Naturalizing Artifacts

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ABSTRACT

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Knowledge, in the framework of recent naturalized epistemology, has devoted a certain interest in the definition of natural kinds and the accompanying studies related to their acquisition. Moreover, there is a widespread consensus in univocally considering knowledge as truth conducing. The purpose of this thesis will be to analyze the possibility of including artifacts in the definition of knowledge without altering the epistemological context. The main sources of research are naturalized epistemology, neuroscience, neuropsychology, perceptual studies and evolutionary psychology. A particular emphasis is also placed on the study of emotions and their relation to cognition.

In order to accomplish the purpose aforementioned, I will, on the one hand, present and challenge some of the main epistemological tenets and, on the other hand, in the last part of this work, I will introduce the example of art as a case of study. Hence, after introducing the methodological framework, I will discuss the problem of natural kinds and the definition of knowledge focusing on the problem of perceptual kinds. The following section will analyze false beliefs and the possibility of grounding them in evolution and reasoning. Whereas the first part is mainly negative, the last part, based on the previously developed counterarguments, will expose the possibility of "naturalizing artifacts" through the study of emotions and perception.

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1. Introduction, Methodology and Framework

The main purpose of this thesis will be to emphasize how artifacts, in their functional role, lead to a form of knowledge and can consequently be inscribed in an epistemological framework through the contribution of naturalistic studies. In this first, introductory chapter I will be concerned with an explanation of what is here intended as naturalistic. The two principal threads will be, on the one hand, an analysis of evolutionary psychology and, in particular, its outcomes regarding the modularity of the mind and its different interpretations. On the other hand, I will present a neuroscientific analysis of the visual system and the neurological and neuropsychological accounts of emotions.

In connection with the first point, I will consider Cosmides and Tooby's account of evolutionary psychology and how their theory of the modularity of the mind can be differentiated from the one advocated by Jerry Fodor and integrated, mainly from an epistemological standpoint, by the one proposed by Clarke in his book *Reconstructing Reason and Representation.* A further position presented will be the one held by Edelman. It should be noted how Edelman's view, rather than be specifically concerned with the modularity of the mind, can nonetheless function as a bridge between a naturalistic, evolutionary and scientific vision of the mind and the brain and the possibility of explaining the emergence of feelings and states such as emotions.

The second part of this chapter will provide an introduction to a rather narrow number of issues in the neuroscientific field, namely, the visual system and the emotional system. First, the visual system has been studied with major accuracy in the history of neuroscientific studies and there also are several implications in the understanding of

perception, both in folk psychology and in more complex works; for instance, the study of visual perception has been reconnected to the study of forms, illusions, space and, most important, there is a widespread consensus on the link between the visual system and our language abilities; in other words, visual perception is ultimately interwoven with studies on rationality and expression. In the second chapter of this thesis, visual perception and thus the recognition of forms will be presented as the source of our "shape bias", one of the most crucial abilities in identifying natural kinds. Furthermore, visual perception will turn out to be a crucial point in the fourth and last chapter, when dealing with the perception of art from a strictly naturalistic standpoint. In the second chapter visual perception will be connected to the recognition of shape biases and hence to natural kinds, while in the last chapter visual perception will be associated with artifacts and to art as a specific case of study.

If a scientific interest upon the visual system can easily date back to the beginning of the XIX century, a truly scientific study of emotions is quite recent. The pioneer role of William James has been grounded on neuroscientific bases long after his suggestions. Part of the difficulty resides in the problem of attributing a location to the emotional system and to the contested relationship between, in a general dichotomy, emotions and reason. I will then briefly consider two theories of emotions; the first one, outlined by Aaron Sloman, understands emotions in the context of development as the need of establishing different architectures with the purpose of a more suitable approach to evolution and to behavioral strategies. The second study, from Rolls, is mainly concerned with the mechanism, and thus to the functional content of emotions, a study that will reveal to be of particular interest in the fourth and last chapter.

1.1 Naturalized Epistemology and Evolutionary Psychology. How to Conceive an Empirical Background of the Mind.

Although Quine's essay *Epistemology Naturalized* was published almost forty years ago, the question of how this renewal in epistemology has to be interpreted remains open. Jaegwon Kim provides one of the most well known interpretations focusing on the importance of Quine's shift as well as on the rediscovered problem of beliefs and justification. The question is close, according to Kim, to one of the tenets of analytic, also addressed as standard or classical epistemology, namely, the essential normative character of epistemological claims; an assumption that faces the slippery slope of presumption, as Kim holds:

The usual presumption is that our answer to the first question [what conditions must a belief meet if we are justified in accepting it as true?] *should leave our epistemic situation largely unchanged. That is to say, it is expected to turn out that according to the criteria of justified belief we come to accept, we know, or are justified in believing, pretty much what we reflectively think we know or are entitled to believe.*[1]

According to Quine, the reasons of such "epistemological stubbornness" have to be found in conceptual and doctrinal reduction, two lost cause attempts collapsing in the general mistake of trying to provide an epistemology capable of validating science. The twist, however, resides in science itself, but, rather than improving deductive abilities, the solution would be to move toward an holistic approach, to, in other words, extend the boundaries of philosophy to the experimental field of psychology intended as the study of

[1] Kim, J. (1988): 302.

cognitive processes. What Quine addresses as empirical psychology is an open door to natural science in the philosophical field and stresses how the relationship between epistemology and natural science ought to be of reciprocal containment. The first point affected by such a shift is the "enigma of epistemological priority", as Kim clearly notices, moreover, a much broader issue needs to be reconsidered, namely, the modified approach to knowledge once justification is rephrased in empirical and experimental terms. Quine, concludes his essay mentioning the possibility of relating perception to language and thus to the study of phonemes, yet, introducing empirical research in epistemology theoretically discloses an extremely wider range of plausible investigations. For instance, the application of perception and perceptual studies has strongly improved, and perhaps partially resolved, fundamental issues in epistemology such as the problem of concept acquisition, as I will briefly outline in the second and third chapter. However, Quine's suggestions have been extended to several scientific disciplines with germane attention on evolutionary studies and their direct connection to natural sciences.

It is along the lines of evolutionary studies and evolutionary psychology that several epistemologists have started to rethink the concept of knowledge and, much more related to the main themes of this work, to the mind problem. The turning point represented by evolutionary epistemology is indeed to join the interpretation of the mind as a modular and computational mechanism with development and survival strategies. One of the most relevant accounts is the one defended by Cosmides and Tooby. The point of departure is to object to the Standard Social Science Model that understands the mind exclusively as a social construction, independently from any evolutionary or psychological constraints.

Conversely, evolutionary psychology aims to provide an alternative view, a novel approach to psychology were the mind is seen as a "*set of information-processing machines that were designed by natural selection to solve adaptive problems faced by our hunter-gatherer ancestors*". Two main corollaries should be emphasized: first, most of the tools that are regularly used are biological. Secondly: the relevance of adaptation. In particular, what evolutionary psychology is looking for is design evidence, some kind of universal, species-typical architecture. The founding thought is that a better design will do better at problem-solving and, as a consequence, will stimulate more useful behavior. Cosmides and Tooby list five principles that ought to be considered in every psychological account:

1. The brain is a physical system. It functions as a computer. Its circuits are designed to generate behavior that is appropriate to your environmental circumstances.
2. Our neural circuits were designed by natural selection to solve problems that our ancestors faced during our species' evolutionary history.
3. Consciousness is just the tip of the iceberg; most of what goes on in your mind is hidden from you. As a result, your conscious experience can mislead you into thinking that our circuitry is simpler than it really is. Most problems that you experience as easy to solve, are very difficult to solve –they require very complicated neural circuitry.
4. Different neural circuits are specialized for solving different adaptive problems.
5. Our modern skulls house a stone-age mind.

The first claim is connected both with a computational view of the mind and an account of behavior. Mind is frequently addressed as a "wet computer". This vision doesn't have to be confused with the plausibility of an artificial brain, where the matter constituting the brain is irrelevant. This is not fully acceptable; a deep study of the neurological system is a necessary condition to tie together biological and evolutionary views. Moreover, the connections of neural circuits with sensory receptors and so with muscles and the motor system, is the prior cause of our behavior. Motion generates behavior in response to information from the environment.

Point two emphasizes the relevance of the environment and the immersion in it. Our behavior cannot be stated *a priori*, without an external and contingent referent. Behavioral adaptation represents a parallel to adaptation in the brain; whether a neural circuit is more useful or not, it is a consequence of our past and present evolution. It is a continuum that allows us not to separate brain mechanisms and mind abilities.

In light of Edelmann's account, I will concentrate on the third principle, while I will now focus on two fundamental claims related to the forth one: the functionality of the mind, and the separation and segregation of modules:

Our minds consist of a large number of circuits that are functionally specialized. For example we have some neural circuits whose design is specialized for vision. All they do is help you to see. [...] We have all these specialized circuits because the same mechanism is rarely capable of solving different adaptive problems. [...] To solve the adaptive problems of finding the right mate, our choices must be guided by qualitatively different standards than when choosing the right food, or the right habitat. Consequently, the brain must be composed by a large collections of circuits, with different circuits specialized for solving different problems. You can think of each of these specialized circuits as a mini computer that is dedicated to solving one problem. Such dedicated mini-computers are sometimes called modules. [...] So, more precisely, one can view

the brain as a collection of dedicated mini-computers whose operations are functionally integrated to produce behavior.[2]

In the history of neuroanatomy, the modularity of mind was foreshadowed by Franz Josef Gall fifty years prior to the publication of Darwin's *Origins of Species*. According to his view, the mind is composed of segregated functional units; each unit operates for the purpose of one specific faculty. Gall was right in localizing these functions in the cerebral cortex, but made some considerable mistakes in relating the shape of the skull with a wider or restricted functionality of the correspondent cortical part.

A more recent view, albeit not grounded on a strict scientific analysis, is the one defended by Fodor in *The Modularity of Mind* (1983). Fodor argues that modules are task-specific, informationally encapsulated sub-systems. He individuates six modules: one for each sense and one specifically designed for language. He calls the mechanisms able to process inputs "transducers"; while transducers enable our relation with the world, a central system processes the collection of inputs. The product is the representation of the world we get as an output. The frame mechanism of this system is not distant from a Turing machine; the differences lie in the characterization of inputs. Fodor identifies nine properties of modules; I will here concentrate on the most debatable one, asserting that modules are informationally encapsulated. In other words, perceptual mechanisms can work in isolation from background information. He motivates this point with results acquired by the study of perceptual illusions. Roughly, if our visual system fails to recognize actual evidence, it is because the evidence of empirical factors is not related to vision in such a perfectly observable way. He particularly refers to Pylyshyn:

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[2] Cosmides, L., and Tooby, J. (1992).

Pylyshyn speaks of the cognitive impenetrability of perception, meaning that the output of the perceptual systems is largely insensitive to what the perceiver presumes or desires. Pylyshyn's point is that a condition for the reliability of perception, at least for a fallible organism, is that it generally sees what's there, not what it wants or expect to be there. Organisms that don't do so become deceased.[3]

Fodor's account is not free of objections. On the one hand, there is a certain autonomy in the visual system that has brought several thinkers to postulate, for instance, the existence of a "visual intelligence" parallel and integrated to our cognitive system. On the other hand, perceptual inputs don't work alone. In the case of the visual system, most of what we see is mediated and constructed with the help of previous beliefs. Finally, Fodor advocates the existence of a central nervous system processing information, a system that has not been proven to exist.

Cosmides and Tooby's last criterion is of crucial importance in understanding how the functionality of the mind ought to be conceived. The process of evolution does not permit sudden changes, thus, our mind is mainly a stone-age mind. Our modern brains are the result of ten million years of natural selection. Having a stone-age mind also means that we have a stone-age memory; given the slow transitions of evolution, our mind hasn't been designed to solve all the problems we face in our present lives, conversely, it responds to our ancestors' problems.

In order to study the brain and how it works and responds to the environment it is thus worth analyzing how it is functionally organized and how the functional organization affects the construction of knowledge and rationality. It is precisely from this framework that Clarke's analysis stems, conjoining a radical empiricism to epistemology and to a

[3] Fodor, J. (1993).

reconsideration of the concept of knowledge and the modularity of the mind. I will consider the first point in the next chapter exposing his concept of knowledge as a set of natural kinds. What is of main interest now, is to briefly focus on the relevancy of his account of the modularity of the mind as an extension of evolutionary psychology and a radical correction of Fodor's conception of mind.

Modules are domain specific computational mechanisms and, most important, they are innate, following the thread opened by evolutionary psychology Clarke holds:

For evolutionary psychologists, what is left over that is innate is enormous: a mind that is largely, but not completely, constituted by hundreds of thousands of functionally dedicated computers. Darwinian modules, in sum, are innate, naturally selected, domain specific, Turing computational mechanisms that often work alongside domain-specific bodies of data or representations. Call this the massive modularity hypothesis.[4]

The cooperation between modules and set of data avoids one of the possible flaws attributed to the modularity of the mind; indeed, Cosmides and Tooby are not committed to an entirely modular vision of the mind. Sets of data can, on the one hand, be the product of Chomsky modules, or innate data, yet, on the other hand, sets of data can come from different, acquired domains. Thus, the picture portrayed is much more flexible that it may seem, allowing for more general forms of processing mechanisms. Tied to a functional and computational view of the mind is the issue of module reliability. As will become clearer in the course of this work, modules are related to the possibility of successful behavior in the actual environment.

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[4] Clarke, M. (2004): 5.

As any account based on evolution implies, the role of modules is somewhat prone to change; moreover, any occurring change is but a proof of the extreme plasticity of the brain and of its adaptive functions. However, as I will argue in the last part of this chapter, the modularity of the mind needs to be corrected when confronted with the study of emotions and the results of studies on the cognitive unconscious. To be sure, this is absolutely not a rejection of the evolutionary framework, furthermore, it aims to be an integration of the widespread evolutionary thought defending the exclusive transmission of true beliefs as the best adaptive strategy.

For the purpose of this introduction, however, it is still worth highlighting how an evolutionary account of the mind can lead to different outcomes than the modularity of the mind. Rejecting a Turing and thus computational account of the mind, Edelman proposes a theory of Neural Darwinism where perception, memory, action and intention are the constituents of consciousness. Neural Darwinism is a theory of neural group selection grounded on three principles: developmental selection, experiential selection and reentry. The first principle regards the early establishment of neuroanatomy with the result of a connection system formed by millions of variant circuits or neuronal groups. Experience, the second stage of development, partially overlaps the first; after the constructions of a system, synaptic circuits are strengthened due to the impact of environmental inputs; this process is a constant interaction among mind, body and environment. Although all these principles are crucial, the third one specifically characterizes Edelman's theory:

Reentry: during development, large numbers of reciprocal connections are established both locally and over long distances. This provides a basis for signaling between mapped areas across

such reciprocal fibers. Reentry is the ongoing recursive interchange of parallel signals among brain areas in space and time. Unlike feedback, reentry is not a sequential transmission of an error signals in a simple loop. Instead, it simultaneously involves many parallel reciprocal paths and has no prescribed error function attached to it. (...) Through reentry, for example, the color, orientation and movement of a visual object can be integrated: no superordinate map is necessary to coordinate and bind the activities of the various individual maps that are functionally segregated for each of these attributes. Instead, they coordinate by communicating directly with each other, through reentry.[5]

Hence, not only does Edelman's theory stems from an evolutionary account, but the reentry function gives a clear idea of how the plasticity of the brain is not limited to a hypothesis-testing process. Various pathways are simultaneously working in a constant evolutionary process. Brain mechanisms are not immediate; their logic is often more complicated than what can be expected. As already mentioned, Edelman's account is embedded in Darwin's theory of population thinking, -functioning structures and organisms emerge as a selection of individuals in a population. A parallel can be inferred while considering the brain, as Edelman holds:

In evolution, fitter individuals survive and have more progeny. In the individual brain, those synaptic populations that match value systems or rewards are more likely to survive or contribute more to the production of future behavior.[6]

Edelman's theory aims to be global, an overall understanding of how the brain works; such a theory will combine a study of perception, memory, action and intention.

Action and intention are two fundamental components of vision and visual intelligence. Intention is based on the connection between the cortex and the first visual configuration.

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[5] Edelman, G. (2004): 39-40.
[6] Ibidem: 35.

In other words, it won't be wrong to say that we "aspect" to see something and, consequently, we direct focalization. Action, on the other hand, is related to complex mechanisms that are not only related to vision. Hence vision appears as a cooperating mechanism and an ultimate subject of the interaction between memory and emotions. In the case of memory it should be made clear how both long-term memory and working memory are in place. The case of working memory is particularly relevant given its connection to the emotional pathways and to the role played by the amygdala in registering and selecting data. Before entering into these issues, though, it is worth providing a brief overview of some of the most crucial neuroanatomical aspects related to both vision and emotion. In particular, I will focus on those aspects that mainly highlight the connection with development and evolution. This introduction will turn out to be useful in the last chapter of this work where I will relate visual studies to the study of emotions introducing their convergence in the realm of art. Moreover, art will be related to an evolutionary and neuropsychological framework aiming to reconsider artistic knowledge in a more scientific and natural context.

1.2 The Visual System

There is no doubt that the visual system is the most developed, and also, the most studied perceptual system. Humans rely on sight more than animals and they developed different capacities in order to apply visual functions to the environment. In this section I will propose a brief overview of some of the features that have been described in the neuroscientific literature emphasizing those characteristics that, more than others, show a clear adaptation. Evolutionary results can be found both in its anatomical structure and in

the way phenomena are perceived. I will first briefly analyze anatomical features that, more than others, show a development. I will later on, concentrate on perception *tout court* as strictly dependent on anatomical mechanisms.

