



ARTICLES AND TREATISES / ARTYKUŁY I ROZPRAWY

Embodied mind and phenomenal consciousness

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ABSTRACT

In recent years, a central debate in the philosophy of mind and cognitive science concerns the role of the body in perception and cognition. For many contemporary philosophers, not only cognition but also perception is connected mainly with the brain, where the processing of input from the senses takes place; whereas for the proponents of ‘embodied cognition’ other aspects of the body beyond the brain, including the environment, play a constitutive role in cognitive processes. In terms of perception, a new theory has emerged which stresses perception’s active character and claims that the embodied subject and the environment, with which it interacts, form a dynamic system. Supporters of ‘enactive perception’ such as Susan Hurley and Alva Noë maintain that the physical substrate or the supervenience basis of perceptual experience and phenomenal consciousness may include besides the brain and the nervous system other bodily and environmental features. Yet, it will be argued in this paper that the interaction between the subject and the environment forms a system of causal relations, so we can theoretically interfere in the causal chains and create hallucinations, which cannot be distinguished from veridical perception, or a virtual reality as in the film *Matrix* (1999). This kind of argument and its related thought experiments aim to stress the primacy of the brain in determining phenomenal states, and show that the body and certain interactions with the environment have a causal, but not a constitutive or essential role, in forming phenomenal consciousness.

KEYWORDS

philosophy of mind; cognitive process; embodied cognition; mind–body problem; Susan Hurley; Alva Noë; Evan Thompson

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INTRODUCTION

There is an ongoing debate in the philosophy of mind regarding the question of whether cognition is embodied. What is the role of the body in cognition? While for most contemporary philosophers, the brain is the organ par excellence for cognition, proponents of embodied cognition give the whole body a constitutive role in cognitive procedures. For John Haugeland, who is one of the initiators of the debate, cognition is essentially embodied, *i.e.* it would be impossible to conceive of cognition without the feature of corporality. He compares the human body to an enormous key influential for encoding and decoding messages. Without this key all ‘messages’, namely the output consisting of directives for action and the incoming stimuli, make no sense. Each key is unique, *i.e.* each body has its own features, eyes, ears, and finger shapes that influence in a decisive manner the interaction with the environment (Haugeland, 1998: 226). In general, according to this position, cognition is conceived as a part of a dynamic system consisting of the embodied subject and the environment with which it interacts, so that feedback loops are created. More recently, a lively discussion has focused on the embodiment of perceptual processes and especially of the conscious perceptual experience or phenomenal consciousness regarding perception.¹ Perceptual, as well as higher cognitive states and processes like thoughts, cannot be regarded as internal mental states that supervene only on the nervous system and the brain, but instead involve the whole system of man and the environment. Cognition and perception are not only essentially embodied, according to some philosophers, but are embedded in the natural and social environment as well.

In this paper, I will examine in what sense we can say that phenomenal consciousness is embodied. First, I will present the enactive approach to perceptual experience, and then introduce arguments supported by thought experiments that contest some positions of regarding the embodied character of conscious perceptual experience.

ENACTIVE PERCEPTION

In recent years, the conception of embodied cognition has been used in studies of perception and phenomenal consciousness. Philosophers of perception stress its active and embodied character, where perception is not just a process involving the brain, the nervous system and the sense organs, but is an activity of the whole body. The embodied subject and the environment with which it

¹ Jesse Prinz writes: ‘Consciousness is trendy. [...] Embodiment and situated cognition are also trendy. [...] An embodied or situated theory of consciousness is the philosophical equivalent of a blockbuster’ (Prinz, 2009: 419).

interacts form a dynamic system. This way of viewing perception has led to the formulation of the so-called enactive theory of perception.²

Francisco J. Varela and Humberto R. Maturana were among the first to formulate this theory, which was influenced mainly by James J. Gibson but also by the phenomenologists, especially Maurice Merleau-Ponty (Maturana & Varela, 1987; Gibson, 1979; Merleau-Ponty, 1945; Merleau-Ponty, 1964). In its present form, the theory has been developed by a group of philosophers, neurophysiologists and psychologists including Alva Noë, Kevin O'Regan, Evan Thompson, Susan Hurley *et al.* The proponents of the view that perception is foremost an activity of exploring the environment, claim that it offers solutions to some puzzles regarding perceptual experience. They oppose the following view common among researchers: perceptual experience gives us a detailed picture of the world, and it is as if we had a sharply focused photograph, which represents a scene in high resolution where we can focus our attention on a different part of it at any time. Noë calls this the 'snapshot' conception of experience (Noë, 2002: 2).

