechtel 2008: 74).

Interestingly and apart from the discussion about the levels of explanation of a cognitive system, "…animal research in the years after H.M. generated a rather different account of the functions of the hippocampus" (Bechtel 2008: 75). Animal research found that rats with hippocampal lesions were unable to succeed in spatial navigation. In the experiment, rats were put in a water maze. A submerged platform was placed in the water maze on which rats can stand. With effortful swimming, rats were able to find the place of the submerged platform. After learning the place, normal rats went directly to the platform no matter from where they were released to the water maze. On the other hand, rats with lesioned hippocampus went directly to the platform only if they were released from the same point. When they were released from a different point to the maze, they searched for the platform all over again (Morris et al. 1982). Instead of resting on the idea that episodic memory and spatial navigation are narrative to the hippocampus, the need to focus on the processes that give rise to these phenomena occurred. For example, Howard Eichenbaum and his colleagues "proposed that what is crucial about declarative memory (and what the hippocampus accomplishes) is establishing relationships between

information items that can be accessed in a flexible manner" (1993). They suggested that spatial memory is just one example of this kind of memory" (Bechtel 2008: 76). In the same manner, John Gabrieli et al. suggests that "operations may be the same whether they are considered in the context of language, working memory, episodic memory, or implicit memory (1998: 912). If the operations are the same, then the distinctions between language, memory, etc. may be drawn by us phenomenally. Then we can assert that thoughts, memories, etc. are "collections of mental states that are products of the brain, but they do not correspond to brain organization in one-to-one fashion" (Barrett 2009: 328). Neither reductionists nor mechanists are uninterested in these kinds of suggestions which are based on neuroscientific studies. This is why they are both listed under "the convergence thesis" by Hochstein (2015).

4.1.4 A Note on Mechanists and Reductionists

In order to make cognitive neuroscience seem revolutionary, mechanists say that

> [i]n place of the eliminative/reductive and classical functionalist / autonomist views of cognitive science, we have proposed the framework of integrated, multilevel, representational, and computational neural mechanisms as capturing the essence of successful explanation in cognitive neuroscience (Boone and Piccinini 2016: 1530).

This classification seems wrong because the ultimate motivation for eliminativists, reductionists and mechanists is to explain a cognitive system by means of the activities of the brain. Here, eliminative materialism plays the heuristic role and reductionists and mechanists provide technical details. "Indeed, Churchland and Sejnowski [1992] wrote one of the earliest primers in

computational cognitive neuroscience" (Bickle 2006: 413). In this respect, it does not make sense to place eliminative materialism as a rivalry to those who favors cognitive neuroscience.

Boone and Piccinini set the stage for cognitive neuroscience as there were two traditional positions to account for the cognitive phenomena: "traditional autonomist and reductionist views" (2016: 1520). Their suggestive difference is that: while the former is against explanations of cognitive phenomena in terms of activities that take place in the brain, the latter defends the view that explanations of cognitive phenomena should be described in terms of the activities that take place in the brain. As an improvement upon those positions, explanations of cognitive neuroscience is said to provide "integrationist framework" (Boone and Piccinini 2016: 1520). "In this framework, neither structure nor functions are given primacy over the other; neither can explain cognition without the other (Boone and Piccinini 2016: 1522).

> Traditional reductionist – e.g. type physicalists (Smart 1959) – strove to identify mental types with physical types. As a result, they may be interpreted as focusing on structural properties at the expense of functional properties, relegating the latter to "second order states" of physical types (Smart 2007). Traditional functionalists do the opposite: they give primacy to functional properties at the expense of structural properties (e.g., Putnam 1967; Fodor 1968a) (Boone and Piccinini 2016: 1520-21).

By contrasting traditional reductionists and traditional functionalists, cognitive neuroscience is put forward as an answer to the problem of reconciliation. "That problem is to understand how the disciplines that study cognition fit together … with neuroscience" (Boone and Piccinini 2016:1513-14)

According to new mechanists, if eliminativism is construed radically enough to eliminate "all 'cognitive' theoretical posits, such as representation, computation, or information processing" then the solution is antithetical to cognitive neuroscience because "[c]ontemporary cognitive neuroscience aims to explain cognition on the basis of neural computation over neural representations. On the other hand, this way of contrasting eliminative materialism and cognitive neuroscience is not impartial. Churchland, with Sejnowski wrote the article "Neural Representation and Neural Computation" in 1990 which says that "[t]he types of representation and the styles of computation in the brain appear to be very different from the symbolic expressions and logical inferences that are used in sentence-logic models of cognition (343). What seems obvious is that Churchland does not hesitate to use the concepts of representation and computation. Rather, she contrasts neural representations with the representations that occur in the explanations of cognitive science. To say that "neither eliminativism nor reductionism offers a satisfactory framework for explanation in cognitive neuroscience; the former as it neglects cognition altogether; and the latter because it offers only partial explanations" seems unfair (Boone and Piccinini 2016: 1515).

As an answer to the problem of reconciliation, cognitive neuroscience is defined as the integration of neuroscience and cognitive psychology:

> the resulting framework for explaining cognition is a mechanistic version of homuncular functionalism, whereby higher-level cognitive capacities are iteratively explained by lower-level cognitive capacities until we reach a level at which the lower level capacities are no longer cognitive in the relevant sense (Boone and Piccinini 2016: 1524).

A level is defined as cognitive "depending on the extent to which the components of that level perform computations over representations in a way that is relevant to explaining some cognitive capacity" (Boone and Piccinini 2016: 1524). These computations and representations are said to be different because they are neural computations and neural representations as of being the cognitive level as a neurocognitive level (Boone and Piccinini 1524).

What emerges is the move from functionalism to homuncular or "mechanistic functionalism". Piccinini and Craver argues that "functional and mechanistic explanations are not distinct and autonomous from one another precisely because functional analysis, properly constrained, is a kind of mechanistic explanation – an elliptical mechanistic explanation" (2011: 284). Against this formulation, reductionists such as Bickle defend explanations "that are no longer computational but instead purely biophysical… These purely biophysical (and lower) levels are no longer representational and computational in the relevant sense" (Boone and Piccinini 2016: 1524).

Hochstein acutely notes that mechanists and reductionists constitute the convergence position with the motivation they share with eliminative materialism. The feature of the convergence position, according to Hochstein, is that psychological explanations will resemble neuroscientific explanations in the long run. This is why I consider eliminative materialism and functionalism as heuristic positions. They provide materials to the discussions regarding the nature of explanations in neuroscience.

4.2 The Autonomy Position

Opposite to "the convergence thesis", there are those who favor the autonomy of psychology which posits that "[w]hat is likely the most commonly held view among contemporary philosophers of mind regarding the relationship between psychology and neuroscience is that the explanations of the two domains are largely autonomous from one another" (Hochstein 2015: 137). We have no reason to doubt the rational network that navigates through the propositional attitudes in explaining the movements, i.e., behavior of a cognitive system. Propositional attitudes form the functional states which do not need the investigation of the physical implementation. In other words, these functional states have an autonomy of their own. Their explanation requires only the definition of the functional state and the establishment of the relations that holds between the functional states. "The theories of psychology characterize functional states of systems that can be realized in different ways by different mechanisms, while the theories of neuroscience only characterize the physical implementation of neurological mechanisms" (Hochstein 2015: 135). Psychology is considered as an autonomous science, the thesis of the "multiple realizability". This is why Hochstein calls the thesis of "multiple realizability" the "autonomy position" as opposed to "the convergence position" (2015: 135).

Both Stoljar and Gold (1998) and Hochstein (2015) provide the same arguments while arguing for the autonomy of psychology. The first argument is based on the claim that psychological explanations cannot be reduced to neuronal explanations because psychological explanations involve more than what is covered by neuroscientific explanations.

> After all, cognitive behaviour is not solely the product of neural mechanisms. Additional causal influences include genetic, epigenetic, historical, environmental, dynamic, developmental, socio-economic, cultural, and the embodied characteristics of the system, to list only a few (Hochstein 2015: 138)

Stoljar and Gold call this argument "externalism": "the social, physical and evolutionary environment" and understand that these environments "do not supervene on neural facts (1998: 115).

The other argument comes from "considerations of the levels of explanation": "[t]he mere fact that As are made up of Bs does not by itself mean that the explanation of As is to be given *in terms of Bs* (Stoljar and Gold 1998: 115). Interestingly enough, this argument is used by mechanists to ensure the levels of explanation in cognitive neuroscience and by autonomists who defends "multiple realizability" to ensure that functional states and their implementations are two different things. In other words, this argument against "the convergence thesis" is also used by those who are in "the convergence thesis". The difference arises in how radical the construal of the argument will be. If it is construed radical enough not to include any material from neuroscience to psychology, it serves for "the autonomy thesis". Conversely, if it is construed liberal enough to develop psychological theories in relation to neuroscience by accepting additional causal influences such as environment - which cannot be covered by neuroscience - the argument serves for the mechanists. Reductionists who are outside of this discussion, "*reduce* psychological theoretical posits to neuroscientific theoretical posits" (Boone and Piccinini 2016: 1514).

4.3 The Irreconcilable Codependence

Hochstein says that neither “the convergence position” nor “the autonomy position” are correct. While psychology and neuroscience are irreconcilable, they are also codependent on each other. In that, there is an irreconcilable codependence between them, “necessary for both domains to improve and progress” (Hochstein 2015: 135). “The theories and models of psychology and neuroscience are deeply dependent on one another for further refinement and improvement, yet this dependence does not imply the eventual convergence of the two disciplines” (Hochstein 2015: 135).

In the problem of relating psychology and neuroscience, there are two positions that disregards one another: the “autonomy position” and “convergence position”. They resemble what Sellars calls “the manifest image” and “the scientific image”. Hochstein calls both positions inaccurate in understanding the relationship between psychology and neuroscience. The former claims that “it is possible to have a scientific psychology that vindicates commonsense belief/desire explanation (Fodor 1987: 16). The latter claims that neuroscientific explanations transform psychological explanations in that psychological explanations will converge to neuroscience and that as a result, psychology and neuroscience will resemble each other until the merge completes. Although mechanists preserve the status of psychology, this does not form a shelter to psychology. This is because explanations of psychology seem to change in light of the new developments of neuroscience. As mentioned above, the case of H.M. resulted in a thought process that there are different types of memory systems. This seems to show that psychological

explanations or explanations of functional states may not be as independent as "the autonomy position" declares.

4.4 Constructive Empiricist Approach

What is crucial about constructive empiricism is that van Fraassen does not only "formulate constructive empiricism on the basis of the epistemic inaccessibility of the unobservable" entities and processes (2003: 490). He also formulates constructive empiricism on the basis of commonsense realism (2003: 480-481). Recall Russell's point in stating that empiricist epistemology faces a complicated situation when naïve realism is false (1923: 213). In this respect, since "realists are engaged in ontology …, there is *an empiricist take on the same philosophical labor"* (van Fraassen 2003: 491).

Science is an activity whose end product is a representation. For van Fraassen, commonsense realism is the proper ontological attitude to science. Metaphysical questions regarding unobservables, substance, causality, etc. are questions not about nature but about nature as represented in scientific theories.

> For when we analyze the scientific image *as representation* all those questions posed in ontology do arise—such as questions about substance, individuation, causality, haecceity—but in a new key. They are not just *verbally* the same questions, for the concepts used belong to the same conceptual framework drawn from metaphysics. But on empiricist lips they are questions *not about nature, but about our representation of nature.* Empiricist philosophy of science revamps and relocates those metaphysical questions, giving them a distinctly different (though structurally similar) content, namely as questions about *nature as represented,* not about nature (van Fraassen 2003: 491).