Our eyes are two spheres enclosed in three layers of tissues: the retina, the uveal tract and the sclera. Despite its innermost position, the retina mediates the first encounter with light. The cornea, because of its transparency, is responsible for the refraction of light necessary for the image to be focalized by the retina and its receptors. Receptors are only one of the five types of neurons in the retina in addition to bipolar cells, ganglion cells, horizontal cells and amacrine cells. There are two kinds of photoreceptors: 90 million rods and 4.5 million cones. Receptors are able to transform information received by the environment in electrical impulses that are transmitted to the lateral geniculate nucleus in neuron chains composed by photoreceptors, bipolar cells and ganglion cells. This process is called phototransduction. Due to the distinction between the two receptors a first level of analysis is already performed at this stage. Cones have a high spatial resolution, they determine the acuity of vision and allow us to see colors, conversely, rods are more related to light sensitivity. Photoreceptors are used in different percentages depending on three different kinds of vision. In scotopic vision -when it's dark- only rods are activated and this is why, at night, our resolution is not optimal. Photopic vision, on the other hand, involves only cones. Both rods and cones contribute to mesopic vision –at twilight, for example. Despite the majority of rods, it should be noted that in the fovea, a highly specialized centre, rods are totally absent, while there is a high density of cones due to their effectiveness in high visual acuity.

Another observable characteristic at this level is focalization. Our image field is limited to 140° horizontally and 120° vertically. Although this capacity is less extended than the one of a camera, it is wider than the one we believe we perceive. Moreover, the visual field is never fixed as happens with a camera. Our eyes, with the help of ciliary muscles constantly redirect the fovea in rapid short jerks, called saccades, to achieve clarity and distinction between different shapes. Movement is related to the perception of a 3D world. We are incapable of two-dimensional vision. This has been demonstrated by clinical cases; for instance, a person blind from birth acquiring sight later on, does not understand two-dimensional images, hence, two-dimensional vision has to be learned.

Another phenomenon should be noticed considering the further ramification from receptors to ganglion cells, namely, the blind spot. This point of blindness in our retina is the beginning of the receptor nerve pathway. We intuitively fill this part with information derived both from other parts of the retina and from previous knowledge.

Axons in the optic nerve pathway do not immediately lead to the lateral geniculate nucleus; retina's fibers form a chiasm undergoing a partial decussation. Approximately 60% of the fiber crosses, while 40% continue toward the thalamus and midbrain on the same side. The fibers of the nasal half of the retina decussate and enter in the opposite side of the optic tract, while fibers of the temporal half do not decussate. Thus, our binocular vision is not always effective; on the one hand, because of decussation, the two hemispheres share information. On the other hand, our temporal vision, is strictly monocular. Hence, peripheral vision is less complete.

Once the nerve reaches the lateral geniculate nucleus ulterior subdivisions should be considered. There are six layers of cells. The two ventral layers contain *magno* cells that

are responsible for depth, spatial resolution and perception of movement. The remaining, and the uppermost located four layers, are *parvo* cells. Parvo cells share with magno ones spatial resolution, but are also able to perceive colors and contrast. Probably, magno cells –that we share with animals- developed before parvo ones. This will explain why they share some functions.

Most of the features listed above are explainable in the light of our ancestor's adaptation. Perceiving a 3Dworld, our ability of judging depth and distance, the more effective development of day vision, the relevance of focalization to the detriment of periphery's vision are only examples of how our abilities correspond to a world in which we mainly were predators. The development of these features allowed us to survive. Moreover, development is constant; paraphrasing Goldstein, perception is a brain contact with a constantly refined representation of the environment.

1.3 The Emotional System

Under a neuroscientific standpoint emotions are motor changes and expressions. However, the connection with the motor system is not the only characteristic of the emotional apparatus. Emotions, in a nutshell, seem to represent something more than immediate motor responses such as the ones that can be described by facial movements. Especially in the past 50 years emotions have been associated with rational responses and decision-making, moreover, the role of emotions is associated with working memory establishing a connection that might be able to respond to the questions raised by the problem of awareness and, more specifically, conscious awareness.

Traditionally, emotions have been associated with the limbic system, however, the emotional apparatus is much more extended and involves different functional centers, the most relevant is the amygdala and its connection to the frontal and prefrontal cortex and to the visual system. Emotional responses are related to sensorimotor activity in a rather specific way. Such activities have been studied during the course of the past century with a particular attention to the localization of such stimuli and, in more recent years, to the connection between adaptation and the development of immediate responses to the environment and emotions. Among the different experiments, it is worth mentioning Philip Bard and the discovery of a crucial role in the hypothalamus. Bard demonstrated how the expression of emotions does not entail cortical processes. Moreover, Bard made the first steps in the relationship between evolutionary studies and emotional processes focusing on self-preservation and the location of emotions in phylogenetically older parts of the nervous system. Walter Hess, working with electrical stimulation, ultimately improved Bard's results, as Purves summarizes:

Experiments like those of Bard and Hess led to the important conclusion that the basic circuits for organized behaviors accompanied by emotion are in the diencephalon and the brainstem structures connected to it. Futhermore, their work emphasized that the control of the involuntary motor system is not entirely separable from the control of voluntary pathways.[7]

Among these structures the most important is the one composed by the reticular formation. The connection between the hypothalamus and the forebrain is considered part of the limbic system affecting somatic and visceral motor responses independently from

[7] Purves, D. (2004): 689.

the classic motor cortical areas located in the posterior frontal lobe. Hence, there are two parallel and anatomically distinct pathways of visceral and somatic responses; on the one hand, the classic motor areas related to the basal ganglia and cerebellum and, on the other hand, the interactions placed in the limbic system and in what is described as the Papez circuit. James Papez was the first one in 1937 postulating the existence of specific brain circuits devoted to emotional responses. The circuit discovered by Papez involves an interconnection between the cingulate cortex and the hypothalamus via projections from the mammillary bodies to the anterior nucleus of the dorsal thalamus that projects in turn to the cingulate gyrus. The Papez circuit has been extended with the important addition of the amygdala that turned out to be playing a crucial role in the experience and expression of emotions. The amygdala's functions are extremely complex and differentiated; most of what we know was discovered by the pioneer research of Joseph Le Doux at New York University during the 1980s. Le Doux described the amygdala as the major center of emotions; its main function is to attach emotional significance to incoming data preparing the body to act by signaling the hypothalamus to secrete hormones. This importance has been firstly showed in the study of fear responses and subsequently in the expression of freezing behavior; both these reactions emphasized a participation of the amygdala in the association between neural sensory stimuli such as those coming from the environment and stimuli with primary reinforced value that are connected to the learning process and the reward/punishment reactions. Hence, emotions play a fundamental role in the construction of belief, therefore, the evolutionary mediation of certain beliefs is also a mediation between different emotions.

The process of belief construction involves, once again, the relationship between the neocortex and the amygdala, as Purves holds:

More generally, the amygdala and its connections to the prefrontal cortex and basal ganglia are likely to influence the selection and initiation of behaviors aimed at obtaining rewards and avoiding punishment. (...). The parts of the prefrontal cortex interconnected with the amygdala may provide emotional input to overt (and covert) deliberations of this sort.[8]

Two further functions are embodied by the amygdala; on the one hand it seems to be responsible for elaborate and subjective feelings. On the other hand, the understanding of such feelings interacts with conscious responses and with the resulting establishment of working memory functions capable of maintaining conscious awareness.
In the last chapter I will rehearse some of this data showing how the comparative study of working memory and emotions has enlightened new hypotheses in the construction of a rational, although unconscious, attitude in facing the environment and differentiated social contexts.

1.4 Emotions and Evolution

The debate concerning the impact of emotions on evolution and adaptation has provided several results in the course of the past years. In this section I will present two accounts stemming from such relationships. Rolls, in his article *A Theory of Emotion, Its Functions and Adaptive Value*, worked on the functions and effects of emotions in the evolutionary context mainly focusing on the individuation of two routes of emotions.

[8] Purves, D. (2004): 703.

Hence, Rolls aims to provide a definition of emotions where cognitive capacities join more immediate reactions. Conversely, Aaron Sloman presents emotions in their design architectures. According to Sloman, different architectures and systems are responsible for different definitions of emotions that may consequently be in sharp contrast. Identifying an appropriate architectural model will establish correct boundaries for a more precise definition and understanding of emotions.

Defining what emotions are implies two further questions. On the one hand, it is necessary to understand what causes emotional states and, on the other hand, emotions have to be identified in their functional context; in other words, emotions can be categorized accordingly to their functional capacities and to the reasons why we developed those sorts of reactions. As outlined in the previous section, emotions are often related to the reward/punishment mechanism. Yet, as Rolls claims, the instrumental conclusions related to such mechanisms are not the only ones that need consideration. Moreover, emotions, however participating in a natural and evolutionary context, can occur in the absence of external stimuli. In this second case the role of emotions will be connected to the cognitive apparatus and, according to Rolls, to the establishment of a human language. Some stimuli are reinforced by learning and by cultural transmission; a cultural understanding of emotions that will entail both an acquired sensory and motor response and the shift from a short-term memory to the subjective feeling of control embodied by consciousness. In particular, Rolls distinguishes between two processes in the functionality of emotions. The first is the stimulus-reinforcer association learning and

the second, related to teleological goals of action, is the instrumental learning of an operant response, as Rolls holds:

Another function of emotion is that by enduring for minutes or longer after a reinforcing stimulus has occurred, it may help to produce persistent and continuing motivation and direction of behavior, to help achieve a goal or goals.[9]

The two processes outlined have their correspondent anatomical routes to action. The first route has been found in nonhuman primates and it is part of a really old evolutionary step including the amygdala and the orbifrontal cortex. The stimulus reinforcer process is enhanced by the rapid updating of emotional states caused by the amygdala and, usually, it is facilitated by the rapid succession of stimuli and responses. Conversely, the second route does not rely on very tight chronological intervals and it is open to the implementation of plans and goals, as Rolls emphasizes:

The second route to action in humans involves a computation with many "if...then" statements, to implement a plan to obtain a reward. In this case, the reward may actually be deferred as part of the plan, which may involve working first to obtain one reward, and only then to work for a second more highly valued reward, if this was thought to be overall an optimal strategy in terms of resource usage (e.g. time).[10]

Interestingly Rolls highlights how this second process requires syntax and a language system in the brain. The combination of syntax and short-term memory gives rise to the phenomenon of consciousness that can consequently be found only in the second route:

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[9] Rolls, E. (2002): 19.
[10] Ibidem: 25.

The hypothesis is that consciousness is the state that arises in virtue of having the ability to think about one's own thoughts, which has the adaptive value of enabling one to correct long multistep syntactic plans. This latter system is thus the one in which explicit, declarative processing occurs. Processing in this system is frequently associated with reason and rationality, in that many of the consequences of possible actions can be taken into account.[11]

Rolls' analysis of the connection between emotions, language and rationality clarifies how the emotional system can be related to sensibly more complex processes than immediate sensory motor response. Consciousness, understood through the parameters of emotions, is a form of teleological rationality; the embodiment of emotions into agency and, in general terms, into any possibility of actions.

In order to provide a definition of what emotions can be Sloman steps back to the possibility of describing their biological architecture. In particular, given the internal relationship among different parts of the brain, and the external inputs affecting the emotional system, any architecture, in the case of emotions, will have to deal with its capacity of informational processing. The functionality associated with emotions ought to be, in other words, a detection capacity and a solution to the understanding of external phenomena. Traditionally, any evolved architecture can be summarized with a multilayer and chronological scheme. The oldest layer is purely reactive, the second layer can either be called metamanagement or reflective and it is capable of monitoring, categorizing and evaluating and puts into communication different parts of the system. The third layer is typically related to consciousness or self-consciousness and represents the ultimate

[11] Ibidem: 26.

formalization of stimuli. The classic understanding of emotions follows such scheme outlining a threefold classification including primary, secondary and tertiary emotions. It still has to be stressed how this classification remains a posteriori and rather abstract. However, as Sloman emphasizes, picturing the emotional system as a fully unstructured process will strongly deny the existence of any shared evolutionary design. Conversely, his research relies on the existence of a functional design and on the hypothesis of a modular organization of emotions. Compared to the accounts of modularity presented in the first section of this chapter, Sloman's modularity is neither rigid nor innate, as he holds:

As Simon pointed out, the boundaries between modules need not be sharp and clear: a complex system may be "nearly decomposable". Moreover, during learning and development, new modules may be added and boundaries can change. Despite these qualifications, the claim that the design is modular contrasts with the claim that there is no intelligible structure in the architecture.[12]

Given these premises, Sloman presents an architecture of emotions that relies on the combination of two previous, simplified models, namely, the Triple Tower Model and the Multilevel System. In the first case, the emotions are organized following a distinction between sensory mechanisms, central processing and action mechanisms. In the second case the architectural partition is represented by a collection of processing layers operating at different levels and different degrees. Focusing on a multilevel system also implies the existence of subsystems acting in parallel to the main elements of the structure. To some extent this hypothesis eliminates the predominance of a hierarchical

[12] Sloman, A. (2002): 47.

representation of levels disclosing the possibility of observing interactions between the previously described stages, (reaction, reflection and self-consciousness). A further difference between the two models resides in the inclusion, in the case of the second model, of "what if" reactions that do not presuppose an immediate and actual contact between inputs and the processing mechanism.

Sloman combines the two systems proposing a "labyrinthine architecture", in sharp opposition to the much more static models aforementioned. As Sloman describes it:

This model implies that information coming in via a particular sensory subsystem may be processed concurrently in several different ways, and that different kinds of information will be routed in parallel through various different subsystems, according to their current needs.[13]

This theory is ultimately justified by discoveries on multiple visual pathways. The crucial element capable of enhancing such a process is the presence of "alarms". Alarm mechanisms are subcomponents of the immediate reaction layers. However, as Sloman emphasizes, reaction systems are not simply limited to primary emotions but also to secondary emotions and deliberative and metamanagement layers. This combination highlights how reactive systems, being concerned with more complex functions do not have to be part of fully innate modules. Moreover, reactive systems, in contrast with what was mentioned in the case of Rolls, can trigger "what if" reasoning mechanisms without the necessity of a language system. Obviously, such reactions are not constrained, but are constantly evolving and being stored in memory. The relationship between emotions, evolution and plan formation is thus resolved by postulating an initial reactive plan store

[13] Ibidem: 55.

with a surplus capacity. The various kinds of learning will slowly begin to encode new plans that will then be used when new needs come about. Hence, given the interactions participating in the labyrinthine model, syntactic complexity is a consequence and not an initial requirement.

1.5 Conclusions

In the course of this introductory chapter I have been presenting some of the scientific bases and theories that will provide a foundation for the following chapters. In particular, the materials presented ought to be understood in the framework of naturalized epistemology and in the possibility of rethinking the concept of knowledge, or, in an even more promising hypothesis, knowledge itself. Hence, I will begin the next chapter with some of the tenets defended by sustainers of naturalized epistemology and their approach to the question of knowledge. I will first focus on the option of seeing knowledge as a natural kind or as a set of natural kinds aiming to extend such a theory to artifacts through a more accurate study of perception and perceptual kinds.

In the third chapter, I will consider a second crucial point in the debate upon knowledge, namely, the problem of true beliefs and their relationship to the acquisition and establishment of knowledge. I will defend the evolutionary possibilities embedded in false beliefs grounding their origin in the cognitive unconscious. False beliefs, in other words, are a product of the actual environment and thus they ought to be considered in the same functional framework defended, in the case of true beliefs, by epistemologists such as Millikan and Dretske.

The last chapter will rehearse both the importance of a deeper consideration of artifacts and the possibilities disclosed by the acceptance of false beliefs as an evolutionary tool. Moreover, I will analyze in a more prècise fashion some of the issues confronted in the introductory chapter regarding emotions. It is from a naturalistic and scientific analysis of the aforementioned issues and accounts that I will ultimately introduce the problem of art in a neuroscientific and neuropsychological perspective.

2. Is Knowledge a Natural Kind? The Problem of Artifacts, Perception and Empiricism

The problem concerning natural kinds is at least twofold; first, what are natural kinds? This question immediately entails the problem of how we address natural kinds according to a supposedly shared definition. Secondly, how do natural kinds apply to knowledge? To explain this latter point it is necessary to see natural kinds as part of a determined theoretical context that includes theory of perception, evolutionary psychology and naturalized epistemology. Nevertheless, all these disciplines are conducible to an even broader framework, namely, the actual environment. Thus, my purpose will essentially be to combine the two questions aforementioned in a functional analysis grounded on the consideration of the actual environment. Reformulating such questions will entail the analysis of a further distinction: the one between natural kinds and artifacts. This distinction pertains, in recent epistemological literature, to the problem of knowledge and to how knowledge, once liberated from the a priori constraints of standard analytic epistemology, should be considered from an empirical standpoint.

Therefore, I will present two different accounts of natural kinds and artifacts and their relation to language and psycholinguistic studies. Then I will add, as a preliminary to the second section and to the epistemological approach, a brief analysis of Quine's essay on natural kinds. In the second section, I will connect the issue of natural kinds to knowledge basing the analysis on Kornblith's naturalism and Clarke's *Reconstructing Reason and Representation.* In Clarke's case I will emphasize how his conception of

knowledge as a natural kind is embedded in both evolutionary psychology and, directly connected to this point, a version of the modularity of the mind. Moreover, Clarke presents an interesting distinction between natural kinds and artifactual kinds. My purpose, regarding this issue, will be to question this distinction precisely in the context of evolutionary psychology and the modularity of the mind.

To conclude, rather than eliminating the distinction itself, I will propose a different version of it based on a functional analysis of the actual environment and on how evolutionary domains do interact with the neural system. Reintroducing perception in what I take to be a mainly metaphysical distinction, will ultimately shift the issue to what kind of empirical and epistemological analysis should be pursued when dealing both with cultural products and natural kinds. I believe this codicil to be relevant both in understanding the problem of inputs in the modularity of the mind and in responding to the worries generated by a metaphysical versus empirical definition of natural kinds.

