

The Science of Omniphysical Life

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Information Fields

The defining characteristic of an information field is that its information cannot be reduced to or expressed in the information terms of another field. Its information is separate and distinct and of its own kind.

We humans exist in two distinct information fields, the physical and the descriptive. Each information field enables an autonomous self who exists in its information terms. Body is the self of the physical information field and mind is the self of the descriptive field. All other living beings are confined to the physical information field alone and thus have bodies only. We are life's only two-field creatures; we are the only living beings who have both a body and a mind.

The information of the physical information field exists in the embodied orderliness of physical form and function. This kind of information is present in any physical entity existing away from the complete disorder of thermodynamic equilibrium. The orderly contents of reality arise from the creative potential of energy and matter operating under the laws of nature. Our universe and

planet are full of orderly structures – ranging from non-living ones to us trillions-cell creatures of complexity. To be clear, the information of the physical field is not the orderly physical contents of reality. It is the information that exists in the orderliness of those contents, as well as the potential for order inherent in our universal reality.

The ability to create orderly structures was revolutionized by nature’s discovery of replication, giving rise to life, and opening the way for evolutionary processes to conserve, test, and select information-laden forms and functions able to sustain living things. Seen through an information lens, it is by exploiting the information possibilities of the physical information field that evolutionary processes have given rise to life’s astounding capability and diversity.

The information of descriptive field is of a completely different kind. Descriptive information arises within symbol systems in which multiple symbols are linked and defined in terms of each other. Descriptions are meanings and what a symbol means is determined by the definitions of other symbols to which the symbol’s definition is linked. It is the descriptive meanings arising within symbol systems that comprise the information of the descriptive information field.

The informational independence of the two fields follows from the nature of symbolic representation which is based on information assignment – the act by which a physical object is used to represent assigned information that is different from the physical field information inhering in the physical object to which the information is assigned. The object becomes a symbol token representing the assigned information. The act of information assignment supplants the information inhering in the symbol token with the assigned information arising within the linked definitions of the symbol system: the relevant information is not the token’s physical field information but its assigned descriptive meaning. For example, when we see the written marks “Ichthyocentaur,” our sensory capabilities see a particular array of markings, but our mind computes the descriptive meaning of the symbol.

The information of the physical field exists in the orderliness of physical particulars; the information of the descriptive field exists as meanings that are independent of the information of the means used to physically represent and process those meanings. Even though descriptive information is *materially dependent* on the physical field’s symbol tokens and processors, it is *informationally independent* of the physical means of its representation. Each kind of information exists in its own field and cannot be reduced to or expressed in the other’s information terms.

Given the nearly unlimited leeway in assigning descriptive meanings to tokens, the information of the descriptive field can be materially represented omniphysically by any number of appropriate physical means. Mind is an entity that exists solely in the information terms of the

descriptive field and can thus be supported omniphysically. Mind need not be tied to and physically enabled by only one particular set of material supports.

Symbolic Representation and the Emergence of the Descriptive Information Field

Less than two million years ago our hominid ancestors made a world-altering discovery. The innovation was so profoundly important that it triggered a rapid co-evolutionary dynamic, producing a species that could exploit this newfound capacity. We are that species and it is that ability that utterly separates us from the rest of life.

What was this planet-altering innovation? It was to discover symbolic representation. The initial breakthrough was to discover information assignment – the act by which a physical object is assigned to represent information different from the information inherent in the object’s physical nature. Through the act of information or semantic assignment, the physical object becomes a symbol token representing the assigned cognitive content.

The token is the device used to represent the assigned information using an instantiation that can be processed by the human nervous system. Processing of the assigned information takes advantage of the same bodily structures that are used to represent, conserve, and process information from the physical information field. In the case of symbol-based meanings, however, the instantiated neural patterns and their activities represent the assigned meaning rather than the information inhering in the token itself. For example, the token triggers sensory and nervous system peripherals, leading to representations competing for cognitive selection. But rather than triggering performances appropriate to the information inhering in the physical token, the learned coding supplants those and triggers responses based on the learned meaning – such as eliciting a sound which is a token whose assignment within the meanings of the symbol system makes it an appropriate response.

While information assignment is the seminal accomplishment, more is needed to get to symbol systems and mind. The essential requirement is for symbol-based meanings to be defined and understood in terms of other symbols and their meanings. By gaining the ability to use meanings defined in terms of other meanings, symbol-based information can be about anything. It becomes possible to think in terms of descriptions that denote particular objects or events, but also descriptions whose meanings are abstracted from particulars. Although other animals have discovered information assignment – one sound means predator, another means mate – ours is the only species that took the next critical step to define, understand, and deploy meanings in terms of other meanings. We are the only ones to have developed symbol systems.

The development of symbol systems requires the adoption of conventions determining which symbols are assigned to represent which content; how symbols are defined in terms of each other; and the rules for processing the symbols. Once consistently cross-referenced symbol definitions and their processing protocols were adopted and learned, symbols took on a dual character; users understood the meaning of symbols both in terms of the conventionally-defined meanings as well as what the symbol denotes.^{1 2}

It was the advent of robust symbol systems that gave rise to the descriptive field – a field that is defined by a type of information that is fundamentally different from that of the physical field. Information of the descriptive field resides in the meanings of the symbol system and not in the physical means used to represent and process those meanings. The act of assignment overrules and supplants the information inhering in the symbol token with the information existing in the defined meanings of the symbol system.

Developed in a brief span of evolutionary time, the ability to develop and deploy symbol-based representations is the primary factor separating human beings from the rest of life. Our use of symbolic representation is pervasive: we use it to describe and conceptualize reality, to communicate and conserve information, and to guide our actions in a very demanding world. Symbolic representation has made us stunningly smarter by providing an information resource to support thinking in descriptive terms. The original and still dominant use of symbol-based meanings is to describe reality but these meanings can easily reach into conjectural and imaginary worlds as well.

The fossil record shows that some two million years ago the size of the hominid brain began to increase, growing from a volume of roughly 500 cubic centimeters to the present human size of approximately 1350 cubic centimeters. During this period of rapid evolutionary change, alterations in the hominid brain were accompanied by the development of new kinds of tools – both cognitive and in the world at large. The correlation of brain growth, symbol development, and tool usage is no coincidence. The rapid growth of brain size and the larger proportionate growth of the prefrontal lobes were driven by the need to develop an internal infrastructure supporting the emerging symbolic capacity. In turn, symbolic representation and tool usage (aided by those wonderful opposable thumbs) were enabling our ancestors to become smarter

¹ A symbol's meaning is computed by a reduction to primitives where primitives may be of two types: a symbol designated within the system as a primitive, or a descriptive mapping denoting an object or event in physical reality. Given the independence of the information fields, the use of descriptive meanings to denote objects or events is an inferred mapping from the descriptive information field to the physical.

² While the use of descriptions to denote objects in reality arose naturally in early deployments, this linkage is not a necessary feature of symbolic representation. The conventionally-adopted meanings of a symbol system may be fully self-contained, defined exclusively in their own terms without correspondence to physical reality.

and more powerful, contributing to mankind's emergence and ascendance among life in the savannah.

Symbolic representation emerged within a co-evolutionary process. On one side were numerous physiological adaptations – growth in brain size, rewiring of the hominid brain, and development of biological mechanisms to take in, organize, process, conserve, and report symbol representations. On the other side of the co-evolutionary ledger were corresponding adaptations in symbol systems. Tokens, grammars, languages, and processing protocols aiding symbol use were selected for their representational power within the constraints of a primate processor.

The innovation of symbolic representation was only possible on the foundation of life's prior acquisition of semantics achieved through evolutionary search. Over time, evolution had assembled the sensory and cognitive abilities allowing animals to identify, parse, correlate, and categorize incoming information of the physical field – providing physical field cognitive content available to be assigned. Without this pre-existing repertoire of physical field concepts, there would have been no underlying content available for assignment and symbolic representation.

One reason symbol usage was able to emerge so rapidly was that our ancestors could take advantage of many existing bodily systems to convey and process symbol representations: using the visual, auditory, and nervous system mechanisms in development over evolutionary time. By assigning semantic content to an external physical object, that content was represented physically in ways that could be processed through existing channels. Our ancestors' first symbolic representations were likely assigned to instantiations expressed in sound and gesture.³ The sounds assigned particular meanings are conveyed as waves in the atmosphere and are converted through long-established auditory capacities into the electro-chemical media of the brain. Similarly, gestures show up as patterns of photons and are received through visual capacities connected to the nervous system and brain's processing mechanisms.

Undoubtedly, the first uses of symbolic representation were to help deal with the exigencies of day-to-day life. There are obvious and multiple deployments for a system of shared representations: to communicate and broadcast all sorts of signals and intentions, to organize activities such as hunts, defenses against others, social structures, and on and on. Of course, such deployments require users to grasp the linkage between the symbol and its assigned meaning. This is no small accomplishment. Consider the sheer novelty of taking a tangible object, sound, or other instantiation, wresting it from its naturally-given context and assigning it to represent

³When modern man is forbidden to use language for a period, he doesn't abandon the use of symbolic representation; he reverts awkwardly to more primitive forms of symbolic communication – gesturing, pointing, using sets and physical constructions, and mime.

something else. Even though symbols were first deployed based on our ancestors' previously-acquired physical field information content, it took either great luck, insight, or both to step beyond the information inherent in a physical object, use it to represent something else, and then create symbol systems.

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After achieving a nucleus of semantic content, symbol-based representations became the common currency for expressing thought. Language became the primary means for symbolic organization and expression, able to efficiently represent large amounts of complex information in a coherent manner. The users of the symbol system quickly figured out that deploying symbol-based representations empowered their ability to communicate, store, access, integrate, and keep straight information.