Several studies have shown that perception does not function in this way. In one well known experiment, subjects were asked to watch a videotape of a basketball game for a few minutes and to count how many times one team took possession of the ball (Neisser, 1976; Simon & Chabris, 1999). During the game, a man disguised as a gorilla entered the centre of the court, made some hand gestures to the audience and walked slowly away. It is remarkable that most of the subjects who watched the film did not notice the gorilla; and the same result was repeatedly found in similar experiments. This is a case of inattentive blindness (related to the phenomenon of change blindness). If the perceptual experience had been like a snapshot, in which all details are present, the subjects of the experiment would have seen the gorilla. The conclusion of this sort of experiment is that we do not experience the world in full detail and in sharp focus, as some think we do.

Are we then the victims of a grand illusion (using Noë's expression) concerning the character of our experience? In this case, a new form of scepticism has arisen, besides the existing scepticism about our ability to perceive the world as it really is. This new scepticism is more radical, because it even questions whether we can know how the world appears to our consciousness; *i.e.* we think that our experience presents us with a more complete and much more detailed picture of the world than how it actually is. However, this sceptical problem exists only for those who accept the snapshot conception of perception. If we adopt the enactive approach, the new scepticism disappears and phenomena like inattentive and change blindness are better explained. The

² The term comes from Francisco J. Varela (see Varela, Thompson, & Rosch, 1991). The following discussion on enactive perception is based on Venieri, 2013: Chap. 3.2.

world is not present at once in all its details, but it is potentially present. In other words, it is available every time we turn our eyes and focus our attention on different places, while we explore our environment.

Let's now examine in more detail this enactive approach to perception. When we perceive, we do not just passively receive sensory stimuli through our senses, but we actively do something. According to Alva Noë, we can better understand this new approach if we take as our example the way a blind person perceives by gradually touching a surface (Noë, 2004: 14–17). The modality of touch could serve, regarding some of its aspects, as a model for other modalities and especially for vision — the modality we mostly have in mind when we investigate problems in the philosophy of perception. When we see, we explore our environment using some capacities. So vision can be defined as an activity of exploring the environment, mediated by the implicit knowledge of patterns of sensorimotor contingency (Noë & O'Regan, 2002: 571). The term sensorimotor contingency means the interdependence between the subject's sense organs (in this case the eyes, but also the hands, *etc.*) and the movements of her body on the one hand, and of the sensory stimulation on the other.

To use a very simple example, when an object (*e.g.* a sculpture) is situated on our left, we turn our eyes and our head in its direction, to see it better, and we see it from another angle. If we come closer, it occupies a larger part of our visual field. Conversely, when an object in our environment moves suddenly, there is a change in the way the visual stimuli arrives at our eyes. In order to understand the interactive character of vision (and of perception in general) we can compare seeing to dancing! In a dance like a waltz or tango, when the dancers are good, they respond even to the slightest movements of their partner. Similarly, in vision, we have patterns of interaction between the perceiver and the environment. It must be noticed that to every one of the five sensory modalities corresponds a different pattern of the laws of sensorimotor contingency. According to the supporters of the theory, this difference in the laws explains the differences between the modalities, because there is no quality that differentiates the neurons in the brain into visual, aptic or olfactory categories.

ENACTIVE PERCEPTION AND PHENOMENAL CONSCIOUSNESS

The proponents of enactive perception proceed to give an account of perceptual experience by focusing also on the problem of phenomenal consciousness. The perceiving subject has an implicit knowledge (*i.e.* a practical mastery) of the sensorimotor laws. In other words she has 'a familiarity with the ways sensory stimulation varies as a function of bodily movement' (O'Regan & Noë, 2001: 1013). This implicit knowledge also explains phenomenal

consciousness, *i.e.* the subjective character of our experience, or the ‘what it is like’ (Nagel, 1974) to have an experience. For supporters of enactive perception, it is better to talk of perceptual activities and not of perceptual states. When we perceive, we are not in a state with different qualities or *qualia*, we are interacting with our environment. Phenomenal consciousness, or the phenomenal character of our experience, consists of just this implicit knowledge of the sensorimotor laws of interaction.