2.1 A Framework on Natural Kinds and Artifacts; Language, Essences and Intuition

To be sure, proposing a univocal definition of natural kinds seems to be almost impossible. Part of this difficulty has been resolved by substituting an overall definition with a definition of features. If natural kinds are specific entities, they must be definable according to specific terms. It is thus not surprising that natural kinds have been mainly analyzed following the various pathways of empirical research. Prior to the naturalized

move in epistemology, the privileged research when dealing with natural kinds has been linguistics and the connected relationship between the definitional aspects of language and its acquisition. A minor, although interesting solution, has been proposed by Daniel Putnam; according to him, there is no sensible gap between naming and identification of kinds. In other words, natural kinds are the product of a speaking world characterized by an almost imperative ability of defining. Putnam insists on what Kornblith calls a "baptismal ceremony"[14], the process of pointing at something and thus introducing the entity in the realm of recognition. The apparent simplicity of this argument is prone to several flaws when compared with more scientific accounts of natural kinds. Suffice to say that connecting language to the environment hardly entails a connection between language and the inner properties of the kinds considered. Nonetheless, Putnam's provides useful advice: natural kinds, although in their non-constituent definition, are committed to a functional role. The opposition between a scientific or a metaphysical status of kinds and what he addresses as the "epistemic postulate of knowledge" allows Putnam to push its argument even further, to extend it to an apparently dissimilar domain, namely, to artifacts:

Terms like "joke" or "game" or even "neighborhood" and artifact terms for tools, types of food, articles of clothing, etc. could either be natural kind terms themselves or be essential properties of the natural kind Homo Sapiens. Their status would in all cases be empirically determined. [15]

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[14] Kornblith, H. (Jan 1980): 110.

[15] Putnam, D. A. (Jul. 1982): 419.

Two conclusions, according to Putnam, can be drawn:

(1) *There are no such things as natural kinds and what we take to be metaphysical necessity always collapses into the epistemic perspective of the observer. Every kind could be a nominal kind if your perspective were different. Natural kinds may then be solely a necessary epistemic postulate for knowledge, the particular kinds postulated depending on socio-cultural factors, not underlying essences.*

(2) *There are natural kinds but more exist than we now suspect. Everyday language and the personalized nature of the knowing process make it difficult to see our own behavior as part of a natural process. We think we linguistically invent kinds like "joke" or "game". In this regard I suggest that the paradigms of physics, chemistry and biology be expanded to include the insights of early anthropology.*[16]

Instead of focusing on determined features, Putnam recurs to science, and specifically anthropology, as the empirical field in which natural kinds can be identified. I believe Putnam's conclusion to be correct overall, yet, according to it, natural kinds and artifacts do not need any sort of distinction at all. Is this true? Interestingly, Putnam motivates his assumptions with socio-cultural factors that will, as a consequence, allow for a more flexible conception of kinds without recurring to underlying essences.

Nonetheless, it is important to focus on what other linguistics and psycholinguistic studies have emphasized among the different features and properties of kinds.

In their scientific study, Barton and Komatsu propose explanatory details on what, according to our psycholinguistic perception, determine membership in natural kinds or artifacts. A first step in their analysis is to divide features in "defining", individually necessary and collectively sufficient for something to be identified as an instance of a

[16] Ibidem: 419.

category, and "characteristic", associated with an instance of a category, without necessary and sufficient conditions. The importance of this distinction stems from the problem of acquisition. Keil and Batterman, for instance, have described the development of concepts in infants as a shift from characteristic features to defining feature representations. According to Barton and Komatsu, both natural kinds and artifacts have defining features; natural kinds are characterized by essential molecular/chromosomal properties, whereas artifacts are distinguished by functional properties. The fact that both these features can be considered as defining seems to contradict Keil's assumption regarding older children and the different importance attributed to functions and physical characteristics:

Kindergarteners treat natural kinds and artifacts equally, referring to their appearance when identifying an object. Fourth-graders, however, differentiate between characteristic features and an underlying biological/molecular structure for natural kind objects, giving more weight to the underlying molecular structure than to the characteristic features. In contrast, when identifying an artifact, the older children continue to grant a change in identity based on changes of physical characteristics.[17]

Although this experiment does manifest certain relevance, Barton and Komatsu point out three general flaws in the conduct of the experiment: first, the effects of physical, functional and chromosomal structure have not been analyzed independently. Secondly, no characteristics were defined as critical for an object. Thirdly, changes in the function of natural kinds and changes in the underlying chromosomal/molecular structure of artifacts were not proposed.

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[17] Barton, M., and Komatsu, L. (Mar. 1989): 436.

In order to respond to these three points, Barton and Komatsu performed two experiments. On the one hand, the subjects were asked only whether some object "X" was still "X" after the change. On the other hand, they investigated whether having the same chromosomal structure, function, or physical characteristic, was sufficient for membership. Therefore, the former experiment was designed to detect necessary changes, whereas the second was concerned with the sufficiency of determined properties. As predicted, both experiments showed that whereas chromosomal/molecular structure was necessary in the case of natural kinds, function was fundamental for artifacts. Further evidence showed that, in contrast to what Keil argued, older children do not base their characterization on the physical characteristics *per se,* thus, changes in physical characteristics are neither necessary nor sufficient for the recognition of kinds. What have to be analyzed are *functional* and *causal* changes that are, in other words, relationships between kinds and perception. Univocally relying on underlining properties would detach kinds from our appreciation of them. Compared to Putnam's study, Barton and Komatsu do establish a differentiation between natural kinds and artifacts, however, they do not conceive this differentiation as physical and not subject to changes. Beyond the clear fact of developmental changes, changes in functions and in causal relations do affect our way of conceiving of natural kinds and artifacts.

In the next section I will deal with the difference between natural kinds and artifacts in the framework of naturalized epistemology. In this respect, it is worth introducing the issue presenting some points of Quine's groundbreaking analysis on natural kinds and its connection to science, empiricism and perception.

At the very beginning of his 1977 essay *Natural Kinds*, Quine raises the issue of similarity. The importance attributed to similarity has to be explained in the context of intuition; although subjective, similarity is what guarantees the attribution of the kind "green" to emeralds. The fact that "green", when applied to emeralds is *projectible,* (Goodman), can only be explained through our tendency to detect similarities, -a rather dubious ability that, nonetheless, constitutes the first stage of, for instance, learning a language. In the case of language a double resemblance takes place: first, a resemblance concerning a comparison between past and present circumstances and, secondly, a comparison between past and present utterances. Hence, Quine suggests a first, temporary hypothesis:

The notion of a kind and the notion of similarity or resemblance seem to be variants or adaptations of a single notion. Similarity is immediately definable in terms of kind; for, things are similar when they are two of a kind.[18]

Similarity and intuitions arise spontaneously, yet they do not represent a necessary condition to define kinds. In other words, a logical relation of sameness cannot be established; rather, similarity and kinds vary together, there is a correlative sense in which the two ought to be understood. Thus, the relationship between kinds and similarity is scientific, natural and progressive. The innovative potential of this conclusion resides in the reintroduction of induction in the realm of science:

[18] Quine, W.V.O. (1969): 160.

For me then the problem of induction is a problem about the world: a problem of how we, as we now are (by our present scientific lights), in a world we never made, should stand better than random or cointossing chances of coming out right when we predict by inductions which are based on our innate scientifically unjustified similarity standard.[19]

Moreover, the step into science has a second purpose: what Quine holds is that, considering intuitions and similarity in their evolution within the progress of science, intuitions will ultimately be substituted by a more appropriate scientific analysis. The pathway that should be followed goes from an almost innate sense of similarity to similarity as "unreason". In the former sense, as mentioned above, similarity, can be observed in the learning of a language. Learning is thus mediated by ostension and by the way a determined word applies to what is presented. If "red" is similar in two objects, then we learn where and how to apply "red". This process is mainly unconscious and Quine rightly compares it with the way animals learn to respond to stimulations and the command of a master. Quine's suggestion stems from an empirical analysis of behavioral psychology; a rather useful one, though, as Quine explains:

Not only is ostensive learning a case of induction; it is a curiously comfortable case of induction, a game of chance with loaded dice. (...) Always, induction expresses our hope that similar causes will have similar effects; but when the induction is the ostensive learning of a word, that pious hope blossoms into a foregone conclusion. The uniformity's of people's quality spaces virtually assures that similar presentations will elicit similar verdicts.[20]

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[19] Ibidem: 165.

[20] Ibidem: 164.

But, to what extent can similar verdicts be trusted? Whether induction should be trusted or not turns out to be a specific philosophical problem. The point is not to argue against the existence of certain well-known regularities in the world, the point is to ask why such regularities are present. To respond, any consideration regarding induction should slide from a behavioral analysis based on mere observation to a more scientific account. It is at this point in the text that Quine introduces the problem of evolution and the suggestion of a Darwinian paradigm. Darwin's natural selection is able to explain why, for instance, recognizing colors helped food-gatherers. Through a process of trial and error, better intuitions have developed and have slowly established their superiority upon basic mistaken intuitions. In other words, second order intuitions arise intensifying the complexity of the aforementioned innate intuition. This is, according to Quine, an increase in the methodological sophistication of science. As a consequence, science will entail a shift in the account of kinds:

This development is a development away from the immediate, subjective, animal sense of similarity to the remoter objectivity of a similarity determined by scientific hypothesis and posits the constructs. Things are similar in the later or theoretical sense to the degree that they are interchangeable parts of the cosmic machine revealed by science.[21]

It is in the metaphor of the interchangeable parts of a machine that similarity acquires its "theoretical" status, that is, in other words, the overcoming of innate similarity through the two stages of evolution and science. Quine sees in this movement the epitome of a

[21] Ibidem: 167-168.

scientific spirit that embodies the goal of naturalized empiricism. An issue already emphasized in Quine's account of naturalized epistemology:

(...) a conspicuous difference between old epistemology and the epistemological enterprise in this new psychological setting is that we can now make free use of empirical psychology. The old epistemology aspired to contain, in a sense, natural science; it would construct it somewhat from sense data. Epistemology in its new setting, conversely, is contained in natural science as a chapter of psychology.[22]

Leaving aside the various interpretations of this passage, it is interesting to notice how the mechanism of reciprocal containment is repeated when dealing with the definition of kinds:

In general we can take as a very special mark of the maturity of a branch of science that it no longer needs an irreducible notion of similarity and kind. It is that final stage where the animal vestige is wholly absorbed into the theory. In this career of the similarity notion, starting in its innate phase, developing over the years in the like of accumulated experience, passing then from the intuitive phase into theoretical similarity, and finally disappearing altogether, we have a paradigm of the evolution of unreason into science.[23]

Quine's theoretical approach to kinds and, at the same time, their inscription into the realm of science represents the basis for a more empirical approach to knowledge itself.

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[22] Quine, W.V.O. (1969): 297.

[23] Quine, W.V.O. (1969)b: 170.

In this section I have presented three accounts of natural kinds. In Putnam's sense the specific scientific nature of kinds is partially obscured by reference to natural kinds and, thus, by naming them. This led me to a psycholinguistic interpretation of kinds as outlined by Barton and Komatsu. According to them, what ultimately has to be analyzed is a process of change in identification and acquisition. This shift reconfigures the distinction between natural kinds and artifacts not solely in terms of essence, but in the process of perception and interaction. Quine, on the other hand, offers a broader, but certainly challenging understanding of kinds where naturalism is on par with the recognition of intuitive abilities. Nonetheless, Quine argues for a second cut, a scientific cut that reintroduces the problem of essence and, mostly relevant, the problem of knowledge. In the next section I will address this point adding artifacts to the debate. If we are to connect knowledge to natural kinds and if the framework at stake does refer to the actual environment, how are we going to define the contrast between natural kinds and artifacts? And, moreover, how is the contrast, if any, to be understood in the project of naturalized epistemology? Before trying to respond to these questions I will analyze in further details what knowledge as a natural kind means in the accounts advocated by Kornblith and Clarke.

2.2 Knowledge as a Natural Kind

It is in Quine's framework that a final account of kinds stems, a perspective where natural kinds coincide with knowledge. Kornblith's book, *Knowledge and its Place in*

Nature, belongs to this movement. Kornblith defends a vision of epistemology where empirical research is essentially conducted in biology and cognitive ethology. Thus, knowledge is strictly related to nature in the most radical sense of naturalism. In Clarke's *Reconstructing Reason and Representation*, the arguments concerning knowledge and natural kinds have to been seen in the overall picture of evolutionary psychology, approximating even more the pathway traced by Quine. I will first briefly focus on Kornblith and then present Clarke's argument and its distinction between natural kinds and artifacts. In defining natural kinds Kornblith draws on the definition proposed by Richard Boyd:

I take natural kinds to be homeostatically clustered properties, properties that are mutually supporting and reinforcing in the face of external change. Consider the case of water. Water is just H20. Why does H2O count as a natural kind? Two atoms of hydrogen and one of oxygen unite to form a homeostatic cluster. The chemical bond that joins these atoms provides the newly formed unit with a degree of stability that is not found in just any random collection of atoms. (...) the properties that are ultimately responsible for this homeostatic unity are also responsible for a wide range of the kind's characteristic properties. The reason natural kinds support inductive inference is that the properties that are homeostatically clustered play a significant causal role in producing such a wide range of associated properties, and in thereby explaining the kind's characteristic interactions.[24]

In Kornblith's case it is the selection of determined abilities in animals that explains the causal relation to the environment, a causal relation, or a means-ends relation, that ought to be considered a case of knowledge. In other words, natural kinds have been selected

[24] Kornblith, H. (2002): 62.

for because of their specific properties and their ability to fulfill certain needs; thus, processing information in the scheme of a causal relationship explains the direct relation, and equation, of natural kinds and knowledge.

Clarke adopts the same definition of natural kinds, yet, the empirical constraints are somewhat different. What Kornblith aims to argue is the plausibility of a comparison between human and animal knowledge; thereby the evolutionary issues at stake deal with a rather simplified account of causal relationship. Conversely, Clarke adds to the debate two crucial points. First, the evolutionary resources of human knowledge depend upon social interaction and on the identification of "social contracts", -as emphasized by Leda Cosmides. Secondly, knowledge is applied to the modularity of the mind that is, roughly, a functional mechanism of the acquisition, processing and final elaboration of knowledge. It follows, from the latter point, that the knowledge considered is necessarily fragmented into a "plethora of innate, Chomsky modules". Therefore, Clarke's first argument aims to eliminate any confusion regarding the status of natural kinds and knowledge in such a framework. As he notices, a debatable case, would be to what extent conceptual kinds and artifactual kinds can fulfill the knowledge equation. Clarke clearly denies this link; in his argument for knowledge as a natural kind he holds:

1) Knowledge exists.

2) Knowledge is a conceptual kind or a natural kind.

3) If knowledge is a conceptual kind, then is a social construct.

4) If knowledge is a social construct then epistemic relativism is true.

5) Epistemic relativism is false.

6) Knowledge is not a social construct.

7) Knowledge is not a conceptual kind.

8) Therefore, knowledge is a natural kind.[25]

Considering possible objections to this argument Clarke deals with the possibility of knowledge being a conceptual kind or not a kind at all. The latter hypothesis would lead to a crude version of skepticism where the extension of knowledge is denied. It is clear that such an account would potentially undermine any problem of epistemology, being it analytic or naturalized epistemology. But, what about knowledge as an artifact? In this respect Clarke considers a further differentiation between conceptual kinds and artifacts. The differentiation is mainly empirical. Whereas artifacts are mere physical instantiations, conceptual kinds are addressed as an "a priori product of the human imagination":

We create our concepts. These include bachelors, dollar bills and voting ballots. We might not have created such concepts at all, or we might have created concepts that were similar to those that we now employ in our conceptual scheme. Our conceptual scheme is both arbitrary and contingent. But what are artifactual kinds? At best, they are simply instantiation of our concepts. (...) As such, artifactual kinds are derived from conceptual kinds.[26]

This argument is fomented by two main worries: on the one hand, Clarke is willing to discard the hypothesis of epistemic relativism. The fact that any community may provide

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[25] Clarke, M. (2004): 133.

[26] Ibidem: 135.

a different instantiation of the concept of knowledge would undermine the project of analytic epistemology and the possibility of research willing to investigate knowledge itself. The attempt followed by Clarke does not dismiss the premise of analytic epistemology, yet, it adds to the a priori core a more empiricist methodology founded on naturalism. On the other hand, focusing on conceptual kinds as a form of knowledge will lead to a too specific focus on reason that will ultimately underestimate the potentiality of any naturalist research.

In order to provide a counterargument, it is necessary to rehearse a further distinction concerning the status of the environment in which kinds, in their most generic sense, should be considered. The issue concerning natural selection is divided between features that have been selected for and features that have been selected of. Clarke relies on Sober's definition:

To say that there is selection for a given property means that having that property causes success in survival and reproduction. But to say that a given sort of object was selected is merely to say that the results of the selection process was to increase the representation of that kind of object[27]

Features that have been selected for are thus the ones that affect the course of evolution. In this sense, what is selected for is the product of a proper environment, which should, nonetheless, be opposed to the actual environment. The functions of features that have been selected for are only observable in the actual environment. It follows that, since

[27] Ibidem: 79.

features were selected for in correspondence to a different actual environment, they may well produce mistakes in an environment that is invariably changing.

Hence, when observing natural kinds and their meaning as a form of knowledge, what should be stressed is the actual application of kinds in a specific, although fairly determinable, actual environment. What about conceptual kinds and artifactual kinds? To what extent can this distinction be part of the actual environment and why do conceptual kinds do not provide knowledge?

The first point that needs to be considered is the creation of conceptual kinds. Clarke holds that they are both a product of imagination and an a priori form of knowledge, hence not empirical, hence inadequate for any account of naturalized epistemology. It is not clear how the term imagination ought to be interpreted. I take imagination to mean, in this context, a subjective instantiation of presumably cultural concepts. However, imagination has been empirically analyzed in an ultimately non a priori fashion. For instance, imagination plays a cardinal role in neuroscience and cognitive studies within the study of counterfactual thinking. The problem is how imagination can lead to counterfactual thinking and how the product of such thinking can be considered a conceptual kind. Being judgments, counterfactuals are a form of knowledge, although a conditional one. Counterfactuals are defined as mental representations of past occurrences, features and states. Nonetheless, applying imagination to counterfactuals does not imply any a priori considerations. To be more precise, they can be both unconsciously activated or intentional and controlled, but, in both cases, imagination is triggered by some sort of empirical evidence, -although not always fully definable. The empirical background of counterfactual and imagination is

the application of stored experience to the present and future environment. Using cultural knowledge about the past is, in this case, mainly an explanation of how cultural issues lead to the formation of concepts without recurring to a priori capacities. Thus, imagination is mainly programmatic because it is able to fulfill present situations with stored practical experiences from the past. In addition to that, it is possible to consider imagination and counterfactuals as a form of prescriptive, normative knowledge:

Longitudinal research by Nasco and Marsh (1999) confirmed that the relation between counterfactuals (regarding an exam grade) and subsequent academic achievement (improvement on a subsequent result) were mediated by self-reported perception of contingency between actions (studying) and outcomes (succeeding). In general, expectancy based mental simulation that focuses on specific plans and processes enhances achievement (Olson, Roese, & Zanna, 1996; Pham and Taylor, 1999; Taylor and Pham, 1996). Thus, counterfactuals, though directed at the past, can provide causal information that may supply a roadmap for future action: Counterfactuals are prescriptive.[28]

Therefore, imagination can be seen as stemming from an empirical, non a priori ground and it can be considered as a form of knowledge.