Symbol-based representations have become easily and automatically callable to accompany our physical experiences.⁴ When we select sensory information for awareness, we can effortlessly trigger a symbol-based description of the object or event. Symbolic representation is so pervasive in our lives because it can conserve and convey an enormous amount of information that is useful to us. Our lives are so semantically rich because we benefit from powerful two-field semantics drawing on sensory physical experience as well as the robust realm of descriptive information. Our ability to select information from both fields has not only propelled our ascendance, but vastly enriches our lives. This mode of representation finds favor in our internal dialogue – including our descriptions of ourselves. We possess expansive descriptions in which plans, hopes, expectations, aspirations, and other semantics are formulated and play out. For each of us, the exact content of a symbol may differ, either because we are not fully cognizant of its conventionally-assigned meaning or as is more likely, its mapping to our own physical representations influences its impact and use. Despite this, these discrepancies are contained by the orderly nature of the reality at the level of life as well as our common evolutionary history. And, of course, users make ongoing efforts to clarify meanings in order to keep the symbol system functioning effectively.

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By liberating information from its embodiments, descriptive information opens the way to abstract thinking. Symbol systems are well suited to representing complex relations, supporting

⁴ Symbolic representation began by associating tokens with objects and events, effectuated in brain's network by inclusion of the token's neural representation with the existing representations of the object or event. This is the reason mind's mappings to body's sensory experiences are accurate: the token denotes (is assigned to) an object or event in reality as part of the sensory experience. It is also the reason mind can automatically produce a description of objects or events to which a token has been assigned. Brain's processing of the neuronally instantiated sensory information includes the token which has meaning in the descriptive terms of mind.

the combinatorial and associative links at the heart of descriptive thinking. For example, our ancestors surely had the thought that a rock can kill prey as well as that a sharp stick can kill prey.⁵ Implicit in these representations is a more general concept, the set of things that kill prey. That thought is an abstract one open to inclusion of more types of weapons. Arrows are weapons, and so are traps. Those relations can spark generalizations in other directions – such as the set of animals that can be killed by particular weapons, or the various properties of weapons, and on and on. These kinds of associations are suggested by the structure of reality but require the ability to represent information beyond that inherent in the objects of sensory experience.

Descriptions provide an expansive representational form allowing semantic content to grow, mutate, reproduce, and gain a foothold in reality as multiple minds post, manipulate, and retain semantic insight in these terms. The way to unleash descriptive content is to create a shared, open, extensible system of representation that can serve the purposes of multiple users.

Without the kinds of complex and abstract representations supported by symbol systems, we couldn't fathom reality. That's not only because much of the information inherent in reality is not evident on the surface nor accessible to our sensory capabilities. It's because physical field information can't be detached from its physical embodiments; it offers no way to represent information about the abstract, the conjectural, the unobserved, and more. It is only through semantic assignment that information can be freed from that of its embodiments.

In the process of descriptive creation and permutation there are no restrictions on content. In this sense, man is the maker and mover of his described world, forming representations to describe entities that are present in the environment as well as those that are not. Mankind uses these to create complex stories and explanations and to fashion understandings of reality and life itself. Description allows us to externalize, convey, and conserve a vast reservoir of meanings, whether science or superstition.

There are numerous positive aspects to the unconstrained reach of descriptive representation. Such detachments and flights of fancy can give rise to creative results, whether in the arts or sciences. But if the flights of fancy are not understood as such, then we may run into potentially serious problems. Survival in a complex world relies on recognizing which descriptions are grounded in reality and which are not.

To meet this challenge, mankind has invented systematic means to test the correspondence of his symbol-based descriptions to the physical world. With growing sophistication, strict and testable

⁵Keep in mind that these thoughts of our ancestors were representations of the physical information field and were in the informational terms of their evolved physical representational devices. Right now, you and I are deploying our descriptive abilities to depict and understand these states of affairs. Such capabilities were unavailable before the advent of symbol systems.

methods verifying the accuracy of descriptive mappings to reality have been deployed – an essential aspect of science. The importance of the adopting and adhering to scientific standards for these mappings cannot be overstated. Without such commitments and protocols the descriptions on which we act can easily become unanchored from reality with harmful consequences.

Symbol Processing

The assignment of tokens to represent cognitive content can be quite arbitrary. The content can be assigned to a sound, a mark, an electronic signal, a mechanical arrangement, virtually anything that can ultimately be perceived and processed by the evolved human processor. But in practice there is quite a bit to choose. We prefer symbol tokens and processing conventions that make for a workable, easy-to-use, powerful, and productive system of symbolic representation.

Even though there is wide leeway in assignments between symbol tokens and their meaning, we must never lose sight of the fact that symbol processing rests directly on the good old-fashioned kind – the manipulation of physical media. Symbol processing requires material interactions between the chosen tokens and physical processors. As we have come to appreciate in recent decades, the processing of symbols is possible on any number of artifacts; computers are symbol processors par excellence. The computer software program provides the algorithmic instructions for manipulating symbol tokens on processing devices with the requisite performance characteristics. In all applications, symbols and their processing must conserve the assigned information. Although symbol tokens can take alternative physical forms – electronic, mechanical, etc. in order to achieve processing with optimal use of energy, time, or other standards of performance – the appropriate semantic assignments must be conserved throughout. There must be protocols to assure that through all the intermediate stages of representation and processing, the semantic content can be ultimately understood using our evolved biological means.

The co-evolutionary dynamic leading to our descriptive capabilities necessarily unfolded within primate bodies. Once our nervous systems gained the ability to process both physical and descriptive information, we had the ready-made bodily means through which descriptive determinations could instruct physical actions. Of course, our evolved bodily means are limited – although now enhanced by tools leveraging our physical powers. Unlike us, however, artifact descriptive systems and their processors do not come ready-made to act in the physical world. That requires appropriate devices to go from descriptive thought to action. Fortunately, the freedom of instantiation of symbol tokens and processors opens vast possibilities for instructing action.

Properties of the Descriptive Field: Omniphysicality, Definitional Transparency, and Universal Computation

To persist in the face of physical dissipation, information must be conserved using alternative embodiments, that is, omniphysically. Our current system of life achieves its needed omniphysicality in the only way it can by the reproduction of genomic information stores and the individuals whose creation they instruct.

Omniphysicality. The emergence of the descriptive field opens a new route to life's needed omniphysicality – a direct consequence of the independence of descriptive content from the information of its supporting embodiments. Descriptive information can be represented using any number of appropriate physical means – effectively any which conserve the token and its assigned information. The physical conservation and processing of descriptive content does not need to rely on particular instantiations. But, of course, it must be embodied by some physical means. Descriptive information is at all times and in all places physically represented.

We each have access to the descriptive realm but we are currently locked into a biological processor and body that ultimately dies. For all these years, it has seemed that mind must perish with its body. But this fact of our replicate reality is about to be overturned. Mind can be supported omniphysically.

Definitional Transparency. The semantic content of the descriptive field arises in the terms of conventionally-adopted definitions of a symbol system. That semantic content can be made transparent by deploying well-defined meanings that are consistent with each other – ones whose related and cross-referenced meanings are not contradictory. As well, the flexibility and definitional precision of descriptive content allows algorithmic instruction, enabling the processing of descriptive content by universal computational devices.

Universal Computation. Our one and only cognitive processor ultimately goes the way of the flesh. Unless there is a way for individual mind to be conserved and enabled by alternative physical means, there is no path to omniphysical life.

The freedom of instantiation of tokens and physical processors assures us that this content can be processed relying on any number of appropriate physical devices – providing the basis for descriptive content to be conveyed, conserved, and computed omniphysically despite the fact of physical dissipation for each particular token and processor.

Very importantly, and as we will see, both the content and capabilities of mind are meanings. All of mind's capabilities are meanings which are algorithmic instructions for processing symbols.

Thus, both the content and processing capabilities of mind can be physically enabled by universal computing devices. Mind is *per se* descriptive.

The main challenge to making a person's mind omniphysical is not the physical processor. Any number of appropriate universal computational devices will do. The challenge is to conserve and then convey the content of a person's mind to an infrastructure of descriptive capabilities enabling that content can be made operational as the person's omniphysical mind.

Two Distinct Kinds of Thinking

For living beings existing solely in the information terms of the physical field, all thinking is deeply physical. Neural and other structures help coordinate and direct myriad informational inputs and outputs – not only those running from sensory input to responsive action but also within internal milieus of form and function. But thinking in physical information terms is deeply physical in another respect. Not only the supporting devices but the *information content* of this kind of thinking exists only in the information terms of the physical field: there is no difference between the content of thought and its physical correlates. The content of all non-human thought inheres in the embodied information of its physical structures, capabilities, and performances.

At base, thinking in the physical field is physical cause and effect operating within information-laden structures of the physical field. More generally, and in the physical information field, physical cause and effect is information processing. For example, a physical event has its effects on sensory devices. All along the ensuing chain of physical cause and effect, instantiated information is appropriately transformed, conserved, and conveyed, having its impacts as evolution selected and embodied learning informs. Throughout all of this, information is embodied; physical field information is the information of its physical correlates.

Like other living entities, we human beings exist in the information terms of the physical field, able to execute physical performances selected for survival. But our species is the only one to have discovered symbolic representation and undergone the adaptations enabling the development and use of symbol systems. We are the only ones able to think in descriptive information terms. We are the only ones with minds.

Our brains have been adapted to think or process information in both physical and descriptive information terms. When coordinating and directing our physical performances, our brains are processing information of the physical field. But when we are thinking descriptively, we are in the information realm of mind and our nervous system is processing tokens and their assigned meanings. The symbol token is the device used to represent the assigned information using an

instantiation that can be processed by the human nervous system, taking advantage of the same bodily structures that are used to detect and process information from the physical information field. In the case of descriptive information, however, the neural instantiations represent the assigned meaning rather than the information inhering in the token itself. Thus, rather than triggering performances appropriate to the information inhering in the physical token, the learned assignment supplants that and triggers responses based on the descriptive content— such as eliciting a sound which is a token whose assignment within the meanings of the symbol system make it an appropriate response.