The enactive theory can offer, according to its exponents, a radical solution to the problem of *qualia* and the so called explanatory gap (Levine, 1983) concerning the way that the brain is the physical substrate of consciousness. They claim that there is no explanatory gap to be bridged, for the simple reason that there are no *qualia* (*i.e.* subjective qualities of perceptual states). This is the case because there are no perceptual states, but only activities. When we drive a Porsche, we have a different ‘feeling’ from driving a motorcycle, but this does not mean that we have a different sensation or that we are in a mental state with specific qualities. We just know how the car responds to our movements. What it is like to drive a Porsche is nothing more than the sum of the sensorimotor contingencies of driving and our practical knowledge of them. So too, phenomenal consciousness is just the result of the implicit knowledge of the laws of sensorimotor contingencies.

What about the phenomenal character, or the ‘what it is like’ to have a visual experience? The adherents of enactive perception do not wish to deny the specific character which differentiates perceptual experiences from other kinds of mental states, such as thought or memory. They explain this character through two features of sensory stimuli (and of our sensory system): ‘corporality’ and ‘alerting capacity’ (O’Regan, Myin, & Noë, 2005). Corporality refers to the fact that the input of sensory information is so directly influenced by the slightest movements of the eyes and the head that it seems that it belongs to the body itself. Alerting capacity means that a sudden change in sensory stimulation creates a reaction in the sensory organs, *e.g.* the eyes react automatically and turn towards the source of the stimuli. We attribute a special ‘feel’ (O’Regan, Myin & Noë: 2005: 370) to certain mental phenomena, such as the perception of a red light. This is due to these two features, which give sensory stimulation a ‘clinging’ quality and a quality of intimacy. Unlike thoughts and memories, you cannot get rid of sensations. They follow you, as O’Regan says, ‘like a faithful dog’ and it seems that they belong to you (O’Regan, Myin, & Noë, 2005: 375). So, according to the advocates of enactive perception, corporality and alerting capacity explain the aspect of sense perceptions. This aspect is the subject’s implicit knowledge about the alerting capacity and the corporality of sensory input.

Yet, how plausible is this view of perception as an activity of gradually exploring the environment? An obvious objection to this view is that we see

a whole object (e.g. an apple) and we do not just exercise activities which allow us only a gradual access to parts of the object. Even the proponents of enactive perception admit that in vision we have the feeling of ongoingness. This is due to the fact, as Regan says, that sensations seem to us to happen in an occurring fashion, and to have a duration. His answer is that this feeling of ongoingness is because we know (always implicitly) what kind of interaction we could have with the object at any moment. It is not due to our receiving sensory input from the whole object at once. Therefore, we cannot talk of a perceptual state. O'Regan and Noë claim that even the consciousness of a colour, like the colour red when we look at a red wall, is nothing more than the implicit knowledge that if we moved our eyes and directed our attention to various parts of the wall's surface, we would have an input typical of colour perception (O'Regan & Noë, 2001: 961). When we see, we exercise a series of activities; we do not experience in a passive way. So, we cannot talk of an experiential state which has a qualitative feature, *i.e.* a red *quale*.

In experience, according to Noë, we cannot distinguish potential properties from occurrent ones, because an experience is a dynamic process. The qualities of an experience do not appear as completed; they are not given, but always potential. In perception, the world is made available to us and there appears a structured field, which we cannot grasp at once. We proceed from one feature to the other and we cannot isolate one feature to perceive it completely. According to Noë, even a shade of red exceeds our grasping if we try to isolate it from the other elements of experience. We say we see the whole apple, but in fact we always see only aspects of it. We never see all sides of an object at once; however, the occluded parts are present as absent (Noë, 2006: 428). This is what we call 'amodal perception' or 'presence in absence' (Noë, 2006: 415–416). Objects in the world such as red walls, red apples and cars are not wholly present in experience, but are accessible to us through our exploring activities, and in this sense they have a virtual presence.