Van Fraassen wants to expand the discussion about unobservables to include nature itself in terms of how we conceive it with our scientific theories. He

wants to draw attention to the discussion between scientific realism and anti-realism along with theories as representations of nature. In this framework, the questions belong to the model in which nature is formulated as such. In this respect, van Fraassen wants to discuss unobservables as an aspect of nature as it is represented. This is in contrast when unobservables are discussed as an aspect of nature.

He seems to think that discussions of scientific theories as representations of nature does not downgrade constructive empiricism as a position based on the epistemic inaccessibility to unobservables. Constructive empiricism is not a position to be reduced to discussions about observables and unobservables. When the discussion is about nature as represented by scientific theories, but not about the nature itself, empirical adequacy seems to be the only criterion of success because we are not pursuing to grasp a reality. In this framework, common sense realism provides the optimum framework to describe and assess both scientific activity and scientific product.

Van Fraassen seems to think that ontology, based on common-sense realism, prevents ideas from straying into metaphysics. On the other hand, "ontological (or metaphysical) scientific realism for a number of categories of observable and unobservable items found in science …" do stray into metaphysics (Nola 2006: 183). Labeling commonsense realism as the "trusted basic discourse", van Fraassen conducts a survey about "what is science" without recourse to metaphysics (2003 481). For him, "[t]he notion of a basic unit of physical existence must be distinguished from that of an ultimate of metaphysical analysis, a primitive which accounts for other principles but itself is not

explained by anything else" (Denkel 1996: 16). Common sense realism provides this notion of a basic unit of physical existence. After all, van Fraassen says that [f]or we can and do see the truth about many things: ourselves, others, trees and animals, clouds and rivers—in the immediacy of experience (1989: 178).

Scientific theories construct models. When scientific theories concern matter, constructive empiricism favors common sense realism. When scientific theories concern human psychology, constructive empiricism seems to favor common sense psychology. The questions of cognitive neuroscience and molecular neuroscience are not the questions of some reality about the common sense psychology. Their questions are the questions of the models themselves. In this respect, the discussions between the autonomy position and the convergence position are regarded as different formulations of human psychology, of which merit is determined solely by empirical adequacy. Likewise, the discussion between new mechanists and e-eliminativists, concerning the levels of explanations of a cognitive system, is about their framework and their formulations. The different formulations allow human psychology to be represented in different ways. For example, memory consolidation can be represented by the molecular structure which is revealed as LTP or memory consolidation can be represented in a way in which LTP is regarded as a part of an overall structure. Moreover, it is possible that one of the accounts of memory consolidation may survive the competition. This is not to say that it survives because it grasps the reality in a more faithful way. Rather, it survives because "any scientific theory is born into a life of fierce competition, a jungle red in tooth and claw. Only the successful theories survive—the ones which *in*

fact latched on to actual regularities in nature" (van Fraassen: 40). For constructive empiricist approach, functionalism and eliminative materialism, as heuristic positions, pursue their scientific investigations with their different formulations of human psychology rather than grasping some reality about human psychology. In the same way, e-eliminativism and mechanistic functionalism pursue their explanatory levels in their respected neurosciences with their different formulations rather than grasping some reality about human psychology. What matters is that their questions about human psychology are about the representations not about the psychology itself.

Chapter 5

Conclusion

> In the positivist tradition from Comte to van Fraassen, the phenomenal behaviour of meatballs and monkeys may be known, but talk about muons is at most an intellectual construct for prediction and control. Antirealists about muons are realists about meatballs. I call this a colonial war because one side is trying to colonize new realms and call them reality, while the other side opposes such fanciful imperialism.
>
> Then there is *civil* war, between say Locke and Berkeley. The realist (Locke) says that many familiar entities have an existence independent of any mental goings on: there would be monkeys even if there were no human thoughts. The idealist (Berkeley) says everything is mental. I call this a civil war because it is fought on the familiar ground of everyday experience (Ian Hacking 1983: 95-96).

The problem of reconciliation is that a colonial war transforms into a civil war. According to Ladyman, "[w]e could try and mount a defence of extension, motion and so on as primary properties, but unfortunately, about these properties modern science seems to be on Berkeley's side (2002: 144). It is on Berkeley's side because Berkeley opposes the distinction between the primary qualities and the secondary qualities. Today, the primary properties listed by corpuscularians such as mass, etc. are not regarded as the ultimate properties of entities physics deals with. The candidates of primary properties today are spin, charm, etc. and they do not seem resembling anything in our experience.

When Eddington says that substance is our illusion, he points at the scientific understanding of matter which seems very different from our everyday conception. According to Eddington and Russell, contemporary atomic theory is in complete contrast with naïve realism. In other words, things are not what

they seem anymore. Moreover, this seems to pose a problem for the epistemological position, empiricism. If things are not what they seem, empiricist claim that knowledge comes from experience may not be defended. Scientific theories may be interpreted realistically but this seem to jeopardize the status of everyday experience or naive realism. This is why van Fraassen seems to formulate constructive empiricism within common sense realist discourse, where scientific theories are also evaluated as well, in a scientific antirealist fashion.

According to van Fraassen there is nothing problematic about the literal interpretation of scientific theories. The problem arises when they take place in a framework to *explain* everyday objects. This is why *the status of everyday objects* seems to be jeopardized. The explanatory power of the theoretical entities implies the ontological superiority over the properties of everyday objects. Ladyman's complaint about van Fraassen is representative of the issue: "It seems the debate between scientific realists and van Fraassen leads back to the debate about the existence of everyday objects …" (2003: 227). An everyday object like a table for instance:

> has colour, shape, weight, a typical texture, hardness, etc. It is motionless both as a whole and in part, persistent at least over the stretch of time I perceive it, and occupies a region of space fully, that is, without leaving gaps. It is impenetrable: I cannot place another concrete object into the spatial region occupied by this table at the same time. Though imperfectly, this description summarizes the way in which we are phenomenally aware of what we characterize as physical things (Denkel 1995: 23-24).

This analysis allowed me to develop the discussion between constructive empiricism and scientific realism with respect to common sense realism and

scientific realism, which is, according to van Fraassen, embedded in metaphysical realism. I tried to disclose what is hidden in the discussion between constructive empiricism and scientific realism because I wanted to construct a relationship between this discussion and Sellars's images. They are the manifest image and the scientific image. The manifest image and the scientific image differ in so far as the scientific image postulates imperceptibles in order to explain what is manifest in experience. This also implies the ontological superiority of the scientific image over the manifest image.

Van Fraassen argues against this kind of demand of explanation. The reason why he argues against this kind of demand seems meaningful when thinking that constructive empiricism is an interpretation of science within the empiricist tradition. According to van Fraassen, constructive empiricism is not a variant of empiricism. It is an empiricist philosophy of science. In this respect it differs in its evaluation of the theoretical entities from scientific realism. While scientific realism makes commitment to the existence of the theoretical entities, constructive empiricism is unwilling to make such commitment. The important thing here is, though, constructive empiricism commits itself to common sense realism. Moreover, scientific realism, by committing itself to theoretical entities, commits itself to metaphysical realism because the commitment to theoretical entities does not seem possible without the commitment to metaphysical realism. And, as it is pointed above, this is the reason why the discussion turns into a civil war regarding the status of the everyday objects and their properties.

The same problem appears in the discussions concerning the relationship between psychology and neuroscience. In other words, the same problem appears concerning the status of common sense psychology. Functionalism defends the view that "it is possible to have a scientific psychology that vindicates commonsense belief/desire explanation", autonomous from neuroscience (Fodor 1987: 16). On the other hand, eliminative materialism discredits commonsense belief/desire explanation and defends neuroscientific terms and entities when explaining what is manifest in experience. The difference between functionalism and eliminative materialism may be put forward as the following: while functionalism derives theoretical entities from common sense psychology, eliminative materialism derives theoretical entities from neuroscience. In this respect, they are both antithetical to constructive empiricism. They work in the same paradigm that is established around 10950s when " "[t]he revolt against logical empiricism took as one of its most important tasks that of uprooting the alleged dichotomy between theoretical and observational terms" (Psillos 1999: 21). Thinking about the establishment of cognitive science around the same date against the behaviorist program, the postulation of inner mechanism to explain behavior, the same attitude of uprooting against the logical empiricist approach seems apparent. While behaviorist program avoids such postulation, cognitive science explicitly postulates inner mechanisms.

Fodor, for example, with the thesis of multiple realizability, assumes autonomy between psychology and neuroscience. The physical states that are studied by neuroscience assumed to have no bearings on the mental states. Eliminative materialism on the other hand claims the opposite. There are also those

unconvinced by the autonomy thesis, classified as the new mechanists and reductionists such as Bickle. The mechanists favor multiple levels in the explanations of a cognitive phenomenon and exemplify the explanations of cognitive neuroscience. New mechanists say that psychological explanations are not autonomous because neuroscientific studies have effects on psychological explanations and vice versa. “The scientific practices based on the old two-level view (functional / cognitive / computational vs. neural / mechanistic / implementation) are being replaced by scientific practices based on the view that there are many levels of mechanistic organization” (Boone and Piccinini 2016: 1510). In other words, cognitive science is replaced by cognitive neuroscience which assumes autonomy between multi-level and irreducibility of the levels due to the functional organization. This is why they are identified as the latest upgrade to functionalism (Maley and Piccinini 2013).

The shift from two-level to multi-level, i.e. from cognitive science to cognitive neuroscience, is not regarded as the only reasonable move to be accepted by those who find the autonomy thesis unconvincing. Bickle, for example, says that cognitive phenomena can be explained by the molecular mechanisms of neurons. It is possible to construct an explanation of a cognitive system from the molecular explanations of neurons. The levels in between have only heuristic value. This position seems to be a two-level view but without the autonomy, i.e., from molecules to cognitive phenomena. Essentially, those favoring two-level without autonomy are reductionists seeking explanations in terms of the molecular basis of cognition.

With the constructive empiricist approach, the questions of cognitive science, cognitive neuroscience and molecular neuroscience becomes questions about *human psychology as represented*, not about human psychology. Since they are about human psychology as represented, constructive empiricism does not seem to evaluate their questions with respect to some reality beyond human behavior. Rather, their questions are evaluated as the problems of models. Their explanations constitute models of which merits are determined solely by their empirical adequacy. Dealing with the ontological questions, empiricist epistemology does not regard those question such as causation, autonomy etc., as belonging to nature itself. Those questions arise as the nature is represented in our models of nature. Every models, with their different formulations of the issue at hand, bring about different ontological questions. However, those ontological questions do not represent some problems of the issue. Rather, those questions represent the problems of the way we handle of the issue. For example, assuming autonomy between cognitive states and physical states creates different ontological problems. Assuming multi-levels in the explanations of a cognitive system as in the case of the new mechanists or regarding the levels in between molecular level and behavior as having only heuristic value creates different ontological problems. It is not because that those questions arise since human psychology has those problems. Those questions arise because human psychology is formulated in different ways in different models.

Whether it is psychology or physics, the discussions seem to be formulated within the framework Sellars put forward: the manifest image and the scientific image. Although Sellars is not the first philosopher to realize the problem, his

role in the development of constructive empiricism and eliminative materialism makes him an important figure. Constructive empiricism and eliminative materialism is evaluated with respect to the scientific image and the manifest image. In order to locate constructive empiricism and eliminative materialism to their proper places in the framework, I contrasted constructive empiricism with scientific realism and eliminative materialism with functionalism. Initially, the contrast between scientific realism and constructive empiricism is formulated as a contrast between scientific realism and common sense realism. Then the dissimilarity between the images is construed in light of the integration problem of psychology and neuroscience with respect to the positions.

As Daniel Dennett says that

> Since at least a large part of philosophy's task, in my vision of the discipline, consists in negotiating the traffic back and forth between the manifest and scientific images, it is a good idea for philosophers to analyze what they are up against in the way of folk assumptions before launching into their theory-building and theory-criticizing. Philosophical work on the perennially hot-button topic of free will, for instance, certainly must be guided by an appreciation of what non-philosophers think free will is or might be—and why it matters so much to them (2013: 99).