Mind

In thinking about mind, we must be careful not to slip into thinking that there is something or someone apart from mind doing the thinking. Actually, and accurately, it is mind that is thinking about itself. It is mind that is aware of itself, its content, and its abilities to understand, decide, make plans, instruct actions, communicate, and much more, all in its descriptive information terms. There is nothing apart from mind that thinks in descriptive terms. Even though ‘we’ use personal pronouns and other descriptors to describe ‘our’ thinking, ‘we’ recognize that this is mind thinking in its descriptive terms.

Each of us is ontologically certain of our mind’s existence. In every waking moment it is able to describe reality and itself, communicate, conserve descriptive content, integrate and coordinate descriptive inputs and outputs, make plans and test hypothetical alternatives, reach decisions, and make determinations guiding bodily actions, and more. It is your mind that is currently processing, mapping, and updating its vast reservoir of descriptive content as it processes the meanings of this paragraph.

All of mind’s content and capabilities exist as part of a system of symbol-based descriptive meanings. It is not just that mind is able to describe; mind is *per se descriptive*: all of the content and capabilities constituting mind exist in symbol-based descriptive information terms. All of mind’s amazing capabilities: its awareness and self-awareness; its abilities to understand, parse, categorize, and organize information; its abilities to set goals, priorities, express preferences, and make decisions; its abilities to store and recall information and all of its numerous other capabilities exist as part of a descriptive system.

Mind is not just any descriptive system. It is an autonomous self that is able to act in line with its priorities and preferences. The first priority is survival – both of itself and the body supplying its material support. The foundations of mind’s selfdom are its abilities to be aware and self-aware: without these capabilities, there could be no mind and no selfdom in descriptive information terms. The capability of awareness provides the means by which mind is able to experience

descriptive information while the capability of self-awareness enables it to be aware of itself as the one who has its descriptive experiences. It is mind's capabilities of awareness and self-awareness that give rise to the subjective 'I' through which each of us is able to describe ourselves as the living person we are.

It is mind's descriptive nature that makes it informationally powerful. Unlike body whose information is embodied in physical form and function, mind is free to roam. Mind's ability to map to and describe reality, to understand beyond the sensory surface, to conjecture and hypothesize, to link descriptions in complex explanations, and to instruct intelligent actions is what has made us powerfully-intelligent and has allowed our species to gain dominion in an evolutionary moment. It is mind that allows us to imagine, be fanciful, and creatively deploy our descriptive powers in unlimited uses. The linked nature of its descriptive meanings supports an open-ended and extensible semantics allowing new content to be integrated while flexibly permitting revisions and adaptations. Mind's content can be multilayered and complex, allowing abstract and nuanced description at any desired level of detail – including the self-reference at the heart of individual selfdom.

Being a descriptive information entity, mind can be supported omniphysically by any number of physical means. This follows from the nature of information assignment in which there is nearly unlimited leeway in the assignment of meanings to symbol tokens, allowing descriptive information to be represented, conserved, and processed by any number of appropriate physical means. Our mind is not inextricably bound to our current body but can move to new ones, enabling omniphysical life and the ability of the individual to persist despite bodily death.

Mind is Per Se Descriptive

The central fact about mind is that it is a purely descriptive information entity. It exists entirely in the information terms of the descriptive information field. It is mind's descriptive nature that enables it to move from body to body, and that also makes it informationally powerful. To be clear, it is not just that mind is able to describe. It is that mind is *per se* descriptive, that is, all of mind's capabilities and content are descriptive. Its contents are descriptive meanings and its capabilities are meanings which are algorithmic instructions for processing the system's symbol-based meanings represented by assigned tokens. This section offers several perspectives affirming mind's descriptive nature.

First, and at a formal level, it is possible to show that mind's content and capabilities, including its hallmark capabilities of awareness and self-awareness, are enabled by descriptive meanings. All of mind's capabilities are meanings which are instructions for processing symbols. Further, it can be shown that those meanings are reducible to algorithmic instructions for processing tokens

representing meanings and can thus be processed on any number of appropriate universal computing devices.⁶

A second perspective is an introspective one available to any of us. Take the following actions. Begin by finding a quiet place, close your eyes and to the best of your ability shut off all sensory inputs. Now begin to put your mind through some of its paces: do some times tables, recite the alphabet, count from 100 backwards to 90. These particular performances are chosen to hopefully avoid descriptive thinking that might trigger bodily ‘feels’ that might be induced by descriptions of a poignant or emotional nature. If you have isolated your descriptive thinking, you will notice there are no feels. That’s because mind is a system of descriptive meanings whose information is independent of the information of its material supports. It is per se descriptive and cannot have bodily feels.⁷

A third perspective is to consider mind’s evolutionary emergence and that mind could not exist until the advent of symbol-based descriptions. Mind came along very late in life’s evolutionary history, having to await the creation of a suitable networked processor, the development of a trove of physical field concepts able to be assigned, and the discovery of information assignment and symbolic representation. Mind is not just any descriptive system; it is one that is aware and self-aware. The critical descriptive performance enabling mind’s self-awareness is to describe oneself as the entity that is experiencing its descriptions. This critical recognition came along organically and quickly once individuals learned to deploy symbol-based representations. That’s because it is self-evident to the person using their descriptive capabilities that she is the one doing the describing and having the descriptive experiences.⁸ Mind’s emergence as an aware and self-aware entity was only possible on the foundation of descriptive representation.

Yet another way to recognize the descriptive nature of mind is to have it focus its awareness capability on itself. We are not accustomed to doing this; most of our mind’s descriptions concern our experiences and actions in physical reality, and not mind as mind. But if we have our mind surveil itself, it will be able to describe that it has purposes, starting with its survival and that of the body which physically supports it. It will also be able to describe that it has various priorities, aspirations, and preferences, and plans for achieving those. It will recognize

⁶ US Patent 9,412,069. To be clear, mind is not a machine, it is a system of descriptive meanings. A universal computing device such as a Turing machine processes the *symbol tokens* representing meanings.

⁷ Supporting this demonstration is that evolutionary search selected nervous systems able to process descriptive content without discernible physical feels during normal processing.

⁸ It didn’t matter that those individuals misidentified the self-aware entity as ‘themselves’ rather than mind, the actual self-aware entity. All that mattered was that something about them allowed them to be aware and self-aware in descriptive information terms, that is, to be aware of themselves as experiencing their descriptions.

that it has an enormous knowledge base it uses to understand complex situations, formulate constraints and opportunities, and make good decisions – and use those determinations to instruct its actions. Upon reflection, it will also understand that it has capabilities that allow it to appropriately organize and process information, draw on memory stores, evaluate and decide, and more. These reflections on mind reveal two things: all of the surveilled capabilities and content are not physical but based on descriptions, and that the reflections themselves are descriptive. Mind is a self-contained, self-aware descriptive system.

My Mind is Me

There are two fundamental facts that underlie the opportunity of omniphysical life. First, and as a descriptive information entity, mind can be supported omniphysically; it can move from body to body. The second and crucial fact is that mind is our powerful, persisting, autonomous self. In essential regards, my mind is me.

It is mind that allows us to be aware and self-aware, to know ourselves as the person who lives our life and has our experiences. It is mind that gives rise to the subjective ‘I’ that allows us to know ourselves with our unique history, relations, expectations, aspirations, knowledge, and on and on.

It is mind that makes us powerfully intelligent, providing the knowledge base to navigate in our complex reality. Mind is the source of our powerful autonomy. Of course, any creature is an autonomous bodily self. But that selfdom is a constrained one in which the information that can be put to use is embodied, limited by the capabilities of physical form and function. Mind is different, its power rests in its powerful information stores and descriptive capabilities. Its knowledge base underwrites our abilities to survive and thrive in the world; to understand deeply and broadly; to choose goals and formulate strategies; to evaluate and make decisions in our interests; to be expert and productive; to anticipate, plan, and direct our actions.

It is mind that is the seat of our memories. Its information stores conserve massive amounts of information describing ourselves, our lives, and reality. Mind accurately orders our memories in its semantic web of relations by any number of dimensions: time, place, participants, event, and on and on. It is mind who is able to seamlessly update and integrate new information, ready to deploy its robust information stores to our numerous purposes.

With information freed from its embodiments, it is mind that allows us to be fanciful, creative, invent reasons and explanations, and conjure hypotheses. Mind provides the information base on which we permute possibilities, generate options, think through alternatives, and come up with novel content. It is the font of imagination and creativity.

It is only through mind's descriptive capabilities that we have a represented concept of time. It is mind that allows us to understand the temporal order of reality: that we existed in the past, are alive in the present, and hope to be part of the future. Of course, all creatures have a past, present, and possible future. But lacking descriptive capability they cannot represent the temporal dimension of their lives. It is only mind that provides us with the temporal framework in which expectations, plans, aspirations, etc. can be formulated and ordered.

Of course, a capable body is necessary for existence. It is body that provides the physical basis for existence, that enables sensory experiences, feelings, and actions in the world. A body is certainly needed, but not a particular body. Each body will ultimately wear out and fail but thanks to omniphysicality, it can be replaced with new and ultimately better ones. It is mind that makes each of us the unique person we are and which allows us to continue our existence by moving to a new body. Mind is the person who drives, and body is the vehicle.

To emphasize that mind is who I am, let's imagine that I wake up one day and I don't have a mind. For clarity, it is not that I wake up and think to myself that my mind is not working properly. That would take mind. Nor am I saying that I wake up and have the thought that I don't have a mind. That thought would also take mind. I am saying that I awaken and am devoid of descriptive ability. I have reverted to a creature existing solely in the information terms of the physical field. Upon awakening, and being generous about my capabilities in the absence of mind, I am able to do several accustomed behaviors: I go to the bathroom, brush my hair, and wash my face. Returning to the bedroom, however, I must decide what to wear. But that depends on a knowledge of what I intend to do in a world that I can no longer comprehend, and in a future that I can no longer conceptualize. Is it a weekday? Am I going to work? Am I coaching? Am I going shopping? The questions and answers are impossible without mind.

