

What, if anything, is represented? Objects in their worlds.

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## I INTRODUCTION

Cognitive Science is an interdisciplinary field with contributors from philosophy, psychology, linguistics, neuroscience, computer science and related areas. In the past three decades it has replaced behaviourism as the dominant paradigm for the study of human, and often animal, nature. The new paradigm accepts "mind" as a object for scientific study and cognitive categories as legitimate theoretical concepts. Mental states are based in the brain although they cannot be simply identified with neural states. The received position is that "functional" states are like symbols which represent the world and which can be computed in accordance with formal rules similar to computer programmes. In other words, thought is like a language which parallels the world - a position reminiscent of Descartes'.

There has been significant recent debate in the philosophy of mind about the nature of mental representations in cognitive science, their functional and causal roles, how they are related to meaning, the importance of the syntax-semantics distinction, and so on. Much less has been written about the question of what is represented; indeed it is often taken for granted that this question is unproblematic. This paper will show just how problematic the question actually is.

It is often presupposed, in both cognitive science and the philosophy of mind generally, that cognition is the recovery by an animal or human of objective features of reality. "Reality" is understood to be an "in-itself," a realm of objects, properties, events and laws which are independent of any observer. (I call this position *Realism*.) The task of the cognitive system is

then to form true, or at least pragmatically useful, representations of the salient features of reality. (I call this *Representationalism*)

I think this presupposition is wrong. Objects can only be individuated and classified within a system of categories. The categories which are relevant to understanding cognition must be those that the animal or human itself uses to constitute its world. Hence, "what is represented" is not reality, but the unities into which the experienced world is segmented by the organism. From this perspective the central issue is no longer representation, but how objects in the world come to be individuated and categorized in the first place.

Indeed, the issue is the nature of a "world."<sup>1</sup> My aim in this article is to use the notion of causal supervenience to establish a naturalistic concept of world. I present the concept as an alternative to both realism and representationalism, and to the dilemmas they involve.

First, a note on terms. I will use "object" in a general way to include features and events as well as things. "Subject" will be used for an organism in its cognizing capacity, that is, for any animal, human or other cognitive system. I will keep the term "world" for the structure within which subjects experience or perceive objects, in opposition to "reality," which I will reserve for how things are "in-themselves." "Physical world" or "physical nature" will refer to the set of objects and relations hypothesized by current theories of physics and chemistry, particularly micro-physics. The words "constitute" and "transform" will also be used in special senses which will become clear as I proceed.

In Part II I will illustrate my approach with an example which focuses on colour vision, an area recently discussed by Thompson, Palacios and Varela, Hardin, Dennett and others. In Part III I will generalize these results into a overall view of the relationship between a subject and the objects in its world, a view that is not based on representationism. This part will explain

the concept of supervenience and use it to illuminate the notion of a world. This will lead me to examine the various dependencies, some causal, some non-causal, between subject, object, world and micro-physical nature. In Part IV, I will discuss the ontological status of objects in a world.

## II A COLOURED ILLUSTRATION

Let me start by analyzing a simple scenario:

*It is a warm summer evening so Alysha moves her rocking chair to the west side of the house, facing the green mountain, to watch the sunset.*

Typically, cognitive science proposes that a "scientific" account of such a scenario should be something like the following. The sunset is a real physical object which is external to and distal from Alysha and, as a result of causal processes, Alysha's brain comes to represent it. This representation is part of the content of her beliefs and desires. Alysha's behaviour - moving the chair - can be explained by her desire to enjoy the sunset, and her belief that she can achieve this by sitting on the mountain side of the house. Similarly, representations of the house, the rocking chair and the green mountain are essential elements in her belief. The *explanandum*, her moving of the chair, is explained by the causal link between the behaviour and the preceding desire and belief, themselves causally explained. Often (for example, in the work of Fodor or Pylyshyn<sup>2</sup>) this Representational Theory of Mind understands representations as symbols in a Language of Thought so that they have both syntactic and semantic aspects. Syntactically they are mental tokens whose causal relationships mirror their semantics, that is, the objects in the physical world that they are "about."

But this cannot be right. Our physical sciences tell us that what is real is a causal network of atoms, sub-nuclear particles, electro-magnetic waves, mass-energy clusters or whatever. None of these things are represented by Alysha as she moves to watch the sunset, nor does the syntax of her representations mirror the laws of physics. The objects Alysha is responding to are objects in *her* world, the objects towards which her visual system and bodily responses are oriented.

Consider, for instance, the blue sky Alysha perceives above her and, in the west, the red sunset and green forest. Alysha does not move her chair to see the astronomical event of the earth turning so that the sun is no longer visible from Alysha's location, an event which occurs every day. She didn't sit out last night because, as we say, "there was no sunset to see." We don't mean, of course, that the earth hadn't turned or that the sun didn't set, we mean there was no red glow in the west. Her seeing the red glow against the blue sky is what has motivated her action. It is the red colour which differentiates the sunset in the west from the rest of the sky.