Navigating between the manifest image and the scientific image, the analysis progressed further to extend constructive empiricism to account for the discussions around the nature of explanations between cognitive science and neuroscience.

REFERENCES

Andersen, P., Morris, R., Amaral, D., Bliss T., and O'Keefe J. (2007). Historical Perspective: Proposed Functions, Biological Characteristics, and Neurobiological Models of the Hippocampus. In *The Hippocampus Book* Andersen, P., Morris, R., Amaral, D., Bliss T., and O'Keefe J. (eds.) 9-36. Oxford University Press

Aune, Bruce (1990) Sellars's Two Images of the World. *The Journal of Philosophy* **80:10** 537-545

Barrett, L. F. (2006a). Emotions as natural kinds? *Perspectives on Psychological Science*, **1**, 28–58.

Barrett, L. F. (2006b). Solving the Emotion Paradox: Categorization and the Experience of Emotion? *Personality and Social Psychology Review*, **10 (1)**, 20–46

Barrett, L. F. (2006c). Valence is a basic building block of emotional life. *Journal of Research in Personality*, **40**, 35–55

Barrett, L.F., & Wager, T.D. (2006). The structure of emotion: Evidence from the neuroimaging of emotion. Current Directions in Psychological Science, **15**, 79–85.

Barrett, L.F., Lindquist, K., Bliss-Moreau, E., Duncan, S., Gendron, M., Mize, J., & Brennan, L. (2007). Of mice and men: Natural kinds of emotion in the mammalian brain? Perspectives on Psychological Science, 2, 297–312.

Barrett, L. F. (2009) The future of psychology: Mapping mind to brain. *Perspectives on Psychological Science*, **4**, 326–339.

Brandom, Robert B. (2015) *From Empiricism to Expressivism: Brandom Reads Sellars.* Cambridge, MA: Harvard University Press.

Bechtel, W. (2008). *Mental mechanisms: Philosophical Perspectives on Cognitive Neuroscience.* New York : Routledge

Bechtel, W., Mandik, P., Mundale, J., & Stufflebeam, R. S. (2001). *Philosophy and the neurosciences: a reader*. Oxford: Basil Blackwell.

Bickle, J. (2006) Reducing Mind to Molecular Pathways: Explicating the Reductionism Implicit in Current Cellular and Molecular Neuroscience

Bickle, J. (2014) Little-e Eliminativism in Mainstream Cellular and Molecular Neuroscience: Tensions for Neuro-Normativity In Brain Theory: Essays in Critical Neurophilosophy T. Wolfe (eds) pp. 98-108

Boone, W. and Piccinini, G. (2016) The Cognitive Neuroscience Revolution *Synthese* **193** 1509–1534

Chakravartty, Anjan (2007) *A Metaphysics for Scientific Realism: Knowing the Unobservable.* Cambridge University Press

Churchland, Paul M. (1981) Eliminative Materialism and the Propositional Attitudes. *The Journal of Philosophy*, **78**, 67-90.

Corkin, Suzanne (1968) Acquisition of Motor Skill After Bilateral Medial Temporal-Lobe Excision. *Neuropsychologia*, **6**, 255 - 265

De Caro, Mario (2015) Realism, Common Sense, and Science. *The Monist*, **98**, 197-214

Denkel, Arda (1995) The Problem of Reconciliation. *Philosophical Papers* **24:1** 23-50

Denkel, Arda (1996) *Object and Property*. Cambridge University Press

Dennett, Daniel (2013) Kinds of Things – Towards a Bestiary of the Manifest Image. In *Scientific Metaphysics* Don Ross, James Ladyman and Harold Kincaid (eds) pp. 96-107

DeVries, Willem A. (2016) *Just What is the Relation between the Manifest and the Scientific Images?* International Journal of Philosophical Studies 1-17

Downing, Lisa (2009) Locke: The Primary and Secondary Quality Distinction. In *The Routledge Companion To Metaphysics* Robin L. Poidevin, Peter Simons, Andrew McGonigal, Ross P. Cameron (eds) pp. 98-108

Eddington, Arthur. (1963) *The Nature of the Physical World.* The University of Michigan Press.

Eichenbaum, H., Otto, T., & Cohen, N.J. (1993). Two component functions of the hippocampal memory systems. *Behavioral and Brain Sciences*, **17(3)**, 449–472.

Fine, A. (1991) Piecemeal Realism, *Philosophical Studies* 61:79–96.

Fodor, J. A.: 1987, Psychosemantics, MIT Press, Cambridge MA.

Fogelin, Robert, J. (2001) *Routledge Philosophy Guidebook to Berkeley and the Principles of Human Knowledge.* Routledge

Gabrieli, J.D.E., Poldrack, R.A., & Desmond, J.E. (1998). The role of left prefrontal cortex in language and memory. *Proceedings of the National Academy of Sciences, (USA)*, **95**, 906–913.

Galileo (1623) The Assayer. In *Discoveries and Opinions of Galileo*. trans. And ed. Stillman Drake. Garden City, NY: Anchor Books.

Gazzaniga, M. S., Ivry R. B. and Mangun G. R. (2002) *Cognitive Neuroscience: The Biology of the Mind.* New York: Norton

Hacking, Ian (1983) *Representing and Intervening* Cambridge University Press.

Hume, D. (1978) *A Treatise of Human Nature*, Oxford: Oxford University Press.

Hochestein, Eric (2015) Giving Up On Convergence and Autonomy: Why the Theories of Psychology and Neuroscience are Codependent as well as Irreconcilable. *Studies in History and Philosophy of Science* **56** 135-144

Jacovides, Michael (2007) Locke's Distinctions between Primary and Secondary Qualities. In *The Cambridge Companion To Locke's ''Essay Concerning Human Understanding''* Lex Newman (ed) pp. 101- 129

Kukla, Andre (1998) *Studies in Scientific Realism.* Oxford University Press

Ladyman, James (2002) *Understanding Philosophy of Science*. Routledge: London and Newyork

Locke, J. (1964) *An Essay Concerning Human Understanding*, Glasgow: Collins.

Marshall, J. Peter (2009) Relating Psychology and Neuroscience: Taking up the Challenges. *Perspectives on Psychological Science*, **4 (2)** pp. 113-125

Maxwell, G. (1962) 'The ontological status of theoretical entities', in H. Feigl and G. Maxwell (eds) *Minnesota Studies in the Philosophy of Science*, Volume 3, Minneapolis: University of Minnesota Press, pp. 3–14.

McGinn, Colin (1983) *The Subjective View: Secondary Qualities and Indexical Thoughts* Oxford University Press

Morris, R.G.M., Garrud, P., Rawlins, J.N.P., & O'Keefe, J. (1982). Place navigation impaired in rats with hippocampal lesions. Nature, 297, 681-683.

Nola, Robert (2006) The Metaphysics of Realism and Structural Realism, in Cheyne, C and Worrall, J. (eds.) *Rationality and Reality: Conversations with Alan Musgrave*, pp. 183-223

Piccinini, G. and Craver, C. (2011) Integrating Psychology and Neuroscience: Functional Analyses as Mechanism Sketches **183** *Synthese* 283-311

Psillos, Stathis (1999) *Scientific Realism: How Science Tracks Truth*. Routledge: London and Newyork

Psillos, Stathis (2000) Agnostic Empiricism versus Scientific Realism: Belief inTruth Matters. *International Studies in the Philosophy of Science* **14:1** 57-75

Putnam, H. (1975) *Philosophical Papers*, Vol. 1: *Mathematics, Matter and Method*, Cambridge: Cambridge University Press.

Rosenberg, Jay F. (1990a) Fusing the Images. *Journal for General Philosophy of Science* **21** 1-23

Rosenberg, Jay F. (2009) On Sellars's Two Images of World. In *Empiricism, Perceptual Knowledge, Normativity and Realism: Essays on Wilfrid Sellars*, deVries, William A. (ed.) pp. 283-296

Ross, Peter (2015) Primary and Secondary Qualities. In *The Oxford Handbook of Philosophy of Perception* Matthen, Mohan (ed.) pp. 535-556.

Rowbottom, Darrell P. (2011) The Instrumentalist's New Clothes. *The University of Chicago Press* **78:5** 1200 – 1211

Rowbottom, Darrell P. (2014) Aimless Science. *Synthese* **191:6** 1211-1221

Russell, Bertrand (1923) *Human Knowledge, Its Scope and Limits*. London: Allen and Unwin.

Russell, Bertrand (1940) *An Inquiry Into Meaning and Truth.* London: Allen and Unwin.

Sellars, Wilfrid. (1963) *Science, Perception and Reality.* New York: The Humanities Press

Sellars, Wilfrid (1968) *Science and Metaphysics*. London: Routledge and Kegan Paul.

Sellars, Wilfrid (1997) *Empiricism and the Philosophy of Mind*. Harvard University Press.

Smith, A. D. (1990) Of Primary and Secondary Qualities. *The Philosophical Review*, **99:2**, pp. 221-254

Stark, Craig (2007) Functional Role of the Human Hippocampus. In The Hippocampus Book Andersen, P., Morris, R., Amaral, D., Bliss T., and O'Keefe J. (eds.) 9-36. Oxford University Press

Strawson, Peter. (1979) Perception and its Objects, in Macdonald, G. F. (ed.) *Perception and Identity*, London: Macmillan, pp. 41-60.

Squire, Larry R. (2008) The Legacy of Patient H.M. for Neuroscience. *Neuron* **61** 6-9

Squire, Larry R. (2008) Memory systems of the brain: A brief history and current perspective. *Neurobiology of Learning and Memory* **82** 171-177

van Fraassen, Bas C. (1980) The Scientific Image. Oxford: The Calderon Press.

van Fraassen, Bas C. (1985) Empiricism in Philosophy of Science. In P.M. Churchland and C.A. Hooker (eds), *Images of Science* Chicago: University of Chicago Press, pp.

van Fraassen, Bas C. (1989) *Laws and Symmetry*, Oxford: Clarendon Press.

van Fraassen, Bas C. (1999) The Manifest Image and the Scientific Image, in Aerts, D. (ed.) E*instein Meets Magritte: The White Book – An Interdisciplinary Reflection*, pp. 29-52.

van Fraassen, Bas C. (2003) On McMullin's Appreciation of Realism Concerning the Sciences. *Philosophy of Science*, **70:3**, pp.479-492

van Fraassen, Bas C. (2008) *Scientific Representation: Paradoxes of Perspectives*, Oxford: Calderon Press

van Fraassen, Bas C. (2017) Misdirection and Misconception in the Scientific Realism Debate. in Agazzi, E. and Gonzalez, W. (eds.) *Varieties of Scientific Realism Debates*, Springer, pp. 95-108.

van Fraassen, Bas C. (2019) Refections on a classic in scientifc realism, 20 years later *Metascience* **28** 13–21

