Chapter 6
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Instinct as Form: The Challenge of Bergson

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Abstract In *Creative Evolution* (1907/1911), a pivotal discussion is the extreme complexity of instinctual behavior. As one of many examples, a member of the Hymenoptera "knows" precisely the three locations of motor-neuron complexes at which to sting a cricket such that it is paralyzed, yet remains fully alive for the wasp's larvae. Two points: a) This behavior is as much an "irreducible" complex of *acts* as the structural organization of the wasp's body, and just as inexplicably formed by natural selection, and, b) the instinctual behavior is actually at the same level as the vital processes of the organism. This is to say that any theory of evolution, be it selection, self-assembly or self-organization, is equally bound to address not only the origin-problem of an organism's structure, but the correlated functional problem of instinct.

Instinct, however, was Bergson's prime source for holding, firstly, that we must see Consciousness as the impetus behind evolution and secondly, that it is only by utilizing the essence of instinct, conjoined with intellect – his "intuition" – that mind and science can penetrate these mysterious evolutionary processes. This double thesis of the role of Consciousness and the role of intuition likely helped to cause Bergson's neglect in the biological world, but subsequently there has emerged the current sharp awareness of the "Hard Problem" of Consciousness (Chalmers, 1995). The ongoing failure on a solution to this problem – its very, very unresolved status – should give us pause. In fact, integral to the argument of *Creative Evolution*, though always only obliquely referenced, was *Matter*

and Memory (1896/1912), and in this work was a remarkable solution to the Hard Problem – when understood, an amazing feat of "intuition." This, we will see, casts Bergson's view of the role of Consciousness in evolution, and the nature of instinct as one of evolution's lines of development, in a new light.

Key words Bergson, instinct, intuition, time, consciousness, Gibson, affordances

X.1 Introduction

Intuition. Bergson is perhaps most famous for his emphasis on this. Intuition – this is something everyone has a feel for, understands somewhat, experiences, but as usual with Bergson it is highly doubtful this concept is understood with its radical implications for our Science. Bergson's vision of it was developed in the context of evolution, i.e., how is evolution explained, what is the "mechanism" behind it, and thus in analysis of Darwin and Neo-Darwinism. It is the salient feature of *Creative Evolution* (1907/1911; henceforth, CE). In Bergson, intuition merges with the problem of instinct, with instinct itself being seen as an inescapable problem for any theory of evolution. One cannot separate a theory of the evolution of *forms* – birds, bees, butterflies – from a theory of the instinct these forms display. These are inseparable problems.

We're going to go immediately to a pivotal point in CE. Bergson begins here on the problem of the Hymenoptera – the wasps (and sawflies, bees, ants). Per Wiki, females "typically insert their eggs in hosts." Fine, one would think this is not a problem for evolution theory. Here's Bergson:

> We know that the different species of Hymenoptera that have this paralyzing instinct lay their eggs in spiders, beetles or caterpillars, which, having first been subjected by the wasp to a skillful surgical operation, will go on living motionless a certain number of days, and thus provide the larvae with fresh meat. (Bergson 1907/1911, 172)

Yes, a bit gruesome, and:

> In the sting which they give to the nerve-centres of their victims, in order to destroy its power of moving without killing it, these different species of Hymenoptera take into account, so to speak, the different species of prey they respectively attack. (ib)

Continuing:

> The Scolia, which attacks the larvae of a rose-beetle, stings it in one point only, but in this point the motor ganglia are concentrated, and those ganglia alone – the stinging of other ganglia might cause death and putrefaction, which it must avoid. (ib)

And:

> The yellow-winged Sphex, which has chosen the cricket for its victim, knows that the cricket has three different nerve-centres which serve its three pairs of legs – or at least acts as if it knew this. It stings the insect first under the neck, then behind the prothorax, and then where the thorax joins the abdomen. (ib)

Finally:

> The Ammophila Hirsuta gives nine successive strokes of its sting upon the nine nerve-centres of its caterpillar, and then seizes the head and squeezes it in its mandibles, enough to cause paralysis without death. (ib)

How can we account for this knowledge by evolutionary "steps"? Neo-Darwinism gives us:

- Random mutations
- Carried by DNA…
- …IF the mutation has *survival value*.

We ask: an Ammophila once learned all the necessary nine strokes plus the head squeeze – all at once? And transmitted this in its DNA? Less than this, say, transmitting just one of the nine strokes – this is a NO, by definition – no survival value! How were

these wasps providing for their offspring before this, how were the larvae staying alive – before this knowledge? And how is such a complex knowledge/action "encoded" in DNA?

There is, of course, the *new synthesis* position. This adds self-organization to Darwinism, where self-organization implies the self-creation of structures employing constant energy input (i.e., dissipative structures). But how does a system – an organism – "self-organize" into this *knowledge:*

- The exact three points to sting a cricket???
- The exact nine points to sting a caterpillar (plus head squeeze)???
- The precise location of the critical knot of motor neurons?