A second point made by Clarke is the derivative status of artifactual kinds. According to Clarke artifacts are physical instantiation of conceptual kinds. The point is that conceptual kinds might or might not lead to a physical instantiation. In the case of tools, the physical instantiation follows from the function of an object and its concrete presence in the environment. However, conceptual kinds can simply pertain to what, in the

[28] Roese, N., Sanna, L., and Galinsky, A. (2005): 145.

counterfactual example, is called "stored experience". The empirical instantiation of homeostatic properties is as empirical as the neuropsychological analysis on attitudes that may or may not trigger actual action. It is true that different cultures can have different concepts, but all cultures deal with the general creation of artifacts and concepts. The problem with artifacts is that they are a key element of society not because of their intrinsic, metaphysical properties, but because of their ability to mediate relationships. Artifacts are, in a sentence, mechanisms for processing interactions in the actual environment. Social interactions are mediated by artifacts, and there is no actual instantiation of, for instance, a social contract, without a previous involvement of artifacts.

Finally, what I aim to show is how, empirically, there is no fundamental distinction whether something is *perceived* as a natural kind or as an artifact. In terms of inputs, the two are simply different inputs. In the previous section I have highlighted how the reasons why artifacts are recognized is mainly their function, but how can there be a function, if not in an actual environment? The issue at stake is twofold: on the one hand kinds are related to perception, on the other hand, kinds have a role and not simply a name. Briefly, there is a fundamental, metaphysical distinction between the two, but there is no functional distinction. If the mechanism of the brain is modular it should not be subject to changes in the natural components or status of what is perceived. The modularity of the mind is capable of explaining how the mind works and how the mind works and interacts in the actual environment is one of the tenets of evolutionary psychology. It follows that the product of a modular, computational process, has to be a form of knowledge. But once the process is activated knowledge has to serve a purpose

and the purpose is ultimately functional. I am not denying the existence of distinctions, and I do agree with Clarke's argument against the establishment of a univocal concept of knowledge. Nonetheless, perception and its functional impact are often left aside with the consequence of limiting the concept of knowledge to natural kinds. Paradoxically, this distinction would be natural, but not empirical, not if empiricism relies on perception and, particularly, on the perception of the environment.

What is problematic in the notion of kinds is the application of a metaphysical framework to empirical perception. A powerful example is the debate on perception and conception of objects in visual theories. To be sure, if the definition of artifacts can be broad, the one of objects incurs in even further difficulties. However, the definition of object permits us to fill the gap between natural kinds and artifactual kinds precisèly because of its generality: *everything that is, is an object*, as Quine holds. Hence, objects are material and spatial things on which we perform computations, being quantifications or simply identifications. For instance, we do label different parts of a chair in different ways, but we still see the chair itself as a separate, independent object. Alas, the kind of quantification into language conflicts with that sustained by developmentalists and visual theorists. Quine's theory does not seem to offer an analysis of what it is to perceive and conceive objects. Exclusively relying on his account would then mean to avoid providing an account of how the modularity process begins, of how, say, we are going to conceive inputs and the very first step of perception. The input impasse is partially overcome by a further, broad notion, namely, the body. According to Quine bodies display "continuity of displacement, continuity of visual distortion and continuity of discoloration". This insight into perception turns out not to be sufficient when the notion of objects and the one of

bodies, are compared on a referential, linguistic ground. Bodies and objects share the same difficulty: there is both a count and a mass use of the terms, which is, a distinction between units and general terms. Replacing objects with bodies does not introduce any fixed ontology, rather, it denies its possibility.

However, the problems with a referential ontology can be addressed from a different perspective. The two issues that have to be considered are, on the one hand, the aforementioned perception and the problem of inputs and, secondarily, the relation of inputs to both developmental studies and evolution. Once this framework is put into play, the notion of bodies or of objects necessarily shifts from an account of bodies *per se* to what we, roughly, need to know about perception. The question is thus, as Robert Shwartz holds, "What does it means for the visual system to implicitly take something as a body?", a question that may well be reversed to both natural kinds and artifacts, especially when their natural essence seems to depend upon our perception of them and the way we place them in the environment. The most basic assumption that can be inferred is that the visual system marks the boundaries; interestingly visual theories add a further consideration:

What does not follow is that in order for the visual system to make this discrimination it must first determine, represent, or otherwise render the information that there is an instance of the property "body" present. [29]

And,

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[29] Schwartz, R. (2006): 196.

Bodies have both spatial and temporal dimensions. Cars, dachshunds, edibles and sitables not only occupy areas of space, they also have settled pasts and futures rife with threats and promises. Discriminating among regions of space that are so described, however, neither requires nor presupposes having knowledge of such life histories and prospects.[30]

Going back to Clarke's account it seems that the differentiation between natural kinds and artifacts is based precisely on the recognition of information and properties residing in kinds. The existence of natural, empirical properties has little, if not no, effect on what we perceive at first glance.

Moreover, visual theories of perception do not discard development and evolution. Marking boundaries is tied to the two concepts of persistence and permanence: persistence over time and in space is then a condition of reliability, an account, in other words, of the empirical environment and our presence as beholders of it. Immediately connected to this point is the problem of change and identity. When it comes to artifacts, albeit I believe this to be applicable to natural kinds too, the notion of changes, mutations and alteration of material instances and features seem to represent a major challenge. In Clarke's account of natural kinds, kinds are truth conducing and equivalent to knowledge. Although Clarke points to the fragmentation of knowledge, the concept of natural kinds appears rather stable and not prone to considerable changes. Conversely, artifacts seem to be more volatile entities, if not because of their strictly cultural definition.

The concern about changes and thus changes in identity is, in the end, not really motivated. On the one hand, the environment does show sets of homogeneous cluster

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[30] Ibidem: 198.

properties, but a reification of this claim is unassailable. The environment, in its actual definition is a continuous alternation of various changes, interactions and juxtapositions. The crucial example resides in society itself. Social contracts, for instance, lie on the attribution of specific interactions to the components that have to face various picks of complexity before reaching a common agreement. On the other hand, when properties are translated into brain inputs their natural stability is elaborated and mediated by the complexity of the neural system. The fact that we identify and declare identity is related to the possibility of not seeing identities at all; that is to say that without the perception of movements nothing can be identified. Fragmentation perfectly applies to this framework in the sense that fragmenting knowledge is a way to observe its changes. I intend observing here in a strict, perceptual sense, a strict perceptual sense that, nonetheless, excludes the possibility of conceiving a strict identity. Therefore identity has to be taken in a more abstract sense that ranges from functional considerations to mere perception of bodies, objects and, as I aimed to demonstrate, kinds. In the concluding chapter I will show how the mere perception of bodies and object would often not be sufficient to understand the impact of artifacts on reality. The case of art will clarify the importance of abstraction, and sometimes the distortion of the environment, for both cognitive and evolutionary purposes.

2.3 Conclusions

What would then be the conclusion? Is knowledge a natural kind? Is it an artifactual kind? A collection of objects?

I do not aim to challenge Clarke's hypothesis. Knowledge is a set of natural kinds, but evolutionary psychology and an account of the actual environment require more than this assumption. The definition of natural kinds is clearly scientific and it is an empirical starting point for any naturalized epistemology. What I would add, though, is how any investigation of kinds in the actual environment should analyze the role of kinds as well as their definition. A metaphysical distinction is relevant in the perspective of a theoretical analysis, but it is under the risk of excluding a sensible empirical part of reality as the one showed by both neuropsychology and studies on perception.

Rather than on the problem of acquisition of kinds, perception focuses on the actual confrontation with them. And it is only in this sense that brain modules are triggered. I believe the modularity of the mind to necessitate deeper understanding of the possibilities of cognition and its interrelation with the body. The point of differentiating natural kinds and artifacts seems to rely more on the results, and so on the outcomes, of a modularity process rather than on how the modularity process is activated. But this would be reversing the process itself, or, at least, discarding its premises. Rethinking modularity would imply both a major consideration of the issue of perception and a privileged attention to inputs and to how inputs are analyzed at the brain level.

One of the main difficulties concerning the modularity of the mind precisely relies on inputs and their interactions. Correctly, Clarke does not advocate the existence of a central nervous system capable of re-elaborating the products of encapsulated modules. However, it remains to be explained how the same inputs in different subjects can lead to different outputs and what sort of connection can be seen between the two. The brain certainly has specific functions, but specific functions interact with both unconscious

thoughts and other sets of data. In addition unconscious inputs are sensibly closer to the selection of functions outlined by evolutionary psychology. Thus, a more complex account of the modularity of the mind should deal with both what is considered knowledge and with unconscious processes. In fact, one of the points that I purposely did not analyze within knowledge is the relevancy of true beliefs. Hence, in the next chapter I will question the evolutionary specificity of true beliefs and how they apply to the problem of inputs and to the possibility of developing false beliefs. The concluding chapter will ultimately add a last possibility of objecting to the modularity of the mind, namely, the study of emotions.

3. False Beliefs and the Evolution of Agency

In the previous chapter I have focused on Clarke's account of knowledge as a set of natural kinds. Although I believe this account to be correct under a metaphysical standpoint I highlighted how, in a strictly evolutionary and epistemological framework, any account of knowledge can be extended to artifacts when functionality is considered. Nonetheless, the importance attributed to functionality, and the accompanying empirical outcomes resulting from a reconsideration of perception, trigger a further debate on knowledge and its role in the actual environment, namely, the problem of beliefs. There is general consensus in the history of evolutionary psychology regarding the relevancy of true beliefs. Knowledge and true beliefs are interrelated in order to guarantee a successful adaptation to the environment. Alas, the immediacy of such an account is not free from further problems. One of the main concerns has been, and it is, to give an explanation of misrepresentations. In the first part of this chapter I will analyze in further detail the role of misrepresentation, and its responses. I will, for the sake of the argument, limit my analysis to those epistemological accounts that mainly have considered the importance of functionality. In particular, I will focus on the definition and application of beliefs. I will compare Dretske and Millikan's attempts to explain behavior as two examples of a naturalistic and externalist account.

The second part of the chapter will push the argument a bit further; despite the general agreement upon the connection between true beliefs and knowledge, the possibility of misrepresenting beliefs both in a perceptual and contextual context leads to a

reconsideration of false beliefs and whether such beliefs can exercise causal power over reason and the acquisition of knowledge. Hence, I will first consider Dennett and McKay's discussion on false belief; their account will turn out to be extremely useful in its possibility of connecting an evolutionary debate to knowledge and the problem of natural and perceptual kinds. A second resource will be to consider neuropsychological literature and experiments regarding the unconscious and the possibility of seeing, in automatic and voluntary behavior, an instance of rationality and agency. In this context, I will consider the problem of virtual agency and apparent mental causation as an alternative account to the presumption of a general mental and causal control over behavior. Other aspects directly connected to this topic will also be presented; for instance, I will briefly analyze the effects implied by the hypothesis of a subliminal self and how the presentation of the self in the actual environment and social context can be detached from conscious activity, on the one hand, and, on the other hand, in what sense it can be related to the development of false beliefs.

Hence, I aim to demonstrate the possibility of conceiving false beliefs and their relation to knowledge as an adaptation to the actual environment.

3.1 Beliefs and Functions

Discussing the discrepancies between natural kinds and artifacts, one of the main differences highlighted was the contrast between homeostatic properties and the recognition of a functionality intrinsically connected to artifacts. Furthermore, a

theoretical definition of kinds is ultimately related to the problem of acquisition and to how the consideration of physical development can affect the resulting knowledge.

The relevancy of acquisition needs to be framed in the reflection on concepts and in the defense of conceptual atomism; according to conceptual atomism, concepts are atoms with no internal structure and without a necessary relation to other concepts. An immediately following step has been to naturalize conceptual atomism. This shift implies two main difficulties: on the one hand, conceptual atomism has led, in the well-known account proposed by Fodor, to postulate the innateness of concepts and thus to discard the possibility of learning primitive concepts. However, in his 1998 book, *Concepts,* Fodor has entirely repudiated his previous argument for the innateness of primitive concepts by adding a metaphysical-locking relationship that reinterpreted the innateness of primitive concepts through a supposedly non-inductivist mechanism capable of locking our representation to the concept at stake. What Fodor addresses as SIA, (Supplemented Informational Atomism), connects informational atomism with a locking theory of concept possession. SIA denies any hypothesis-testing model of concept learning and substitutes it with a nomological relationship where having a concept is being locked to the properties of the concept considered.

Fodor's solution to the acquisition problem is not highly satisfactory and generally lacks an empirical and truly neurological foundation. Hence, the problem of acquisition, when conceived as a crucial epistemological problem, needs to be grounded in neuropsychological and psychological facts. On the other hand, once acquisition is established in a natural sense, there is a need to explain why and how misrepresentation can occur. Regarding the first point I will present Lawrence and Margolis' solution to this

burden and Clarke's attempt to correct and integrate such naturalistic analysis in an evolutionistic framework, whereas I will rely on Dretske and Milliken's theories to answer to the problem of misrepresentation. Lawrence and Margolis, albeit defending a theory of atomistic concepts, have proposed a different explanation of acquisition based on a sustaining mechanism: a combination of essential predispositions and perceptual data. As Margolis holds:

Within the IBS (informational based semantics) framework, acquiring a concept involves establishing a sustaining mechanism that connects the concept with the property it expresses. So, to a large extent, the question of how concepts are acquired amounts to the question of how their sustaining mechanisms are acquired.[31]

There essentially are three kinds of sustaining mechanism. The first one, called theory-based sustaining mechanism, is based on the subjective knowledge of a person regarding a specific natural kind. The knowledge previously acquired permits her to lock her state of mind with the concept considered. Secondly, Margolis lists deference-based sustaining mechanisms. In this case, mainly drawing on Putnam's theory, our acquisition of concepts can be mediated by the help of an expert. If I do not know what differences there may be between beeches and elms I can ask a botanist that will certainly be more competent than me. Nonetheless, the most interesting mechanism is the syndrome-based one:

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[31] Margolis, L. (1999): 559.

What I have in mind is a situation where someone, while ignorant of the nature of a kind, nonetheless knows enough contingent information about the kind to reliably discriminate members from non-members without relying upon anyone else's assistance.[32]

Membership is determined by the shared belief of an essential, or set of essential properties that cause a kind to belong to a certain category. A good proof of the presence of such an essentialist bias is found in the studies of developmental psychology. Instead of relying on surface properties, children tend to focus on the inside of an item, on, in other words, the inner and essential characterization of things. Furthermore, perception is guided by common rules of recognition. The most important is related to the identification of common shapes that turns out to be fundamental in our taxonomic abilities. Essentialist bias and shape recognition disclose a new point of departure, perceptually and conceptually based, in which knowledge can be understood. As a consequence, knowledge acquires a strictly empirical and natural sense that explicitly discards a priori standpoints.

The account proposed by Clarke assumes the above conclusion; yet, he correctly questions how and why shape biases and essentialist dispositions are part of our process of acquisition. Why did we develop such abilities? What is the evolutionary background of our approach to kinds? According to Clarke, essentialist predispositions are the product of evolutionary adaptation. What adaptation brings about is not a learning process but an innate mechanism that allows acquisition. Natural kinds and perceptual kinds are dependent on such mechanisms. As Clarke holds:

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[32] Ibidem: 556-557.

We lock to natural kinds by virtue of innate mechanism that hook us up to perceptual kinds. And, those perceptual kinds are themselves informationally atomic. Natural kind terms and perceptual kind terms are not innate, nor are they learned.[33]

Once the problem of acquisition is set in a natural framework, it still remains to be explained how the possibility of acquiring concepts will lead to the construction of knowledge. Clarke's account of knowledge relies on both his consideration of the environment and the role of natural kinds:

Knowledge is a set of natural kinds located in a variety of MMRP modules whose function is to assist modules in the production of true beliefs that enhance the adaptiveness of the organism to its functional environment.[34]

Leaving aside the issue concerning the possibility of adding artifacts to this definition, I would like to focus on two of the main points outlined by Clarke. In fact, a further and detailed reflection is needed in the definition of "beliefs" and "functions".

As mentioned before, both Millikan and Dretske's accounts are based on a naturalistic and externalist framework; it is only in our relationship to the world and to adaptation that our mind's functions can be explained. Externalism is thus tied to a historical account: it is in virtue of our history that mind and meaning are explained. Furthermore, history is a collection of events in which a function has been displayed.

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[33] Clarke, M. (Apr. 2007): 3.

[34] Clarke, M. (2004): 147.

The emphasis attributed to functions rehearses the natural belonging of psychology to biology and physiology, as Millikan holds:

Psychology, no matter how it is done, necessarily is a branch of physiology, hence biology. Human physiology is the study of how the various parts and systems that make up a human work, that is, of what they do and of how they go about doing it. Psychology studies what mental tasks are and how they are performed, on the assumption, of course, that there are some special systems (material or nonmaterial) that work in accordance with special principles and do special kind of tasks that fall, sensibly, into a distinguishable field for study –study of the mental.[35]

Understanding the way something works is thus a functional problem, without forgetting, it is necessarily to remark, the constraints posed by the environment itself. Following this thread leads to a differentiation in the understanding of functions. In the previous chapter the distinction between proper and actual environment has already been considered. Here it is worth adding, drawing on Millikan's account, the definition of a proper function in a normal condition. Functions that are proper to a certain system or organ are those set of functions that, helping survival and proliferation, can guarantee the existence of such systems. Proper functions are biologically selected characterization of systems. The setting in which proper functions are located is the one of normal explanation and normal conditions. In the first case, for instance, a heart will fall in the category "heart" only in the following two conditions:

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[35] Millikan, R. (1993): 54.