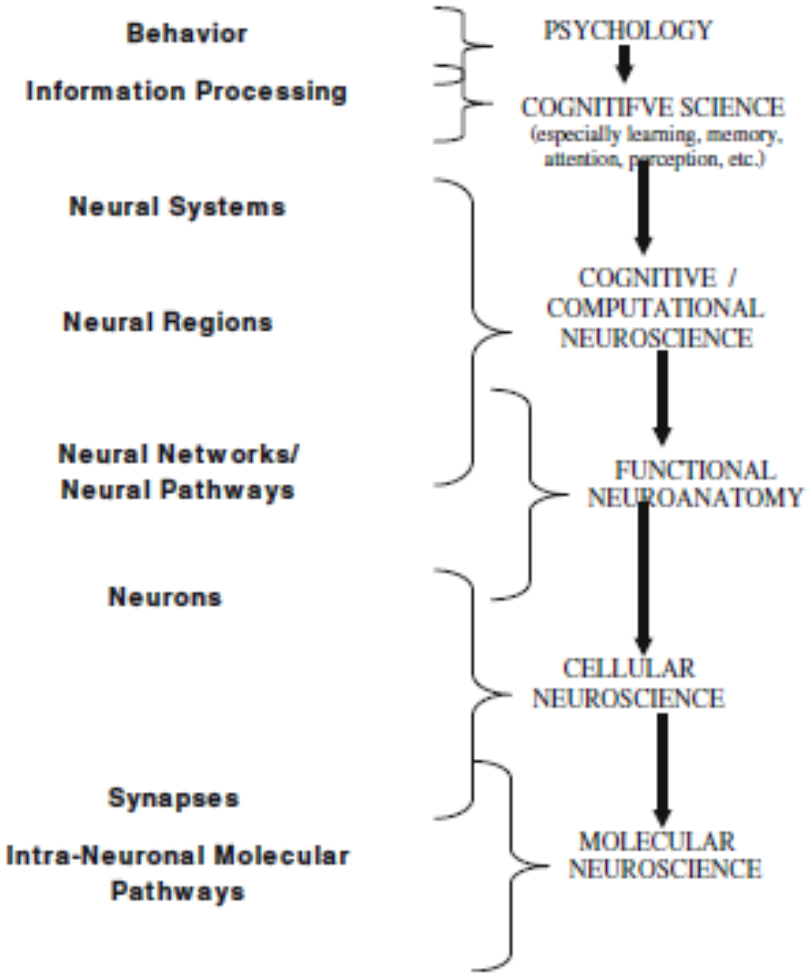
Watkins, John (1996) Scientific Realism versus Common-Sense Realism, in R. S. Cohen, R. Hilpinen and Qiu Renzong (eds.) *Realism and Anti-Realism in the Philosophy of Science,* Kluwer Academic Publishers, pp. 219-226.

Wright, John (1996) Metaphysical Realism and the Explanation of the Success of Science, in R. S. Cohen, R. Hilpinen and Qiu Renzong (eds.) *Realism and Anti-Realism in the Philosophy of Science,* Kluwer Academic Publishers, pp. 227-243.

APPENDICES

A. LIST OF FIGURES

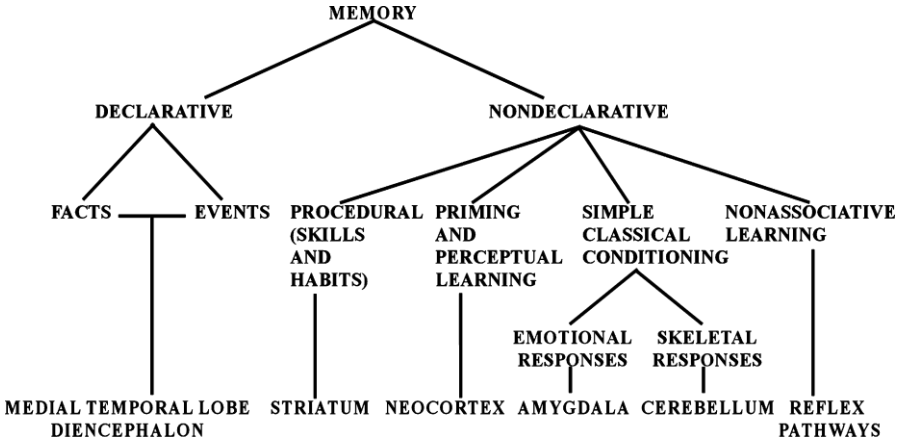
Figure 1



Schematic illustration of the currently standard view of levels of organization within the nervous system, relationships to higher levels of organization (behavior, information processing), and the scopes of the mind-brain sciences addressing these levels. Allied with this standard view is a “step-by-step” view of psychoneural reduction (downward arrows), in which reduction succeeds only when features of a higher level of organization (via their affiliated

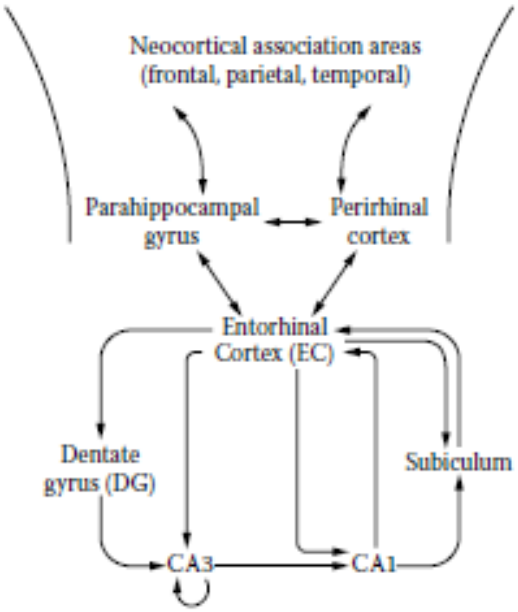
scientific theories) are linked to features at the next level down (Bickle 2006: 413).

Figure 2



A taxonomy of mammalian long-term memory systems. The taxonomy lists the brain structures thought to be especially important for each form of declarative and nondeclarative memory. In addition to its central role in emotional learning, the amygdala is able to modulate the strength of both declarative and nondeclarative memory (Squire 2004: 173).

Figure 3



Schematic diagram of the hippocampal system. Information from widespread areas of neocortex converge on the parahippocampal region (parahippocampal gyrus, perirhinal cortex, and entorhinal cortex, EC) to be funneled into the processing loops of the hippocampal formation. The tightest loop runs from EC into the core areas of the hippocampus (CA1 and CA3) and back; the loop through the dentate gyrus and the recurrent connections in CA3 are also important; and the subiculum, which is not part of the hippocampus proper, provides an alternative return to EC. Not shown are a number of subcortical inputs and details of pathways and their synapses (Bechtel 2008: 74).

B. CURRICULUM VITAE

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PUBLICATIONS

1. Cagatay, H. and Ekemen, C. (2011). “Mary’nin Odası ve Fizikalizm.” Felsefe Tartısmalari [Philosophical Discussions]: A Turkish Journal of Philosophy. 47 26-33.

C. TURKISH SUMMARY / TÜRKÇE ÖZET

DENEYİM VE BİLİM: EDDINGTON'IN İKİ MASA PROBLEMİ

Tezin temel konusu Wilfrid Sellars'ın kavramsallaştırdığı şekliyle Eddington'ın iki masa problemidir. Bir diğer deyişle uzlaştırma problemidir (the problem of reconciliation). Wilfrid Sellars iki masa problemini aşikâr imge ve bilimsel imge kavramlarıyla ele almıştır. Problem sadece nesne söz konusu olduğunda değil, zihin söz konusu olduğunda da ortaya çıkmaktadır. Nesne söz konusu olduğunda ele alınacak felsefi pozisyonlardan birisi van Fraassen'in kurucu ampirizmidir. Zihin söz konusu olduğunda ele alıncak pozisyonlardan birisi Paul Churchland'ın ve Patricia Churchland'ın felsefi pozisyonu olan eleyici materyalizmdir. Bu isimleri sıralamamın sebebi, van Fraassen ve Churchland'ların Sellars'ın öğrencileri olmalarıdır. Sellars'ın öğrencisi olan Bas van Fraassen, 1980'de The Scientific Image başlıklı bir kitapta kurucu ampirizmi ortaya koymaktadır: "Bu kitabın başlığı, dünyanın bilimsel imgesini, dünyanın insan deneyiminde görünen şekli olan aşikâr imge ile karşıtlık içinde sunan Wilfrid Sellars'ın bir ifadesidir" (van Fraassen 1980: vii). Kişisel bir iletişimde, Van Fraassen, ilk olarak doktora öğrencisiyken bilimsel imge ve aşikâr imge tartışmasıyla karşılaştığını ve o zamandan beri ilgisinin canlı olduğunu söylemiştir. Dahası, Patricia ve Paul Churchland'ın, sağduyu psikolojisini ve sinirbilimi, sırasıyla "aşikar imge ve bilimsel imge" ile benzerlik içinde karşılaştırarak eleyici materyalizm pozisyonunu geliştirmiş olmasıdır. Sağduyu psikolojisi zihnin aşikâr imgesini temsil ederken, sinirbilim zihnin bilimsel imgesini temsil etmektedir. Jay Rosenberg'in "Fusing the Images" adlı makalesi, bu tezde yer alan filozofların neden bir araya geldiğini bize göstermektedir:

> İlk olarak Sellars'la 1963'te, doktora çalışmalarına başlamak için Pittsburgh Üniversitesi'ne geldiğimde, tanıştım. Sellar'ın kendisi, Nuel Belnap ve Jerome Schneewind ile birlikte Yale'den Pittsburgh'a gelmişti, - Alan Anderson 1964'te takip edecek- ve Kurt Baier, Adolph Grunbaum ve Nicholas Rescher halihazırda ikamet edenlerle, Pittsburgh felsefe bölümü tam anlamıyla gelişmişti.
>
> Şansına, bu son derece seviyeli fakülte, 60'lı yılların başı ve ortalarında, son derece yetenekli doktora öğrencileri ile karşılaşmıştı, benim dışımda, Brian Skyrms, Ernest Sosa, Bas van Fraassen, Michael Dunn, Richard Burian, Lois Goble, Paul Churchland ve Patricia Smith (daha sonra Churchland). Bu grup, öğretim elemanının Sellars olduğu, üç dönemde bir yapılan olağanüstü sayılabilecek seminerin …. çekirdeğini oluşturdu.

Aşikâr imge ile bilimsel imge arasındaki uzlaşma sorunu bağlamında, bu bağlantılar ilk etapta gözden kaçabilmektedir. Yukarıda belirtilen bu değerlendirmeler olmadan, bilimsel imge ve açık imge arasındaki uzlaşma problemi dikkate değer bir problem olarak değerlendirilmeyebilmektedir.

Sellars'ın Eddington'ın iki masa problemi olarak kavramsallaştırdığı problemi ortaya koyan kişi Arthur Eddington'dır. Arthur Eddington 1927'de Edinburgh üniversitesinde Gifford dersleri adı altında dersler vermiştir. Bu derslerin amacı, ortaya çıkan yeni fizik teorilerinin, kuantum ve görecelilik teorilerinin, ortaya koymuş olduğu evren anlayışının ne gibi değişikliklere yol açacağını anlamaya çalışmaktır. Bu anlamda, Eddington, bilimsel gelişmelerin felsefecilere yeni malzemeler sağladığını ifade etmektedir. Kendisi de bu malzemeyi kullanmış ve tanıdık dünya ile bilimsel dünya ayrımını yapmıştır. Eddington'a göre bu iki dünyanın nesneleri ve bu nesnelerin özellikleri birbirine benzememektedir. Bu bakımdan Eddington benim için her nesneden birer çift var demektedir. Masa örneği üzerinden gidecek olursak, bir no'lu masa

> " … dünya denilen çevrenin sıradan nesnesidir. Nasıl tanımlamalıyım? Uzamsal, görece kalıcı olan, renkli; ve her şeyden öte tözsel … İki no'lu masa ise bilimsel masadır. Bilimsel masam çoğunlukla boşluktur. Boşluğa seyrek bir şekilde serpiştirilmiş yüksek hızda hareket eden elektrik yükleri vardır… İkinci masamın herhangi bir tözselliği yoktur. Neredeyse tümüyle boş mekandır" (Eddington 1928: x-xi)

James Ladyman'a göre, Eddington'ın iki masa tanımı üzerinden ortaya çıkan felsefi problemi anlamak için "bilimsel devrime ve modern bilimsel bakış açısının öncülüğünü yapan büyük düşünürlerin çoğu tarafından kullanılan özelliğin iki türü arasındaki felsefi ayrıma, birincil ve ikincil özellikler arasındaki …" ayrıma dönülmesi gerekmektedir (2002: 132).