My wife, sensing something is amiss, starts asking what's wrong. But I can't understand the language in which she is expressing her thoughts; it's all a bunch of sounds without meaning. She reverts to mime and tries signs and signals. But these attempts at communication are largely incomprehensible to me since the knowledge and interpretation of these gestures arises within a complex set of meanings that are only available to mind. She leads me downstairs with the hope that a cup of tea will pull me out of it. She's also thinking it might be time to call our family physician. Of course, the reasons for her concerns and for the movement to the kitchen are completely lost to me.

I sit down beside our family dog. My senses tell me that he is familiar but I've lost knowledge of things beneath the surface: about the dog, my wife, or anything else. I have no knowledge of my previous life or the reality in which I live. Having lost the information stores with which I

understand the world, my reality has been reduced to surface sensory inputs and my bodily abilities to react to those. I am completely adrift.

My wife, hearing that there has been a change of ownership of the Washington Football Team, decides that taking me to the game might get me back on track. She leads me to the stadium but I am clueless about everything: why people are here, why they are cheering intermittently, why large beings are running into each other and throwing projectiles, why beings in black and white are making whistling noises, causing everyone to stop, and on and on. I don't understand anything.

Having been dependent on mind to make my way in the world, my loss is profound. More generally, all of the values, morals, conventions, complex behaviors, and knowledge of reality are gone. Of course, I still have my body and its embodied semantics that allow me to stay alive but only as long as someone who is able navigate in our mind-built civilization takes care of me. I could go on, but the point is clear. Without mind, I am no longer me.

Fortunately, each of us has a mind. And mind is our powerful, thinking self. It is what enables us to know ourselves as the living being we are. It is the self-aware 'I' at the center of our existence. It is mind that opens a temporal dimension to our existence, not only to know ourselves as persisting but to remember, anticipate, aspire, plan, and execute actions over time. It is mind that is the source and repository of a far-reaching and profound knowledge base able to exploit a deep understanding of reality that not only enables our survival but makes life rich and meaningful. Mind is the seat of memory, of the descriptions that tie us to other times and places and people and things. Mind is what allows us to imagine, to be creative, to think holistically and deeply. It is mind that is the autonomous self who is home and in charge, who decides what to do, and who instructs body to do it. Mind is the locus of our identity, power, and persistence. My mind is me.

Consciousness

For millennia we have misunderstood the nature of our consciousness. The reason is that we have failed to recognize our existence in two distinct information fields. The confusions can be put to rest once we understand the manner in which each information field supports its own type of conscious awareness and self-awareness.

Living things are aware in the information terms of the fields in which they exist. Like all of life's other creatures, we are aware of physical phenomena. That awareness comes in the information terms of our sensory devices – the sights, sounds, smells, touches, and tastes that our

sensory and representational capabilities allow – the feel of pain, the sight of the color red, the smell of a rose.⁹

But having minds, we are also aware in the information terms of the descriptive field. Ours is the only species to have developed and exploited symbolic representation and to have benefitted from the adaptations through which our nervous system is able to process both physical and descriptive information. When processing sensory information as well as coordinating and directing our physical performances, our brains are processing information of the physical field. But when we are thinking descriptively, our nervous system is processing symbols, definitions, and meanings. Having access to both fields, we are able to seamlessly generate both kinds of awareness. For example, when we prick to our finger, we are not only aware of the sensory feeling of pain but also its description as painful.

In any aware experience, there is a self who has the experience. Existing in the information terms of two fields, we humans are comprised of two distinct selves, each of which has its aware experiences in the information terms of the field in which it exists.

Given the distinct nature of each information field, the nature of each self's conscious awareness and self-awareness is completely different. The bodily self of the physical field is conscious of its environment and itself in the information terms that its sensory devices and follow on physical representational capabilities allow – the felt experiences of life. Mind is conscious in the information terms of descriptive meanings, including those that allow it to be aware of itself as the descriptively aware entity. Unlike awareness of physical phenomena, descriptive awareness has no feels whatsoever. Descriptive information is independent of the information of the particular means of its physical representation and processing.

Given our existence in two information fields, we must be on guard not to confuse or conflate the two types of information. Once we understand the two types of awareness, we will be able to resolve numerous consciousness confusions while making clear the information foundations of omniphysical mind. Like us, omniphysical individuals will be consciously aware and self-aware in the information terms of both fields, only more capably. In addition, we will see that we tend to attribute more semantic content to physical field awareness than is actually the case. The semantic richness of our lives is primarily a product of our descriptive powers.

⁹A creature can be affected by physical objects and events but will not be aware of these unless they are detectable by its sensory devices. Awareness of physical phenomena is dependent on the capabilities and thresholds of the creature's particular sensory capabilities. And, of course, a creature is not generally aware of all the information produced by its sensory devices but only that elevated cognitively through selective processing.

Mind's Conscious Awareness and Self-Awareness

Each of the descriptive and physical information fields gives rise to its own distinct kind of awareness and self-awareness. Experiencing both types without understanding their distinct information nature has let us go badly astray, conflating two completely different kinds of information experiences. To set things straight, we start with mind's conscious awareness and self-awareness. Then, we'll address the very different nature of body's conscious experiences.

Mind's descriptive awareness arises from its ability to establish the meanings of symbols within the defined terms of the symbol system constituting it. Mind gains awareness and experiences descriptive content by understanding what it means in its information terms. Specifically, mind gains awareness of a symbol by calling it and computing its meaning – where the meaning is determined by the definitions of other symbols to which the symbol's definition is linked.¹⁰ For example, consider the symbol token 'Ichthyocentaur.' First, we must not to conflate sensory and descriptive information. Our sensory capabilities perceive a particular array of marks, but our mind computes the meaning of a symbol. Our descriptive awareness of 'Ichthyocentaur' does not arise because our bodily sensors see marks but because our mind determines its meaning within its defined terms. Mind's descriptive awareness arises only by dint of its ability to generate the meanings of its symbols in its defined terms.

Like awareness, self-awareness is a capability of mind. Mind's self-awareness relies on the system's underlying capability of awareness applied to itself. By becoming aware (establishing the meaning) of the symbol representing its capability of awareness, mind becomes aware of

¹⁰ Analytically, the meaning of a symbol is determined by first calling a symbol and its definition which definition is comprised of other symbols. For each symbol in the original definition, its definition is substituted, and on and on until no further substitutions are possible, arriving at primitive symbols. Primitives are of two types: symbols defined as primitives, and symbols which are denotational mappings to physical field objects and events. In practice, we humans truncate the process when a meaning serving the intended purpose is generated.

itself as the entity that is aware.¹¹ Mind is able to be self-aware because it can describe itself as the entity who is aware of its descriptions.¹²

In sum, mind gains conscious awareness by being able to generate meanings in the information terms of the descriptive content constituting it. Mind's self-awareness arises because its meanings include the description of itself as the aware entity. Thus, the system is able to generate both the content being experienced as well as the self-identified entity having aware experiences, all in descriptive terms. It is mind that enables the subjective "I" that is aware of itself as having its experiences. Put another way, the definitional flexibility of symbolic representation supports both the descriptions being generated and the subject experiencing those descriptions, all as part of the same self-contained descriptive system. We arrive at the answer to the age-old question, "Who or what is consciously aware and self-aware?" It is mind itself, the descriptive self who is able to understand meanings – including of itself as the aware and self-aware self.

Mind is able to map its descriptions to sensory information, using error-correction processes to maintain the accuracy of its descriptions. Thus, mind is able to be *descriptively* aware of the environments in which it lives, its own body, and its sensory feels. But as a descriptive entity whose information is independent of that of its physical supports, mind itself has no physical feels – it can only describe them. Not understanding this fact has led to numerous confusions about the nature of mind, as we will see. It has even led some to doubt the reality of mind. Of course, mind is completely real, a system of meanings physically represented by physical tokens which are manipulated by a very real processor.

Body's Conscious Awareness and Self-Awareness

Despite the wondrous diversity of non-human animals' capabilities, all of their aware experiences exist only in the information terms of the physical field. It's not just that the sensory

¹¹To be precise, the meaning of the symbol representing the system's awareness capability is the computational means through which a symbol's meaning is established. By establishing the meaning of this symbol, the system gains awareness of its own capability of awareness; the system is aware that it is the entity with the capability of awareness. Similarly, a symbol can be introduced whose meaning is the descriptive content of the system, including the content as well as the processing rules underlying its capabilities. When mind becomes aware of this symbol it gains awareness of its own content and capabilities.

Given the convoluted and unrecoverable nature of mind's evolutionary development, human mind is not fully transparent to itself. While it can be aware of vast amounts of its stored content, mind is not fully aware of all of its content and capabilities. To be fully self-aware, mind must be aware of itself as the aware entity, as well as all of its content and capabilities. Omniphysical mind is able to achieve full self-awareness.

¹² Although not understanding its own nature and its information separateness from brain and body, human mind was easily able to represent its awareness and self-awareness even as it misattributed those capabilities to the person generally rather than to itself as mind.

and other representational devices of all living things, including humans, are products of the physical field. It's that all of non-human animals' information, including aware experiences, exist only in the information terms of the physical field in which the information contents of aware experience are identical to their physical correlates.