First, because it was produced by mechanisms that have proliferated during their evolutionary history in part because they were producing items that managed to circulate blood efficiently in the species that contained them, thus aiding the proliferation of species. It is a heart, second, because it was produced by such a mechanism in accordance with an explanation that approximated, to some undefined degree, a Normal explanation for production of such items in that species, some resemblance to Normal hearts of that species.[36]

It should be added, though, that proper functions may never come about. The external environment might not tolerate them due to some aberrant states, or, more simply, because the conditions required for proper functions to occur are never in place. The same can obviously be held for normal conditions, hence, our reference to normal conditions is based on what has been historically discovered. Proper functions of actual entities are inherited from our ancestors; it is only their ability to function that gives rise to the reproduction of functions. The causal power conferred on a historical and natural account of proper functions highlights a further point related to the connection, and analogy, between proper functions and purposes.

The definition of proper function is a theoretical definition opposed to a conceptual definition. Conceptual definitions are committed to a constant referral to evolutionary theory, on the one hand and, on the other hand to a descriptive definition. Conversely, a theoretical definition connects to the notion of proper function the one of purpose extending the notion of functions beyond a description of current properties. "Beyond" is here meant in two senses. First, whether a thing has a proper function is related to the right sort of previous biological history. Secondly, without the analogy between functions

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[36] Ibidem: 55.

and purposes, any description would remain static. It is in this sense that, in any functional analysis, the possession of purposes is of crucial importance in the understanding of meaning. As Millikan's summarizes:

My claim is that actual body organs and systems, actual actions and purposive behaviors, artifacts, words and grammatical forms, and many customs, etc., all have proper functions, and that these proper functions correspond to their functions or purposes ordinarily so called. Further, it is because each of these has a proper function or set of proper functions that it has whatever marks we tend to go by in claiming that it has functions, a purpose, or purposes.[37]

The emphasis attributed to purposes introduces a second focus in Millikan's account, namely, behavior and the construction of beliefs. Being proper functions tied to purposes, a broad, albeit correct definition, would be to conceive proper functions as helping to fulfill desires. However, this point does not, according to Millikan, add any information about the nature of beliefs. I have emphasized how, in the context of natural kinds, beliefs are set to be truth conducing. Millikan's conception of true beliefs is developed in accordance with the asymmetry to false beliefs. False beliefs are biologically described as defective. This suggestion is clearly related to the definition of proper functions; in other words, a defective belief will be less likely to achieve any purpose. Moreover, the occasional positive results of false beliefs cannot be related to any normal function:

The truth condition of a belief is a Normal condition for fulfillment of proper functions that lie beyond simply participating in inferences. That is, the truth condition of a belief

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[37] Millikan, R. (1998): 301.

is one of the conditions that must obtain if the belief is to fulfill any such functions in accordance with a Normal explanation.[38]

The occurrence of false beliefs is simply explained as the impossibility of always guaranteeing proper functions and natural conditions. That is, in abnormal conditions it is normal to misrepresent. This first response to what have been mentioned as the second problem of naturalized accounts of the mind, acquires major significance in the proposed definition of knowledge. Along the same lines of naturalism, Millikan defends her account of knowledge as a *phenomenon in the world.* In this sense she dissociates herself from the twofold distinction between a research toward the concept of knowledge and the investigation of the criteria of knowledge. As already stressed, the survival capacities developed in a historical context allow for the development of true beliefs in normal conditions. To label beliefs as true is not sufficient, though. A further element that needs consideration is the problem of different degrees of strength. This debate applies to dispositional beliefs, and to the following consideration pertaining to the possibility of testing beliefs in our disposition to act. Once again, the attribution of certain strength of dispositional belief traces back to evolution and, in particular, to the concept of evolutionary design. As Millikan's holds:

Sensible design, then, would make us sensitive to the relative reliability of the methods by which we acquired and perhaps later reinforced our various dispositional beliefs, and would allocate strength of dispositional belief accordingly. It would equip us not only with mechanisms for forming true beliefs and for learning to form new kinds of true beliefs but with further mechanisms for evaluating the relative reliabilities of our various

[38] Millikan, R. (1993): 72-73.

belief-forming methods and for translating these evaluations into relative strengths of dispositional belief.[39]

Recurring to sensible design is particularly important in allowing for the possibility of change and, most important, it admits the loss of knowledge, as in the case of induction. What may seem a declassification of knowledge is, conversely, an enhancement of its functional building blocks.

In the 2002 *Jean Nicod* lectures, Millikan ultimately underlines the problem of intentionality and representation in the previously outlined context of knowledge and in the burden related to false beliefs. A proper way to introduce this point is, according to Millikan, to focus on the problem of teleosemantics. The discourse shifts, once again, to whether and in what sense false beliefs can be justified. The first remark is to separate the possibility of "aboutness" from the one of falsity. Drawing on Brentano, Millikan identifies the focus of the problem in the distinction between different forms of intentionality. In particular, besides the possibility of referring to a context and object intentionality -mental phenomena *about* things- Brentano spoke of "intentional inexistence" explaining it as the possibility of conceiving objects that are in or before the mind. According to teleological theories, false or mistaken representations are still representations, but representations that are failing to represent. The solution to this paradox can only be found in turning back to the definition of what representation is. In this sense, teleosemantic theories always depend on theories of representation. What it means to represent, though, implies a second question: what kind of interpretation would come about according to our representations? I will deal with this question in the last

[39] Ibidem: 251.

chapter. However, the issue of interpretation is solved by Millikan through the introduction of the notion of a natural sign. Natural signs are not the function of an intentional representation; natural signs are part of a "normal mechanism" framework. Normal mechanisms carry a new possibility for teleologists, as Millikan claims:

The teleologist might claim that when the systems that produce and/or use intentional representations perform the tasks they were designed to perform and perform these tasks by means of their normal mechanism –let us just say "in the normal way"- then the intentional representation are basic representations –whatever "basic" representations are taken to be.[40]

This position is clearly similar to the one held by Dretske. According to him, the function of carrying natural information does represent intentionality. As a parallel to what was mentioned about Millikan, Dretske is also concerned with the question of how the recognition of signs implies, at the same time, a recognition of sign's use. Recalling Millikan's account, it should be reminded that no intentional signs could be defined without recurring to purposes. Purposes that, nonetheless, do not require any a priori rationality; representations are, in most of the actual cases, not used in this sense. Functionality is, in both authors, an actual matter. This does not discard the possibility of external conditions, yet, it encapsulates false beliefs in their contingency, in their being, say, accidents, albeit frequently recurring ones.

However, Dretske's account of representation seems to be, if not more complex, at least more structured. If the issue at stake is to understand what the use of signs is, then the

[40] Millikan, R. (2002): 69.

very issue of representation requires further characterization. Needless to say, the overarching framework is still natural and evolutionistic, however, Dretske's account looks at further variables, namely, indicators. Dealing with conventional systems of representations, Dretske identifies three systems. Before getting to the third, and main focus of his analysis, he describes representations in their possibility of being either passive and fully dependent from us as creators and users, "we give them a job to do, and then we do it for them"[41], or, as mentioned before, indicators. In systems of Type II indication, and the accompanying power of indicating, come before our intervention and thus before function. As Dretske holds:

Their ability to perform their function does not, as in the case of systems of Type I, depend on us, on a user-system already in possession of the required indicator skills. The status of these elements as indicators is therefore intrinsic. What is extrinsic, and therefore still conventional, still relative to the interests and purposes of its users, is the determination of which, among the various things they can already do it is their functions to do.[42]

In the case of Type III, the term of reference shifts from users to the environment. This system has a natural power of representation, it responds, in other words, to Millikan's question about sign's definition and use. Hence, the issue is to demonstrate the uncontroversial existence of such a system. The first obstacle that needs to be overcome is, as in Millikan's, the one of false beliefs, or, in Dretske's terminology, misrepresentations. Interestingly, Dretske begins by saying what the power of

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[41] Dretske, F. (1998): 54.

[42] Ibidem: 62.

misrepresentations is, rather then highlighting their dependence relationship from true beliefs:

In the game of representation, the game of "saying" how things stand elsewhere in the world, telling the truth isn't a value if you cannot lie.

And again:

It is the power to misrepresent, the capacity to get things wrong, to say things that are not true, that helps define the relation of interests. That is why it is important to stress a system's capacity for misrepresentation. For only if a system has this capacity does it have, in its power to get things right, something approximating meaning.[43]

It is worth remembering how meaning, in this context, is related to evolutionary abilities and to the display of behavior. Hence, the response to the problem triggered by false beliefs has to do with both a misrepresentation of the environment, and, most important, with a misrepresentation of functions and their indications about the world. The problem of misrepresentations is thus connected not to an a priori distinction between true and false beliefs, but to the problem carried within misrepresentations themselves, namely, the indeterminacy of functions. Is this indeterminacy avoidable? According to Dretske it is. Yet, it is necessary to move one step back and recall the purpose of achieving, or at least approximating meaning. Functions do have to pursue this goal, hence, their indeterminacy is explained in the relationship between meanings and functions; more precisely, what has to be understood is the natural functional and/or explanatory role of

[43] Ibidem: 65.

meaning. The best, and strictly empirical way to show this point, is to look at meaning in the very sense of their natural expression: their physical effect. It is in accordance with physical effects that the status of meaning has to draw back to evolution and, in particular, to Sober's distinction between selectional explanations and developmental explanations. Developmental explanations are related to how actual actions come about. Yet, the physical effect Dretske is researching does not have to do with actions, but with selection, with what has been selected for in a widely larger context than individuals.

To conclude, both Dretske and Millikan come to similar theses. Millikan's normal conditions and proper functions can easily be compared to Dreske's results. Nonetheless, a main difference lies between the two accounts. Whereas for Millikan proper functions may occur occasionally, Dretske's emphasizes how the occurrence of proper functions always leads to truth. Functions, in the latter case, are reliable indicators capable of nomically connecting sign and signified. However, there remain several analogies. In both cases, representation is treated in a natural, although rather open, fashion. It is in representation and intentionality that misrepresentations can be found. It is worth noticing, though, how misrepresentations, mistakes and false beliefs, are characterized as contingent or accidental. In the next section I will try to emphasize how, still framing the analysis in an evolutionary context, false beliefs can possibly acquire a different and more radical status.

3.2 Misbeliefs and Evolution

In the previous section I focused on various responses to the problem of misinterpretation. However, and increasingly in more recent researches, misrepresentations, false beliefs and misbeliefs, have acquired a different status. Remaining in the evolutionary framework, misbeliefs have started to be regarded as a powerful evolutionary solution.

In their recent paper, *The Evolution of Misbelief*, Dennet and McKay provide an example of such an attitude. The framework is strictly functional and based on the analysis of evolutionary results. Beliefs, in this sense, are *tools that enable us to act effectively in the world.* As recognized by the authors, the most accredited hypothesis holds that only true beliefs will accomplish this purpose, that is to say, that beliefs are truth-aiming, grounded on alethic reason.

As analyzed in the previous section, misbeliefs are typically attributed to the occurrence of fallacies in the display of a proper function that is ultimately described as the function activated and applied in normal conditions. However, evolution is not infallible: the systems produced by evolution often fail in their purposes for a wide set of reasons. Physiologically, for instance, sight does not mirror the actual state of thing, different individuals rely on their perceptual apparatus in an often contrasting fashion and perceptual fallacies have been and still are, a particularly interesting field of study. Moreover, selection implies a historical and topographical combination of events to work properly and, even once the process of adaptation has begun, a decrease in the marginal utility has been observed when a more sophisticate state is reached, in other words, sophisticated states are increasingly less related to survival strategies and more to contingencies.

Nonetheless, the overview on the difficulties concerning selection does not discard the possibility of asking a second question, and thesis of the essay:

We agree that misbeliefs can indeed result from imperfections in the belief formation system. We argue, however, that not all misbeliefs arise that way –specifically, there are certain situations in which misbeliefs can actually be adaptive. In those situations, therefore, we can expect that we will be evolutionarily predisposed to form misbeliefs. In short, misbelief evolves.[44]

Hence, misbeliefs are not defects, but a way to improve our conditions of survival and general well-being. The first case presented concerns Error Management Theory results. False beliefs such as overperception of women's interests in men or the overestimation of potential danger in opposed ethnic groups have, in the course of the years, guaranteed more chances for reproduction, in the case of men, and more safety in the case of possibly contrasting ethnic groups. A criticism of these results typically holds that such effects are mere acceptances; prudent actions that, slightly maximizing the cost of our efforts, (through a generally excessive overestimation), can lead to significantly more positive outcomes in the whole condition. Can this criticism be sustained? Finding a middle way between non-proper activation of functions and the evolution of misbeliefs is certainly a cautious response. However, the importance of false beliefs in the evolutionary framework cannot be denied.

The case of study proposed by Dennett and McKay is the one of positive illusions. Positive illusions are exaggerated perceptions of our personal control such as the "better

[44] Dennett, D., and McKay, R. (2007): 2.

than average effect" and an overestimation of our social desirability. Such attitudes have proved to improve health and longevity; in the case of illness, for instance, positive illusions can regulate the neuroendocrine responses helping people to manage stressful situations.

It is still worth asking whether such responses are limited to certain effects or localized in automatic behavior. The possibility of a holism in falsehood is mentioned in the conclusion of Dennett and McKay's essay:

The fact that this apparently benign and adaptive effect has been achieved by the maintenance of a more global state of falsehood (as revealed in the subject's responses to questionnaires, etc.) is itself, probably, an instance of evolution's sub-optimality as an engineer: in order to achieve this effect, evolution has to misinform the whole organism.[45]

I believe a good way to investigate this problem would be to rely on recent neuropsychological literature related to unconscious abilities and to how, unconscious processes can be related to the evolutionary debate and to a new way of finally interpreting the relationship between beliefs, rationality and knowledge.

It is worthwhile to add a premise; I am not aiming to talk about the psychological unconscious, but the one, that, starting with Kihlstrom in 1987, has been called the cognitive unconscious. Whereas the psychological unconscious is founded on a threefold distinction between the id, (innate sexual and aggressive drives), superego, (conscience and ego ideals), and the ego, (process directly related to reality, perception, defense

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[45] Ibidem: 7.

mechanisms, etc), the cognitive unconscious stems from a reflection upon the brain system and the possibility of relating the brain and the mind through an analysis of unconscious mechanisms. The most striking claim defended by advocates of the cognitive unconscious view is the non-necessity of awareness for elaborating complex processes. This claim immediately entails a rather polemical question: if awareness is not necessary, what is consciousness for? Cognitive psychologists are not aiming to question the distinction between the brain and the mind, between, in other words, brain states and mental states such as the ones described in the debate on qualia. However, the same debate can be taken from a slightly different standpoint: instead of questioning the theoretical and metaphysical distinction, neuropsychologists have, increasingly in recent researches, analyzed the relationship between controlled and uncontrolled processes, how they interact and what kind of dependence mechanism can be highlighted both in the neurological context and in sociological results stemming from a scientific analysis.

Wegner, in his essay, "*Who is the controller in controlled processes?*", gives an interesting analysis of these points. The dichotomy presented is the one between automatic, unconscious processes and controlled processes. The first angle from which this comparison can be taken is the way controlled processes are felt, namely, the homunculus problem. The homunculus is, metaphorically, a little man in our head capable of rationally controlling our will, actions and thoughts. This appeal to a homunculus is, according to Wagner, a fatal theoretical error. A more refined, but still generally mistaken approach to controlled and uncontrolled processes is the popular, early psychological line distinguishing between the subliminal self and the unconscious self. This distinction is willing to decrease the importance of the subliminal self -labeling

it as a mere robotic, not particularly skilled, function that does not have any contact with the mind. Conversely, the conscious self is described as capable of intelligent thoughts and actions. Yet, as Wegner notes, this characterization, besides drawing a distinction, does not explain what the conscious self is. First, it is worth analyzing why the necessity of picturing a homunculus is so prevalent in the psychological and philosophical tradition. Recalling false beliefs, the question can be rephrased in this way: Why do we need to rely on the false belief of a constant control? As mentioned before, the temptation of the homunculus goes back to theory of mind. We learn to attribute events to the mind, we learn, in other words, to anthropomorphize events and objects as they could possibly be agents. Several experiments showed how cartoons of geometrical figures were generally seen as causal agents. A further reason is highlighted by Wegner:

Our readiness to perceive minds behind events is enhanced further by the experiences we have of our own minds –particularly, the experience of causal agency. We each have extensive experience with the sense that we control actions, from fingers wags to greater gestures, and these many instances add up to the convincing intuition that we are controllers who cause our actions.[46]

The problem does not reside in the notion of control itself, but in the notion of a overarching controller. The controller, in himself, is a scientific illusion; it is a framework of falsehood that we constantly apply to action. A consequence of this attitude is known as the phenomenon of apparent mental causation:

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[46] Wegner, D. (2005): 23.

The theory suggests that we experience ourselves as agents who cause our actions when our minds provide us with previews of the actions that turn out to be accurate when we observe the actions that ensue.[47]

Thoughts are, in this sense, immediately related to actions. Wegner identifies three main principles of apparent mental causation. The priority principle assumes that, in performing experiments as well as in reality, the thought about action occurs just before the action itself. Only in this way the action is perceived as voluntary. As Wegner and Wheatley demonstrated, people possessing a relevant thought regarding something, (in this case the idea of a swan), always connect it with a following action. In the experimental case they were asked to relate, by moving a mouse, the idea to a figure on the screen, without being aware that the mouse was not controlled by them, but from the experimenters. In all reported cases, although they did not even have time to move the mouse, they declared to have moved it.

A second principle in apparent mental causation is the consistency principle: there must be a semantic connectedness between the thought and the corresponding action. This implies that we ordinarily know our actions in advance of their performance; we rely on the consistency of our thoughts as a form of preview. The consistency principle is particularly interesting in its consequences on other people, on, to be more prècise, the way we feel the consistency of other people's action. As Wagner describes:

In a laboratory test of the consistency principle, Wegner, Sparrow, and Winerman (2004) arranged for each of several undergraduate participants to observe their mirror

[47] Ibidem: 23.

reflection as another person behind them, hidden from view, extended arms forward on each side of them. The person behind the participant then followed instructions delivered over headphones for a series of hand movements. (...). When participants could hear the instructions that the hand helper followed as the movements were occurring, they reported an enhanced feeling that they could control the other's hands.[48]

The third principle is exclusivity: there is only one link between a determined thought and its related action. Other potential causes of action are typically discarded, only one agent, with her own thoughts, can perform a specific action. The importance of feeling a "first person" responsibility goes back to the homunculus and to its supposed capacity to rationally perform an action and control its will. In short, apparent mental causation applies to the homunculus belief –a radically false belief-, as an experience of constant construction; the construction of a rational agent.