And note, *this knowledge implies the structures* (stinger, ovipositor, muscular support...) with their functionality required to support the actions implementing this knowledge.

So, the problem is inverted – function (the *concept* of the *action*) precedes structure. We are not simply "self-organizing" (or mutating) new structures which beings (like wasps) then discover are useful, say, for stinging caterpillars at precise points! We already have to account for the concept of the function, or as Bergson will term it, the *impetus* driving the birth of this function. This is to say that we need consider whether we are dealing with a problem of Consciousness, i.e., a Consciousness behind evolution. For Bergson, Consciousness is the impetus of evolution. It is for this reason that our intellect, by itself, cannot penetrate the wasp, the origin of its instinct, the origin of its structure. Why? This is what we're about to see. A bit paradoxically, we will be mixing an analysis of the problem of instinct and form with a methodological prescription to its solution based in the very nature of instinct. But firstly a couple of correlated things.

X.2 The Problem of Commonsense Knowledge

The nine stings necessary for paralyzing the caterpillar, the three stings at precise points for the cricket: of what does this remind us? "Irreducible complexity" and Behe's (1996, 2000, 2007) mousetrap – the mousetrap being only a metaphor for the complexity of the organization of parts in an organism. The force of Behe's argument was not that one cannot imagine simpler mousetraps than say, our standard mousetrap. McDonald (2000, 2002), in fact took on the mental exercise of constructing a series of such, starting from an extremely simple trap, yet functional, to increasingly more complex versions. The force of Behe's argument was that, to evolve to a new and different form of trap, one cannot evolve (or mutate) just one part of an already functional mousetrap for the resultant new trap, given just this one change, is useless – non-functional – the one change then itself having no survival value. Or if transitioning from trap A to trap B, make one change to trap A which leaves it non-functional (until we get to B) – we need the entirety of the function changes or transformations at once. We need an interrelated set of parts/changes that create a functional whole. Consider (Fig. X. 1) the transformations required to move from one of McDonald's "fully functional" mousetraps to a next, more advanced, functional stage:

Transformation steps (partial list), from Trap 5 to 6:

- Expand platform
- Reposition spring
- Rotate hammer down
- Create slot for hold down bar
- Position hold down bar
- Create fancy release for hold down bar

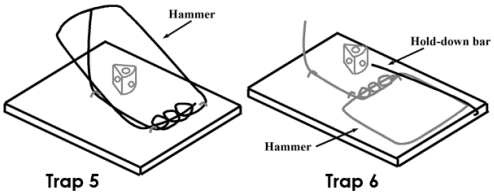

Fig. X.1 McDonald's Traps #5 and #6

Elsewhere (Robbins 2002, 2012), I argued that evolutionists, in treating this problem, have simply bumbled, with apparently no awareness, into the massively unsolved problem of AI – *commonsense knowledge*. AI oscillates from ignoring the problem to renewed enthusiasm as new developments come along. For example, LeCun (2016) expresses explicitly a new determination to solve the problem (per him, "a very old, classic problem in AI") via deep learning networks with their many variants. In truth, the commonsense problem is simply a restatement of the "frame problem" (McCarthy and Hayes 1969) already deeply recognized in the 1960's. One can state the frame problem as such: how does a robot, watching coffee being stirred (a very commonsense piece of our knowledge of things) recognize an anomaly? Anomaly examples might be: the coffee surface erupts in geysers, or the spoon collapses and melts, or the coffee liquid periodically rises one inch above the cup and falls back. The problem is that the robot is (constantly) checking his very, very long list of "frame axioms" – things that *do not change* while this event (a "frame") occurs – the cup stays in a stable position, the cup does not collapse, the table holds steady under the cup, the president stays the same, the sun stays up, etc. How to perform this axiom-check against this very, very long list in real time against the ongoing event? As Wheeler (2008) notes, this problem was attacked enthusiastically for 30 years, then simply "faded," i.e., despite occasional claims that the problem was solved (which LeCun is obviously disregarding), never actually solved.

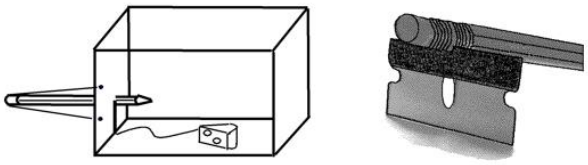

Fig. X. 2 Crossbow trap, axe for a beheading trap

The exercise considered in the 2012 paper was creating a mousetrap out of a pile of components, say, for a partial list: a small box, rubber bands, paper clips, tooth picks, string, staples, a razor blade, a pencil, a piece of cheese. This was actually a little creativity test for engineers, and the paper was sourced originally in contemplating an AI paper by Freeman

& Newell (1971) we'll discuss further in a later section. The paper purported, by implication, to do this kind of thing, i.e., to *design* a device. So, back to the component list: one could construct a type of "crossbow trap" with pencil as arrow, rubber bands pulling the arrow back, paperclip locking the pencil in position, string attached to the cheese and clip. Or (Fig. X. 2) one could construct a form of "beheader," with the razorblade and pencil forming an "axe," rubber band providing the downward force, pencil propped up by a toothpick, string/cheese attached to toothpick, the pencil's (non-axe) sharp end lodged in the box corner, etc.