This dynamic conception of visual experience creates some problems, especially concerning the qualities of experience. The supporters of the enactive approach, like Noë, wish to avoid mental states in perception, and regard perceptual experience as an activity. Then, when we sense the presence of an object, our experience has no occurrent properties, but only potential ones. (Although, according to Noë, as experience is a dynamic process, we 'factor [it] into an occurrent and a merely potential part' [Noë, 2006: 428]). However, 'potential' in this context is an ambiguous term. It can mean a dispositional property: if we act, the object is available to us. In this case, there is no perceptual state, and thus no *qualia*. Alternatively, potential could mean a dynamic property. Noë himself claims that perceptual experience is a dynamic process and stresses that its qualities have a dynamic property, which is not

exhausted by the present experience, but lead the subject ‘beyond [herself] to the world’ (Noë, 2004: 217). The fact though that these qualities have a dynamic character does not mean that they are potential (*i.e.* not actual). Our interaction with the environment through our sensory organs (and the whole body) happens in time, so these are qualities which are occurrent and not dispositional, because they have a duration. In this case then, why should we not be allowed to talk about mental states or processes which have qualitative features or *qualia*?

If we accept that perceptual experiences are states or processes that have a duration, and thus a qualitative aspect, then the problem of phenomenal consciousness and of the explanatory gap returns. Phenomenal consciousness cannot be adequately explained through the enactive theory of perception. The experience of ‘red’, even if it is momentary, has some phenomenological features and cannot be thought of as the implicit knowledge of sensorimotor contingencies. So in this sense, the enactive approach cannot eliminate phenomenal consciousness in the form of phenomenal states, and thus offer a solution to the problem of *qualia*.

WHAT IS THE SUPERVENIENCE BASIS OF PHENOMENAL CONSCIOUSNESS?

THE ENACTIVE POSITION

As the proponents of enactive perception stress the close connection of the subject with the environment, it is obvious that they oppose internalism about perception. They do not accept that internal physical states (namely states of the sensory organs, the neural system and especially the brain) can alone determine the content of a perceptual experience. If we paraphrase Hilary Putnam’s well known expression ‘Meanings ain’t in the head’, we can equally say ‘Perceptual content is not in the head’ (Putnam, 1975: 227). On the contrary, the supporters of enactive perception are externalists and believe that perceptual content is not determined only by internal states but also by the environment, and not only causally or instrumentally according to Hurley but essentially: the content would not have the features it has, if the subject was not embedded in this specific environment.

A more controversial position held by Hurley, and to an extent Noë, is that of externalism not only about the content but also about the vehicles of perceptual experience (Hurley, 1998: esp. Chap. 8; Noë, 2004: 217–222). In a subpersonal level, neurophysiological states of the brain and the nervous system are considered as the vehicles of perceptual experience, but for the aforementioned philosophers, the body’s movements and the procedures in

the environment can be the vehicles of experience as well.³ For Noë, concerning some kinds of experience at least, the vehicles of perceptual experience can (but do not necessarily) exceed the limits of the brain and the neural system and extend to the environment (Noë, 2004: 217–218; Noë, 2006: 428–430).⁴ Thus, it is preferable to regard consciousness as supervening not only on the brain, but also on the whole system comprising the organism and the environment.

This form of vehicle externalism seems to cause considerable difficulties to those who claim that it is possible to duplicate the brain states of a subject, and in this way to have the same state of consciousness as the subject, even when the environment is different. If consciousness supervenes not only on the brain, but also on the whole system comprising the organism and the environment, it is questionable that we could create an exact neural duplicate of a subject concerning their experiences. According to Hurley (1998: 329), the world appears to be in a ‘brute’ way and not just instrumentally related to our nervous system and the brain, so it does not seem empirically possible that we could create exact neural and hence phenomenal duplicates of a subject, unless we were to duplicate the whole environment as well. The difficulty concerning the creation of a neural duplicate having the same phenomenal states consists mainly in the complexity of the dynamic system of perception, in which the brain, the nervous system, the body and its movements, as well as the environment are involved in continuous feedback loops (Hurley, 1998: 333).

THE ARGUMENT FROM HALLUCINATION

There is a series of arguments and thought experiments which are based on the possibility of creating neural duplicates with the same phenomenal states; hence, they have to face the challenge set by vehicle externalism. One such traditional argument is the argument from hallucination.