Yet the redness and blueness are not elements of reality or of the physical world; they are categories that depend on Alysha's visual system, and probably on the visual systems of some other species. "Sunsets are red" means that they have something, namely their colour, in common with other red things, such as, berries, rainbows, and hot objects. There is, however, no physical property common to these things which "redness" signals: berries are red due to their surface reflectance; the red in rainbows is caused by dispersive refraction; and red-hot objects are red because of incandescence. The physical processes which cause the set of light frequencies to be radiated are entirely different in each of these cases. But even if the causes are different, is not the wavelength of the light emitted the same for all red things? No! Even that is not true, since any number of combinations of frequencies may lead to the experience of redness. The *only* feature red

things have in common is the capacity to provoke a positive response in the red-green opponent system of our visual systems. While light with a wavelength of 650nm will produce such a response, so will a vast number of combinations of other wavelengths ("metamerism"). The capacity to see things as varied as blood, rubies and lasers as all having the "same" colour is to be found in primates and a number of other species, but not in many others. Excluded, for instance, are most other mammals, who are monochromats, and pigeons, who can see many more, and totally different colours, than we do.<sup>3</sup>

What then could it mean to say that Alysha has a representation of a red sunset? It cannot mean that some process in Alysha's brain (or mind) represents redness as an objective property of reality, for redness does not exist "objectively," that is, without reference to particular kinds of visual systems. Thompson, Palacios and Varela criticize this objectivist approach to colour vision:

The typical emphasis in computational vision [is] on optimally 'recovering' prespecified features of the environment (i.e., distal properties whose specification is thought to be independent of the sensory-motor capacities of the animal.)<sup>4</sup>

By comparing the world as it must be perceived by different visual systems, Thompson, Palacios and Varela present excellent and detailed arguments to show that objectivism with respect to colour must be rejected. What is the alternative? Since there are no extra-dermal coloured objects, the most obvious alternative is subjectivism. Hardin, for instance, identifies colours with chromatic properties of neural states. Thompson, Palacios and Varela, however, are no happier with subjectivism than with objectivism. They propose instead an "enactive" analysis based on the evolutionary interaction

between each species and its environment. This ecological approach claims that there are indeed colours in the world, or at least "*context-dependent and interest-relative* structural analogues of color,"<sup>5</sup> but that these structures have evolved through a process of co-determination between perceiving animals and their environments. Animals select properties of the world relevant to their capacities while the environment selects for certain corresponding capacities in the animal.

For instance, the evolution of ultra-violet perception in the visual system of the bee has occurred in tandem with the evolution of flowers having ultraviolet pigmentation, since the flowers need the bees for pollination as much as the bees need the flowers for honey. The enactive theory claims, then, that colours are extra-dermal (against Hardin's subjectivism) but nonetheless are not independent of the existence of perceivers (against objectivism).

The enactive theory of Thompson, Palacios and Varela is a major advance for our understanding of the problem. I want to go further, however, and claim that colour is but one illustration of a more general structural interrelationship between subjects and their objects in general. This generalization will lead to the concept of world.

### III THE NATURE OF WORLDS

#### *1. Generalization from colour to all perceived objects*

I have examined in some detail the nature of colour because I think it illustrates very clearly the "prejudice of reality," that is, the presupposition that there is a reality-in-itself whose structure is independent of the subject and that a subject represents more or less successfully, in other words, truly or falsely. The prejudice is clear and explicit in objectivism. Subjectivists like

Hardin however also presuppose objective reality; they just claim that colours are not among its features, hence they must exist only in the subject.

It is not only in the investigation of colour that we find this presupposition. David Marr, in his very influential theory of vision, holds that the function of the visual system is to recover from retinal stimulations information about how things are objectively. One essential step in the perception of objects is the use of computation to recover "edges." The visual system detects rapid spatial variations in the matrix of luminescence values reported by the retina. These edges, together with various constraints, allow the visual system to reconstruct real surfaces and objects, which can be assumed to exist in the real world beyond the retina.<sup>6</sup>

In this analysis, Marr assumes that unlike retinal variations, edges are real properties definable by purely physical parameters. It seems to me that Marr here neglects an essential reference to the subject. He claims that the function of the vision system is to reveal to us the objects and features of the visible world. "Visible world," however, cannot mean physical world in the sense of the world of physics. When he speaks of edges, he is clearly thinking about the edges of tables or chairs. But what about molecules? Do they too not have edges? And the galaxies? Why are their edges not discussed? Marr is presuming that an "edge" is defined only on a certain scale. This scale is relevant to, indeed defined by, the size of the animal, its capabilities and its interests. Which physical features qualify as "edges," in Marr's analysis of vision, are defined by the organism; they are properties of the world it experiences and lives in, not of some reality-in-itself.