These are dynamic transformations of (visual, kinesthetic) imagery in thought. They must occur in an indivisible flow of time. This cannot be within the discrete state "time" of the computer model of mind, where, as each state arrives, the previous disappears. In this framework, there is only one (abstract) state at a time. There is no *transformation* per se, i.e., there is no basis for continuity in this abstract framework, but continuity is intrinsic to "transformations." (I'll expand these statements in a later section on the *classic metaphysic* of space and time this framework reflects.)

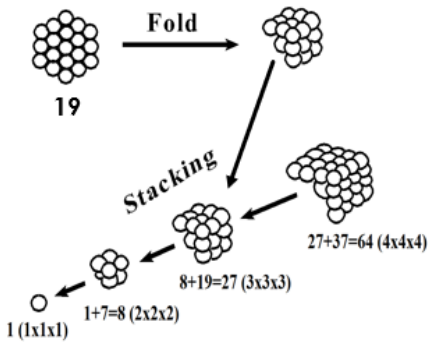

Fig. X.3 Penrose's visual proof of a computation that does not stop: adding two successive hexagonal numbers always results in a cubical number. A hexagonal number (like 7, 19, 37) is *folded* into a three-sided cube, then *stacked* over the previous cube, the resultant always being a cubical number.

This point is precisely that of Penrose (1994) in his examples of "non-computational thought," a process he argued required *consciousness*, though unfortunately neither Penrose nor his many angry critics were aware of this implication of his argument. One example he

gives (Fig. X. 3) is a *visual* proof of "a computation that does not stop" (i.e., the halting problem). In this, he takes a hexagonal number, folds it into a three-sided cube, then stacks this three-sided structure over the previous cube, the result being again a cube (thus a cubical number, with each successive stacking also being a cubical number). It is obvious that this process and its cubical result will never end, and it is obvious that this is a *continuous* visual event-transformation – folding, stacking – each transformation preserving certain *invariance* – cubicalness, three-sided structure, rigidity, stability, spatial fit.

The problem of consciousness and the nature of time are inseparable. Consciousness itself, as we shall explore, is an indivisible, continuous flow. This underlies the perception, shall we term it, of the *globality* of the transformation, with the various invariants being preserved. This is not possible via a discrete state machine. This is not grasped nor understood as a need by AI, consciousness being yet an epiphenomenon in its "cognitive" framework; consciousness exists, yes, but its function is mysterious, apparently unneeded. In fact, this is why *consciousness is required for true cognition* (Robbins 2009), not only for transformations upon forms in proofs, but even for the transformations of pencils while creating lowly mousetraps.

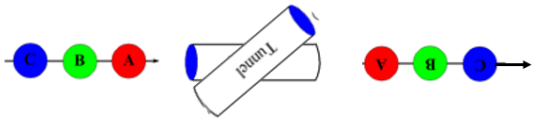

Fig. X.4 Piaget's Tunnel-Bead Experiment. The beads (on a wire) are pushed into the tunnel, the tunnel given N half-turns, and the child is asked in which order will the beads emerge.

"Continuous transformations" is a bit insufficient to cover what is intended here. We are talking continuous transformations in a perceptual (or cognitive-perceptual) *modality* – the visual, the auditory, the kinesthetic. The great theorist of child cognitive development, Jean Piaget, studied these extensively. In one example (1946), the children, ranging from ages 3-7, are shown a tunnel into which three beads, ABC, on a wire are moved (Fig. X. 4). The tunnel is semi-rotated (180^{o}) and the children asked in which order the beads will come out (inverted: CBA). The questions are ultimately generalized: what is the order after 3

semi-rotations, after 7 semi-rotations, after 8? The abstract generalization – the invariance – is the "odd-even" rule: the order remains the same after an even number of rotations and the order changes (inverts) with an odd number (yes, again, a computation that does not stop). But the children struggle until roughly the age of seven to reach this generalization – to perceive the invariance. In the meanwhile, over the years of their developmental trajectory (i.e., over the changes of their neural organization), they are working on improving the visualizing of the semi-rotations. They will come to a point for example where they can predict the result of 3 or 4 semi-turns, but are yet lost when asked to jump to, say, 7 or 8 – they cannot visualize this many half-turns. For Piaget, the eventual achievement of the odd-even rule or invariance (his "concrete operations" stage) is the result of *schematizing* these visual transformations, until they become like a little schematic experiment that does not actually have to be fully performed.