A creature's awareness of physical phenomena occurs in the information terms of its sensory capabilities. Like other animals, our body feels pain and sees color because we have sensory devices and representational capabilities for producing and processing this type of semantic content. The experience of color is the product of photon-sensing devices and ensuing physical capabilities that produce that particular color representation and make it available for cognitive selection and processing. The semantics flows from the bottom up, becoming eligible to be the content of aware experience.¹³

To help guard against conflating the two fields, I am going to examine physical field awareness using the example of a real live critter that exists only in the information terms of the physical field, our yellow lab Guy de Guy.¹⁴ This is a good approach because we humans share the same kinds of sensory capabilities as Guy and, like him, benefit from a central nervous network which not only helps coordinate bodily activities but enhances aware experiences of physical field information.

Lacking access to the descriptive field, Guy is incapable of describing anything. His attentiveness to particular English language requests is stimulus and response pure and simple. If properly trained, he would respond to verbal stimuli that are pure gibberish; he does not have access to nor does he comprehend meanings in the terms of a descriptive network's symbols and definitions.

Without a description capability, Guy's world of information is fully captured in physical structure and capability. But even in the physical field, there are many things that go on inside and around Guy of which he is not aware (the same is true for us and any creature). Despite this,

¹³ From an information viewpoint, physical cause and effect is information processing. When a stimulus has its effects on a sensory device, all along the ensuing chain of physical cause and effect, information is appropriately transformed, conserved, and conveyed, ultimately having its impacts as evolution and learning allow. Throughout all of this, information is embodied; physical field information is the information of its physical correlates. Put another way, the information of the stimulus is physically transformed and processed with the physical instantiations of those transformations being the representational vehicles for the information. There is no information assignment; the information is that of its physical correlates.

¹⁴ I could have chosen a much simpler animal not so near and dear to us to make stark the differences between the semantic content of the two fields but at the cost of being further removed from our own aware experiences in the physical field.

Guy can have aware experiences with lots of physical semantics. Not only do his sensory devices allow him to be aware of much of his surroundings but also many of his bodily performances.

Guy is such a marvelously capable physical creature because, among other reasons, evolution built a central nervous system supporting the integration and coordination of his capabilities – both eligible for aware experience and not.¹⁵ Guy's multiple sensory and other capabilities as well as his brain's ability to select from among those representations enhance his physical experiences. His networked nervous system allows the coordination of Guy's bodily abilities in reaction to stimuli and in service to his own inner initiatives.

For example, let's assume that Mr. Fox enters Guy's visual field. That information is selected for awareness, immediately triggering other physical performances supporting a virtuoso pursuit if not the catch. In the chase he will be aware of multiple kinds of physical field information – the sights, sounds, smells, etc. selected to have their information impacts. His aware experiences are only in the physical information terms of his sensory devices. So, for example, he will be aware of his heightened adrenalin and other chemical levels only to the extent that their effects are registered in the detectable information terms of his sensory devices.¹⁶

What is it like for Guy or any creature existing solely in the information terms of the physical field to have aware experiences? In answering this we must never lose sight of the fact that Guy has no descriptive ability. He cannot describe himself or anything else. All that I have just described about Guy is simply beyond him. He has no mind (sorry, Guy), no selfdom in the descriptive field, and no descriptive notion of himself or anything else. His thinking and other actions are all highly organized physical cause and effect. He cannot think descriptively, abstractly, theoretically, etc. because he lacks access to the descriptive information field.

But he is a self of the physical field. He is an autonomous living creature, an astounding orderly creation whose embodied information of life was found, conserved, and enhanced over evolutionary time. He is marvelous physical form and function existing in the very real information terms of the physical field. And we love him for the amazingly wonderful creature that he is.

¹⁵His experiences not eligible for awareness rely on his nervous system, respond to appropriate stimuli, and are coordinated with other of his physical activities. But he is not aware of these activities because their physical effects are not detectable by his sensory devices. We humans have been able to extend the reach of our sensory capabilities by external tools able, for instance, to peer into the body, or the cosmos. But, of course, that information must be in forms detectable by our bodily sensors.

¹⁶ And, of course, lacking descriptive ability he will know nothing of the chemistry underlying his sensory experiences. He may be aware of a heightened heart rate but will have no clue to its physiological cause, even when his sensory devices allowed detection of such underlying states.

It should be no surprise that what it is like for Guy to be aware is to experience information in the terms of his sensory representational abilities. In his dust-up with Mr. Fox, his aware experiences were in the terms of sights, smells, sounds, tastes, feels, etc. associated with his great adventure. In running after Mr. Fox his awareness was not directed to information about his own body as much as toward his environment and its most important feature, Mr. Fox.¹⁷ But, of course, he could quickly become aware of his own body through his sensory devices – such if he were to step on a sharp object. No matter what the stimulus, the information of his sensory devices delimits the content of his aware experiences, including those of his own body. There is indeed something that it is like for Guy to be aware. It is to experience sensory-based information.

Even for advanced animals like Guy, aware experiences are in physical information terms only. These creatures lack access to the kind of information that would go beyond their physical representational capabilities.¹⁸ As an aspect of this and as would be expected under evolutionary search operating in demanding environments, their representations available for selection are highly capable but semantically sparse, selected for the efficient conveyance of information honed for survival.

Now let's turn to the critically-important issue of self-awareness in the physical information field. Being confined to the physical information field, Guy's awareness, including of himself, is only in the information terms of the sensory devices. He can see parts of himself that his eyes can detect, touch himself, smell himself, etc. Of course, much of the information of which he is aware, including of himself, can be multi-dimensional, conserved in his nervous system, available for recall and processing, and deployable for survival. But all of that information is embodied in form and function.

Body's self-awareness is completely different from mind's descriptive self-awareness. Mind enables the subjective 'I' who can describe to itself that it is having its descriptive experiences, including its descriptions of its bodily and other experiences. Not so for Guy. Lacking mind, Guy has no way to describe himself as the physical self that he is; he cannot descriptively represent himself as the creature who is having his experiences, although he is. The information of the physical field cannot be detached from its embodiments. Symbolic representation frees

¹⁷We know that in growing up, Guy directed his awareness to help learn much about his body and the performances of which it is capable, conserving that information as routines and allowing him to now navigate masterfully while focusing his awareness on the environment and the chase.

¹⁸Existing only in the information terms of the physical field, all of Guy's concepts are embodied physical form and function. Of course, these are complex and nuanced, reflecting the enormous amounts of information synthesized in Guy's nervous and other bodily systems. He can recognize objects, register and learn correlations in reality, and act to causes with appropriate effect. But all of these concepts are embodied physical semantics reflecting genetic instructions or as learned and embodied in form and function.

information from its physical correlates, giving rise to descriptions about all manner of things, including the key description that I am the one living my life and having my experiences in both information fields. Lacking mind, Guy lives his life but lacks the information capabilities to represent to himself the nature of the life he is having.

Of course, we humans with our descriptive abilities can describe that Guy is the bodily self that he is. But Guy cannot. When we attribute such capabilities to Guy or any other creature, we are confusing the information of the two fields. Our animal brethren lack the representational means to truly comprehend the nature of themselves or reality. In our own thinking about these animals, we can mistakenly endow them with description-based understanding that they simply lack.

Resolving Consciousness Confusions

We now briefly address numerous confusions arising from the failure to recognize the nature of mind, and the very different nature of mind and body's conscious capabilities. I first consider some generic confusions, followed by what are taken to be the deeper problems of consciousness.

The Guy in Our Head. It is natural to think that if there are conscious experiences, there must be someone who is having those experiences. Conflating the two information fields, early attempts to identify the basis of our conscious experiences conjectured that it might be an organ like the pineal gland, or a homunculus in our head. There is indeed a guy 'in our head' that has our descriptive experiences. But that guy is our mind, a descriptive entity. Mind's aware experiences are of descriptive content, including that it is the descriptive entity experiencing its descriptions, including its descriptions of body's feels. To posit a physical entity having mind's conscious experiences is to violate the separation of the two information fields. And, of course, body has conscious experiences, but only in the sensory information terms of the physical information field.

Idealism. Another wrong turn was to take the description of physically aware experience as the experience itself. Having made this error, it is a small but profoundly mistaken step to infer from the non-felt nature of descriptive information that physical phenomena are either not real or at least not open to physical explanation. Once again, awareness in the information terms of the physical field is completely real, the product of sensory and nervous system capabilities built over evolutionary time. And, of course, the descriptions of those physical field experiences are made by and experienced by self-aware mind.

Information Independence versus Physical Dependence. Errors arise by the failure to make the fundamental distinction between mind's informational independence and its physical dependence. The information of the descriptive field cannot be reduced to physical field

information terms. But descriptive content must be physically supported, represented by tokens able to be processed by appropriate physical means. Not recognizing the omniphysical basis of mind's support, some have posited that mind depends on strange and inexplicable physical sources, even appealing to quantum phenomena, or pseudo-phenomena like 'perceptronium.' All such musings are profoundly wrong. In fact, mind can be supported by any number of appropriate universal computing devices.

One Processor, Two Kinds of Information. Although our nervous system supports both descriptive and physical field thinking, it processes two distinct types of information. The notion that mind is what the brain does mistakenly puts the emphasis on the operations of the physical processor rather than the more fundamental information facts. Like other animals, our cognitive processing of physical field information is essential to our physical performances. But it is descriptive content that is the province of mind.

Focus on Physical Correlates. Further confusions are evident in the focus on physical correlates as the key to mind. Once we grasp the nature of mind, we see that the physical processor is not at all the main show. It is descriptive content, capabilities, and structures that are the keys to mind. Indeed, with omniphysical mind properly constructed on the basis of algorithmic processing rules, any number of universal computational devices will do. Despite all sorts of good reasons for understanding brains and their capabilities, assuming that these are the keys to mind has masked its nature as a descriptive information entity.