Birincil ve ikincil özellik ayrımını açıklamak için genellikle saat analojisi kullanılmaktadır. Saatin akrep ve yelkovanını hareket ettiren mekanizmanın özellikleri ile akrep ve yelkovanın özellikleri arasında ayrım yapılarak, mekanizmanın özelliklerinin birincil özellikleri, yelkovan ve akrebin özelliklerinin ise ikincil özellikleri temsil ettiği ifade edilmektedir. Yine aynı şekilde, altının iç yapısı görünüşüne sebebiyet vermektedir. "Doğa felsefesinin amacı gözlemlediklerimizden sorumlu olan iç mekanizmaları anlamaktır" (James Ladyman 2002: 133).

Lisa Downing, birincil ve ikincil özellikler ayrımının terminolojisini Locke'un ortaya koyduğunu söylemektedir (2009: 98). Downing'e göre "Locke, birincil ve ikincil özellik ayrımını direk olarak kendi döneminin en iyi fiziği üzerinden yapmaktadır" ve günümüzün en iyi fiziği söz konusu olduğunda "birincil özellikler, duyu algısına tanıdık olmayan, örneğin, spin veya tılsım kuark

(charm) gibi özellikler içerebilir (2009: 104). Günümüz fiziği söz konusu olduğunda,

> Locke ve diğer parçacıkcılar (corpuscularians) tarafından ortaya atılan hiçbir birincil özellik, maddenin nihai yapıtaşlarının doğru özellikleri olarak değerlendirilmemektedir. Kütle bile belirli bir referans sisteminin nesnelerinin durağan kütlesinden (rest mass) üretilen ikincil özellik olarak değerlendirilmektedir. Fizik biliminin nesnelere atfettiği birincil özellik adayları, yük, isospin, spin, 'renk-yükü' ve benzeri şeylerin deneyimimizde karşılığı yoktur, bu yüzden bizde ürettikleri duyumsamaların onlara benzediğini zor söyleyebiliriz (James Ladyman 2002: 144).

Eddington tanıdık dünya ile bilimin dünyası arasındaki bağın son döneme kadar yakın olduğunu, "fizikçinin kendi dünyasının ham maddelerini tanıdık dünyadan ödünç aldığını, fakat artık yapmadığını" söylemektedir. "Onun ham maddeleri eter, elektronlar, kuanta, potansiyeller, Hamilton fonksiyonları vd., ve bugünlerde bunları diğer dünyadan ödünç alınan kavramların kirlenmesinden korumak için titizce dikkatlidir." (Eddington 1928 xi). Elektron'un gündelik dil içerisinden tanımı veya tasavvuru mümkün görünmemektedir çünkü elektron fiziğin oluşmakta olan alfabesinin harflerinden bir tanesidir (Eddington 1928 xi).

Sellars Eddington'ın tanıdık dünya ve bilimsel dünya ayrımını aşikâr imge ve bilimsel imge olarak kavramsallaştırmıştır. Sellars'a göre "aşikâr imgenin kendisi, uygun bir şekilde, bilimsel imgedir" (Sellars 1963:7). Ancak bilimsel düşünmenin bir çeşidi olan "duyumsanabilir şeylerin davranışlarını açıklamak için duyumsanamayan nesneleri ve onlara ait prensipleri varsayma" aşikâr imgede yoktur (Sellars 1963: 7).

Sellars aşikâr imge ve bilimsel imge ayrımını, Kantın fenomen ve numen arasında yaptığı ayrıma benzetmektedir: "… tutarlı bir bilimsel gerçekçi gündelik deneyimin dünyasını, edinilebilirliğinin açıklaması, Kanta göre, yalnızca tanrı tarafından bilinen kendinde şeylerle değil fakat bilimsel nesnelerle olan …, Kantçı anlamda fenomenal dünya olarak kavramalıdır" (Sellars 1968: 173). Brandom, Sellars'ın yaptığı bu tanımlamayı aşkınsallıktan arındırılmış Kantçı numen/fenomen ayrımı olarak ifade etmektedir (2015: 32).

Aşkınsallıktan arındırılmış Kantçı numen / fenomen ayrımı ya da Sellars'ın aşikâr imge / bilimsel imge ayrımı görünüş ve gerçeklik arasında basit bir epistemolojik ayrımdan ziyade, derin bir ontolojik ayrıma neden olmuştur (Brandom 2015: 32). Burada ontolojik ayrımdan kasıt, nesnelerin doğasına dair farklılaşmadır. Epistemolojik ya da bilinebilir olması bakımından metodolojik bir farklılaşma değildir. Nitekim, Sellars bu ayrışmanın epistemolojik yönüne dikkat çekerek ontolojik farklılaşma tartışmalarından kaçınmaktadır. Örneğin, Sellars'a göre gözlemlenebilir olan gündelik deneyimin nesneleri ile kendisine bilimsel teorilerde yer bulan teorik nesnelerin arasındaki fark ontolojik değil metodolojiktir.

> Bu şeylerin türlerinin ne olduğundan ziyade şeyleri nasıl bildiğimizle ilgilidir… Teorik şeyler, tanımı itibariyle, çıkarım yoluyla haklarında iddialarda bulunabildiklerimizken, gözlemlenebilir şeyler çıkarımsız bir şekilde de ulaşılabilir olanlardır. Fakat bu durum olumsal (contingent) ve değişebilir, tarihsel gelişmelere bağımlıdır (Robert Brandom 2015: 16).

Tarihsel gelişime bağlı oluşu, insan fizyolojisinin orta ölçekli nesneleri deneyimleme kapasitesi düşünüldüğünde anlamlı olacaktır. Eğer insan fizyolojisi orta ölçekli nesneleri değil de teorik nesneleri deneyimleme

kapasitesine sahip olsaydı, teorik nesnelere dair bilgi üretme yöntemimiz çıkarımsal değil direk olacaktı. Böylelikle gündelik deneyimin nesneleri ile teorik nesneler arasında da bilgi üretme bakımından metodolojik de olsa herhangi bir fark olmayacaktı. Ancak burada sorulması gereken soru şudur: İnsan deneyimi bu şekilde değişiklik gösterdiğinde, insan deneyiminin nesnesi olan şeylerin özellikleri aynı kalacak mıdır? Sellars'ın bilgi ölçüsü (scientia mensura) prensibi çok açıktır. Bilgi ölçüsü prensibine göre "dünyanın açıklaması ve tanımlaması boyutunda, bilim her şeyin, olanın ne olduğunun ve olmayanın ne olmadığının, ölçüsüdür (Sellars 1997: 83).

Ortaya çıkan durumu Bertrand Russell şu şekilde ifade özetlemiştir:

> Problem budur: bütün ampiristler olgunun bilgisinin algıdan elde edinildiğini savunur, fakat fizik doğru ise duyu yolu ile edinilen şeyler (percepts) ve onların dışsal nedenleri arasında çok az bir benzerlik olmalıdır ki duyu yolu ile edinilen şeylerden dışsal nesnelerin bilgisini nasıl edindiğimizi anlamak zordur. Problem fiziğin algıdan çıkarsandığı (infer) olgusuyla daha karmaşıklaşmıştır. Tarihsel olarak fizikçiler naif gerçekçilik, nesnelerin tam da göründüğü gibi olduğu, fikrinden başladılar; bu varsayım temelinde, maddeyi algıladığımızdan farklılaştıran bir teori geliştirdiler…Kısacası: Eğer fizik doğru ise, bilinebilirliği mümkün mü? (Russell 1923: 213).

Bertrand Russell aynı meseleyi, naif realizm ve fizik meselesini, 1940'da tekrar ele almıştır:

> Hepimiz "naif realizm" ile, nesnelerin gözüktüğü gibi olduğu doktrini ile başlarız. Çimenin yeşil, taşların sert, karın soğuk olduğunu düşünürüz. Fakat fizik çimenin yeşilliğinin, taşların sertliğinin ve karın soğukluğunun, deneyimimizde bildiğimiz yeşillik, sertlik, ve soğukluk olmadığını fakat farklı bir şey olduğunu temin eder. Gözlemleyen, kendisine bir taşı gözlüyormuş gibi gözükse de, eğer fiziğe inanılacaksa, taşın kendisinde uyandırdığı etkiyi gözlemektedir. Böylece bilim kendisi ile savaşıyor gibi gözükmektedir: objektif olmayı en çok amaçladığı zaman, kendi rızasına aykırı olarak öznelliğin içine düşmektedir. Naif realizm

> fiziğe yöneltti ve fizik, eğer doğruysa, naif realizmin yanlış olduğunu gösterdi. Böylece naif realizm, eğer doğruysa, yanlıştır; dolayısıyla yanlıştır (Russell 1940: 15).

Russell'ın naif realizm ve fizik arasında ortaya çıktığını düşündüğü problem aslında deneyimimizde karşılaştığımız dünya ile bilim tanımladığı dünyanın farklı niteliklere sahip olması problemidir. Eddington'ın iki masa problemini hatırlayacak olursak, Eddington "sağduyunun (common sense) dünyası ile bilimin tanımladığı dünyayı ayırmıştır. Bilimsel tanımlama sağ duyu gerçekliğinin bir illüzyon olduğunu ya da en azından bizim belli açılardan kesinlikle [nesneleri] olduğu gibi algılamadığımızı önerir (James Ladyman 2002: 131). Burada sağduyu ile veya sağduyu gerçekçiliği ile ifade edilmek istenen, naif realizm doktrinidir. Buradan çıkan sonuç şudur: Bilimsel teorileri gerçekçi bir şekilde yorumlayacak olursak, sağduyu gerçekçiliği ile bilimsel gerçekçilik arasında bir uzlaştırma problemi (the problem of reconciliation) ortaya çıkmaktadır. Bu soruyu Strawson şu şekilde formüle etmiştir:

> Sağduyunun fizik alanını kapladığını varsaydığı, görüngüsel olarak zengin, direk olarak algılanan şeyleri ham bilimsel gerçekçiliğin ikame edeceği iddiasında olduğu nihai parçacıkların yapıları ile özdeşleştirebilecek miyiz? (Strawson 1979: 56).

Bir diğer deyişle çimenin yeşilliğini, taşın sertliğini ve karın soğukluğunu çimeni, taşı ve karı oluşturan nihai parçacıklar ve özellikleri ile özdeşleştirmek mümkün mü? Bu soruyu şu şekilde sormak da mümkün: sağduyu gerçekçiliği ile bilimsel gerçekçilik uyumlu pozisyonlar mıdır?

Soruya direk olarak bir cevap sunmuş olunmasa bile, Van Fraassen'in, bilime karşı gerçekçi olmayan yaklaşımını, kurucu ampirizmini, sağduyu gerçekçiliği içinde kurması, sağduyu gerçekçiliği ile bilimsel gerçekçilik arasında zorunlu

bir ilişki olmadığını göstermektedir. Bu bakımdan, bilimsel gerçekçi yaklaşımların aksine gerçekçi olmayan yaklaşımını sağduyu gerçekçiliği içinde formüle etmesi de anlam kazanmaktadır. Van Fraassen "… bilimsel ürünün ve bilimsel aktivitenin tanımları ve değerlendirmeleri, kurucu ampirizmin de formüle edilmiş olduğu, sağduyu gerçekçiliği içinde yürütülmektedir" demektedir (2003: 480-481). Ayrıca Andre Kukla da bilimsel gerçekçi pozisyonlar ile gerçekçi olmayan pozisyonlar arasındaki tartışmanın naif gerçekçilikle ya da sağduyu gerçekçiliği ile ilgili olduğunu söylemektedir (1998: 8).