This is what is required: a "device" that supports, in multiple modalities, continuous transformations over which invariance is preserved. This is a "device" far beyond a standard computer, its intrinsic discrete time framework and its homogeneous substrate for memory (e.g., magnetic cores). Indeed, if the universe is capable of creating such contraptions as beetles (variant after variant), butterflies, or brontosaurs, it must be a far different "device" from a Turing form of "cosmic computer" employing AI-like processes for design. Yet it is not difficult to show that *the evolutionists and AI are allies*, with evolutionists implicitly, covertly appealing to AI-like processes, for the concept is apparently that these transformations of parts into new functionality, i.e., commonsense knowledge, is easily solved, in fact algorithmic. Noting Miller's (2003, 2004) concept of pools of available biological parts, Dawkins (2006) held that evolution is simply "commandeering" from these pools of biological parts and modifying them into new "devices" or forms. The concept is already there in Darwin's "exaptation":

> On the same principle, if a man were to make a machine for some special purpose, but were to use old wheels, springs, and pulleys, only slightly altered, the whole machine, with all its parts, might be said to be specially contrived for that purpose. Thus throughout nature almost every part of each living being has probably served, in a slightly modified condition, for diverse purposes, and has acted in the living machinery of many ancient and distinct specific forms. (Darwin, quoted by Shermer 2006, 68).

Though Darwin is clearly going to be no better off than Miller in coaching AI on creating programs for the design of mousetraps, in lieu of "commandeer," Shermer confidently employs the term "co-opt," as in evolution "co-opts" features to use for another purpose. For "commandeer," Scott (2004) uses "borrowing and swapping." For "commandeer," Dennett (1996) substitutes the term "generate and test," holding, with no explication, that evolution simply "generates" new devices such as flagellar motors (or mousetrap #6) to test them out. Finally, Kevin Miller (2004) himself simply uses "mix and matching" saying, "…it's to be expected that the opportunism of evolutionary processes would mix and match proteins to produce new and novel functions" (2004, 88). It is difficult to resist stating that if Dennett, Shermer or the evolutionary biologists know secretly how to program these things, if they have solved the problem of commonsense knowledge, they should be transmitting this to the folks in AI.

DNA and Coding "Commonsense"

There is the problem then of the transformations of forms, say, from beetle variant 1 to beetle variant 2 – the implicit force of Behe's argument. But this is equivalent to *employing* these forms, using these in behavior – a human making the mousetrap out of handy materials, or, if one is a spider, constructing webs. This is the "commonsense" of spiders. One could spend much time, for an example, on the incredible complexity of spider web construction. Gunther (2012) takes us through a thought exercise, scaling up the web problem to human size. We would face stringing a web between two 90-foot-high trees separated by 300 feet. We end up employing nearly one mile of rope, casting the first line across from one tree to the other, somehow, and then creating the radial spokes, constantly adjusting the spokes for tension, and always tailoring the web, contextually, to the conditions of wind, to the precise configuration of branches from which it will be hung. Each web is thus slightly to even largely different. As a spider, we can do this from Day 1, and since the spider can do this on Day 1, all this knowledge, this ability to make contextually dependent, complex engineering feats called webs – this *instinct* – is supposedly encoded, yes, like an AI program, in DNA.

Just like the wasp, the question becomes: How can DNA possibly "code" such knowledge? One could explore the possibility of morphic fields (Sheldrake 2012), but even were these fields to explain the memory (passed from spider generation to generation), they could not explain the *initial creation* of the ability. There was Spider #1, and Wasp #1. We are forced to the beginning – to Consciousness.

X. 3 Consciousness, the Hard Problem and Evolution

If there is a deepest theme in CE, it is: Consciousness is the impetus behind the explosion of forms in evolution. My suspicion is that the role of Consciousness in CE is considered "interesting" at best. It does not carry close to the weight it should. Why? Because *Matter & Memory* (1896) is the foundation of CE, and the difficulty is that M&M and its significance was little understood. Even by its admirers, its concept of perception was considered "obscure." This is because it was a holographic theory, fifty plus years before Gabor's 1947 discovery. It was elegant, yet abstruse, well beyond Pribram's (1971) attempt to use the holographic concept, and anticipating but well beyond Bohm's approach (1980). It was, as well, a solution to the Hard Problem – before the Hard Problem was (somewhat) understood or "announced" (e.g., Chalmers 1995). In CE, it is amazing how minimal is Bergson's explication of his M&M model of consciousness and perception, barely a, "I said things on this in another work…"

The Hard Problem is still not understood. But this problem is key, the salient problem of our times, hovering over physics with QM's measurement problem and over the whole endeavor of AI! It is interesting to ask: suppose this problem and Bergson's solution were really grasped and accepted? Would CE then be weighed far more seriously? *This* is the problem: if consciousness is merely an epiphenomenon, a mere "phosphorescence from the brain" (as Bergson described this materialist position), all is just *matter*, and Consciousness cannot be the impetus of evolution, rather, it is just a result. But if not an epiphenomenon, then, particularly in Bergson's framework, we have something else entirely.