The same can be said for "surfaces." The many surfaces that make up a human face, and their variations in reflectance, are crucially important to human beings for guiding their social interaction. It is highly unlikely the visual system of pigeons would segment the world in the same way. On the other hand what we see as the more or less uniform grey surface of a

pigeon's neck may be broken into intricate patterns of differently coloured surfaces to other pigeons' pentachromatic visual systems, patterns that pigeons probably use to identify individuals. Surfaces are aspects of visual worlds, not of objective reality. As Thompson, Palacios, and Varela put it, "although the reflectance at any point in the scene can be specified in physical terms, what counts as a *surface* may in fact involve tacit reference to a type of perceiver."<sup>7</sup>

I have examined colours, edges and surfaces and argued that they are dependent for their definition on perceivers, or subjects. But visual objects are defined by colours, edges and surfaces, so we can now conclude that perceived objects are not pre-specified parts of reality, but unities whose very definition depends on the perceptual capacities of perceivers. Not only the sunset, but the chair, the house and the movement are undefined without reference to Alysha or organisms like her.

I can now offer a simple answer to my initial question about what the brain or the mind represents: if it represents anything at all, it represents objects in the world. These objects, however, are not the unities of physical theory, atoms, gravity, electro-magnetic radiation, quantum states, or whatever, but unities defined by the capacities of subjects.

How does this appeal to objects in an organism's world enable us to understand behaviour? Let us look at a simpler and more artificial example than the case of Alysha and the sunset. The game of chess.

Consider how a psychologist might explain my action, during a game of chess, of moving a knight to protect my king from your queen. My move takes place in a chess world; the objects in it are defined and individuated by an interlocking set of chess categories. As Wittgenstein puts it, to label something as a "king," we must first understand the rules of the game.<sup>8</sup> (Indeed, worlds, as I am using the term, are related to Wittgenstein's language games.) Once she understands the rules that define the game of



chess, and only then, the psychologist can see why the position of your queen is a threat to me. Then, given my beliefs about what will protect my king, she can explain my behaviour of moving the knight.

The psychologist's explanation only makes sense if she accepts that there are chess pieces and moves in the world and that these are capable of acting as causes of my behaviour. This explanation makes no appeal to the physical processes which make up the game. Since it is irrelevant whether the chess pieces are made of wood, marble, ink on paper or pixels on a computer screen, the actual physical components which compose the pieces have no place in the psychological explanation. On the other hand, the pieces are not in my head; they are on the chess-board.

In the psychologist's explanation, we need to distinguish two phases. First she needs to understand the constitution of my world of chess, that is, how the objects I am perceiving and moving are categorized. She presupposes this constituted world when she identifies the queen as the cause of my action. A representationalist might want to say that the cause of my behaviour is not the queen as such, but my internal representation of it. I have reservations about this way of putting it – as we will see below -- but even if we accept it for the sake of argument, what is alleged to be represented is a "queen," not a piece of wood or the pile of molecules that makes it up. The cause of my behaviour is an external object, the queen and its chess-board position. External here does not mean physical: queens do not exist in the world of physics, but only in the world of chess. Of course, such a world is dependent on my human capacities: only in so far as I have a neural system capable of responding to objects in the chess world, a capacity that dogs, for instance, lack, is it possible for queens to motivate my action.

A representationalist, such as Fodor, might say that the only way I can have a neural system with this capacity is if there are processes whose

causal-syntactic structure models the semantic content "queen." He might be right; I suspect this is an empirical question. Given the new story about parallel distributed processing, this theory seems less and less likely. The psychologist's explanation, however, doesn't depend on the outcome of this issue, but only the presence of *some* neural structures which enable me to constitute and live in a chess world. There is a queen for me in this external world if there are some circuits or other, (maybe different from those that other people have) which enable me to respond to the unity "queen," and which would respond in the same way whether the queen were made of marble, wood or whatever.

Understanding the chess world and the way I live in it, grasping how I define the pieces and moves, and seeing how this world constitutes its objects and my ability to perceive them, are necessary prerequisites for the psychologist to explain my behaviour.

## 2. *Worlds depend on supervenience*

With this chess model in mind, I am now ready to propose my central thesis about the relationship between worlds, subjects and objects.

*A world is a brain-object structure that supervenes on micro-physical processes and within which supervenient causal regularities are to be found. Each world is defined by reference to a species of subject or organism which is part of that world and whose perceptual and behavioural responses define the supervenient unities or objects which are to be found in that world. Each world has evolved from a previous world by an internal transformation.*

In unpacking this position, I will start by briefly explaining the notion of supervenience and then showing how it can be applied to illuminate the

nature of worlds. Then I will look at the intricate interrelationships between the causal, non-causal and supervenient dependencies which the analysis requires.

### 3. *Supervenience*

Supervenience is a notion developed by Moore, Horgan, Kim and others which presupposes as fundamental the existence of micro-physical laws.<sup>9</sup> Everything that exists is determined by these laws and so, in principle, if we understood these laws and the initial conditions to which they were applied, we could understand and predict anything that happens. In practice, of course, this is seldom if ever possible on the macro-level. Predicting where a leaf will fall is beyond the competence of anyone but a divine physicist. It is not that the laws are too complex; the problem lies in the complexity of the initial conditions needed to apply each of the relevant laws.