Sağduyu gerçekçiliği içinde formüle edilmiş kurucu ampirizme göre bilimsel aktivite keşiften ziyade model kurmadır. Bu modellerin fenomene uygun olması gerekmektedir. Bunun ötesinde, gözlemlenebilir olmayan nesnelerin doğasına dair bir keşiften bahsetmek tercih edilebilir değildir. Keşiften ziyade model kurma fikri kurucu ampirizmin kurucu kısmını temsil etmektedir. Ampirizm kısmı ise, bilimsel teorilerde postule edilen yapıların fenomeni kurtarmada sadece bir araç olarak yorumlanmasında ortaya çıkmaktadır: gözlemlenebilir olan neyse onun hesabını vermek ve onun dışında kalan yapıları birer araç olarak görmek.

Van Fraassen'in kurucu ampirizmden ya da bilimsel gerçekçilikten ne anladığı önemlidir. Van Fraassen'e göre, kurucu ampirizm, ampirizmin bir türü değildir. Kurucu ampirizm, ampirist kaygıları olan ve bilimin ne olduğunu yorumlayan bir pozisyondur. Aynı şekilde bilimsel gerçekçilik de gerçekçiliğin bir türü değildir. Bilimin nasıl yorumlanması gerektiğine dair bir pozisyondur. Van Fraassen'e göre bilimsel teorilerin postule ettiği gözlemlenebilir olmayan

nesnelerin varlığından söz edeceksek, metafizik gerçekçilik savunulmadan tutarlı bir bilimsel gerçekçilik savunusu mümkün gözükmemektedir. Bu anlamda van Fraassen, Stathis Psillos'un "metafizik gerçekçilik içinde tutarlı bir bilimsel gerçekçilik" ortaya koyduğunu söylemektedir (van Fraassen 2019: 20).

Kurucu ampirizmin, "sağduyu gerçekçiliğinin en tutarlı anlatımlarından birisi" olduğunu söyleyen Mario De Caro bunu "bilinebilir olanın alanını direk olarak gözlemlenebilir olanla sınırlandırmasına" ve "böylelikle gözlemlenebilir olmayan nesnelere referans olduğu sürece bilime karşı gerçekçi olmayan pozisyon üstlenmesine" bağlamaktadır (2015: 202). Grover Maxwell, insan fizyolojisine dayanan gözlemlenebilir ve gözlemlenemez nesneler arasındaki ayrıma karşı çıkmaktadır. Bu ayrımın "rastlantısal ve fizyolojik yapımızın bir işlevi…" olduğunu düşünmektedir (1962: 14–15). Ancak van Fraassen, "gözlemlenebilirliğin varoluşla hiçbir ilgisi olmasa bile (aslında bunun için çok insan merkezli olsa da), yine de bilime yönelik uygun epistemik tutumla ilgisi olabilir" demektedir (van Fraassen 1980: 19). Bu bakımdan, kurucu ampirizmin ontolojik ve epistemolojik taahhütleri arasında şaşırtıcı olmayan bir bağdaşıklık vardır, çünkü bunlar ampirist konumun bir sonucu olarak birleşirler. Sağduyu gerçekçiliği, ölçme aparatı olan insan fizyolojisi vasıtası ile gözlemlenebilir olan nesnelere temel sağlar. Ölçüm aparatı tarafından üretilen bilgi sağduyu gerçekçiliğinin sağladığı nesnelere göre analiz edilir.

Sağduyu gerçekçiliği listesinde yer almayan nesnelere dair inançlar metafiziğin konusu olarak kabul edilmektedir. Van Fraassen, gözlemlenemeyenlerin gerçekliğine inancı içerdiğinden "[bilimsel] gerçekçiliğin … metafiziksel" bir

pozisyon olduğunu söylemektedir (van Fraassen 1980: 8). Bu bağlamda, gözlemlenebilir olan ve gözlemlenebilir olmayan nesnelerin varlığı bilimsel gerçekçiliğin metafizik tezi ile sağlanmaktadır. Metafizik tez, varlığının gözlemciye bağlı olmadığı zihinden bağımsız bir dünya olduğu iddiasını içerir. Dünyanın zihinden bağımsız doğasına yapılan vurgu, bilimsel gerçekçiliği idealizm veya fenomenalizmden farklı kılar. Ancak, metafizik tezin amacı, yalnızca bilimsel gerçekçiliği idealizmden veya fenomenalizmden ayırmak değildir. Amaç, bilimsel gerçekliği, bilimsel teorilerin ortaya koyduğu gözlemlenemeyen nesne ve süreçlerle ilgili gerçekçi yaklaşımı olmayan diğer pozisyonlardan ayırt etmektir. Realistler, başarılı bilimsel teorilerin, dünyanın neredeyse gerçek tanımları olarak kabul edilebilmesini ancak "bilimsel teoriler tarafından öne sürülen varlıklar varsa, biz insanların iddia edebilmesinden, rasyonel olarak doğrulamasından ve benzeri şeylerden …" bağımsız bir şekilde var olmasına bağlamaktadır (Psillos 1999: 12). "Kabaca, bilimsel gerçekçilik, en iyi bilimsel teorilerimiz tarafından öne sürülen gözlemlenemeyen nesnelere inanmamız gerektiği görüşüdür" (Ladyman 2002: 129).

Metafizik tez aynı zamanda bilimsel gerçekçilik ile kurucu ampirizmi ayırt etmeyi de mümkün kılar, çünkü her ikisi de semantik tezi, yani en iyi bilimsel teorilerin literal yorumlanması gerektiğini savunurken, kurucu ampirizm metafizik tezi kabul etmez. Gözlemlenebilir olan nesneler ve gözlemlenebilir olmayan nesneler söz konusu olduğunda, gözlemlenemeyenlerin bilişsel yeteneklerimizden bağımsız olarak var olduğunu kabul ettiğimiz zaman, semantik tez, bilimsel teorilerin iddialarının "halihazırda biçimli ve zihinden bağımsız bir dünyayı keşfettiği ve haritalandırdığı sürece doğru olduğunu" söylememizi sağlamaktadır (Psillos 1999: xvii). Bilimsel bir teori, örneğin bir

elektrona atıfta bulunuyorsa, dünyada bir elektron veya elektrona benzeyen bir yapı vardır. Metafizik ve semantik tezler bir arada ele alındığında:

> Teorik varlıklar hakkındaki iddiayı doğrulayan şey, doğruysa, gerçeği için sahip olabileceğimiz herhangi bir kanıt değildir, ancak bu kanıtlar gerçeğe olan inancımızı haklı kılmak için kendinde önemlidir. Aksine, böyle bir iddiayı doğrulayan şey, aslında işaret edilen nesnelerin işaret edilen ilişkilere yönelmesidir (Psillos 1999: 13).

Öte yandan, kurucu ampirizm, bilimsel teorileri keşiften ziyade kurgular olarak gördüğü için kurucu ampirizm bilimsel teorileri literal yorumlasa bile, işaret edilen nesnelerin işaret edilen ilişkilere yönelmesi gibi bir yorum söz konusu değildir. Başka bir deyişle, metafizik tezi taahhüt etmeden semantik tezi taahhüt etmek, işaret edilen nesneler ve ilişkiler hakkında agnostisizme yol açar. Kurucu ampirizm için, yalnızca gözlemlenebilir olan nesnelerin varlığı kabul edilir, çünkü "… gerçekçiler deneyimi aşan nesneler hakkındaki iddialara inanırlar …" (Chakravartty 2007: 15). Bu aynı zamanda bilimsel gerçekçiliğin ilk taahhüdünün, metafizik tezin, neden ontolojik değil de metafizik olarak adlandırıldığını da açıklayabilir.

Kurucu ampirizmin semantik tez konusundaki taahhüdünü nasıl değerlendirmek gerekmektedir? Van Fraassen'in buna cevabı "varoluşun soruları, … olgunun meseleleri hakkındaki sorulardır … ve felsefe olgunun belirleyicisi değildir" (2017: 95). Bilim adamları çalışmalarını teorik varlıklar varmış gibi yapabilirler. Felsefe, elektronların var olup olmadığına karar vermekle ilgilenmez. "Elektronların var olup olmadığı, Norveçlilerin, cadıların veya manevi zekâların varlığından daha felsefi bir soru değil" (2017: 95). Her ne kadar teorik varlıklar hakkındaki iddialar doğru veya yanlış olma ihtimaline

sahip olsa da varlığı noktasında yapılacak değerlendirmeler var olduklarını göstermez. Kurucu ampirizmin epistemolojik tezi, yalnızca deneyimde neyin göründüğünü bilmekle ilgilidir:

> Bir kişi, belirli bir teorinin doğru olduğuna inanabilir ve bunu açıklayabilir, örneğin, gerçeklerle ilgili en iyi açıklama olduğu için veya ona en tatmin edici dünya resmini verdiği için. Bu onu irrasyonel yapmaz, ancak böyle nedenlerden uzak kalmayı ampirizmin bir parçası olarak görüyorum (van Fraassen 1985: 252).

Uzlaştırma problemine ya da Eddington'ın iki masa problemine, sağduyu gerçekçiliği içinde formüle edilmiş, bilime karşı gerçekçi olmayan bir tavır takınan kurucu ampirizm ile metafizik gerçeklik içinde formüle edilmiş, bilime karşı gerçekçi bir tavır takınan bilimsel gerçekçilik arasındaki tartışmanın izdüşümü şeklinde yaklaşmak mümkün gözükmektedir. Ve aynı problem sadece nesne söz konusu olduğunda değil, zihin söz konusu olduğunda da ortaya çıkmaktadır. Zihin söz konusu olduğunda,

> … Eddington'ın iki masa probleminin esas özelliklerinin tekrarına sahibiz – iki masa, bizim terminolojimizde, aşikâr imgenin masası ve bilimsel imgenin masası. Orada problem aşikâr masa ile bilimsel masayı birbirine uydurmaktı. Burada problem aşikâr duyumsamayı nörofizyolojik karşılığına uydurmak. Ve, ilginç şekilde, her iki durumda da problem özünde aynıdır. Aşikâr imgenin nihai bağdaşıklığı ile bilimsel nesnelerin sisteminin nihai bağdaşıksızlığının ulaştırılması (Wilfrid Sellars 1963: 35-36).

Eric Hochstein zihin felsefesinde var olan pozisyonları iki ayrı başlık altında sınıflandırmıştır (2015). Bu başlıklardan ilki yakınsama pozisyonu (convergence), diğeri otonomi pozisyonudur. İki pozisyonu birbirinden ayıran temel özellik zihin ile beyin arasında kurduğu ilişkidir. İnsan zihnini anlamak için beyin çalışmalarından faydalanılması gerektiğini iddia eden pozisyona yakınsama pozisyonu demektedir. Zihin çalışmaları ile beyin çalışmaları arasında bir bağ yok diyen pozisyona ise otonomi pozisyonu demektedir.

Otonomi pozisyonunun altında işlevselcilik (functionalism) vardır. İşlevselciliğe göre beyin, zihnin donanımını oluşturmaktadır. Bu donanım üzerinde kurulu olan yazılımı yani zihni anlamak için donanımı çalışmak gereksizdir. Yazılımın farklı donanımlarda da aynı şekilde yürürlüğe konulabileceğini varsayan işlevselciliğin temsilcilerinden olan Fodor, "sinirbilimden bağımsız, sağduyusal inanç / istek açıklamasını doğrulayacak bir bilimsel psikoloji mümkündür" demektedir (1987:16).

Hochstein, yakınsama pozisyonunun altında ise eleyici materyalizme, yeni mekanikçilere ve indirgemecilere yer vermiştir. Bunların ortak noktası, sinirbilim çalışmalarını dikkate alarak insan zihnini açıklamaya çalışmalarıdır. İşlevselciliğin aksine eleyici materyalistler için sağduyu psikolojisinin terimleri sinirbilim için yeterli değildir. Üstelik sağduyu psikolojisinin terimlerinin yanlış olduğunu iddia etmektedirler:

> … psikolojik fenomenin sağ duyusal kavrayışı kökünden yanlış bir teori oluşturmaktadır ki temelinden eksik prensipleri ve ontolojisi …, eninde sonunda, tamamlanmış sinirbilim tarafından yerinden edilecektir (Paul Churchland 1981: 67).