The Hard Problem, as stated by Chalmers (1995), is generally this: Given some neural or computer architecture, i.e., given chemical-neural flows or changing bit patterns, how does this architecture account for the qualia of the perceived world? Here "qualia" is generally construed as "the redness of a sunset," the taste of cauliflower, the feel of sandpaper, the brown and cream color of a coffee surface. These are somewhat "static" qualities, but this is typical: time is not considered a problem in this literature. Though the term qualia was not used by Chalmers in 1995, this was the import. The emphasis since Chalmers has been on explaining qualia or qualities, or "why things 'feel like' something."

This has been a misdirection: the problem is more generally stated as that of explaining *the origin of the image of the external world*. There is nothing in our image of the world that is not qualia, to include its dynamically changing forms – rotating cubes, buzzing flies, swirling coffee liquid and stirring spoon. Witness Hardcastle's description of qualia: "…the conductor waving her hands, the musicians concentrating, patrons shifting in their seats, and the curtains gently and ever-so-slightly waving…" (Hardcastle 1995, 1). Here we see form as qualia too, in fact, dynamically changing form, for all qualia exist only over time; all qualia is *dynamic*. The experiential image of the orchestra Hardcastle is describing is entirely qualia, to include, and especially include, its dynamically changing, qualitatively changing forms – as equally non-computable as the colors and sounds. It is the image of the external world that must be explained – that coffee cup, "out there," on the table, liquid surface swirling. This has been the dilemma: neuroscience certainly has found nothing like the image of the coffee cup with its swirling surface and circling spoon in the brain, nor does such a thing exist in a computer with its changing bit patterns (save by pure conceptual *attribution*, e.g., "this bit pattern must be, or correspond to, a coffee cup").

Bergson addressed this exact question, in 1896, in *Matter and Memory*. Surely, he noted, there is no "photograph" of the external world in the brain. The neuroscience of the day was already sufficient to know this – no image of the coffee cup was anywhere to be found in neural structures. But he noted, if one examines the implications of Leibniz and his monads, or better, Faraday and his atoms, each atom being the nexus, the intersection of lines of force in every direction from all other atoms in the universe, one must be led to this conclusion, "…the photograph, if photograph there be, is already developed in the very heart of things and at every point of space." (Bergson 1896/1912, 31) This was his

declaration, years before Bohm (1980), that the universal field is a *holographic field*. When one draws out the implications of M&M's subsequent theoretical development, upgrading it into current terms/concepts that have been birthed subsequent to holography's discovery, this describes his vision of the role of the brain: in essence, the brain is *a modulated reconstructive wave,* passing through this holographic field, specifying or "specific" to a source within the field (Fig. X. 5) – the coffee cup and stirring spoon (Robbins 2000, 2002, 2004, 2006, 2013, 2017, 2020). There is no image being developed or being represented in the brain; the coffee cup is being specified right where "it says it is", external to the body, on the table top, within the holographic field.[1]

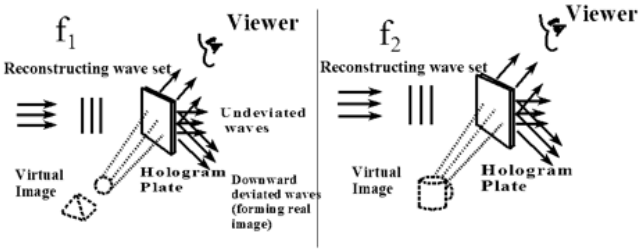

Fig. X. 5 Modulating the reconstructive wave. Modulating the reconstructive wave to frequency 1: the original wave front (object wave) from the pyramid-ball is specified. Frequency 2: the object wave from the cup (the original source) is specified. The holographic plate becomes the universal field; the brain is the wave passing through this "plate."

A fly "buzzing by" the coffee cup, his wings beating at 200 cycles/second, is perceived with its wings as a *blur* – this being an index of our "normal" *scale of time*. This scale of time is determined by the brain's dynamics, its underlying chemical velocities, themselves underlying the brain as a very concrete, resonant wave form. Other scales can be specified: increase the chemical velocities: the fly becomes heron-like, barely flapping his wings. Note too: this specification is to the *past*, to past portions of field's transformation, for any light

[1] The brain's modulation pattern is driven by the external event, specifically by the dynamic structure of invariants defining the event. For stirring coffee, a partial list of such: 1) a radial velocity flow field over the swirling liquid surface, 2) an adiabatic invariant – the ratio of energy of oscillation to frequency of oscillation

reflected from the fly, striking the retina and transduced through the perceptual system is now "long ago," long in the past when taken relative to the presently specified fly. How is this possible?

This is where Bergson's conception of time must be factored into the picture. Briefly, for we must return to this, he argued that motion, say, an object's motion from point A to B, cannot be treated as a series of static, discrete states, as though we are simply carving up a space – a line or trajectory we visualize from A to B – into points, each point corresponding to an "instant" of time. This is an infinite regress. Between each pair of static points on this line, to account for the motion, we must re-introduce yet another line of points – ad infinitum. In other words, we are applying *a principle of infinite divisibility*. This is the source of Zeno's paradoxes. Rather, motion must be seen as *indivisible*. Thus, the transformation (motion) of the ever-changing holographic field is indivisible. There are no discrete instants, where each "past" instant is falling into the past (non-existence). Rather the field is inherently 4-D.