Conversely, the only possibility of truly perceiving agency comes from the understanding of controlled processes. However, controlled processes cannot be separated from unconscious processes. There is no such a thing as an independent subliminal self. The construction applied is always a result of our response to the connection between thoughts and actions, but it does not lead to a controlling agency, to, in other words, a pure form of consciousness. Our agency is, as Wagner holds, intrinsically virtual.

How does this apply to false beliefs and to the purpose aforementioned? Did false beliefs, and so virtual agency evolve? A way to tackle this problem is to refer the relevancy of virtual agency to social behavior and to the outcomes that can be outlined starting from the construction of agency.

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[48] Ibidem: 25.

Translating agency in different terms, it won't be mistaken to address it as a form of authorship. Feeling control of emotions and accompanying actions is both a form of defense and a confirmation of a supposedly superior status. Conscious will is one of the cardinal points of interactions, and it is, as demonstrated both by Damasio and Wagner, a way to translate emotions and feeling into rational thoughts. Uncontrolled and controlled processes work as a mechanism of mutual translation. On the one hand, feelings are reported as conscious will, on the other hand, virtual agency is often a result of past, controlled experience. In a metaphorical sense, we are never fully present to our actions and we are not for two orders of reasons. First, obviously, because of our unawareness of unconscious processes and, secondly, because even our conscious processes are not the result of an immediate response to the situation we are currently in. We learned to be agents and we evolved in this sense despite the striking physiological impossibility of it, as Wegner holds:

We must know what we have done if we are going to claim that our actions have earned us anything (or have prevented us from deserving something nasty). Our sense of what we have achieved, and our ideas too, of what we are responsible for in moral domains, may arise because we gain a deep apprehension on our likely causal role in the experience of will.[49]

The evolutionary standpoint regarding the unconscious and its possibilities has been pushed even further by Bargh's research on the relationship between automatic processes, consciousness and evolution. The purpose of Bargh is to identify a prior evolutionary

[49] Ibidem: 31.

function of consciousness in the selection of flexible behaviors that can be performed automatically. Ultimately, his thesis will also imply a reconsideration of the subliminal self and of its independent skills.

There are several examples demonstrating how people can unconsciously perform complex, flexible, goal-oriented behaviors. Bargh proposes a "magical mystery tour" in some forms of social behavior and developmental psychology that shows how the conscious motivation for acting is often linked to the harmony between the unconscious and external factors. In other words, behavior is, in a considerable number of cases, a passive mechanism. Mimicry and social interpersonal goals are two examples. The mimicry effect, also known as the "chameleon effect", shows how the activation of a commonly recognized stereotype influences people's action. In the case of intrapersonal goals, individual choices are strongly reduced and substituted with the unconscious impression of a common goal. The effects on the concept of rationality and on the achievement of true, correct beliefs are impressive. As Bargh notices:

Two aspects of these phenomena seem particularly magical. One is the profound dissociation between these varied psychological and behavioral responses to one's environment, on the one hand, and one's intentions and awareness of them on the other. People are behaving, interacting, and pursuing goals, all apparently without meaning to or knowing they are doing so. How is this possible? The second mysterious feature of these effects is that the same verbal or pictorial stimuli produce all of them. All it takes, it seems, is to activate the relevant concept in some manner.[50]

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[50] Bargh, J. (2005): 41.

Part of the illusion is, as already highlighted by Wegner, an exaggerated belief in our free will. It is actually easier, contrary to the most common belief, to manipulate free will from outside than having a clear view on our purposes. A further point is nonetheless defended by Bargh; according to him, the reason for the dissociation between unconscious and conscious processes has to be found in the physiological distinction between conscious intentions and the behavioral motor system. Our conscious apparatus is separated from most of our motor responses, both in the case of simple actions and complex actions. Complex behaviors can be guided automatically from informational input of the environment, moreover, the outputs of such process extend to the main planning area of the brain, the prefrontal cortex, providing a neurological basis for unconscious action plans. Hence, an automatic context and stimulus can evoke an action plan. Another connection highlighted is the one between the neocerebellum, involved in the acquisition of new skills, and the prefrontal cortex:

A major advance in human cognitive capacity and capability was the connection between the prefrontal cortex and neocerebellum, which increased in size by a factor of five. This expanded pathway enables nonconscious control over higher executive mental processes, because it connects the main cerebellar receiving areas in the brain stem with the frontal tertiary cortex (two levels of analysis removed from direct sensation). This part of the cortex receives inputs only from secondary analysis areas of the brain (which take input only from other mental representations and not from sensory organs), and thus entirely buffered from direct sensory areas.[51]

[51] Ibidem: 44.

As a parallel to the aforementioned separation, another dissociation can be found in the gap between perception and action. The existence of two separate cortical visual pathways has been emphasized in recent neuroscientific studies (Grèzes 1999, Norman 2002, Jeannerod 2003). A dorsal pathway is related to action tendencies based on perceptual information, whereas the ventral consciously processes and recognizes the information. In slightly different terms Jeannerod distinguishes between a pragmatic representation of the object (dorsal pathways and unconscious behavior) and a semantic representation (ventral pathway and conscious behavior). Hence, the dorsal stream can be activated externally and without any sort of conscious awareness.

These examples find a confirmation in the discovery of mirror neurons (first described in macaque monkeys in 1998 by Rizzolatti and Arbib and then in humans in 2001 by Buccino). In the case of mirror neurons simply watching mouth, hand and foot movements activate the same function in the premotor cortex showing a direct connection between visual information and action control. There is thus no need of cognitive understanding to simply react to the environment; actions are related to perception and such a perceptual ability, and the accompanying motor response are stimulated and enhanced by the contact with other people.

All these factors have various implications on both the issue of consciousness and working memory, however, what I aim to emphasize is how these data can constitute a physiological basis for false beliefs. False beliefs can, according to these theories, be a lot more than acceptances of free-riders, they can, for instance, naturally belong from the unconscious part of our responses. They can, in other words, be the selected product of unconscious behavior. Moreover, nothing hinders the possibility of seeing the general

development of our knowledge abilities as an increase in the production of such beliefs. False beliefs are complex, yet, they sensibly help the perception of our consciousness and thus they enhance a feeling of control.

3.3 Conclusions

In the course of the chapter I shifted from an epistemological, natural and functional analysis to recent developments in neuropsychology. Studying the brain means, in some sense, to study its independence from a priori constraints. Any functional analysis clearly embraces this standpoint. However, as I showed, functional analyses tend to discard the relationship between false beliefs and knowledge, or, at least, they conceive false beliefs as aberrations of proper functions in normal conditions. Nevertheless, portraying a framework of "falsehood" does not immediately lead to a negation of functional abilities. In the evolutionary context, false beliefs have demonstrated to be particularly useful and their evolution in the actual environment does not seem an entirely improbable hypothesis.

However, it is tendentious to frame false beliefs in the realm of conscious and controlled actions and thoughts. A more suitable way to understand the biological basis for false beliefs is to investigate the cognitive unconscious and its relationship to agency and to the possible interrelationship among people. Moreover, false beliefs can concretely occupy their part of the brain triggering perception and motor responses independently from what rationally might be recognized as a true, conscious beliefs. Ultimately, it would be more correct, in my opinion, to consider false beliefs as different degrees of actual responses.

This will allow for a better understanding of how responses can vary among different individuals according to their reaction to the environment. Different degrees of beliefs can have separate evolutionary pathways, nonetheless, the final result would still be a functional adaptation to the environment.

In the next chapter I will rehearse one of the issue related to the aforementioned debate upon the unconscious and false beliefs, namely, the relevance of emotions. I will present a neurological perspective on emotions and I will relate it to the evolution and understanding of emotions. In order to restrict the issue, I will limit my analysis to the perception of art as a case of study.

4. Naturalizing Artifacts

The purpose of this chapter is to collect the different ideas and sources outlined in the previous chapters. In particular, I aim to respond to a major question, namely, to what extent naturalized epistemology can include artifacts and false beliefs. In other words, my main concern will be reflecting on the possibility of extending naturalistic and experimental studies to artifacts and, consequently, to highlight how the definition of knowledge can vary according to the new parameters I have exposed.

Most of the background, scientific material has been presented in the first chapter. Hence, this final chapter will first of all rehearse some of the previously described data with a special focus on emotions and on the relationship between emotion and cognition and emotion and intelligence. The acquisition of knowledge and how it is physiologically acquired and applied will follow as a consequence.

In the first chapter, after briefly characterizing the emotional system, I focused on two possibilities of inscribing emotions in an evolutionary framework. Rolls' study, and Sloman's study as well, provide interesting perspectives on the architecture of the mind and the possibility of constructing a system of emotions. Given these perspectives, I will first move one step back and highlight how the emotional system has, in more recent studies, acquired a further enhanced independence that, nonetheless, does not leave awareness and cognition aside. In this respect, I will briefly consider Phelph's study on the interaction of the amygdala and hippocampal pathways as a powerful example of the

relevancy and autonomy of the emotions in most of our daily reasoning and decision making.

Although focusing on the amygdala is still one of the most important steps in the analysis of emotion, the interaction with cognition has sensibly extended the role of emotions and their presence in cortical areas and "upper" brain. Damasio extensively worked in this field proposing an extremely interesting organismic interpretation of emotions that relates to reason, consciousness and knowledge. Thus, Damasio's account of emotions adds fundamental insights to the discussion concerning the modularity of the mind and integrates Edelman's position, as presented in the first chapter. Moreover, as I will explain in the course of my argumentation, I believe Damasio's perspective to be highly compatible with what was defended concerning false beliefs in the third chapter.

Thus far, all the studies presented are heavily grounded on evolutionism and empirical studies. However, it is worthwhile, in this final chapter, to introduce a different perspective both on the acquisition and creation of knowledge and on emotions and their biological basis. In other words, if the dichotomy between nature and nurture has so far been taken from a strictly natural perspective, I will now expose how the emphasis can and has, in some cases, shifted to learning and to the cultural background in which acquisition and intelligence take place. To be sure, the role of biology does not have to be underestimated, yet, the evolutionary claim sustaining the permanence of a stone-age mind and the existence of proper functions is not free from objections and has been challenged by several developmental psychologists. Moreover, introducing the importance of an actual, social and cultural context will further highlight the relevancy of the functional role of artifacts in knowledge. The cultural hypothesis is consistent with

the functional definition of artifacts proposed in the second chapter and, as mentioned above, does not hinder the possibility of also inscribing artifacts in a neuroscientific and neuropsychological context. I aim to demonstrate how both cultural and natural issues are important for any definition of artifacts and, most importantly, that the two are compatible. In order to better explain this point, I will propose, in the last part of this chapter, art as a case of study. In art creative thinking, emotions, false beliefs and evolutionary psychology are consistently interwoven. It should be noted that the example of art does not pretend to substitute or challenge any consideration in aesthetics, neither do I aim to discuss aesthetic issues. However, it is in particular in the case of art that the importance of the brain and the mind has acquired a renewed interest both in studies on perception and on neuropsychology. Furthermore, as it will be explained in the second part of this chapter, the study of perception, and particularly the study of visual intelligence, cannot be dissociated from the study of emotions, feeling and, as a consequence, from a better understanding of the brain as a complex, composed mechanism.

4.1 Emotions and Cognition

The first focus, when dealing with emotions and the architecture of the brain, is to analyze the importance played by the amygdala, and how its central role can be compared to what is typically associated with cognition and supposedly high cognitive processes. Studies following this direction pinpoint the importance of bridging the gap between

reason and emotions. It is thus not surprising to notice how the first problem requiring an answer has been questioning whether or not emotional processes and cognitive processes can be considered as separate functional mechanisms. Phelps' study on the interaction between emotion and cognition points precisely to this direction; she analyzes the possibility of emotions occurring without cognitive awareness and vice versa. Her purpose is twofold; on the one hand, as mentioned above, the possibility of segregation ought to be considered. On the other hand, though, the reciprocal influence of the two cannot be discarded; on the contrary, the partial independence can be regarded as an evolutionary, although unconscious, strategy, to enhance our ability to reason, decide and memorize experiences.

Regarding the first point, it has been shown how the amygdala, being necessary for the physiological understanding of fear and immediate conditional response, can, both in humans and non-humans, be separated from, for instance, hippocampal pathways. The hippocampus is necessary to consciously remember events, yet, damage in this area does not influence the possibility of recognizing a potentially dangerous situation. Conversely, patients with amygdala damage, although consciously recollecting the events, are incapable of physiological response. In humans such behaviors are explained by the acquired ability of distinguishing dangers without the necessity of relying on immediate physiological stimuli. Needless to say, both the hippocampus and the amygdala are necessary in healthy conditions to understand and respond to fears, however, the two can operate separately. As Phelps holds:

As in other animals, the amygdala in humans is critical for the acquisition and physiological expression of a conditioned response. However, the amygdala is not

necessary for a cognitive awareness and understanding of the episode of fear conditioning. This dissociation between automatic emotional response and conscious recollection and awareness indicates that the amygdala and some emotional responses can operate independently of cognitive awareness.[52]

What should rather be investigated is, according to Phelps, how the two systems are influencing each other, that is, how cognition and emotion can, although with a good degree of independence, relate to each other.

The first example of influence is the one imposed on emotions by verbal, cognitive instruction. Obviously, this case applies to humans, we being able to learn without direct, emotional experience. Given the segregation showed above, it should be possible to conclude that in the absence of emotional experience the patient should still be able to fully respond to the learned input. However, the presence of the amygdala remains of crucial importance in the physiological response; patients with amygdala damage and still intact hippocampal pathways do not show any difficulty in understanding the learned stimulus of an instructed fear, but are unable to respond physiologically. Hence, the interaction between the two becomes necessary in facing actual conditions.

As a parallel to what was described as the influence of cognitive awareness on emotions, the amygdala does influence cognitive awareness and not simply in triggering a suitable physiological response. As already mentioned in the first chapter, the amygdala plays a role in both the modulation of working memory and long-term recollection.

The amygdala recollects arousal stimuli modulating memories and thus, allowing a consistent decrease of memory loss in useful, cognitive responses. Emotional events are

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[52] Phelps, E. (2005): 66.

collected better than neutral events demonstrating how the impact of emotions, and the accompanying function performed by the amygdala, play a major role in what will further be considered cognitively relevant. This also implies that emotional signals are processed before cognitive awareness, highlighting an ultimate connection between sensory responses, emotional processes and cognitive awareness. The passage between, for instance, the recognition of a face and our awareness of it always involves an automatic, unconscious emotional process occurring prior to cognition. In this case emotions play a consistent role in attention and focus, a role that, without an automatic mediation, will be unfortunately bypassed. Hence, in both cases, emotions have been found to participate in a privileged way with the processing of the environment, both in memory recollection and in our capacity to focus on it by constantly redirecting perception.

Phelps' study highlights the crucial role of emotions in its interaction with cognition by focusing on the unconscious impact of it. However, emotions do also imply cognitive processes in a conscious fashion. In the following section I will develop this point by clarifying two different views. First, I will consider Damasio's view of emotions and the relationship between reason and emotions and emotions and the brain. Secondly, I will briefly consider how the role of culture can nonetheless be added between one of the motivations to tie together emotional responses and conscious cognition.

Damasio's outstanding analysis of emotions and feelings stems from a double, critical purpose: on the one hand, he aims to challenge Descartes' radical dualism between the mind and the body. On the other hand, his understanding of emotions

radically diverges from James's theory of emotions specifically in the conception of the body, in the difference between primary and secondary emotions and in the introduction, in the case of Damasio, of a bridge connecting rationality and emotions.

The first response to both the aforementioned perspectives is the introduction of an organismic perspective where a better understanding of the mind and emotions mingles with the physical and the social context, as he holds:

...the comprehensive understanding of the human mind requires an organismic perspective; that not only must the mind move from a nonphysical cogitum to the realm of the biological tissue, but it must also be related to a whole organism possessed of integrated body proper and brain and fully interactive with a physical and social environment.[53]

The context in which the mind and emotions should be understood is sensibly broadened with the introduction of the body and the cooperation between the two. To be sure, this position was already advocated by William James, yet, Damasio's account adds several new distinctions. James is responsible for two orders of mistake; first, albeit giving an important role to emotions, he never thought about the evolution connected to emotions and thus the passage from primary to secondary emotions. Secondly, emotions are seen as an integrated part of the body: a preordinated mechanism acting involuntarily and constantly without any shift or cooperation with rationality. Conversely, Damasio makes the shift to a voluntary understanding of emotions that is furthermore disclosing a

[53] Damasio, A. (1994): 252.

reflection on knowledge and on its acquisition. Knowledge that will consequently highlight its connection to the self and to the intriguing problem of consciousness.

Emotions work as a bridge between rational and non-rational processes through the process of feeling emotions and becoming aware of the status in which emotions are triggered and will further be triggered in comparable, future situations. Needless to say, this process enhances the relationship with the environment permitting the construction of a particular "emotional history of interactions" that will constitute the building block of knowledge. Such movement requires a distinction between preorganized, innate, Jamesian emotions and secondary emotions. Anatomically, the introduction of secondary emotions adds different sections of the brain to the amygdala, the Papez circuit and the limbic system. One of the main innovations of Damasio is indeed the extension of emotions to the prefrontal and somatosensory cortices. Outlining the effect provoked by emotions, Damasio lists (a) the activation of the autonomic nervous system, (b) the dispatching of signals to the motor system, (c) the activation of the endocrine and peptide system and (d), the activation of the nonspecific neurotransmitter nuclei in brain stem and basal forebrain. The latter effect, influencing the basal ganglia and the cerebral cortex, is the more specifically connected with cognition. Once cognition is set into play, emotions can finally be addressed as feelings, namely, the feeling of an emotion. The introduction of a distinction between feelings and emotions is of germane importance in the debate concerning the role of emotions in reasoning and decision-making. In particular, as Damasio notices, not all the feelings originate in emotions. For instance, background feelings can be activated without immediate and actual emotional stimuli.