According to a version of this argument, when someone has a (visual) hallucination, she has a visual experience as of a physical object, but in reality no such object is present. Nevertheless, she sees something, which is usually taken to be a sense datum, or a non-physical entity. As hallucination and veridical perception are subjectively indistinguishable, what we have

³ It must be noticed here that Andy Clark and David Chalmers’ (1998) active externalism about the vehicles of cognition, which influenced Noë’s position, concerns non-conscious mental states such as dispositional believing, and does not extend to vehicles of perceptual experience.

⁴ We can say that Noë advocates a weak form of externalism, because he does not exclude the possibility that some experiences can supervene only on the brain.

in hallucination must be a common factor to both. So in veridical perception, as in hallucination, we are directly aware of something that mediates between the perceiver and the world. In this way, the argument from hallucination is used to support indirect realism, especially sense data theories, according to which non-physical entities mediate between the subject and reality.

In order to avoid certain objections, sense data theorists present a modified argument from hallucination, in which a form of the causal argument is added. According to this argument, the possibility cannot be excluded that we can intercept physiological causal processes in the brain and produce exactly the same effect as if a physical object were present. In this case, we have a hallucinatory experience in which a sense datum is present. If we take into account the principle of 'same proximate cause, same immediate effect', we cannot deny that also in the case of veridical perception a sense datum must be the immediate object of awareness (Robinson, 1994: 154).

This argument plays a central role in the philosophy of perception, especially regarding the debate between direct and indirect realism (Venieri, 2013). It presupposes that perceptual experience supervenes on the brain. Otherwise, it would not be possible to have a hallucinatory experience by stimulating the brain, which would be qualitatively exactly the same as a veridical one. In this way a 'veil of perception' (Bennett, 1971: 69) mediates between the subject and the reality in veridical perception. So indirect realists, especially the sense data theorists, are internalists not only concerning the vehicles of perceptual experience, but concerning its content as well. Consequently, their account of perception is quite different from the one offered by enactivists such as Hurley and Noë, who belong to the direct realist camp.

BRAIN IN A VAT

Hilary Putnam's brain in a vat thought experiment is related to the argument from hallucination, as it is based on the possibility of creating a simulated or virtual reality. Putnam imagines the following story: A person, who could be any one of us, has been kidnapped and is operated on by an evil scientist, so that his brain is removed and put to vat of nutrients, where it is kept alive. The brain's neural receptors are connected to a very sophisticated computer, which stimulates them in such a way that the person thinks he continues his everyday life: he acts and has experiences just like a normal person, and has been made to forget that the operation has taken place and that he has had a different kind of relation to the world (Putnam, 1981: 1–21).

Among other purposes, this thought experiment can be used to illuminate the question of whether phenomenal consciousness supervenes on the brain or

on the whole body or even the environment.⁵ The brain in a vat has experiences without having a body, so it is obvious that the proponents of embodied and enactive perception will raise objections against its possibility.

A common objection concerns the empirical possibility of keeping the brain in a vat alive and functioning. In order to achieve this, it is argued, a complicated life sustaining system must be connected to the brain, so that in the end a surrogate body would be necessary for the maintenance of the envatted brain (Dennett, 1991: 4; Thompson & Cosmelli, 2011: 168–173).⁶ In this sense, the brain in a vat hypothesis is useless when it comes to showing that only the brain is sufficient as a supervenience basis for consciousness, as the brain cannot exist without its sustaining system, *i.e.* without being embodied.

Against this objection, it can be claimed that although the hypothesis of a brain in a vat is empirically highly improbable, it is still conceivable that we could find a way of bringing this about. The important point in this thought experiment is that the brain is causally connected to the rest of the body and the environment, and that theoretically we could provide input of the same kind through alternative sources. Thus, the complexity of the dynamic relations in the perceptual process does not preclude that it is empirically possible to create neural and thus phenomenal duplicates, even if it is not practically feasible at the moment. If we take for granted that this is a system of causal relations, we could theoretically interfere in the causal chains and create a virtual reality as in the film *The Matrix* (1999) or hallucinations which the subject cannot distinguish from veridical perception.

This interference would be impossible if the subject had a direct, internal relation to the world, so that a particular experience could not exist without the relevant situation occurring in the environment. Hurley seems to suggest that there is such a relation, when she talks of a brute relation between the subject and the environment. However, she does not explain the nature of this relation further. The question is what other kind of relations (except causal ones) can a theory such as Hurley's allow, influenced as it is by scientific method?