Mystery in an Enigma. A mainstream misconception is that the nature of our awareness and self-awareness presents a mystery that, given the current state of science, cannot be solved. This throwing up of hands is accompanied by the assumption that the resolution awaits some breakthrough in neuroscience or companion fields – a profoundly mistaken conjecture given that the correct resolution is an understanding of the information facts. We already have a scientifically grounded explanation for our aware feels. It is the same one that applies to all creatures existing in the information terms of the physical field. Our dog Guy is able to smell, see, and feel his environment and parts of his body because evolution has built sensory and supporting representational devices that generate that physical field sensory information. As for mind, there is no mystery. Mind is a powerfully-capable aware and self-aware descriptive self.

The Mind-Body Problem

For millennia, we have been perplexed and confused about mind. A key question for resolution has been formulated as the mind-body problem. "The mind-body problem is the problem of whether mental phenomena are physical and, if not, how they are related to physical

phenomena.”¹⁹ Like many problems resisting solution, it turns out that the quest for resolution has been misdirected. The key issue is not the physical relation between mind and body but the information nature of mind and of body, and the relation between what turn out to be two entirely different kinds of information entities.

Briefly stated, here’s the issue. We know that everything that exists must have a material basis. We also accept that physical entities can be reduced to or explained in the terms of their underlying material constituents – for example, the material basis of a living creature can be reduced from its biological to its chemical to its more elemental physical constituents. The question posed by the mind-body problem is whether mind can be reduced to material terms. More generally, the issue is the nature of mind.

We know that our nervous system provides the needed physical basis supporting mind. But we also intuit that our mind is an entity which seems distinctly nonphysical; our mental experiences are very different from our physical ones. For example, the pain of a pin prick is very different from its description as being painful. And at a fundamental level, mind seems to be irreducible to an underlying material basis, appearing to violate our physical-based view of reality. Lacking an understanding of mind, conjectures outside the bounds of experience have bubbled up, depicting mind as other-worldly, disembodied, driven by strange quantum phenomena, and more. These and similar explanations are completely off-base. Once the information facts are clear, there is nothing mysterious about mind.

There are two main elements to the solution of the mind-body problem. First, the nervous system *mechanisms* supporting mind are most definitely physical and can be reduced to their underlying material basis. The deeper element of the solution is the recognition that mind is a descriptive information entity. All of its content and capabilities are enabled by and are part of a symbol-based system of meanings existing within the descriptive information field; mind is per se descriptive. Given the separateness of the two fields, mind and body cannot be reduced to each other’s information terms.²⁰ Thus, while mind is *physically dependent* on products of the physical field (tokens and processors), it is *informationally independent* of the physical means by which its meanings are represented and computed. As a purely descriptive information entity, and given the separateness of the two information fields, mind cannot be reduced to the

¹⁹ The Cambridge Dictionary of Philosophy, Second Edition, p. 684.

²⁰ Reduction was one of the great discoveries of human mind, setting the empirical framework for the advance of science and civilization. Mankind’s several scientific revolutions have been anchored in reductionism, the belief that reality’s varied phenomena share a physical dependence running from the simple to the complex that is orderly, coherent, and capable of empirical explanation and validation. But the insight of reduction is so powerful that it was misapplied in the quest to understand mind. The misapplication was not due to a flaw in the reductive principle itself but to our failure to recognize the existence of information fields and the fact that reduction is possible within each information field but not across fields.

information terms of the physical field which is embodied in physical form and function. More generally, reduction is possible within information fields, not across.

Mind and Matter

A central and recurring question has been how matter can give rise to mind with all of its intelligent content and capabilities. How can a bunch of molecules give rise to our wonderful mental life and intelligence? As it turns out, we could search forever and never answer this question as posed. That's because matter doesn't give rise to mind. Mind is per se descriptive, existing in an information field that is not reducible to the information terms of the physical information field. Matter supplies the tokens representing mind's content as well as processors able to appropriately manipulate tokens representing meanings. But mind is a purely descriptive information entity existing in its linked sets of defined meanings and not in the information of its material supports.

The Hard Problem of Consciousness

As Wikipedia says, "the hard problem of consciousness is the problem of explaining how and why we have qualia or phenomenal experiences." Qualia or phenomenal experiences are the consciously aware experiences of body's sensory productions of sight, sound, smell, taste, and touch. These sensory productions have been referred to as feels, and the hard problem is to explain our consciously aware experiences of these feels.

The resolution of the hard problem is only possible through an understanding of information fields. We humans exist in two distinct information fields, the physical and the descriptive. Each field enables a self in its information terms: body is the self of the physical field and mind is the self of the descriptive field. Each self is conscious in its distinct information terms: mind is conscious in the information terms of its descriptive meanings and body is conscious in the information terms of its sensory capabilities. We humans benefit mightily from being conscious in two independent but linked information fields.

Once we understand our two-field consciousness, we will see that the issue posed by the hard problem rests on a fundamental misunderstanding of the information facts of our reality and the nature of our conscious experiences.

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Not realizing that each of us is two distinct selves, our linguistic usages merge the two and ‘I’ speak of ‘myself’ without realizing that such a self-identification is a convenient fiction. The confusion is a natural one since mind emerged on the foundation of body, concealing the separate and distinct information nature of our two selves. For most purposes, the fiction does no harm. But it leads us far astray when dealing with the deep issues of human existence, including the nature of our consciousness.

By asking “How do I have my conscious felt experiences?” we are off on the wrong foot, conflating two kinds of information. It is only mind that enables the descriptive I who is able to formulate the question. But being a descriptive information entity, mind can’t have feels. Only body can. But the body that has the feels lacks the descriptive information capabilities to ask the question. More fundamentally, it is only mind’s descriptive capabilities that allow the person to describe herself and her life, including that it is her body that is conscious of its feels. The person’s body lacks the representational capabilities to describe itself as the entity that consciously experiences its feels. Only mind can do that. But mind can’t have feels; only body can. The question posed by the hard problem rests on a mistaken assumption, namely, that there is a self-identifying descriptive I that has conscious feels.

The correct question is, “How do each of mind and body have their distinct conscious experiences and how are those conscious experiences linked and related to each other?” In previous sections, I have addressed the conscious experiences of each of mind and body. I now want to build on those to address the confusions that lead us to think there is a hard problem when, in fact, the formulation is ill-conceived, resting on a misunderstanding of our own nature.

We are the only living beings existing in both the physical and descriptive information fields. All other creatures exist only in the information terms of the physical field in which all information is embodied in form and function. Their conscious experiences exist only in the information terms of their sensory representational capabilities. Not having mind’s descriptive abilities, they lack the descriptive information means to represent that they are the living entity whose body is having its conscious feels. We humans are different. Our bodies have their conscious feels and we have a mind that can describe that our body is having its feels.

Confusion about the role of mind in our conscious experiences is partially rooted in the nature of mind’s evolutionary emergence. As we have seen, the path to mind progressed from information assignment, symbolic representation, linked meanings, symbol systems, and then to mind. The first assigned meanings were tied to important objects and events represented and detected in sensory information terms – rock, food, predator. The assigned meaning became part of the neuronal complex representing the relevant sensory information. So represented, both kinds of information can be triggered simultaneously. We humans have our sensory and descriptive conscious experiences together even though the two experiences are in completely different

information terms. Of course, there's a great deal of evolutionary advantage in having access to the two kinds of information simultaneously – thanks to a brain processor able to support two informationally distinct kinds of thinking.

The conscious descriptive experience that is triggered along with the conscious sensory experience only has meaning within the system of mind's meanings. Thus, mind's descriptions always occur within the context of a mind who is conscious of itself and its body in its descriptive information terms.²¹ The subjective 'I' enabled by mind is able to describe that its body is having its feels. But when these information facts are not understood, and with both kinds of information arising simultaneously, we seek an explanation in which the conflated 'me' has 'my' conscious experiences. We are at a loss to explain as one what are actually two informationally distinct but linked conscious experiences. Our conscious experiences are, as they must be given our two-field nature, two distinct kinds of information that are linked to each other.

But some hard problem folks may not be satisfied with this solution, casting the hard problem as how we and other creatures consciously experience our bodily feels independently of the descriptive abilities of mind. This formulation seeks that extra physical something that causes the physical feel to become the creature's conscious experience of the feel. The desire to add something extra to explain physical reality has a long history and has given rise to kindred speculations in the form of phlogiston, élan vital, and the ether. Fortunately, once science explains physical phenomena accurately, these extra somethings fall by the wayside.

The problem in seeking something extra to explain our felt conscious experiences is that it asks for something that can't exist, namely, the conscious experience of the feel as something different from its physical correlates, that is, different from the physical means by which the feel is generated and consciously represented in body's information terms. Body's conscious feels are the result of information-laden forms and functions found through evolutionary search exploiting the possibilities for order inherent in the physical information field. Any explanation of the experience of feels must be anchored in physical form and function – the physical correlates. Of course, our descriptively-based scientific explanations of body's forms and functions are constantly improving. But those explanations will always be about physical forms and functions and not something apart from or different from those.

Even though the search for something extra seeks to situate itself in the physical field alone, behind the curtain there is the unwitting conflation of two kinds of information. Not recognizing

²¹ Before the distinct information natures of mind and body were understood, people misidentified the self-aware entity as 'themselves' or brain or something else rather than mind, the actual self-aware entity. Even so, all that mattered was that something about them allowed them to describe that it was their body having its conscious feels.

that it is mind which allows the individual 'I' to be conscious that its body is having its conscious felt experiences, an explanation is sought in 'something else' that gives rise to our phenomenal experiences – a quest that is doomed to failure. Our conscious feels are the products of evolution building information-laden forms and functions – the physical correlates of our feels. And we can describe that they are our phenomenal experiences because we have a mind.