And this is the kicker, where we meet that larger, that Cosmic scale Consciousness. For, taken at the "null scale" of time (the most minute scale imaginable) the transforming holographic field inherently carries elementary attributes of consciousness. Firstly, there an elementary awareness defined throughout the field via its holographic property, for the state of each "point" in the field reflects that of every other point, thus, there is an elementary awareness at each point of the Whole of the field. Secondly, there is an elementary memory via the field's indivisible transformation, for state of each moment or "instant" is reflecting the entire history of the Whole.

Thus, the specification (by the brain as a reconstructive wave) is to *a time-scaled form of the elementary awareness defined over the field*. As Bergson stated, *"…questions of subject and object, in their distinction and the union, must be treated in terms of time, not space*" (Bergson ib, 77). At the null scale of time – the smallest scale, the "tiniest instant" imaginable – one can see that our body has no sharp differentiation, spatially, from the field or, for that matter, from a fly within the field. But specify increasingly larger scales: The fly changes from, say, a cloud of electrons to a motionless vibrating, crystalline being, then

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for the spoon, 3) an inertial tensor defining the momenta of the spoon, 4) a ratio of cup height to position on the surface texture gradient, etc. This is where Bergson merges with J. J. Gibson (1966).

to a heron-like fly barely flapping his wings, to the "buzzing" being of normal scale. Subject is differentiating from object, in terms of time. The homunculus (or the observer's eye, the viewer, in Fig. X. 5) is removed.

So, yes, this is a panpsychic theory, but a theory that has no "aggregation problem," i.e., no need for answering this: how do tiny "proto-conscious" particles aggregate or combine to become an experienced coffee cup and spoon, and (though no one notes this piece of the problem) at some particular scale of time? As well, it is a theory, as opposed to standard panpsychism, that actually has the wherewithal – a dynamical mechanism – to explain the origin of the image of the external world. Standard panpsychism has nothing such.

Our individual consciousness, then, is a flowing aspect of/within that larger, flowing Consciousness, the Consciousness defined over the ever-transforming field. The individual aspect is specifying from a unique spatial perspective and specifying a scale of time placed upon this larger whole. So, this is a significance of which to take note: already in M&M, *in the context of the one solution to the Hard Problem that exists when the problem is actually understood, we see the Consciousness – Cosmic scale – that Bergson sees as the impetus behind evolution* and which is the force behind both the knowledge (instinct) of the wasp, and the formation of the wasp as an organic structure.

For Bergson, our intellect is incapable, in and of itself, of understanding this process, this knowledge (instinct), the organic formation of structure. What is the nature and origin of intellect? Why must it be augmented, augmented in fact nearly paradoxically, by something equivalent to, if not itself sharing in instinct? It already starts in the nature of perception.

X.4 The Intellect, the *Classic Metaphysic*

The holographic field is a vast field of information. Bergson visualized this field as a vast sea of motions or "real actions," all forming a vast (holographic) interference pattern. Any given object acts upon all other objects in the field and is in turn acted upon by all other objects. It is in fact obliged:

> ….to transmit the whole of what it receives, to oppose every action with an equal and contrary reaction, to be, in short, merely the road by which pass, in every direction the modifications, or what can be termed real actions propagated throughout the immensity of the entire universe. (Bergson 1896/1912, p 38).

What is the principle for the selection of a subset of this and its specification as an image, say, as a coffee cup? From this information or real actions, our body selects only that (the subset of real actions) related to its action capabilities. Highly correlated to J. J. Gibson's (1966, 1979) "affordances," what is specified and selected from the real actions is now "virtual action" – how the body can act, and at a specific scale of time. A fly specified as barely flapping his wings, is indicative of different action possibilities relative to the normal "buzzing fly." Speaking of organisms as centers of action in this field, Bergson would state, "…the real action passes through, the virtual action remains." Thus, per Bergson, perception is *virtual action*.

From this undifferentiated, ever-transforming field, our body's first order of business is to carve out "objects" on which it can act – to hold a baby bottle, to shake a rattle. Thus begins the partition of the field into "objects" and their "motions."

This partition gets ever more rarified. Beneath and through the surrounding field we place a (mental) mesh as it were (M&M). The meshes are made ever smaller; we end with *the continuum of points or positions.* As noted, the "motion" of an object from point A to point B is now treated as a series of points comprising a line or trajectory though this static continuum. And as noted already, this is an infinite regress. Between each pair of static points on the line, to account for the actual motion, we must re-introduce a new line with its points, ad infinitum. Each point, further, corresponds to an "instant" of time. "Time" is simply the 4th dimension of this abstract space, the series of static instants.