We can, however, discover higher level regularities and causal laws which depend on these fundamental laws and their constraining initial conditions, even if we seldom know exactly how the dependency works in detail. We can understand that a house thermostat regularly causes the furnace to come on even if we are incapable of calculating the trajectories of all the micro-physical particles in its mechanism. The Law of Thermostats, "Low temperature causes the furnace to start," is an example of a causal law that we know supervenes on micro-physical laws, even if we don't know exactly how in each token case. A further complication is that there are different designs of thermostats: some thermostats use bimetal strips, others use air-chambers, and some may use solid-state devices. Indeed there is an indefinitely large number of ways to construct thermostats, all of which would obey the same causal Law of Thermostats, and all of which are

physically deterministic. Hence the Law of Thermostats is not, in its general form, reducible to the laws of micro-physics, although it certainly supervenes on them. It is the initial or boundary conditions, within which the laws operate, which result in the Law of Thermostats and these constraints are not themselves explicable by the micro-physical laws alone.

The Principle of Supervenience is most commonly used to describe the relationship between physical processes and the mental properties which are supposed to supervene on them. The notion is intended to preserve the principle of physical determinism while allowing that mental properties may have multiple physical realizations and are therefore in some sense autonomous. In its weakest form, the principle claims that there can be no differences on the supervenient, mental level of the world without some difference on the micro-physical level.

There is, however, no reason to restrict the Principle of Supervenience to mental properties. It can be used to understand the colours of objects. For example, bees regularly fly to flowers because of their ultra-violet colour. If a bee flies to a particular flower because of the colour the bee perceives, the event can certainly be explained in principle by the micro-physical laws which determine the reflectance of the pigment in that flower. If the bee were to see something different, then something about this regularity would have to change. In the case of another species of flower, however, the same colour may be explained by reference to entirely other physical laws governing the chemical constituents of a different pigment. In other words, the causal regularities to be found in the interaction between bees and ultra-violet flowers may be realized by multiple micro-physical processes and laws. Further, we can say, counterfactually, that if some new pigment were developed which stimulated the bee's visual system in the same way, it too would give rise to the same causal regularities, regardless of which micro-physical process were involved. Every token interactive event can be

explained by micro-physical laws, but the general causal law -- the colour-bee regularity -- that would explain enactive co-evolution, cannot be reduced to micro-physical laws.

#### *4. Supervenience applied to worlds*

Let me now apply the notion of supervenience to illuminate the concept of world in general. There are a very large number of causal systems which could supervene on micro-physical laws. The evolutionary emergence of a world may be seen as the selection of one of these and its development as an organism-object supervenient causal system. On the side of the species, perceptual and motor capacities must emerge which can respond to extra-dermal supervenient causal unities. On the other side, these unities must be valid supervenient causes which are governed by laws. If unities were selected which were not regular in the requisite way, then this evolutionary step would fail; the species would not survive. The organism's perceptual system must latch onto causal unities which are in fact supported by micro-physical laws. When a new species does survive then a new supervenient system, a new pattern of causal regularities has emerged.

To call something an object in an organism's world is to classify it by means of categories particular to this world. These categories serve to individuate the unities in space and in time and to generalize them by assigning them to a kind.

I'll use Alysha's sunset again as an illustration. The sunset causes Alysha's visual system to recognize a sunset. This causation supervenes on the micro-physical processes of electron vibration, emissions of photons of various energies, rearrangements of visual purple molecules, and so on. Her visual system constrains the physical processes in a number of ways. For instance, only certain frequencies of light are "permitted" to have effects on her neural system; ultra-violet is screened out, for example. Only those

combinations of frequencies which positively fire her red-green opponency circuits are permitted to affect her sunset recognizing system. Hence one area of the sky is granted the power to act as a single coordinated cause which results in her recognition of the sunset as its effect. This area is thereby spatially individuated, differentiated from its background, since the rest of the sky is not able to cause this same effect. Generalization occurs in a similar way: since this power is not momentary, but is built into her visual system, these clusters of micro-physical events would produce the "same" effect another day. Further, any cluster of micro-physical events which fire her opponency circuit in this way will cause her to perceive a sunset. We have, then, a system of unified causes and effects within the brain-sky structure, the subject-object structure, which supervenes on micro-physical laws.

None of this explanation requires us to think of there being some pre-existing, pre-unified object-in-itself in the sky that some organisms secondarily categorize as a sunset. From the viewpoint of micro-physics, electromagnetic radiation of various frequencies and intensities is coming from all areas of the sky all the time. There is no motivation from physics for selecting one part of this radiation or one period of the day and segmenting it out as a not-yet-labelled-sunset. Nor is there any physical reason to class what is happening in the sky tonight with what happened last Wednesday, when there was a sunset, as opposed to last Friday, when there was not. The only criteria for individuation in space or in time, or for assignment to a kind, are perceptual ones: Alysha and the rest of the human species has the capacity to respond in a standard manner to a hodge-podge of events that they define as a sunset. The boundaries of this new entity may be "arbitrarily (perhaps infinitely) complex and bizarre," as Haugeland puts it in a similar case.<sup>10</sup>

Haugeland, writing of decisions rather than sunsets but the point is the same, says:

The point is not that the "boundaries" of decisions and actions are micro-physically fuzzy, indescribable, or even negotiable; rather there are no such boundaries at all: decisions are not distinguishable (even in principle) as separate individuals *at the level of micro-physics*.<sup>11</sup>

### 5. Five dependencies

If this scheme is correct, then an organism's percepts are causally dependent on objects in the world. However, it is also true that objects depend on subjects. And both make sense only in a world which depends superveniently on micro-physics. There are at least five kinds of dependencies here which must be clearly distinguished from each other. (I take the opportunity to introduce some technical meanings of terms.)