The above considerations support the claim that the brain is the minimal metaphysically sufficient supervenience basis for perceptual experience.⁷ There are causal connections between the brain, the body and the world; but this does not mean that the body and the world also constitute the supervenience basis of perceptual experience and phenomenal consciousness.

⁵ For the relationship of the brain in a vat hypothesis to skepticism, see also Venieri, 1996.

⁶ Clark (2009: 980–981) supports this view, despite his opposition to vehicle externalism regarding consciousness.

⁷ 'The issue of the constitutive supervenience base for experience is the issue of what is — and is not — a metaphysically necessary part of a metaphysically sufficient condition of perceptual experience' (Block, 2005: 264).

The proponents of embodied cognition react to this argument by providing a further differentiation between, on the one hand, phenomenally conscious states (for which there is something it is like for the subject to be in that state) and on the other hand phenomenally conscious creatures (for which there is something it is like to be that creature). To be a conscious creature is to be a subject of experience (Thompson & Cosmelli, 2011: 166). So, even if we concede that phenomenal states supervene on brain states, it is difficult to accept that the creature consciousness also supervenes on the brain, as other systems of the organism seem to be constitutively involved. As Thompson and Cosmelli maintain, according to current research findings, creature consciousness is based on subcortical areas, which are so densely connected to systems such as the endocrine and the immune system that we cannot separate them for explanatory reasons (Thompson & Cosmelli, 2011: 175).

Yet, why should being conscious in general (and not being *e.g.* in coma) depend in a more intimate way on the body than the conscious states we experience? While accepting that the endocrine or the immune system are closely connected to the brain, why not just say that they casually influence the brain, which in turn is the supervenience basis of being conscious?⁸ Consequently, we see that the possibility of creating a virtual reality, as illustrated by the brain in a vat hypothesis, cannot be excluded on the grounds of the intimate connection between the brain, the rest of the body and the environment.

THE MATRIX

Some of the problems concerning the empirical possibility of the brain in a vat can be avoided if we consider the case of *The Matrix*. The film trilogy of *The Matrix*, directed by Larry and Andy Wachowski, is an artistic realisation of the brain in a vat hypothesis. In the film (we will mainly refer to the first part of the trilogy), the brain is not taken from the body to be put in a vat, but the whole human body is placed in a kind of vat and connected to a computer program, the Matrix, which has not been created by a mad scientist, but by intelligent machines. We see that in this case, no surrogate body is needed, as the creatures in the Matrix have their own body which is fed but is kept totally inactive. Thus, the Matrix is a computer simulation of the real world, which interacts with the human body in a vat. The brain receives input from the computer and produces reactions that in turn are input to the computer.

The individual in the vat believes that she has a body and lives in normal surroundings, the same as everybody around her. The film hero, Neo, believes

⁸ Block (2005: 264) suggests an analogous argument about dream experiences.

that he sees the sun, trees and buildings and that he meets and talks to people, *etc.* In reality though, his body is immobilised in its own vat as are millions of other bodies, which are fed by the machines in a dark, apocalyptic landscape. It is important to remember that the body that seems to us to be in the world and to act and react to the environment is nothing but a simulated body, a creation of the Matrix. It can appear in a form very different from the real one, which lies wired in the vat: *e.g.* the latter may have the features of a Japanese young man of medium height; while the simulated body, of which the subject is conscious, may be one of a middle-aged tall Scandinavian man with blond hair.

Neo gets out of the vat with the help of Morpheus and starts moving between the real world and the Matrix. He becomes the leader of the rebellion against the machines. He is aware that he lives in a virtual world and that the 'physical laws', which govern the Matrix world, are not as stable as the people in the Matrix would think. He learns how to defy and change these laws, as he manages to fly or stop bullets with his hands. So, in the Matrix world strange things happen, brought about by Neo and his friends, who know how to change its laws.

Of course, it's not our task here to offer an analysis of the film and its world. However, we can see it as an example of how a virtual reality can be created. The world of the Matrix is one of the many possible computer simulations. Evidently, in this world, physical laws are violated for the sake of spectacular scenes such as people jumping from roof to roof or fighting while flying in the air.