Bunun sonucunda öngörülen şey ise "birbirimizi anlamamızın ve hatta içsel gözlemlerimizin bile yeniden kurulmasıdır" (Paul Churchland 1981: 67).

Hochstein da otonomi ve yakınsama pozisyonlarını değerlendirirken Churchland gibi düşünmektedir.

> Bir bilişsel sistemi neye inandığı, niyet ettiği ve arzuladığı üzerinden anlamak, yalnızca o zihni durumlar arasında rasyonel bağlantılar varsayıldığı zaman bilgilendirici olabilir. Fakat bu idealleştirme, bu psikoloji teorilerini sinirbilimciler tarafından kullanılan birçok teori ile anlaşmazlığa düşürmektedir.

Hochstein'in yakınsama pozisyonu altında sıraladığı yeni mekanistler ve indirgemeciler hakkında değerlendirme yapacak olursak, yeni mekanistler bir kognitif sistemi açıklamak için birden fazla katman olduğunu iddia etmektedirler[15]. Açıklanması gereken bu katmanların en altında nöronların içindeki moleküler bağlantılar ve sinapslar varken, en üstte davranış vardır. Ayrıca bu katmanlar, farklı dallar tarafından çalışılmaktadır. Örneğin nöron içi moleküler yapıları çalışan bilim dalı moleküler sinirbilimken, nöronal sistemleri oluşturan makroskopik (gross) anatomi kognitif sinirbilim tarafından çalışılmaktadır. Kognitif sinirbilim çalışmaları, beyinde bölgesel çalışmalar yapan, bölgeler arasındaki ilişkileri inceleyen sinirbilim dalıdır. Her katmanın otonomik olduğunu savunan yeni mekanikçiler, katmanlar arasında indirgemenin mümkün olmadığını iddia etmektedirler. Bu prensipler bağlamında bir kognitif sistemi çalışmanın en makul yolunun kognitif sinirbilim çalışmaları olduğunu iddia etmektedirler.

John Bickle gibi, moleküler sinirbilimi savunan indirgemeciler ise davranış ve moleküler yapı arasındaki katmanların açıklayıcı bir değeri olmadığını, sadece neyin nerede çalışılması gerektiği noktasında yol gösterici rolleri olduğunu iddia etmektedir (Bickle 2006). Örneğin x davranışının beyinde hangi bölgedeki moleküler yapıyla açıklanabileceği bulunduğunda, davranışla moleküler yapı arasında direk olarak bağlantı kurmak mümkündür. Dolayısıyla moleküler yapı ve davranış arasında kalan katmanlar açıklayıcı bir role sahip değildir.

[15] Figür 1

Yeni mekanikçiler ile indirgemeciler arasındaki farkı daha iyi anlayabilmek ve eleyici materyalizm ile işlevselcilik arasındaki sağduyu psikolojisine dair tartışmayı temellendirebilmek adına Henry Molaison vakasına bakmak faydalı olacaktır. Bunun da ötesinde, Hochstein'ın da dediği gibi, sinirbilim çalışmalarını dikkate alarak yapılan çalışmalar, eninde sonunda psikolojinin kavramlarının sinirbilimin kavramlarıyla yer değiştirmesine yol açacaktır (Hochstein 2015: 15). Bu bağlamda her ne kadar yeni mekanikçiler katmanlar arasında var olan bir otonomiden bahsetseler de, varsayılan otonomi zaman içinde kaybolacak gibi gözükmektedir.

Henry Molaison (H. M.) vakasına geri dönecek olursak, bu vakanın sinirbilim çalışmalarına katkısını Craig Stark şu şekilde özetlemiştir: "H.M. hastasını göz önüne almadan insan hafızasında hippocampal alanın rolünün tartışmasına başlamamız bile mümkün olmazdı" (2007: 550). Molaison, epilepsi hastası olarak hayatını sürdürmekteydi. 1953 yılında yapılan ameliyat sonucu orta temporal lobları iki taraflı olarak alındı. Ameliyat sonrasında, Molaison'un ileriye yönelik hafıza oluşturamadığı görüldü. Geriye dönük hafızasının ise genel anlamda ameliyat öncesi yılı hatırlamayacak şekilde zarar gördüğü anlaşıldı. Molaison kendi psikolojik durumunu "…. sürekli olarak rüyadan uyanma, her şeyin farklı görünmesi …" şeklinde betimlemekteydi (Andersen et. al. 2007: 13). Kendisi yeni beceriler kazanabilmekle birlikte, bu becerileri öğrendiğini hatırlamamaktaydı. Bu gösterge, "beyinde birden fazla hafıza türü[16] olduğuna dair ilk ipucunu sağladı ve bazı tür hafızaların orta temporal lobun dışında kaldığını akla getirdi" (Larry Squire 2008: 7).

[16] Figür 2

Orta temporal lob, hippocampus'un yanı sıra, amigdala'nın ve diğer bazı yapıların bir arada bulunduğu lobdur[17]. Daha sonraki hayvan çalışmaları ile birlikte, hippocampus'un kısa dönem hafızalardan uzun dönem hafızlar oluşturan bir işlevi olduğu düşünülmüştür. "1970'lerde başlayan hipokampustaki çalışmalar, uzun vadeli güçlenme (Long term potentiation - LTP) olarak bilinen çarpıcı bir sinaptik plastisite biçimi de ortaya çıkarmıştır" (Bechtel 2008: 74). Sinaptik plastisitenin tanımı, "Hebb'in varsayımı ya da Hebb'in yönetimi" olarak adlandırılan önermeye dayanmaktadır (Stoljar ve Gold 1998: 123):

> A hücresinin bir aksonu, bir B hücresini uyaracak kadar yakın olduğunda ve tekrar tekrar veya sürekli olarak uyarıda bulunduğunda (takes part in firing it), bir hücrede veya her ikisinde de gerçekleşen bir büyüme süreci veya metabolik değişim ortaya çıkar ki, B'yi ateşleyen hücrelerden biri olarak A'nın verimliliğini arttırır. (Hebb 1949: 62).

"Böylece AB sinapsındaki bir elektro-kimyasal olay, bu sinapsın gücünde bir değişiklik meydana getirir; bu, A'nın B üzerindeki etkinliğinde bir değişikliktir. Bu sinaptik plastisite, LTP'yi Hebb'in kuralına bağlayan şeydir" (Stoljar ve Gold 1998: 125).

"Moleküler dalga", uzun vadeli güçlenmede görülen sinaptik plasitisite ile birlikte sinirbilim çalışmalarında çok baskın bir hal almıştı (Bickle 2006: 416). Bickle "moleküler dalga" demektedir çünkü zihinsel fenomenlerin moleküler seviyeye indirgenmesini savunmaktadır. Bununla birlikte, buradaki indirgeme, sağduyu psikolojisinin kavramlarının indirgenmesini içermez. Buradaki indirgemeden kasıt şudur:

[17] Figür 3

> • nöronlar içindeki hücresel aktivite veya moleküler yollar seviyesinde nedensel müdahale …
> • daha sonra deneysel psikolojide iyi kabul edilmiş davranış protokollerini kullanarak kontrollü deneysel koşullar altında bu müdahalelerin etkilerini takip etme (Bickle 2006: 425).

Buradan da anlaşılacağı üzere, Bickle moleküler sinirbilim çalışmalarının açıklama gücü üzerinde durmaktadır. Bilişsel sinirbilim ise, temporal lobun içerdiği yapıları hatırlayacak olursak, bu yapılar arasındaki ilişkiye odaklanmaktadır. Bilişsel sinirbilim çalışmalarını temel alan yeni mekanikçiler, moleküler sinirbilimin açıklamasını hafıza sisteminin mekanizmasında sadece bir katman olarak kabul etmektedirler. Makroskopik düzeydeki araştırma ve açıklamalar, bir kognitif sistemi anlamaya yardımcı olmaktadır.

> … kortikal alanların ve diğer nöronal sistemlerin çeşitli bilişsel kapasitelere nasıl katkıda bulunduğunu, bu sistemlerin kapasitelerinin kendilerini oluşturan alt nöronal katmanların operasyonları ile nasıl açıklandıklarını [anlamak] çeşitli seviyelerdeki sistemleri analiz etmek, moleküler sinirbilim ve genetikten nörofizyoloji, nörogörüntüleme, matematiksel analiz, hesaplamalı modelleme ve çok çeşitli davranışsal görevlere kadar uzanan koordinasyon tekniklerini içerir. (Boone ve Piccinini 2015: 1515).

Bu bakımdan, kısa dönem hafızaları uzun dönem hafızalara dönüştüren süreç, hafıza konsolidasyonu (memory consolidation), sadece LTP denilen moleküler işlemle açıklanamaz. Aksine, açıklama hipokampusun genel anatomisini içermelidir, çünkü "[hipokampus], bu tür birbirine benzeyen hafıza kodlama işlemlerinin nasıl yapılabileceği konusunda ipuçlarını gösteren oldukça belirgin bir nöro-mimariye sahiptir" (Bechtel 2008: 74).

Bu tartışmalarla bağlantılı olarak, "…hayvan çalışmaları Molaison'dan sonraki yıllarda hipokampüsün işlevlerinin daha farklı açıklamasını üretti" (Bechtel 2008: 75).

Hayvan araştırmalarında, hipokampal lezyonlu sıçanların mekânsal navigasyonda başarılı olamadıkları bulundu. Su labirenti deneyinde, sıçanlar bir su labirentine konuldu. Su labirentine sıçanların üstüne çıkabileceği batık bir platform yerleştirildi. Efor gerektiren yüzmenin sonucunda, sıçanlar su altındaki platformun yerini bulabildiler. Yeri öğrendikten sonra, normal sıçanlar, su labirentine bırakıldıkları yerden bağımsız olarak doğrudan platforma gittiler. Öte yandan, hipokampusu lezyonlu sıçanlar, sadece aynı noktadan salınmaları durumunda doğrudan platforma gittiler. Farklı bir noktadan labirente bırakıldıklarında, platformu tekrar tekrar aradılar (Morris ve ark. 1982). Bu gözlemler sonucunda, gözlemlenen fenomenlere yol açan süreçlere odaklanma ihtiyacı ortaya çıktı. Örneğin, Howard Eichenbaum ve meslektaşları "bildirimsel hafıza (declarative memory) için önemli olan şeyin (ve hipokampüsün neyin başardığının) esnek bir şekilde erişilebilen bilgi öğeleri arasında ilişkiler kurmak" olduğunu öne sürdüler (1993). Mekânsal hafızanın, bu tür bir belleğin sadece bir örneği olduğunu öne sürdüler" (Bechtel 2008: 76). Aynı şekilde, John Gabrieli ve meslektaşları "operasyonlar dil, işleyen hafıza (working memory, epizodik hafıza veya örtülü hafıza (implicit memory) bağlamında ele alınsalar bile aynı olabilir (1998: 912). İşlemler aynıysa, dil, bellek vb. arasındaki farklar tarafımızca fenomenal şekilde çizilebilir. Öyleyse, düşüncelerin, hatıraların, vb. "beynin ürünü olan zihinsel durumların koleksiyonları olduğunu, ancak bire bir şekilde beynin organizasyonuyla uyuşmadıklarını" söyleyebiliriz (Barrett 2009: 328). Ne indirgemeciler ne de yeni mekanikçiler sinirbilim çalışmalarına dayanan bu tür önerileri, sağduyu psikolojisinin kavramlarının beynin organizasyonuyla uyuşmadığı için işlevsiz olabileceğine dair önerileri kulak ardı etmezler. Bir örnek vermek gerekirse, Lisa Barrett "… açıklamak istediğimiz fenomenler -

duygular, biliş (cognition), benlik, davranışlar" sadece insan zihninin konusu değil de, aynı zamanda zihnin yarattığı şeyler ise? Bu kategorilerin sınırlarına onları yaratan beyinde saygı gösterilmiyorsa?" sorularını sormaktadır (2009: 327). Bir diğer değişle, duygular, biliş vb. kavramlar sadece görünüşten ibaretse ve iki masa probleminde olduğu gibi burada da iki farklı özelliğe sahip görünüş ve gerçeklik problemi ortaya çıkıyorsa nasıl bir tutum takınılmalıdır? Sağduyu psikolojisinin görünüşü ve sinirbilimin gerçekliği temsil ettiği ya da sağduyu psikolojisinin aşikâr imgeyi ve sinirbilimin bilimsel imgeyi temsil ettiğini söylemek mümkün müdür? Hochstein, yeni mekanikçilerin ve indirgemecilerin takınacağı tavrın aynı olacağını düşünmüş olmalı ki her ikisini de eleyici materyalizm ile birlikte "yakınsama tezi" altında sunmaktadır.