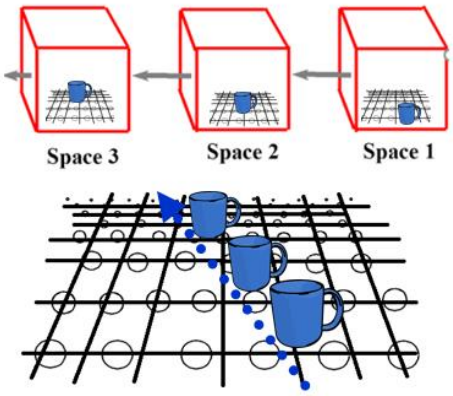

Fig. X. 6. Successive positions of the moving cup across the continuum of points/positions. Each point/position of the cup corresponds to instant of the all of Space.

If we take one these instants/positions of the moving object, we can take it as a point in the "all of Space" at an instant, where this "all of Space" can be visualized as a huge Cube (Fig. X. 6). As the limit of the division operation is a mathematical point, each Cube of Space, corresponding to a point on the object's trajectory, has the time-extent of a mathematical point. Each Cube is thus utterly stripped of quality – homogeneous. This aspect of this overall conceptual framework on space and time is the *start* the "whence qualia?" problem (Robbins 2013). In fact, we could note, as did Lynds (2003), each Cube is frozen, never to change again – unless some extra agent or "force" is envisioned to create the next Cube and then the next, etc. (To Descartes, seeing this implication, this had to be where God was needed.) This is the *classic metaphysic*. This is the playground of our intellect. All our science, our mathematics, our calculus – based upon it.

But this conception is further rarified. The motions are *relative*. One can move the object across the continuum of points/positions, or one can move the continuum (or coordinate system) beneath the object. Motion becomes *rest*, merely upon perspective. Thus, all *real*, concrete motion is lost. But there must be *real* motion. Stars explode, trees grow, roses bloom. Thus Bergson would argue, we must see the Whole is changing, like a kaleidoscope. In this, the "motions" of "objects" become, rather, *changes or transferences of state*, like waves in the ocean, within this global transformation.

In such a global transformation, there is clearly simultaneity. Biologists should take note: *It is in organic motion that the classic metaphysic, with its intrinsic relativity, most*

clearly fails and falls. The blooming expansion of a rose cannot be relativized. The branching growth of a tree cannot be relativized. If for a "stationary" observer, two opposite petals of the blooming rose strike equidistant points simultaneously, the fact that a physicist, in motion, passing the rose, taking an instantaneous cross section of this motion (an abstract "instant"), says "not simultaneous" – this is totally irrelevant, an artifice of the abstraction; it cannot possibly be so without destroying the simultaneous flows of the organic growth, the integral blooming process of the rose. Einstein's famous lightning bolts, simultaneous to a stationary observer, supposedly non-simultaneous to a moving observer, when both bolts are generated simultaneously from a massive, organic storm system with all its complex forces – the "non-simultaneity" (supposed per one observer) is equally an abstract artifice, without reality (Robbins 2010, 2014). In this we see an example of Bergson's (in CE) critique of Kant and Kant's vision of a unified structure of science, where the classic metaphysic, in essence, is applied to physics, to biology and to psychology – *uniformly, across all subjects*. But the essence of CE (we shall visit the why of this in closing) is that the classic metaphysic, as it describes and is applied to the extended world of matter, is only an *ideal limit – never actually reached*. This metaphysic works for physics – practically, to a large extent, though not entirely. Applying it to the biological and psychological takes it increasingly beyond its applicability.

With the classic metaphysic, it all started with solids – with our perception parsing those "objects" upon which we can act.

> Let us start then from action, and lay down that intellect aims, first of all, at constructing. This fabrication is exercised exclusively on inert matter…And of inert matter itself, fabrication deals only with the solid. The rest escapes by its very fluidity. (Bergson 1907/1911, 153).

He adds:

> If therefore the tendency of the intellect is to fabricate, we may expect to find that whatever is fluid in the real will escape it in part, and whatever is life in the living will escape it altogether. Our intelligence, as it leaves the hands of nature, has for its chief object the unorganized solid. (Bergson 1907/1911, 153).

To the intellect, we are surrounded by a material field – extended – objects (absolutely distinct) external to other objects, parts external to parts. Each part infinitely divisible – all treated as units. The "objects" (solids) are certainly mobile. But from the motion itself the intellect turns away.

> But the intellect is meant for something altogether different. Unless it does violence to itself, it takes the opposite course. It always starts with immobility, as if this were the ultimate reality. When it tries to form an idea of movement, it does so by constructing movement out of immobilities put together...Of immobility alone does the intellect form a clear idea. (Bergson 1907/1911, 154-155).

Of course, he notes, "Motion as a series of immobilities is an absurdity."

This homogeneous, empty medium, infinitely divisible, lends itself to any mode of decomposition:

> This space is therefore, preeminently, the plan of our possible action upon things… the intellect is characterized by the unlimited power of decomposing according to any law and it does so by constructing movement out of immobilities put together. (Bergson 1907/1911, 155).