Still, the question of how is it possible to feel emotions remains open. The process of feeling an emotion involves constant changes in the neurological and chemical structure of the brain. On the one hand, the body is experienced through the effects described above, on the other hand, Damasio considers a mental "juxtaposition" of the image of the body state with its understanding. This process involves a distinction between a qualified, for instance a face, and a qualifier, the juxtaposed body proper. It is not a blending, but a superimposition that generates our integrated experience. Thus, what characterizes the feeling of emotion, is also a correlation between what the representation of the body is and the accompanying representation of the self and of its sense of life. It is specifically in this case that feelings are separated by emotions. Background feelings, as Damasio addresses them, originate in background body states. It is certainly harder to describe them because of their relationship to a more general status than the one that can be stimulated by direct emotional impact, yet, background feelings are the major components of our daily experience. As Damasio holds:

We are only subtly aware of background feeling, but aware enough to be able to report instantly on its quality. A background feeling is not what we feel when we jump out of our skin for sheer joy, or when we are despondent over lost love; both of these actions correspond to emotional body states. A background feeling corresponds instead to the body state prevailing between emotions. (...) The background feeling is our image of the body landscape when it is not shaken by emotion.[54]

Obviously background feelings are constantly monitored and subject to changes, there is no such a thing as an "island of sameness", neither, as already outlined in the previous

[54] Ibidem: 150-151.

chapter, can our self be conceived as a homunculus commanding from its privileged, brain position.

A further reason for the importance of feelings is their capacity of minding the body. Besides the feeling of a causal process and the recognition of a current body state, feelings display a third kind of representation which involves constant feedbacks and thus the construction of the mind as a form of knowledge concerning the mind itself. It is precisely because of this threefold process that emotions and feelings can rightly be considered as a first step in the creation of rationality and decisional acts. To better understand what reasoning might then be and, most important, how such higher process can be influenced by the interaction with the body and somatosensory response, it is still necessary to investigate which are the various possibilities to establish this link. In order to portray this efficiency relationship, Damasio proposes the somatic-marker hypothesis, namely, the ability of conjoining high reasoning capacities with body reactions and stimuli.

First of all, what should be noted, is how reason does not stem from a blank slate, neither can it be addressed as a purely logical calculation of effects and outcomes. Reason, as already mentioned in the course of this paper, can only partially be conceived as an arid deductive process; the relevancy attributed to intuitions and, as shown in the previous chapter, the construction of false beliefs are only two elements among several others confirming the eclectic nature of such processing. Whereas false beliefs are often related to the environment and to an advantageous, although often unconscious, cost-benefit analysis, the paradigm defended by Damasio introduces a further element, namely the body and its responses. In other words, not only high reason can be integrated and

modulated by defective reason, but the secondary response embodied by high reasoning capacity strongly depends upon the immediate stimulation of emotions. Immediate responses are automatic, they rely on a pre-built apparatus and connect the environment to an immediate body reaction. These reactions mark our perception and understanding causing important changes in reasons. Somatic markers occur prior to reason, they immediately hinder or favor an action making us choose between various alternatives very quickly because of the sudden reduction of many of the proposed choices. As mentioned above, most of our somatic markers are innate, yet, markers can be learned and thus acquire the status of secondary emotions. Hence, somatic markers do depend on nature but are constantly modified by culture; a culture that creates markers for the purpose of further acquisition of knowledge and reasoning abilities. This process also generates an internal preference system, as Damasio holds:

Somatic markers are thus acquired by experience, under the control of an internal preference system and under the influence of an external set of circumstances which include not only entities and events with which the organism must interact, but also social conventions and ethical rules.[55]

The part of the brain devoted to this process is the prefrontal cortex, where the information received from the senses and the body is stored. The contingencies of experience have their representation in this area clearly demonstrating a convergence between what Damasio calls the "upstairs" and "downstairs" of the brain. To be sure, the involvement of the body can entail the production of misbeliefs, yet, these attitudes

[55] Ibidem: 179.

remain survival-oriented and cannot be conceived as one-way processes; there is no such a thing as a strictly computational account of the mind where inputs are processed in an almost mechanical fashion. As already emphasized, nothing is fully stable and the interactions described hinder the possibility of thinking about a modularity of the mind. This last claim is ultimately supported by the presence, besides the somatic markers, of co-occurring processes in the use of reason and in the acquisition and definition of knowledge. In strong connection with automatic somatic states and markers, two necessary ingredients for knowledge are attention and working memory that, nonetheless, are modulated by emotional and body signals. In a broader sense, it is the mind itself that cannot be thought without some embodiment and the embodiment of the mind further causes the interaction with the environment, an interaction that admits both the influence of the environment on the mind and of the mind, and the body on the environment.
Damasio does not rule out the importance of experience, neither does he discard cultural acquisition and the establishment of subjectivity. Rather than simply being a natural, mechanical entity, the neural self is an ongoing process with an ongoing perspective on the body and on the brain itself allowing, in certain cases, for the creation of a meta-self.

In the next study I will show how this intuition has brought several scientist to radical conclusions. If the emphasis on genetics and innate processes can be strongly limited and constrained, our vision of the mind and of feelings should investigate in a deeper fashion the cultural components surrounding the operations and mechanisms that have been described thus far.

As a parallel to what was analyzed in the case of Damasio, Greenspan and Shanker investigate the relationship between feelings, emotions and high reasoning abilities with a specific focus on intelligence and symbolic thinking. According to the authors, this relationship not only cannot be avoided, but it also implies the consideration, besides the brain and the organization of the mind, of the cultural environment and of social transmission of information. Hence, the first concern will be with those theories exclusively interested in the genetic contribution dating back to our ancestors. As they explain:

Attempts to attribute this or that percept or influence to genetic or environmental factors when looking at intelligence or different types of temperaments are not only fruitless, they are inaccurate. Nature and nurture are constantly influencing one another.[56]

And again,

Basic biological capacities are a "necessary", but not "sufficient condition" for an individual learning to construct and to think.[57]

These considerations entail a further issue: relying on the stone-age mind as a still operating functional mechanism cannot be entirely satisfactory. Our ability to construct patterns and develop both logical and creative thinking have radically changed in the course of evolution. Evolutionary psychology, according to the authors, lacks a germane connection with the actual state of culture and learning and to their constantly "enriched"

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[56] Greenspan, S., and Shaker, S. (2004): 4.

[57] Ibidem: 4.

status. To be sure, cultural development begins with our ancestors, yet, its boundaries are subject to continuous modification and to a considerable increase in complexity.

Emotional and social signaling are mainly cultural, acquired products and they do effectively influence intelligence. Yet, giving a definition of intelligence in this context requires a more detailed specification. In this respect, the first tentative definition, closely resembles the one proposed by Damasio. Intelligence is here described as "the progressive transformation of our emotions from global reaction to sensation to high-level reflective thinking". The most original contribution of the authors is, nonetheless, their study on the development of intelligence and its connection to the emotions. It has been shown how young children that were able to respond in a more articulate and reflective fashion, all tend to start their speech with a personal anecdote, a fragment pertaining to their emotional, lived experience. Only after this first, concrete step is formalized can there be analytic and abstract thinking. Emotions are thus responsible for the stimulation of creative thinking that further entails a more complex use of intelligence.

It is through the consideration of these stages that intelligence can ultimately be defined as:

The ability to generate or create a full range of ideas in the areas of one's human emotional experiences and then reflect on them and organize them into a logical framework is, we believe, an appropriate definition of intelligence. Both this creative ability and reflective and sequential reasoning are necessary ingredients of intelligence and both are developed through emotional or affective experience. Rather than

measuring intelligence with one cognitive yardstick, we must find ways to evaluate it according to its depth and breadth.[58]

Creative abilities triggered by emotions also involve the ability of "re-creating" the original creative scenarios. This attitude can be interpreted in two main ways; on the one hand, the recollection of emotional experiences prepares the ground for the understanding of concepts. On the other hand, most important, the essence of emotional experiences is preserved in the possibility of communicating it among different people in the society. Intelligence, in other words, molds the creative abilities of a single individual with its cultural relationship to the rest of the community. The necessity of exchanges, once again, traces back to the first steps of learning. Interactive, emotional signaling begins with the sounds a toddler produces to be understood from its parents and, conversely, with the categorization and organization of facial emotional expression the toddler observes in her parents. This first, presymbolic stage evolves into a symbolic stage where, for instance, different personalities add to a more articulated understanding of their subjectivity the necessity of putting determined traits and features in contact. Related examples are multicausal and comparative reasoning, or the capacity of feeling empathy.

What is valid for intelligence can, according to the account presented, be extended to theory of mind. As the authors hold:

There are different levels of the "theory of mind" that are related to or derivative from the different levels of development. But just as intelligence can be either broad or

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[58] Ibidem: 236.

constricted and may involve some processing capacities but not others, similarly, theory of mind capacities have different levels and are exercised in various ways.[59]

The different levels in which the mind operates integrate the subsymbolic, immediate, emotional response with symbolic thinking. As also defended by Damasio, emotions can acquire the status of true knowledge and then become part of our long-term memory. The creation of interactive, emotional patterns is of a crucial importance in cultural interactions. In other words, mastering emotions entails a better understanding of social relationships through the creation of a system of symbols.

All the accounts presented are closely related to some of the main points outlined in the course of this work. Damasio addresses some of these problems with attention to both false beliefs and the modularity of the mind. As mentioned before, the vision of the mind presented seems incompatible with a strict mechanism. The concomitant interaction of the body, neural pathways and chemical responses strongly complicates the access of information to the brain. Moreover, the brain reflects upon itself, without the necessity of external inputs. The modularity of the mind implies a contribution of encapsulated functions that do not interact. According to Damasio, if this would turn out to be true, the achievement of higher reasoning will be impossible because of the lack of connection between sensomotory inputs and cortical cognition. Emotions and their transition to feelings allow this process without any reification. The constant monitoring of the brain will, on the one hand, guarantee a normal and regular function, yet, on the other hand, will admit the possibility of changes even in the performance of the same process.

[59] Ibidem: 246.

Whether a crucial problem in the modularity of the mind is the occurrence of different outputs among people experiencing the same inputs, in Damasio's theory, the influence of emotions on reasoning and vice versa allows for the occurrence of different ways of reasoning and for various, sometimes discordant, solutions in decision-making. The emphasis on the possibility of "discordant" responses justifies the occurrence of different responses among different individuals, moreover it allows the possibility of false beliefs. False beliefs do not cease to be adaptive and their insurgence is motivated by the emotional response. The emotional patterns we developed to survive in the actual environment include the cognitive existence of false beliefs that, therefore, turn out to be images of the complexity of reason. Relating knowledge with truth conducing thoughts can be an exaggerated simplification given the strict relationship with the body and consequently somatosensory responses.

An ultimate confirmation of this point is found in the last study proposed. Although I will not go as far as advocating a radically cultural view of reasoning and emotions, I do agree in the partial inconsistency of a stone-age mind, as portrayed by evolutionary psychology. It is certainly true that most of the main mechanisms present in our ancestors are still active, however, the impact of emotions can strongly modify the perception of our working memory and thus make us behave in a fully "actual" fashion that is correspondent to the situation in which we are engaged. It is then possible to relate the creation and evolution of false beliefs with the emotional system and it is also possible to inscribe this creation to higher processes.

The last study presented, being related to the cultural and social environment, offers the chance for a further consideration. Cultural products are, in the great majority, artifacts.

In virtue of their relationship to functionality, artifacts trigger in emotions the necessity of creativity which is both a way of understanding and of practically using them as a tool in the environment. In the next section I will consider a particular case of artifacts, namely, works of art. In this case the process of creativity is obviously the most relevant and mingles with high reasoning abilities. Artifacts can, in this sense, be inscribed in the debate upon knowledge; moreover, they necessitate the same treatment that epistemology has thus far reserved for natural kinds. In the second chapter I related both natural kinds and artifacts with perception. Ultimately, it is worth emphasizing a further connection; as shown in this and in the previous chapter, perception also entails the study of emotions. In particular, I will focus on vision and its relationship with both art and reason.

4.2 Moving Toward an Epistemology of Artifacts. The Case of Art

In the previous section I showed how emotions apply to reason and high reasoning processes influencing both our concept of knowledge and our intelligence. All three theories presented did consider, as a crucial point in their tenets, the combination between feelings and emotions and the construction of a theory of mind. In this section I will begin by highlighting how the mind, in itself, cannot be segregated from feelings; on the contrary, the mind can strongly be subsumed under a prior considerations of what feelings are. To be more precise, the analysis of what feelings actually are begs a further question, namely, what does it mean to have a feeling. Susanne Langer aimed to respond to this latter question through the analysis of the context where feelings take place,

where, in other words, feelings are essentially actions. One of her examples, and also the one I will draw on, is art. The impact of art and its potentiality on the understanding of the mind and of feelings is easy to grasp and deserve contemporary and future research. Langer perfectly describes this attempt in the introduction:

It was the discovery that works of art are images of the forms of feeling, and that their expressiveness can rise to the presentation of all aspects of the mind and human personality, which led me to the present undertaking of constructing a biological theory of feeling that should logically lead to an adequate concept of mind, with all the possession of mind implies.[60]

An adequate concept of the mind implies the possibility of transcending the "animal mind" as the necessary stage to observe its emergence. This step is triggered by art and by its relationship to feelings. It is worth emphasizing, though, how, according to Langer, the understanding of feelings is absolutely not limited to aesthetic contemplation. Art claims a scientific definition and can be treated as a science where physiology mingles with psychology and perception. Feelings, on the other hand, allow the connection between organic activities and the rise of the mind. As a result, the combination of feelings and art turns out to be an identification; the two studies are inseparable and only in this way the mind can be analyzed as a form of knowledge about feelings. Langer addresses the movement allowing for this identification the "projection" of works of art. What is projected is the symbolic, and often abstract, symbol of art into the realm of feelings and intuitions. As showed in the previous chapter, our understanding will not be

[60] Langer, S. (1967): xiii.

limited to the primary impact of emotions, will not, in different terms, be confined to an immediate state. On the contrary, the hypothesis defended by Langer assumes the possibility of transforming the projection exercised by works of art in knowledge, disclosing the possibility of an epistemological concept of art. Traditionally, epistemology has rejected artistic expression as a non-sufficiently empirical building block for knowledge. Moreover, the relationship between art symbols and emotion has ultimately reinforced the consideration of art as a rather shaky basis to deal with reason. A further motivation not to extend epistemology to art, has been the difficulty in relating art with true beliefs and truth in general. However, it is particularly this point that, according to Langer, needs to be challenged, as she holds:

Artistic conception, for all its similarities to mythical ideation and even dream, is not a transitional phase of mental evolution, but a final symbolic form making revelation of truths about actual life.[61]

But how is art to build knowledge? What is the discovery of art and how does it apply to feelings? In just one sentence, the role of art can be summarized as the "objectification of feelings and subjectification of nature". In other words, the symbolic impact of art implies the formalization of immediate perceptual and emotional experience and its further reformulation into a conceptual framework. Hence, the framework in which feelings are ultimately framed, is a conceptual framework that discloses true knowledge about the mental images caused by art. This form of knowledge remains a complex construction where the objectification of perception contains, within itself, the possibility

[61] Ibidem: 39.

of understanding the self and its role in the environment in place. Interestingly, knowledge, as described by Langer, responds to another difficulty emphasized by advocates of the classical vision of epistemology aforementioned: knowledge generated by works of art relies, of course, on nature and biology, but cannot survive without recurring to artifacts. The construction of knowledge, in other words, is on par with the construction of the environment and the recognition of the functional role of artifacts. It is thus clear how Langer's account, although recognizing the importance of nature and its properties (the specific term "natural kinds" does not appear in this context, but easily applies to it), includes, in the relationship between reason and knowledge, artifacts and their functional contribution. Art is the artifact *par excellance* and its functional impact is one of the main focuses in any theory aiming to admit a theory of mind, perception and feelings, into the realm of epistemology.

The purpose of this work is not to pursue this goal, but to suggest its possibility by considering single tenets of epistemology that need to be reconsidered to accomplish such a project. It is nonetheless worth giving an example of how the functionality of art can be expressed and understood. I will first propose Langer's suggestion; afterwards I will enter into the perceptual problem of art in a more specific way by comparing it with the debate on vision, emotions and intelligence. Finally, I will briefly analyze some recent, neuropsychological studies that are increasingly conjoining the study of the brain with art.

The prime function of art identified by Langer is to make people feel the tension of life. Tension here has to be intended as the passage between the somatic vital tonus

and mental and emotional experience. This movement brings into attention the discovery of a general non-conformity of things and the necessity of understanding the world beyond mere appearance and surface. It is absolutely not mistaken to call this process a necessity. Contrary to what has been argued in the case of primitive art, namely that the survival function was the only reason for paintings, Langer suggests that the artistic drive, in this case, cannot be easily neglected. In a sense, artistic perception goes beyond communication and moves towards the establishment of a complex mind. This shift corresponds to what was analyzed in the previous section of this chapter: creativity is a source of intelligence, its increase is enhanced by emotional expression and can, in the end, achieve an integration between primary feelings and high reasoning capacities. Art, through the medium of intuition, underlines the intrinsic complexity of the vital act of feeling, as Langer emphasizes:

The principles of life are reflected in the principles of art, but the principles of creation in art are not those of generation and development in nature; the "quality of life" in a work of art is a virtual quality which may be achieved in innumerable ways. Yet it is in noting the differences between biological exemplifications of living form and the ways of creating its semblance in art that one finds the abstractions of art which emphasize the obscure, problematic aspects of life that are destined to develop into or to underlie higher activities, felt as emotion or sensation or the spontaneous ideation that is the intellectual matrix of human nature, the mind.[62]

[62] Ibidem: 67.

This claim perfectly fits the account of the mind advocated by Damasio. The obscure instances discovered and emphasized by art reflect the complexity of the mind and the definitely not unassailable vision of the modularity of the mind.