Philosophers who have investigated this version of the brain in a vat argument, have raised questions such as: 'What kind of world is this Matrix world?' According to Morpheus' explanation: 'The Matrix is a dream world created by computers in order to keep us under control'. Apart from comparing our state in the Matrix to a collective dream, we could think of it as a collective hallucination. The computer program created by the machines provides every Matrixian with a flow of sensory information, so that they believe they live in a normal world with buildings, cars, people with whom they interact, *etc.* Therefore, we can say that they have collective hallucinations, caused not by drugs or mental disease but by the machines that have created the Matrix. Thus, the Matrix world is characterised in the film not simply as a dream world, but also as a 'neural interactive simulation', *i.e.* as a virtual reality with which Matrixians interact.

From a philosophical point of view, the Matrix is a variation and an extension of the brain in a vat experiment that can help us approach the classic problem about the nature of reality and our access to it.⁹ People in the Matrix

⁹ For some interesting metaphysical implications of *The Matrix* see Chalmers, 2005, and for further philosophical aspects see Grau, 2005. The material in this part of the paper is drawn from Venieri, 2006.

think, as we have seen, that they live in the real world, whereas they live in a collective hallucination. As it happens, we are not in the Matrix (or the brain in a vat world) and we know the difference between our world and a virtual one. However, it is possible to imagine that we too are in an analogous position as the Matrixians, or the brain in a vat, and that we receive stimuli from a world whose real nature is unknown to us. In this way the real world (the world in itself) would be inaccessible for us.

If we return to our question about the sense in which our perception and our cognition are embodied, we can see that in the thought experiment of the brain in a vat there is no body, and the environment with which the brain interacts is just virtual! In reality, there is nothing but the brain in a vat and the computer to which it is connected. In the Matrix, the real body is immobilised and is not at all involved in perceptual activities, with the exception of the brain, where the input created by the computer program arrives. It is interesting that the virtual body of the Matrixians, as noted above, can differ from their real one regarding height, facial features, *etc.* Indeed, whoever is in the Matrix is aware of a body which is not his own and has capacities beyond those of a human body in normal life.¹⁰ We should not forget that people in the Matrix can fly!

What do the experiment of the brain in a vat and *The Matrix* show us regarding our understanding of the embodied mind? They reveal that it is possible to imagine a world in which the body does not play the essential role assigned to it by the proponents of embodied perception and cognition. In *The Matrix* world, only the brain has a role in perception and cognition. In our world of course, perception and cognition depend on the movements of our body while we explore our environment. However, can we claim that the whole body and its functions have a constitutive role in the supervenience basis of perceptual experience and phenomenal consciousness? Brain in a vat and *The Matrix* may lead us to think that this is not necessary.

Surely thought experiments cannot prove a position, yet they can help us to control our assumptions and think of alternative possibilities. In the case of perception and cognition, these thought experiments favour the traditional view that gives precedence to the brain as the seat of mental processes. Thus, the body and its movements causally affect perceptual experience and higher cognitive processes, but they do not have the essential or constitutive role that is given to them by the supporters of embodied cognition. Therefore, in order to stress the role of the brain, we could say that perception and cognition, as embodied functions, are primarily 'in the head' and do not essentially

¹⁰ It must be noticed that intuitions gained from *The Matrix* about the primacy of the brain concerning not only perceptual experience but also bodily awareness are corroborated by empirical findings and lead to important philosophical questions, which are beyond the scope of this paper. For an overview of the relevant scientific research, see Frith, 2007: 61–81.

concern the whole body, while we cannot exclude the possibility of interactions with a virtual world.

CONCLUSION

The current discussion on embodied cognition brings forth some important aspects of the subject's relationship to the world. Of course our perceptual and cognitive processes are embodied, in the sense that it is through the body and its movements that we interact with our environment. However, proponents of enactive perception cannot give us conclusive arguments for accepting that the body, and even the environment, belong to the supervenience basis of conscious perceptual experience. Accordingly, we can still claim that phenomenal consciousness supervenes on the brain, as is illustrated by the brain in a vat thought experiment and in *The Matrix*. In this sense, we should not forget that the brain mediates between the subject and the world, and forms the way in which we experience reality. Hence, to say that the mind is embodied does not bring us nearer to a solution to the perennial philosophical problem of our access to the objective world¹¹.

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¹¹ I would like to thank the organizers and the audience of the Conference 'Human Body in Comparative Approach: Philosophy, Literature and Art' at Pedagogical University, Kraków 28–30 May 2014, for their helpful comments on a former version of this paper.

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