1. An object in a world may causally depend on a subject or another object for its existence. A red sunset might be caused by the smoke from a forest fire started by Alysha or by a bolt of lightning. I'll call this dependency *worldly causation*.

2. A red sunset depends for its definition on the visual system of human subjects, or organisms with similar visual systems. Let me call this *subjective dependence*. Note that the fact that there is such a dependence is completely objective.

3. Both the perceptual system of an organism and the objects which are perceivable by it depend on a supervenient causal structure. It is this structure that I am calling a *world*. Sunsets cause visual and behavioural effects in humans because both humans and sunsets are

*constituted* by the human world on which they depend. This is *constitutional dependence*.

4. The existence of a world depends on an historical process by which earlier worlds were *transformed* into this world in accordance with biological, evolutionary principles. Alysha's seeing of a sunset depends on a transformation of a monochromatic world defined by some ancestor of primates which led to a world in which both red-seeing and red sunsets could occur. *Historical dependence* refers to the dependence of a current world on its evolutionary predecessor.

5. Finally, all of the above depend on the micro-physical processes upon which they *supervene*. This is *supervenient dependence*.

These dependencies are, of course, interrelated, which makes it crucial that we remain clear on their distinctions.

#### 6. *Interrelationships between the five dependencies*

The most likely confusion is between *subjective or constitutional dependence* (#2 or #3) and *worldly causation* (#1). If one were to hold that cognition involved setting up representatives of reality in the head, then the sunset, like other perceptual objects, would be an event in the head and it would be reasonable to propose the brain as its cause; the brain would construct the sunset within itself. This is Hardin's subjectivism. My position, on the other hand, is that the sunset is a distal event occurring in the world, and while it is dependent on the subject and on the world, these are not causal dependencies.

Now there *are* certainly physical causal processes in vision. Light from the sky in the west causes retinal neurons to cause certain firing patterns in the optical lobes of the brain. But there is no causal process that originates



in the brain and which has as its effect the redness of the sunset in the world. The subject is neither like a painter colouring an internal, mental canvas, nor like the arsonist whose smoke colours the sky. Subjects are not like movie projectors which cause the sunset to appear on the screen of the heavens. Nothing is projected by the subject into the world. So when I hold that the feature "red" in its world depends on the subject -- #2 subjective dependence -- I am not claiming any direct causal dependence. I am simply saying that redness can only be defined by reference to a certain kind of organism.

Similarly, to say that both the sunset and its perception depend on the human (or primate) world -- #3 *constitutional dependence* -- does not imply that the world is an object which causes the sunset as its effect. Compare the relationship of a language to a sentence. In "the cat is on the mat" the agreement in number of the verb "is" with the noun "cat" depends on the structure of English, but this does not mean that the English language *causes* this agreement. A language is not an object like a cat, mat or speaker which could act as a cause of a sentence or a word. Similarly, a world is a supervenient structure within which causal events can occur; it is not itself an object susceptible of acting as a cause of its own objects or subjects. Constitutional dependence is not causal.

Worlds come into being by the evolutionary transformation of previous worlds -- #4 *transformational dependence*. The enactive theory of Thompson, Palacios and Varela, to which I referred above, attempts to explain such transformations. Their account of colours rejects any explanation based solely on neural causes, just as I do. For them, colours are properties of the extradermal world because they have evolved in tandem with the development of organisms whose perceptual systems are responsive to these colours. This is an evolutionary-causal process in which "perceiving animals as both assemblies of sensory-motor networks and as

organismic unities ... shape the extradermal world into an environment in their interactions."<sup>12</sup> The enactive theory might claim (this is my own example) that the red-green opponency system in the vision of certain organisms gave them an evolutionary advantage because it enabled them to easily spot red berries against a green background. The other half of the enactive story is that berries evolved their redness because it promoted their reproduction, given the development of red vision.

Note one thing that the enactive theory does not say: although the theory claims that there may be causes for why our vision sees some things as red, and these causes are related to the causes of the things being red, it does *not* claim that our visual system causes these things to be red. With this I am in complete agreement, as my argument above indicates.