A second function of art ultimately stresses the connection between the mind and symbols portrayed by artworks. In the case of the mind and emotions, it has been noted how the shift from working memory to long-term memory enables the formation of a memory storage that, beyond helping us to face actual and present situations, allows for the projection of future thoughts and conditional thinking. Experiencing, in the case of adults and healthy humans decreases in its necessity and it is substituted by knowledge. The accumulation of experiences entails the formation of a teleology of the mind where functions are never limited to a contemporary temporal dimension. The same applies to art, yet, in this case, the teleological movement is found in a shift to a more complex dimension that does not necessarily have to be placed in a time span. An example of this teleology is the possibility of creating illusions and secondary illusions. The approach of art to vital acts pinpoints the possibility of subordinating the mere actuality of vital acts to a more subjective and personal interpretation of them that may also imply a "disembodiment" of acts. Like in the mind case, feeling and then understanding the very fact of feeling, allows us to understand the illusion of the non-existence of acts. This process paraphrases what, at the beginning of this section has been called the "subjectification of nature"; as Langer describes it:

The process which symbolic projection brings with it is the objectification of feeling, which continues into the building up of a whole objective world of perceptible things and veritable facts. But as soon as it begins to "build the world"-and that is probably very

soon, almost ab initio- it also presents abstractable forms, (...), the symbolic use of natural forms to envisage feeling, i.e., the endowment of such forms with emotional import, mystical, mythical and moral. That is the subjectification of nature.[63]

Land Art and Environmental art have provided several examples of how the subjectification of nature actually takes place. For instance, Robert Smithson ideated the project of the *Floating Island*; in his drawing a fragment of Central Park reconstructed and left floating on the Hudson River without a pre-established direction. The project was realized only after Smithson died and it soon took the form of a happening. Recognizing a familiar landscape and, at the same time, recognizing its non-belonging from its common location were meant to challenge our perception of nature as a stable object, bringing it into a more subjective realm where nature is perceivable only in our recognition of its movement, in its strangeness to places. Were people watching the island floating still persuaded of its natural belonging? Smithson project plays with the emotional attachment to places such as Central Park for New Yorkers, yet, it questions the emotional response by adding a cognitive question about why and how such a common view could change. Art can manifest its imposition over nature by acting upon it. Another example is Diller+Scofidio's *Cloud* in Geneva. Working in the subtle gap between architecture and sculpture, the artists managed to create a constant, immobile cloud on the lake that was reflecting the various colors at different times of the day. In this case the cloud has a double meaning. On the one hand, weather conditions are acting upon the environment modifying it for a short amount of time. On the other hand, this act was made permanent. The constant modification of nature is symbolized by what nature

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[63] Ibidem: 97.

itself can do on its own boundaries. This sort of affection makes nature the subject and, at the same time, the victim of its own acts. The reduplication of nature highlights its subjectivity, it gives it a constant feature, a cloud, namely, its abstraction.

The fascinating account proposed by Langer would never have been achieved without posing, prior to feelings and somewhat prior to cognition, the necessity of perception. All studies related to emotions, and in particular psychological, neuropsychological and developmental studies begin describing emotions by emphasizing the connection between perception, and, in particular, vision, and the understanding of emotions, what is felt. Interestingly both perceptual studies and studies on emotions share a common point, namely, the relationship with intelligence. Once again, and specifically because the attention is mainly on visual perception, art turns out to be a germane example. I will, in this respect, introduce Arnheim's account of visual intelligence as still one of the most outstanding works in this field and in the connection with both art and emotions.

In the introduction of this work I briefly described some of the aspects pertaining to the anatomy and physiology of the eye. What I aim to do here is to analyze the theoretical consequences stemming from the interaction between vision and cognition. Perceiving is only tangentially receiving information; reception accounts for a very small part of what is meant to be seen, thus, perception is only partially the ground of inputs. In the previous section, I highlighted how the processing of inputs can sensibly diverge from a strict mechanicism, here I am considering how almost the same holds for inputs. There

are no tout court instances and objects; the elaboration of inputs is consistent with the analysis of thinking, thus it implies the consideration of how cognition influences and understands images and data. As Arnheim states:

My contention is that the cognitive operations called thinking are not the privilege of mental processes above and beyond perception but the essential ingredients of perception itself.

And, in another passage:

No thought processes seem to exist that cannot be found to operate, at least in principle, in perception. Visual perception is visual thinking.[64]

Needless to say, the "defects" of vision do not have to be seen as pernicious fallacies. On the one hand, biological mechanisms such as the restriction of focus, the constant selection of images and the theoretical fulfillment of the observed represent a strategy to manage with the incredible amount of information coming from the environment. On the other hand, though, vision is part of the environment itself. In other words, what vision reflects are the continuous changes characterizing the environment, movement rather than stasis, objects in spaces that cannot be encapsulated or detached; vision and the environment are overlapping, they contribute to each other by sharing the same mechanisms of presentation. What certainly is a response to the environment slides to the questioning of the environment and the accompanying cognitive need that is carried

[64] Arnheim, R. (1969): 13-14.

within this questioning. It is interesting, in this respect, to consider Gursky's photography. The enormous pictures taken by the artist reflect in perfect detail immense landscapes where people and nature begin to resemble patterns of geometrical forms. In order to perceive the entity of what does perfectly coincide with reality, we are forced to abstract from the context. Hence, what is environment begins to overlap with visual strategies and visual cognition. In the case of Gursky, the process of abstraction provided by visual cognition has been addressed as blandness, a process emphasizing the "undifferentiated foundation of reality". It is in the non-reliability of perception that the environment is questioned and abstracted leading to superior cognitive states.

It has been shown how, in the complex pattern of the acquisition of knowledge, attention plays a major role. Now, attention in perception implies a functional addition, namely, selection. Selectivity is the most basic trait of vision. Moreover, as mentioned above, selectivity reflects the relationship between the environment and vision. To the constant changes of the environment, vision responds with a natural interest in changes. This movement is found both in the system of the eye and in psychology. As Arnheim rightly pinpoints, when one is forced to stare at a figure he will soon start modifying it. The reaction to monotony and immobility applies to memory as well and to the difficulties we all experience in focusing on the trait of somebody we might nonetheless know very well. In most cases we might be able to focus on a scattered number of fragments, but mentally describing a familiar person as photography is able to, often turns out to be a difficult task. Hence, the fixation following selectivity does not have anything to do with immobility. Conversely, fixation and focus introduce higher processes in the immediate stage of perception. It is precisely this movement that brings to attention the connection

between intelligence, reason and vision. In a paragraph entitled "Fixation solves a problem", Arnheim compares fixation with problem-solving as two ways of restructuring a given problem situation:

I have shown that the need and opportunity to select a target exists in cognition even at the retinal level. Since acute vision is limited to a narrow area, an objective must be selected from the total range of the given field. This limitation, far from being a handicap, protects the mind from being swamped with more information than it can, or needs to, handle at any one time. It facilitates the intelligent practice of concentrating on some topic of interest and neglecting what is beside the point of attention.[65]

A further element in the functionality of the eye that is strongly related to cognition is, as shown in the previous chapters, the recognition of shapes, or shape bias. Shape recognition is the beginning of concept formation and acquisition, and it depends on the mind managing the interaction between the acquisition of knowledge and the filter created by vision and visual selection. An object is said to be truly acknowledged only when it fits in some recognized shape, thus, Arnheim concludes, there is no difference between percept and concept. Recalling the discussion on kinds outlined in the second chapter, it would not be wrong to assume that, given the common perceptual mechanism applied to the perception of both natural kinds and artifacts, our concept of natural and artifactual kinds can be, under a perceptual standpoint, exactly the same. This point sustains Arhheim's claim for visual intelligence. Perception itself provides the locking relationship to concepts, it is, in other words, already a form of analysis and acquisition. This is particularly true if the artifacts considered have a special relationship to

[65] Ibidem: 26.

perception; it is, one again, the case of artworks. Arnheim stresses how the organizing abilities of visual intelligence are, in this case, at their utmost precision. The selection of forms, the importance of focalization and also the ability to frame the environment in paintings require a high skilled level of cognition. This process applies to the beholder and the artist as well. In the case of creation, the transmission of forms implies the phenomenon of projection and subjectification of nature described by Langer. Conversely, when art is perceived, the process requires objectification of nature and abstraction. As already emphasized, abstraction is a form of integration rather than the accentuation of distance. This is observable in vision where abstraction often means the ability to complete the field observed and the objects present in it. In slightly different terms, abstraction is productive and not simply a matter of extracting common properties. The complex process of abstraction recognizes the general incompleteness of forms; rather than reconstructing symmetry, abstraction applies distortion to recognition. As Arnheim explains:

How then it is possible to perform an abstraction without extracting common elements, identically contained in all the particular instances? It can be done when certain aspects of the particulars are perceived as deviations from, or deformations of, an underlying structure that is visible within them. When looking head-on at a cube is not perceived as a deformation of the cube; it contains no renvois. However, when such a view is embedded within a sequence of other views, it will acquire the character of a deformation by the context and by its relations to its neighbors in the sequence.[66]

[66] Ibidem: 50.

The projective distortion is an active process and it has to be seen as a positive effect. The deviation from symmetries characterizes the human environment and the way thoughts are communicated and portrayed by humans. Architecture often provides examples of these deformations. Herzog and De Meuron interpreted distortions as the possibility of hiding architecture in the environment by conceiving buildings as interactions. Their projects are grounded on the integration between urban landscapes and architecture, the essential perimeter of the inhabited. A perimeter that includes what architecture reflects, namely the surrounding environment, the portion of nature, atmosphere included, that characterizes surfaces. Herzog and De Meuron's architecture is based on the various light effects that nature and weather conditions cause on the surface of their buildings. They interrupt the boundaries of these surfaces by adding the perceptual results of our observation. The blurring effect resulting from their techniques emphasizes the constant changes of cities and the constant changes that our perception needs to overcome in order to understand the environment as the concept of a city, a concept that, nonetheless, implies its distortion.

Hence, art and perception are reconnected to their relationship to the environment and to how it is understood. This form of perception and understanding, remains, according to the accounts proposed, the most natural way to approach reason in the actual environment. An environment that preserves, among its crucial features, constant move, changes and, as just emphasized, distortions. Once again, abstraction and distortion can easily recall the problematic of false beliefs and, at least partially, they can be one of their causes. Allowing abstraction and complexity to generate knowledge will also allow for the extension of the knowledge framework to the existence of false beliefs giving them a natural, biological basis. Being based on perception and on natural "fallacies" of vision

distortions can be considered as a possible beginning of the production of false beliefs. This claim can be defended both on an environmental and scientific ground: on the one hand, the environment and the proliferation of artifacts such as works of art ask us to understand the possibility of distortions, contradictions and abstractions. On the other hand, the eye as an organ embodies those processes in its functions.

Langer and Arnheim's studies are path-breaking works in the study of interactions between the mind, art and cognition. They opened the door to several researches analyzing the impact of art on the nervous system and, only recently and especially thank to the studies of emotions, the results of such studies are acquiring an epistemological status. In the last part of this work I will briefly list two of these results and hypothesis.

4.3 Art and The Mind

Arnheim emphasized the importance of selectivity and attention as bridges between perception and thinking. Moreover, in describing abstraction as a high cognitive ability, he focuses on the peculiar meaning of it. Along the same lines, recent neuropsychological research has investigated these features as potentially revealing of the capacities of the human brain.

Nicolas Bullot recently published a paper on the comparison between daily attention and aesthetic attention. The main characterization of it is, as already highlighted, its selectivity; moreover, aesthetic attention engages in a special relationship with both the environment and actions. On the one hand, the artistic device has to be "anchored" in a

specific space-time region that corresponds to the focus of perception. Being anchored to a situation also implies the contiguity between what is perceived through vision and the location of the body, and thus the stimulation of the motor system in the environment considered. Needless to say, such an environment can involve artifactual context created on the expressed purpose of presenting a determined work of art, as exemplified by happenings and environmental art. Gilles Clément's project, for instance, is based on both the "anchored" mechanism and on the spontaneous creation of an artifactual context. The anchored place selected is Clément's focus; his attention is based on the willingness to find a "Third Place" where urban reality mingles with nature. In one of his recent works sponsored by the Canadian Center for Architecture in Montréal, the artist started working on a neglected spot parallel to the highway. His purpose was to collect materials from it and to display the constant changes of the materials found in the framework of the Third World reflection. As Giovanna Borasi, the curator of the exhibit explains:

On this site just a few steps from the CCA, he found a profusion of plants, herbs, and flowers, in contrast to the much-reduced number of species found on neighbouring blocks. With a forensic eye, he also "detected" objects abandoned by visitors, dropped or tossed by pedestrians passing by, objects that speak about social uses and abuses of the place. All the organic and inorganic relics of this site were brought together in the glass pendants of "Le Lustre", the Chandelier he conceived to reveal the essential nature of this lost space, which was to all intentions and purposes invisible to the public gaze.[67]

[67] Borasi, G. (2006): 43.

Observing Clement's selective attention and experiencing the modifications occurring to daily life, places and perception ultimately emphasizes the importance of Bullot's hypothesis on the changes caused by art on our routine perception:

In fact ordinary perception seems to be based on the application of routines that monitor, among other cognitive processes, objects selective attention, whereas the interaction with artistic situations appears instead to result in inhibiting the execution of certain routines.[68]

The reasons for the distortion of daily routines are twofold: first, the particular anchoring situation of artistic devices put both the body and the brain in a different context from the one generally experienced. Even when the context and artistic objects themselves are taken from an easily recognizable reality, as in the case of ready-made art, this context will be inhibited to the expense of the revelation of a new meaning that, in this specific case, requires the application of abstract thinking. Secondly, artistic objects lose their "objecthood" status increasing our abilities in meta-representation. Both these phenomena are related with the stimulation of a more complex level of awareness and learning, as Bullot summarizes:

As a result, one of the functions of these alterations could be to favor awareness, or meta-representation, of a series of properties (precisely that series on which the routine gets blocked). This consequently makes possible the collective or public awareness of the

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[68] Bullot, N. (2006): 2.

series in question, in connection with the communicational and critical function of artwork, or its contribution to perceptual learning.[69]

From a slightly different perspective, Alva Noe, analyzes the problem of describing daily perceptual experience in comparison with the experience of art. Since there is nothing able to describe a pure perceptual experience, no images carrying within a transparent concept of reality, we need to adapt our concept of it to different parameters from the one of simple resemblance. Noe's hypothesis is to redefine experience through a new, "enactive" conception. In the light of this definition, it will then be possible to clarify another issue related to perception, namely, consciousness.

Enactive experience is characterized by three conditions: first, experience is an activity we encounter in the world. Secondly, it is always temporally extended and, thirdly, it follows laws of sensorimotor contingency. How is this experience going to cope with our conscious understanding of it? Noe stigmatizes this process as the paradox of transparency where the conscious image represents the perception of totality and complete understanding, whether the real experience is only partial. Experience is detailed, nonetheless, knowledge is inferred as a whole collection of details without real specification, as she holds:

First we experience the environment as fully detailed. (...) Second, the sense in which we experience the environment as present in all its detail, even when we only attend to the environment in this or that limited respect, consists in the fact that we have access to the detail, and that we are familiar –in a basic, practical way- with the fact that we have

[69] Ibidem: 3.

access to it. (...) Your experience as present in totality that which you only experience in part.[70]

One of the reasons for this attitude is our tendency to analyze our experience in the light of knowledge, yet, a more germane reason can be found in the experience of perceptual modality. Examples of this kind are the perception of three-dimensional objects, or, most important, the acquisition of such perceptual modality. In the latter case, we can skip the passage of perception and explain presence through the medium of knowledge. Objects that are not present can be perceived in this way; their presence is somewhat already established, and escapes the need of sensorimotor contingencies. The combination between the contingent perception of objects and the mediation of knowledge results in the distinction between two main perceptual states that, nonetheless, are both framed in the aforementioned definition of enaction. Perception is both movement-dependent and object-dependent, hence, both the body and the object act on perception and on the acquisition of knowledge. This conclusion applies to art in its capacity of influencing both the environment and the beholder. Noe makes this clear describing the work of Richard Serra:

Enter art as a tool for phenomenological exploration. Consider the way Richard Serra sculpture presents a surprising environmental occasion for phenomenological self-reflection. The pieces overpower and overwhelm, induce giddy disorientation, and generally make us aware of what it is like to be a perceiver, an enactor of perceptual

[70] Noe, A. (2006): 2.

context. When we explore a Serra sculpture we are enabled to catch ourselves in the act of exploring the world.[71]

In all the cases presented, the role of art is to challenge the environment and to apply it to our direct perception of it. To make, in other words, the environment a work of art by letting it act and by acting upon it.

4.4 Conclusions

In this concluding chapter I aimed to demonstrate how artifacts can be "naturalized" by grounding them in the study of emotions and in the relationship between emotions and cognition. The problem of false beliefs and how they can be related to both evolution and knowledge remains a starting point to understand the relevancy of intuition over deductive thinking and as a constant reflection on the definition of the actual environment. On the one hand, the environment is what it is perceived, albeit nothing can be considered as perception tout court and, moreover, perception itself implies knowledge and the development of thinking abilities and intelligence. On the other hand, the actual environment is not fully natural, but based on sociological and cultural constraints strongly affecting our perception of it. In order to reconstruct reason, the concept of knowledge, or knowledge itself, we need to rethink the actual environment in the framework aforementioned. To be sure, this project does not discard epistemology, neither does it discard its main tenets. What Quine emphasized opening philosophy to

[71] Ibidem: 5.

empirical studies and science, remains a stable building block for the analysis presented. Although this analysis disagrees with some of the definitions of knowledge defended by exponents of naturalized epistemology, it maintains an interest in scientific research with a particular focus on neuroscience and neuropsychology. It is from a deeper consideration of neuroscientific and neuropsychological studies on perception and emotions that the last reflections on art stem from. In particular, the issues presented question the modularity of the mind and highlight how complex interactions at both cortical and subcortical level require more than a strict mechanicism. It is thus not easy to identify a precise mechanism capable of always being reliable in the understanding of the functionality of artifacts and their role in the acquisition of knowledge. Such a reliability is affected by the presence of many complex variables that are characterizing our approach to artifacts in the actual environment. Nonetheless, the connection between artifacts and our cognitive abilities of understanding them through perception and emotions have been repeatedly emphasized.

To conclude, artifacts are not simply the product of culture, but the product of the interaction between the interwoven concepts of nature and culture. They contribute to knowledge as natural kinds do, and they can improve our reason sorting positive, evolutionary effects.

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