One particularly misguided attempt to explain our conscious feels is to invoke quantum phenomena. Quantum phenomena have nothing to do with either body's or mind's conscious experiences. In fact, quantum phenomena exist in their own separate and distinct information field. The information of the quantum information field exists in the information possibilities for orderly physical entities of the physical field. The quantum field is one of information possibilities; the physical field is one of information actualizations. The informational independence of the quantum and physical fields is brought by the extinguishment of information possibilities in moving from quantum reality to physical reality. That is, it is impossible to reduce the embodied information of physical realizations to the information of possibilities that were never actualized, and which no longer exist. Symmetrically, the information of quantum possibilities cannot be expressed in the information terms of a particular realization. And even though the quantum and physical information fields are informationally independent, physical reality is materially dependent on quantum reality since the realizations of quantum possibilities are, in fact, part of our physical reality. And, of course, as with everything in our physical reality, there must be an underlying material basis supporting any information field – just as the descriptive field is informationally independent but materially dependent on products of the physical field.

Now back to consciousness and the attempt to cross information fields through the invocation of the quantum. All bodies of all living things exist in the information terms of the physical field. All are replete with information inherent in and essential to the existence and functioning of these orderly physical structures, including conscious sensory experiences. All of this is in terms of actual physical entities with their information embodied in form and function, and not existing in the quantum field's realm of information possibilities. Put plainly, the physical constituents of bodies and their conscious experiences have already been actualized in physical reality.

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In sum, our conscious feels are the product of body and are experienced in body's sensory information terms – the feel of pain, the color of a rose. Body experiences its feels, but not being an aware and self-aware descriptive self is incapable of representing that it is the entity who is experiencing its feels. Mind is an aware and self-aware self but only in its descriptive information terms. It cannot feel anything, it can only describe. But mind can accurately map its descriptions to objects and events of the physical field and as part of this can describe that its

body is having its feels. Thus, our conscious awareness of our body's feels has two informationally distinct elements: the feel in body's physical information terms and mind's description of the feel as being our body's.

Thus, when we ask how 'I' have my conscious feels, the question assumes the impossible. The body which has the feels can't consciously describe itself as the one having them, and the mind who is descriptively self-aware can't have feels. In the same manner, when we try to explain why there is something that it is like to be conscious of our sensory experiences, we are again assuming the impossible, an aware and self-aware self that has feels. There is no such thing: we humans are two distinct entities: mind and body existing in separate and distinct information fields. Body has its feels, and mind inferentially maps its descriptions of them.

Once we recognize our true nature, there is no mystery to our conscious experiences. Body's conscious feels are explainable in reducible scientific empirical terms. Mind's conscious experiences arise in a descriptive system capable of describing itself as the one doing the describing and having its descriptive experiences. It is our great fortune that we are conscious in the information terms of two distinct but linked information fields, making our conscious experiences rich, robust, and far more powerful than all other creatures.

The Semantic Richness of Descriptive versus Physical Field Information

The information content of nonhuman animals' conscious experiences is sparse compared to our own. The reason is not that their sensory devices are less capable. Our dog Guy has a sense of smell/taste that is much more information-laden than ours – a fact that can't be discerned from his dining habits. The reason that our aware experiences carry so much information is because we exist in two information fields and our descriptive semantics are so rich. As a reminder, we are concerned with the semantic richness of conscious experiences and not with all the physical field information that allows Guy and all of us to be alive and aware. Forms and functions supporting life are amazing and complex. But the current issue is the contribution of each field to the semantic richness of conscious experiences. I hope to convince with a just a few examples that it is descriptive content that makes our experiences so rich and meaningful.

Sports are structured activities built around human and other physical capabilities. We invent the playground that is adorned with rules and meanings, not only about the physical performances but all the trappings that give sports their richness: winning/losing, fanatic fans, adulation and emulation, home and away, the players, the coaches, referees, and on and on. It is not only the fact that sports are created and exist solely by dint of our descriptive instructions but that our experiences of sporting events gain their semantic meaning from the descriptions we attach. Without these descriptive adornments, sporting events would convey no information other than

sensory observations of physical activities – people running into each other, using physical means to hit and throw objects, and on and on. Without the complex of descriptions that give meaning to these physical activities, the experience of sporting events would be so devoid of information as to be basically meaningless, as they are to Guy.²²

Eating is required for survival and thus co-evolutionary processes have molded creatures and their nutrients symbiotically. For us humans, however, dining involves far more than taking in food. Our modes of dining are diverse and each type, style, and venue carries its own routines and rituals, from haute cuisine to eating hot pockets on the fly. Across the gamut of dining possibilities are realms of experience that go far beyond the basic act of filling our bellies. Our dining experiences involve socializing, catching up, planning ahead, sharing laughs, being entertained, and on and on. All of those are firmly anchored in mind and its descriptive semantics.

Memories. An experience occurs at a point in time. Memories are newly created experiences brought about by processing conserved semantics, whether of the physical or descriptive field. To help appreciate the role of description in memory, have your mind instruct the retrieval of a past event such as the day you stood at the edge of the Grand Canyon, taking in the vista and describing the wondrous scene to anyone who would listen.

Recalling this event, your semantics will be dominated by description. In fact, your physical semantics conserved neuronally will be attenuated; the recalled vista will be a shadow of the reality as actually experienced – the reason we take photos and videos that can be processed anew by our sensory capabilities.²³ The memory of that day will be centered in the descriptive web of who, what, when, where, and why – with mind’s associative network giving meaning to and amplifying the recalled event. The long-ago event at the edge of the Grand Canyon will be remembered within a descriptive narrative with your mind instructing your body to reach for the family picture album to see again the scene at the edge of the abyss.

Now let’s consider aware experiences that are in the wheelhouse of the physical field: sex and sensory experience. Even here, mind transforms the experiences into something completely different from, and far more information-laden, than comparable experiences of creatures confined to the physical information field.

²² Repeating, we always need to keep separate the role of descriptive semantics in enabling the various physical constructions we deploy to enable experiences versus the role of these semantics in the conscious experience itself.

²³ The fidelity of human sensory memory is weak for two basic reasons. First the neural means of storage and retrieval atrophy over time. Second, cognitive conservations are highly processed. For example, the sensory devices that produce original visual data are not involved in the recreations that are those memories. What we ‘see’ as a visual memory is the re-experiencing of a highly processed representation of the neural network.

Sex is the most essential physical act allowing replicate life to persist; we are wired to seek it as a top priority. Again, we are not discussing all the built-in replicate features that drive us to and allow us to perform sex. I am focused on the fact that our experiences of sex are vastly enhanced by our descriptive semantics.

The physical experience of sex was selected to be pleasurable. The sensory devices attending the act are fine tuned to register information that is desirable in the terms of replicates' physical semantics. Even so, the content of the descriptive field has revolutionized human sexual experience. Drawing on the unified semantics of both fields, a pleasurable sensory registration can be enabled and enhanced in multiple ways and meanings by descriptive thoughts, projections, and fantasies. Sexual descriptions can induce strong physical/emotional effects and it is mind that directs the actions, rituals, and the use of visual and other accompaniments that the individual finds sexually stimulating. Our descriptive semantics have transformed sex into a multi-dimensional happening replete with experiences outside the semantic reach of all other creatures.

Sensory experience is a product of the physical information field but it is descriptive adornments that amplify our enjoyments. We humans do not just have physical sensory experiences; they are accompanied by all sorts of descriptive meanings and associations. Even for the most basic sensory registrations, the power of description is apparent. Smells trigger manifold descriptions taking us to places and times, both remembered and imagined. Think of the taste of chocolate, the sight of a sunset, the sound of waves on the beach, and the smell of perfume. The experience of each is amplified, extended, and enriched by our webs of descriptive meanings.

Any of us could continue to cite examples of aware experiences whose semantics are dominated by description – affecting almost all experiences that arise within our mind-built civilization. It is the semantic reach and profligacy of the descriptive field that makes human experiences so full and meaningful. Guy and other nonhuman creatures are wonderful unities of physical form and function. But their experiences occur only in the informational terms of their sensory devices, some of which are pleasurable and some painful. They lack the descriptive capabilities that confer so much meaning to our experiences.

A New Unit of Life's Persistence

To win persistence in the face of material dissipation, life must be omniphysical. Our current system of life achieves its needed omniphysicality through replication. Life's information is conserved in the sequence of bases of replicating DNA macromolecules whose regularities of performance support both the transcription and translation of life's information. Despite this

marvelous accomplishment, a central fact remains; replicate life wins its persistence through the march of generations. Each individual is a passing actor on the stage of life.

The advent of the descriptive information field and mind opens a wholly new means of achieving life's needed omniphysicality, one in which both existence and persistence are vested in the individual. In the omniphysical system of life, omniphysical mind is the persisting information store, the enduring basis of individual identity and autonomy able to instruct the physical means of the individual's ongoing existence. As omniphysical, an individual's mind moves to, inhabits, and commands alternative bodies, allowing the individual to live on and on despite the fact that each particular body must ultimately fail.

It is not only its omniphysicality that empowers mind as the information store of persisting individual life. Mind's descriptive reach is unbounded. It can describe everything that can be physically represented as well as providing the information foundation on which creativity and imagination can flourish. The linked nature of its meanings supports an open-ended and extensible semantics allowing new content to be integrated into the system of meanings while also flexibly permitting revisions and adaptations. Mind's content is multilayered and complex, allowing abstract and nuanced description at any desired level of detail – including the self-reference at the heart of individual selfdom.

Omniphysical mind is the powerful self of the descriptive information field. Not only is it fully aware and self-aware but it is able to be fully interactive with its environments; take in, organize, and process new information; grow its information stores; make decisions in its self-interest; and broadcast its determinations and other semantics. It can easily conserve descriptions of its history, experiences, preferences, aspirations, fact sets, and more. It can think and decide according to its values, beliefs, and goals and instruct the body which houses it. It knows itself as a unique, autonomous, and powerful self with a past, present, and an expected future.