In fact, I think that enactionism in general is true as far as it goes and is an important advance in our understanding of the dependencies I have identified above: #1 worldly causation, #2 subjective dependence, and #3 constitutional dependence. But I don't think it goes far enough; as it stands it has a number of inadequacies. For one thing, it oversimplifies the relationship between perceivers and perceived. The colour of flowers, for instance, may have co-evolved with the vision system of insects, but primates too have come to see flowers as coloured, probably much later. It is unlikely that anything in primate evolution has co-determined the pigmentation of flowers and yet they are coloured objects in primate worlds as well as insect worlds. Even less likely would be the claim that red sunsets have co-evolved with human visual systems.

Since it is my contention that not only colours, but all objects and features of any world are constituted, the enactive, interpretation of transformation cannot be sufficient. The edges of tree-trunks or of mountains, the reflecting surfaces of leaves or of pigeon feathers, and the unity of dogs or sunsets -- all of them features of the human world -- cannot be accounted for by any

co-determination by evolving human visual systems. I think they can be accounted for by appealing to the kind of supervenient categorization I am proposing.

Further, I think that the enactive theory, even where it is successful, still presupposes supervenient worlds. Thompson, Palacios, and Varela make it clear that the features of a perceived world cannot be given a purely physical-level specification. Hence the kind of causation involved in the evolutionary enactive process they describe cannot be purely physical causation either. That is, the objects or events that play the roles of either causes or of effects in the co-evolutionary process are not defined by physical theory, but only by the constituted worlds within which they are categorized. For instance, the colour of flowers which they claim has co-evolved with insects by circular causation cannot be defined by the chemistry of the pigments. Presumably different flowers have achieved their colour by means of different pigments. What have all these pigments in common? Only that the visual system of certain insects responds to them in the same way. They cannot be defined as in-themselves, but only as for-insects. There are no causal laws in physics or chemistry which would take these kinds of unities as causes or effects.

That is, the enactive explanation already presupposes the categorization of the world into supervenient objects before the co-evolution explanation of evolutionary transformations can work.

### *7. The historical transformation of worlds*

The categorization of objects and subjects depends on evolutionary history. Let us work again from my concrete example: how did it come about that Alysha lives in a world with sunsets?

Alysha has inherited her world from her ancestors. The genetic history of her visual system and probably the conceptual history of her culture are

responsible for sunsets being part of Alysha's world. It makes little difference for my analysis whether this inheritance is genetic or cultural. Probably the capacity to see red is genetic in normal human beings whereas the categorizing of these reds and the associated phenomena into a "sunset," an object of note and admiration, is cultural, but it would be of little consequence for my position if it turned out that colour classifications are cultural or that "beautiful sunset" is an innate concept. The crucial point is that an object is what it is for a subject because of the past. The history of the species or culture is the original source of the constitution; the individual, for the most part, just borrows a ready-made world to live in.

A world is a condensed history, and this is as true for the objects in it as for the subjects. I think it would be a mistake to emphasize exclusively the evolution of cognitive capacities in the subject, as I think representationalism does, and ignore the evolution of objects.

Representationalism focuses on cognition by subjects because it conceives of the units of evolution as isolated individuals and places the burden of history solely on the internal genetic or memory processes of each phenotype. Cognitive representationalists conceive of individuals as the sole bearers of evolutionary learning. Colour concepts, for instance, were figured out millions of years ago by some primitive visual system and passed on in genetic code to the current generation.

I think this is wrong on two counts. First it interprets the influence of the past as resulting in knowledge. In contrast, I think evolutionary history results primarily in capacities whose origin is usually unknown to the organism. An organism is the result of eons of adaptive development but this does not mean that the organism knows about this history, or that it knows why it sees the world as it does. Knowledge here is not the point (though it is not excluded). An organism does not see red because it knows or remembers that red berries contain vitamin C, nor because it has an

innate concept of red. Rather, the capacity to see red is a causal result of the fact that its ancestors adapted well by absorbing vitamin C, and so on, from berries. The visual system doesn't know anything about the past; it is not an accumulator of facts nor of knowledge. It doesn't remember facts; it is a product of these facts. It is part of an evolved world in which the visual capacities of the organism are the result of historical success and failure.

Secondly, I think the role of the subject is overemphasized here. It is not only the subjects but also the objects in the world that have been historically constituted. These objects encapsulate both certain survival values for the species and a set of supervenient physical regularities. Objects that did not contribute to the survival of ancestors or that did not have a subvenient basis are not to be found in a species' current world. Successful evolutionary experience is stored in the objects of its world as well as in a subject's cognitive capacities. As Dreyfus puts it:

When we are at home in the world, the meaningful objects embedded in their context of references among which we ... live are not a model of the world stored in our mind or ... brain; they are the world itself. ... My memories are ... stored in the familiar look of a chair or the threatening ... air of a street corner where I was once hurt. My plans ... and fears are already built into my experience of some objects as attractive and others as to be avoided. ... The whole I/O model makes no sense here. There is no reason to suppose that the human world can be analyzed into independent elements, and even if it could, one would not know whether to consider these elements the input or the output of the human mind.<sup>13</sup>

Worlds, and the objects in them, are evolved, historical structures. They are repositories of evolutionary events. Each object – and each subject – is like a condensed history that crystallizes the evolutionary experience of a species. An individual's world is then primarily that of her ancestors'. The history of the species or culture is the original source of the constitution; the individual, for the most part, just borrows a ready-made world to live in.