İşlevselcilik ve eleyici materyalizm arasındaki farkı sağduyu psikolojisine olan yaklaşımları arasındaki fark olarak düşünmek mümkün gözükmektedir. Burada, sağduyu gerçekçiliği içinde kurulmuş, bilime karşı gerçekçi olmayan yaklaşımı, kurucu ampirizmi düşündüğümüzde, sağduyu psikolojisi üzerinden yürütülen tartışmaya, kurucu ampirizm üzerinden değişik bir bakış açısı getirilebilir. Kurucu ampirizm aynı zamanda bilişsel sinir bilimi değerleyen yeni mekanikçiler ile moleküler sinirbilimi değerleyen Bickle gibi indirgemeciler arasındaki tartışmaya dair de değişik bir bakış açısı getirilebilir.

Kurucu ampirizme göre bilim, son ürünü temsil olan bir etkinliktir. Sağduyu gerçekçiliği, bilimin ampirist epistemolojiye uygun şekilde yorumlanmasına olanak sağlayan ontolojik tutumdur. Gözlenemeyenlere, maddeye, nedenselliğe vb. ilişkin metafiziksel sorular, doğa ile ilgili değil, bilimsel teorilerde temsil

edilen doğa ile ilgili sorulardır. Bir diğer değişle doğayı temsil eden modelin sorunlarıdır.

> … bilimsel imgeyi *temsil* olarak analiz ettiğimizde, ontolojide ortaya konan tüm sorular ortaya çıkıyor - madde, bireylik (individuation), nedensellik, buluk (haecceity) soruları gibi - ama yeni bir anahtarda. Onlar sadece *sözlü olarak* aynı sorular değildir, çünkü kullanılan kavramlar metafizikten çekilmiş aynı kavramsal çerçeveye aittir. Fakat ampirik dudaklarda *doğayla ilgili değil, doğanın temsili ile ilgili* sorulardır. Ampirist bilim felsefesi, bu metafizik soruları, belirgin bir şekilde farklı (yapısal olarak benzer) bir içerik vererek, doğa ile ilgili değil de *doğanın temsili* ile ilgili sorular olarak, yeniden canlandırır ve yeniden konumlandırır (van Fraassen 2003: 491).

Van Fraassen, realistler nasıl ontoloji konularıyla ilgileniyorsa, ampiristler de ontolojinin konuları hakkında felsefi bir uğraş içinde olabilirler demektedir (van Fraassen 2003: 491). Ancak van Fraassen'e göre, ampiristlerin ontolojinin konularını ele alış biçimleri, ontoloji ile ilgili soruların mahiyetini değiştirecektir. Çünkü bu sorular ampirist çerçevede "doğaya ait sorular değil, … doğanın temsillerinin [soruları]" olacaktır (van Fraassen 2003:491). Van Fraassen, doğanın kendisini bilimsel teorilerimizle nasıl kavradığımız sorusuyla birlikte gözlemlenemeyenlerle ilgili tartışmayı genişletmek istemektedir. Tartışma, bilimsel teoriler tarafından temsil edilen, ancak doğanın kendisi ile ilgili olmayan modelle ilgili olduğunda, ampirik yeterlilik (empirical adequacy), başarının tek ölçütü gibi görünmektedir. Bu çerçevede sağduyu gerçekçiliği hem bilimsel aktiviteyi hem de bilimsel ürünü tanımlamak ve değerlendirmek için en uygun çerçeveyi sağlamaktadır.

Van Fraassen, sağduyu gerçekçiliğine dayanan ontolojinin metafizik tartışmaları engellediğini düşünmektedir. Öte yandan, "bilimde bulunan

gözlemlenebilir ve gözlemlenemeyen nesnelerin birtakım kategorileri için ontolojik (ya da metafiziksel) bilimsel gerçekçilik…" metafiziğe kaymaktadır (Nola 2006: 183). Sağduyu gerçekçiliğini "güvenilir temel söylem" olarak değerlendiren van Fraassen, metafiziğe başvurmadan "bilim nedir" sorusuna cevap aramaktadır (2003 481). Van Fraassen için, "temel bir fiziksel varlık nosyonu ile, diğer prensipleri açıklayan, ancak başka hiçbir şeyle açıklanmayan nihai bir metafiziksel analiz birbirinden ayrılmalıdır" (Denkel 1996: 16). Sağduyu gerçekçiliği, bu temel fiziksel varoluş birimi hakkındaki nosyonu sağlar. Sonuçta, van Fraassen "biz birçok şey hakkında gerçeği görebiliriz ve görmekteyiz: kendimiz, başkaları, ağaçlar ve hayvanlar, bulutlar ve nehirler-deneyimin dolaysızlığında" demektedir (1989: 178). Bu anlamda da bilimsel gerçekçi yaklaşımın epistemik tezine, bilimsel teorilerimizin doğru olduğunu bilebiliriz tezine karşı çıkmaktadır. Nedeni ise deneyimimizin dolaysızlığında teorik nesnelerin olmayışıdır. Kurucu ampirizmin tezlerini sıralayacak olursak bu tezler şu şekilde olacaktır:

> 1. Ontolojik tez: Zihinden bağımsız bir dünya vardır.
> 2. Semantik tez: Bilimsel teoriler, felsefenin olguların belirleyicisi olmadığına dikkat edilerek, literal olarak yorumlanmalıdır.
> 3. Epistemolojik tez: Bir ölçüm aracı olarak insan fizyolojisi ile gözlemlenebilir olanları bilebilirim.

Yukarıdaki maddelerin ışığında, bilimsel teorilerin konusu nesne olduğunda, kurucu ampirizm sağduyu gerçekçiliğini savunmaktadır. Bilimsel teorilerin konusu insan psikolojisi olduğunda, kurucu ampirizm sağduyu psikolojisini desteklemektedir. Ancak burada kurucu ampirizmin işlevselciliği desteklediği düşünülmemelidir. Nihayetinde işlevselcilik de sağduyu psikolojisi üzerinden geliştirilecek bilimsel bir psikoloji amaçlamaktadır. İşlevselcilik ile eleyici

materyalizmin arasındaki fark, sağduyu psikolojisini açıklamak için postüle edilecek kavramların sağduyu psikolojisi üzerinden mi inşa edileceği yoksa sinirbilim üzerinden mi inşa edileceği şeklindedir. Ampirist geleneğin devamı olarak değerlendirilen Van Fraassen'in pozisyonu, kurucu ampirizm, temel itibariyle postülasyonlar üzerinden talep edilen açıklama biçimine karşı çıkmaktadır. Bu bağlamda bilimsel gerçekçilik yaklaşımının doğuşu ile bilişsel bilimlerin doğuşu hemen hemen aynı tarihlere gelmektedir. Psillos, "1960'lı yılların başlarında mantıksal ampirizme karşı olan ayaklanmanın en önemli görevlerinden birisinin, teorik ve gözlemsel terimler arasında var olduğu iddia edilen ikilemi ortadan kaldırmak olduğunu" söylemektedir (1999: 21). Aynı şekilde, Worth Boone ve Gualtiero Piccinini şunları söylemektedir:

> 1950'lerdeki bilişsel devrim genellikle yerini aldığı davranışsal programla anılır. Bilişsel durumların ve süreçlerin varsayımını reddettiği yaygın olarak kabul edilen davranışçılık metodolojisi ve metafiziğinin aksine, bilişsel bilim, içsel bilişsel durumları ve süreçleri, akıllı kapasiteleri açıklamak için postüle etmektedir (2016: 1511).

Fizik gibi bilimlerin yöntemiyle ilgili "ne" sorusu, psikoloji gibi davranışla ile ilgili bilimlerin "nasıl" yapılacağını belirlemiş gibi gözükmektedir. Başka bir deyişle, teorik varlıkların nasıl yorumlayacağına dair mantıksal ampirist yorumdan bilimsel gerçekçi yoruma geçiş ile, davranışçı programdan bilişsel bilime geçiş arasında bir ilişki kurulabilmektedir. Bu bakımdan, mantıksal ampirizme ve davranışçı programa karşı ayaklanma aynı tutuma sahip gibi görünmektedir: deneyimimizde dolaysız olarak ortaya çıkan aşikâr imgenin ve nesnelerinin bilimsel teorilerdeki gözlemlenebilir olmayan teorik varlıklar aracılığıyla açıklanması. "1950'ler ile 1970'ler arasında geliştirilen" bilişsel bilim, bilişsel durumların ve süreçlerin kabul edilmesinde "temiz bir iş bölümü"

önerdi (Boone ve Piccinini 2016: 1510-1524). “Bir tarafta psikoloji vardı… diğer tarafta sinirbilim … Bu iki seviyedeki açıklamalar birbirinden ayrı ve özerk olarak kabul edildi” (Boone ve Piccinini 2016: 1510).

Yeni mekanikçi ve indirgemeci yaklaşıma sahip tututmlara gelecek olursak, bilişsel sinirbilimin ve moleküler sinirbilimin soruları, sağduyu psikolojisi ile ilgili birtakım gerçekleri elde edecek sorular değildir. Moleküler sinirbilimin ve kognitif sinirbilimin soruları, insan psikolojisinin formüle edildiği modellerin kendi sorularıdır. Aynı şekilde, bilişsel bir sistemin açıklamasında varsayılan katmanlarla ilgili olarak yeni mekanikçiler ve indirgemeciler arasındaki tartışma, insan psikolojisinin temsil edildiği modellerin sorularıyla ilgilidir. Farklı formülasyonlar, insan psikolojisinin farklı şekillerde temsil edilmesine izin vermektedir. Örneğin, hafıza konsolidasyonu, LTP olarak ortaya çıkan moleküler yapı ile de temsil edilebilir, LTP'nin genel bir yapının sadece bir katmanı olarak kabul edildiği bir formülasyon içinde de temsil edilebilir. Bununla birlikte, hafıza konsolidasyonu açıklamalarından sadece birinin zaman içinde kaybolduğu da görülebilir. Ancak bu yürürlükte kalan açıklamanın sağduyu psikolojisi ile ilgili bir gerçeği yakalığı şeklinde kavranmamalıdır. Çünkü “her bilimsel teori, şiddetli bir rekabetin içine doğar… Sadece başarılı teoriler hayatta kalır; aslında doğada var olan düzeni (regularities) ortaya koyanlar” (van Fraassen: 40). Bu bağlamda, otonomi pozisyonu altında olan işlevselcilik ile yakınsama pozisyonu altındaki eleyici materyalizm, yeni mekanikçiler ve indirgemeciler arasındaki tartışmalar, yalnızca ampirik yeterliliğe göre belirlenen insan psikolojisinin farklı formülasyonları olarak kabul edilmektedir.

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