While omniphysical mind is the information store of omniphysical life, it is not the unit of persistence. In the omniphysical system of life, the unit of persistence is the individual able to compel its ongoing existence in both information fields. That accomplishment requires mind to be physically supported so that its descriptive determinations can cause the physical means supporting the individual's persistence – can cause the building of the new bodies on which the individual's persistence depends.²⁴

²⁴ To accomplish this, omniphysical mind's descriptive content must be represented by tokens and aligned with physical processors so that its determinations bring about its described intentions. For us humans, a nervous system capable of controlling and coordinating bodily performances was already in place before the advent of mind. That nervous system was adapted to be a symbol processor whose neural representations of descriptive information aligned descriptive thought and physical action. The alignment of symbol-based instructions and physical actions is a common feature of many of our artifacts such as robots and autonomous systems, albeit at a lesser level of complexity than mind and body.

A self-enabling unit of individual persistence will take time. To help appreciate this, consider the transition from human to omniphysical life. The first and essential accomplishment will be for individuals to conserve the content of their mind – both of the past and the ongoing present. That content will need to be conveyed to a platform of omniphysical mind, an information infrastructure of mind’s capabilities on which a person’s content of mind can be made operational as their omniphysical mind. The contemporaneous undertaking will be to create the bodily means to house and be directed by a person’s omniphysical mind.

Initially and necessarily, the ability to become omniphysical will be accomplished through large-scale efforts harnessing our civilization’s scientific and technological prowess. But in time and on this foundation, individuals will gain in instructive power to become fully self-enabling, able to instruct and cause their persistence in both information fields.

Linkages of the Two Fields

Life is lived in both the physical and descriptive information terms. To enable omniphysical life, the two information realms must be properly linked with an eye to both persistence and power.

The first sets of linkages are those running from the physical field to the descriptive one. Even though mind’s information is independent of the information of its physical supports, its representational and processing capabilities depend on products of the physical field. Fortunately, and as we have seen, omniphysical mind can be supported by universal computing devices.

The second sets of linkages are those allowing mind to accurately map its descriptions to the physical field. Just as for humans, sensory devices of omniphysical individuals will be used to detect and represent contents of the physical field. Those representations will then be mapped into mind’s descriptive information terms, able to be appropriately processed. Error correction mechanisms adjusting descriptions to reality will assure the accuracy of mind’s descriptions.

The next sets of linkages are those allowing mind’s descriptive determinations to instruct – cause appropriate actions in – the physical field. As omniphysical, mind drives the critical determinations of the individual. But those must be supported and linked with appropriate physical devices that effectuate those determinations. The freedom of instantiation at the core of the descriptive field allows tokens and symbol processors to be aligned and linked to bodily capabilities so that the determinations of mind cause intended physical performances in reality.

Bodily devices are the essential mechanisms supporting actions in the physical realm. Like today's evolved ones, many of those of omniphysical individuals will be callable for activity.²⁵ They will be replete with information as physical form and function and vulnerable to physical dissipation. Unlike our current situation, however, these individuals will not live or die with their particular embodiments. Their physical devices are just that, forms supporting the existence and goals of the individual as a persisting individual. These vehicles of life will be built and deployed to enable the individual's performances – allowing the individual to operate in alternative environments and experiential realms.

Information must continuously flow between the mind and body. Omniphysical individuals will deploy sensory devices, translators, and mapping mechanisms supporting isomorphic descriptions of physical reality in the conventions of the language in which individuals are aware and self-aware. That content will become part of mind's information store available for further processing. That store will be dynamic, allowing real-time updates and computations affecting memory, preference functions, and other constraints on computations. Those descriptions will be tested and grounded by the performances of physical devices, with the accuracy and efficacy of its descriptions and instructions continually being revised and updated. From a longer-run perspective, determinations at the descriptive level will drive the construction of bodily devices that increase power in both fields. The linkages among mind's determinations, instructions, experiences, and updated descriptions close the needed information loops between the physical and the descriptive, allowing the individual to generate, extract, and exploit semantics within both information fields. In sum, mind will instruct the physical means supporting life as omniphysical in both information fields with linkages among mind, physical devices, and actions in the physical field providing the basis for a cohesive self.

Why Other Creatures Don't Have Minds

While there are many other intelligent animals, ours is the only species with mind. I want to explain why this is so, first making clear the essential elements needed for mind's existence, and then focusing on the circumstances that enabled our path to mind. That will put us in a position to understand why, despite a common evolutionary foundation, other creatures haven't been able to get to mind.

²⁵ Some devices and actions will not be callable by the individual's omniphysical mind. These would function on a sub-aware basis within their own delimited range of performances –all designed, deployed, and constrained according to descriptive determinations, and built at the 'factory.'

Mind came along very late in life's evolutionary development. It took hundreds of millions of years for complex network brains and nervous systems to develop, able to serve as the physical system on which symbol-based descriptions could be represented and processed.

At the foundation of symbolic representation and symbol systems is information assignment. This is the ability to deploy a physical object to represent information different from the information inhering in the physical object itself. For example, the string of marks written as 'person' is a symbol token whose assigned meaning represents and describes each of us.

Numerous other creatures have developed the ability to assignment information – a particular sound means danger, and another means friend. Sounds and other animal performances are deployed to represent information that is different from that inhering in the physical token. They have the ability to understand “this means that.”

While information assignment is the seminal accomplishment, more is needed to get to symbol systems and mind. The essential requirement is for symbol-based meanings to be defined and understood in terms of other symbols and their meanings. By gaining the ability to use meanings defined in terms of other meanings, symbol-based information can be about anything. It becomes possible to think in information terms that are abstracted from their particulars, only possible using meanings defined in terms of other meanings. The development of symbol systems in which multiple symbols are linked to each other gives rise to a new and powerful kind of information in the form of descriptive meanings.

Whether the threshold to symbol systems can be crossed depends on numerous factors. Fortunately, a confluence of characteristics and circumstances allowed our ancestors to cross that threshold. Being primates, they benefitted from complex brains and nervous systems and had developed substantial troves of cognitive content to be assigned and represented symbolically. Sensory, motor, and communication capabilities under development over evolutionary time supported the ability to use, conserve, and convey meanings. Living in threatening but opportunistic environments that rewarded socialization, our ancestors were organized and situated to share, develop, and pass along descriptive information. A burgeoning brain capable of symbol processing required lengthy gestation and education, with pair-bonding providing the family structures in which smart but weak animals could mature. Being upright increased opportunity and intelligence in numerous known ways, as did the opposable thumbs that made our ancestors dexterous and more. And, of course, the competition to survive rewarded the ability of descriptive information to organize hunts, defenses, the social order, and on and on.

Mind emerged over hundreds of thousands of years, a virtuous adaptive process in which symbol usage sparked supporting physiological changes such as growth in brain size, rewiring of the hominid brain, and development of biological mechanisms and peripherals to take in, organize,

process, conserve, and report symbol-based information. On the other side of the co-evolutionary ledger were corresponding adaptations in symbol systems. Tokens, grammars, languages, and processing protocols aiding symbol use were selected for their representational power within the constraints of a primate processor.

What about awareness, self-awareness, and the ability to self-identify – the capabilities on which mind’s autonomous selfhood rests? Once our primate ancestors could describe, their descriptions included the fact that they existed, as evidenced by their sensory capabilities. And, of course, they were aware of themselves as making and experiencing their descriptions. Self-awareness and the creation of the subjective ‘I’ quickly followed from the ability to describe. Mind, the descriptive self, emerged organically as part of our ancestors’ use of descriptive meanings.

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With this background, let’s turn to why other creatures don’t have minds. Consider whales and dolphins, two intelligent mammals with voice and body language communication capabilities who can signal information, and who know in their pertinent information terms that, “This means that.” Their main impediment is that they live in the sea, an impossible environment for mind to be born given the difficulties of communicating and conserving meanings in ways that can be shared and grown. Even though these are wonderful and highly adapted, the bodily and environmental facts leave them no way to conserve, share, and grow the sets of meanings on which symbol systems and mind might emerge.

How about our primate cousins like chimps, and apes, and orangutans? It should be no surprise that they have several of the characteristics amenable to the development of mind. They live in varied, rich, and challenging environments. They are dexterous, live in social settings, can articulate and communicate by sound and other bodily capabilities. As for representative intelligence, they have a repertoire of signs and signals, and can act appropriately on those, as evidenced by the fact that we can teach them large numbers of signs which they can retain and use appropriately.

But they haven’t been able to create symbol systems whose meanings are defined in terms of other meanings. They are candidates for mind, but their cognitive and other bodily capabilities are insufficient to underwrite the symbol-based usages at the foundation of mind. Best case, they are akin to our ancestors perhaps hundreds of thousands of years ago. While it is heartening that there are species with the potential to get to mind, and as much as we might think we can speed their development of mind, we have no way to affect the underlying issue – the needed physiological basis supporting symbol systems.

How about dogs, our wonderful smart companions who know how to manipulate their own and our behaviors so well? Despite all of their smarts, they are very far from the accomplishments needed for mind. In truth, they and all non-primate animals lack the cognitive capabilities for mind. Their brains are insufficiently developed for assigned information to be understood in terms of other meanings. The fact that their physical means for communicating, conserving, and sharing information are limited are also inhibitory factors. But those aren't the major constraints. The problem is more fundamental: they lack the brains, nervous systems, and bodily peripherals able to support complex systems of meanings.

I want to close by returning to mind's development in our species. That development took an extraordinarily long time. Our descriptions of the evolutionary process tend to summarize and compress. We are unable to fathom the trials, happenstance, and time involved in this most significant accomplishment. Fortunately, our hominid ancestors were advantageously situated to benefit from circumstances in which brains, bodies, and symbol systems could successfully co-adapt. In the early stages, this new kind of information was communicated person-to-person with the generations building on what had been conserved before. With the development of writing, our species gained a powerful way to externalize, conserve, convey, and grow descriptive information. Then came printing and the democratization of knowledge, and recently the digital means that multiply our information capabilities. And now, we see that mind opens the portal to omniphysical life.