It follows that individuals who share an ancestral history thereby also share a world. The objects in their worlds are not only generically identical; individuals can perceive and interact with an object which is numerically identical -- the self-same object – that another individual can perceive. It is the same token-identical sunset that Alysha and her friends admire.

This is not a matter of mental representations. If individuals were motivated only by their own internal representations, each person would respond to her own private model, a different token for each individual. An object in a world, however, is external to the perceiver; it is a worldly-causal unit, and so is accessible to anyone with the evolved perceptual capacity to respond to it.

We should not think of worlds as theoretical entities invented by philosophers or scientists in the third-person mode to give a coherent account of the behaviour of those they are studying. A world can serve this secondary, explanatory purpose only in so far as it is available to the subject herself in the first place. It is because Alysha sees the red sunset that she sets up the chair to watch it. If the sunset were only a theoretical concept available to those adopting a particular psychological theory of behaviour, then it could affect Alysha's behaviour only if she were herself such a psychologist. If Alysha herself did not respond to sunsets, if sunsets were not objects of her world, then this kind of explanation of her behaviour would make no sense.

## VI ONTOLOGY

The traditional explanation for Alysha's behaviour – adopted by many in the Cognitive Science community – is that it is caused by her mental representation of the sunset. The alternative account I have offered above does not rely on representations. It is the sunset itself, an object in Alysha's world, that causes her behaviour.

We need to examine, however, the ontological status, or "reality," of objects in the world. Are worldly objects subjective duplicates of reality? Are they illusions of our brains? If not, are they "real," and what could that mean?

### *1. Representationalism*

A recurrent theme in the philosophy of mind for three and a half centuries has been that the mind is in contact only with its own mental objects or structures. Ideas, impressions, sense-data, or representations have often been presented as models of the extra-dermal world, surrogates inside the head which act as representatives or delegates of physical objects.

Fodor's Representational Theory of Mind is a contemporary example in which the mind is understood to compute over mental representations.

To believe that such and such is to have a mental symbol that means such and such tokened in your head in a certain way; it's to have a token 'in your belief box.' ... Mental processes are causal sequences of tokenings of mental representations. <sup>14</sup>

In the Representational Theory of Mind objects get duplicated inside the organism. There is a functional isomorphism between psychological

structures in the brain and the extra-dermal features which they model. But what objects does Fodor believe are mentally represented? Fodor refers to horses and chess-boards. Yet a horse is not a physical object in my technical sense of an object of physics; a horse cannot be defined in micro-physical terms. Nor is a horse a piece of reality-in-itself: the segmentation of the world into horses involves tacit reference to perceptual systems like those of humans (and, undoubtedly, of horses).

Anyone who, like myself, proposes that an organism lives in its "own" world is bound to be interpreted by many as holding that what a subject actually experiences are only internal duplicates or representatives of objects. But in my case this would be a misinterpretation. The objects in an organism's world are not mental models which correspond, or fail to correspond, to equivalent objects in the physical world. They are not representatives; they are distal unities in the world, but unities that are definable only by reference to a subject. The sunset is not in Alysha's head; it is in the sky, over to the west. A sunset is public, not private.

This does not mean, however, that it is an object of physics, for its criteria for individuation and generalization are not those of any physical theory. A sunset is only such for a particular kind of perceiver, one capable of three-dimensional vision, of colour vision, and whatever else is needed. That this pattern is relative to an observer does not mean that it only occurs *within* that observer. Its place is in the world not in the head. The matter it is made up of is physical. It differs from the objects of physical theory (molecules, atoms, etc.) only in being categorized differently. To say that the world constitutes objects is not to say that it creates duplicate models or mental representatives of objects, but to say that it defines these objects in the first place.



## 2. *Are objects in the world real or illusory?*

Are these objects in the world real? After all, I am claiming that they are dependent on perceivers, and what else can "real" mean but "independent of the observer"? (It should give us pause in this line of thinking to remember that the objects of physics -- those very epitomes of "reality" -- whether one is thinking of the fundamental entities of quantum theory or the attributes of events in Einsteinian space-time, are not independent of the observer.)

Let us approach the problem from the other end. What is not real is illusory; it only "seems" to be the case. Dennett has made much of this way of putting things, contrasting how things "seem" to consciousness in its "heterophenomenological world" with how they are in reality.<sup>15</sup> But expressions such as "to seem" or "to appear" have at least two meanings. In one sense, sense A, the terms are used to distinguish something which is true from that which is false and only "seems" to be the case, as in "He appeared honest, but was really a crook." It is in another sense, sense B, that we use them to refer to how things appear to us in consciousness, or, by analogy, how things are given to any organism. "The sunset appeared to Alysha as a huge redness covering the western sky" does not imply that what Alysha is seeing is false, just that her perspective cannot be ignored.

Dennett plays on these two meanings of the term. He uses "real" to refer exclusively to processes in so far as they are categorized by physics, and contrasts them with the way events are categorized by the experiencer, how they "seem" to consciousness. This is a legitimate use of sense B. However, he slides illegitimately into sense A when he then declares many of these appearances to consciousness to be illusory.

For example, if I say, "It seems like the temperature is 20 degrees but really it's 25" I am using the term in sense A. But if I say, "It seems like the temperature is 20 degrees, but really it's just that the average kinetic energy

of molecules in my environment is so-and-so" I am using "seems" in sense B. If I'm stoned, a mouse may seem to me, falsely (that is, in sense A), to be an elephant. If my neurons are operating normally, then a certain pile of molecules may seem (sense B) to me to be a mouse. To claim that in the second case a mouse is a fiction is to assimilate the case of the mouse to the case of the elephant. Such a claim confuses sense B with sense A.

### 3. *Ontological status of worlds and objects*

So what is real? The term has too many meanings to be very useful. The definition of reality as that which is independent of the observer neglects the fact that many authors use the term in an honorific way. Dennett, for instance, uses it to refer to whatever is most significant in his scheme and to use "unreal," "illusory," and similar terms pejoratively, as put-downs for that which he considers secondary. This hierarchical evaluation originally implied a Divine perspective: how things "really" are meant how they were for God. Newton, for example, contrasts relative space -- space as it appears to a human observer, with Absolute space -- space that is God's *sensorium*. I suspect an implicit appeal to such a hierarchy is behind many contemporary uses of the term "real" even if no explicit appeal is made to God.

I think debates about what we should honour with the title "real" are largely sterile. Instead I propose we distinguish the mode of being of objects categorized by physical theories from those objects of an organism's world which are defined by that organism, or, as I put it, that the world "constitutes." As long as we are clear that the objects in the worlds of organisms are not thereby illusory, but are also not the objects of physics, how we attribute the honorific term "real" is irrelevant.<sup>16</sup> Positively what we need is a substantive discussion about the ontological status of objects. So we should not ask whether the objects of an organism's world are "real;" we

should just describe how they come about, how they are sustained in their being and what ways they are dependent, which is the approach that I've taken above.

Representationalists and Realists would restrict us to two ontological categories. Anything which is real is either an object definable by physical theory or it is a mental entity (which may also be physically definable). Anything else is illusion. In my alternative position, objects in a world do not fall into either of these restrictive categories of latter-day Cartesianism. Worldly objects are not pieces of "reality-in-itself," that is, independent of any organism, subject, or world. They are constituted by a world and their definition depends intrinsically on the capacities of an organism. But this does not make them mental; they are extra-dermal and obey laws as objectively as any other supervenient process (thermodynamics, for example.) They are neither illusions nor one of the two Cartesian-certified "realities."

## V. CONCLUSION

In this article I have challenged the contemporary Cognitive Science paradigm that explains behaviour by reference to internal, mental representations. Instead, I have used supervenience to offer a naturalized account of worlds and their objects. I have argued that it is objects constituted in these worlds -- not some reality-in-itself, or even the objects of micro-physics -- that act as causes on subjects or organisms. If any objects are represented, they are objects defined by an organism's or subject's world. I have suggested, however, that we may no longer need the notion of mental representation at all once the associated concept of reality-in-itself has been replaced by objects in a world.

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## Endnotes

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<sup>1</sup> I am making no claim to originality here. The concept of world has already been proposed by Husserl, Heidegger, Merleau-Ponty and many others. What I think is original is my attempt to naturalize the concept by appeal to supervenience.

<sup>2</sup> See, of instance, Fodor, *Psychosemantics* and Pylyshyn, *Computation and Cognition*.

<sup>3</sup> Hardin, *Color for Philosophers*. See especially Part I, p 2 et seq.

<sup>4</sup> Thompson, et al., "Ways of coloring.

<sup>5</sup> Thompson, et al., p. 20.

<sup>6</sup> Marr, *Vision*.

<sup>7</sup> Thompson, et al., p. 17.

<sup>8</sup> Wittgenstein, *Philosophical Investigations*, para #31

<sup>9</sup> See, for instance, Kim, "Psychophysical Supervenience." *The Southern Journal of Philosophy* Supplemental Volume XXII 1984 is entirely devoted to the topic.

<sup>10</sup> Haugeland, "Ontological Supervenience," p. 2.

<sup>11</sup> Haugeland, "Ontological Supervenience," p. 8.

<sup>12</sup> Thompson, et al., p. 23

<sup>13</sup> Dreyfus, *What Computers Still Can't Do*, p. 265F

<sup>14</sup> Fodor, *Psychosemantics*, p.17

<sup>15</sup> Dennett, *Consciousness Explained*. pp. 66-98

<sup>16</sup>In "Real Patterns," Dennett drops the pejorative word "illusion" and adopts the term "semi-real" for patterns which are correlated with an observer as opposed to the "real" objects of physics. That makes him, he says, a "semi-realist" or a "mild realist."