The "symbols" we use in language, logic, are themselves derived from solids.

> As these symbols are derived from the consideration of solids, as the rules for combining these symbols hardly do more than express the most general relations among solids, our logic triumphs in that science which takes the solidity of bodies for its object [geometry]. (Bergson 1907/1911, 160).

Intellect behaves as if fascinated by inert matter. "Hence its bewilderment when it turns to the living and is confronted with organization." (Bergson 1907/1911, 161) And just as it fixes in things in space, it fixes in time. It cannot deal with pure mobility. Again, the series of static "instants" – the actual motion is lost.

This framework rejects *creativity*. All is the *re-composition of static elements* – of the already old. "The intellect is characterized by a natural inability to comprehend life." (Bergson 1907/1911, 163) The intellect is only an aspect, a cutout, of the larger, flowing Whole, therefore it cannot be that which comprehends this Whole.

Instinct

So, he states: "Instinct, on the contrary, is molded on the very form of life. While intelligence treats everything mechanically, instinct proceeds, so to speak, organically." (Bergson 1907/1911, 165). He adds:

> For [the consciousness driving it] only carries out further the work by which life organizes matter – so that we cannot say…*where organization ends and instinct begins*." (Bergson 1907/1911, 165, emphasis added)

Again, I repeat the starting question: how is the organic structure of the wasp separate from the "concept" of the action [instinct] it will be performing? So he says, "The most essential of the primary instincts are really, therefore, vital processes." (Bergson 1907/1911, 166).

The cells of our body, all working for a common end, yet each living for itself, preserving itself, reproducing itself, like so many instincts, each cell instinctual. The bees and their hive –each bee a "cell" united by an invisible bond. A bee separated, even given food/water, dies. The "instinct" that animates the bee is indistinguishable from the force that animates a cell. Here instinct coincides with "organization" – organizing matter.

> Thus the instinctive knowledge that one species possesses of another on a particular point has it root in the very unity of life…a 'whole sympathetic unto itself'.(Bergson 1907/1911, 167).

Instinct and intellect are two divergent lines of evolution:

- Intelligence => fluid composition/decomposition of inert matter.

- Instinct => Within itself, totally embedded in the concrete.

Perception is an example: The intellect asks, "How is it we see the coffee cup 'out there', on the kitchen table?" We understand touching the cup. The light hitting the retina – like a touch! But seeing the cup "out there," at a distance, is literally *action at a distance*. Yes, it is the same problem Newton had with his own theory of gravitation: it relies upon an abhorrent (to him) unexplained effect of one object upon another a distance away – action a distance – through no medium of transmission. So, starting with the light touching the retina, our intellect begins constructing mechanisms, logic, computer programs, neural nets – to effect all this *inside* the brain (or computer). Witness AI and self-(seeing)/driving cars, Elon Musk, etc., etc. But the "image" of the coffee cup is now "inside" the computer (i.e., the bits being attributed to be such), while the coffee cup is seen as "out there," on the table. Action at a distance still reigns – and unsolved.

Bergson simply says here, in CE, "But we have shown elsewhere that…the philosophical explanation of perception…must be of another kind." (Bergson 1907/1911, 168). But we have seen what he is so vaguely referring to, namely, the holographic/reconstructive wave model of M&M, where the coffee cup is *specified* right where it says it is – "out there," within the external holographic field. So we know what this massively "of another kind" means.

> Thus the instinctive knowledge that one species possesses of another on a particular point has it root in the very unity of life…a '*whole sympathetic unto itself*'. (Bergson 1907/1911, 167)

So how does the wasp solve the "construction" of this instinctive behavior? It does so by sympathy. It is a sympathy between the wasp and its victim, a sympathy which teaches the wasp from within the caterpillar's vulnerability.

> This feeling of vulnerability might owe nothing to outward perception, but result from the mere presence together of the Ammophila and the caterpillar, considered no longer as two organisms, *but as two activities*. (Bergson 1907/1911, 173, emphasis added)

"Objects" in "motions" (the wasp, the caterpillar) are changes or transferences of state within the global motion of the Whole. Each – the wasp, the caterpillar – are two flows, or two *activities*, in the larger, global flow. This is the basis for the operation of instinct. This instinct is not resolvable in terms of intelligent elements, or even in terms necessarily intelligible. But it is not beyond the limits of *mind*.

Intuition

Instinct is sympathy. It is oneness with life, union with other beings, w/all Being. Intelligence dwells on the surface of life with its "objects," with the infinity and composability of their relations.

> But it is to the very inwardness of life that intuition leads us – by intuition *I mean instinct that becomes disinterested*, self-conscious, capable of reflecting on its object and enlarging it indefinitely" (Bergson 1907/1911, 175-176, emphasis added).

This simple sympathy is possible to mind, for there are no true spatial separations in the ever-transforming holographic field. The wasp is one with the caterpillar – as two activities, two flows within this single Flow. This is the basis; it extends to all beings, even to scientific theorists. What Bergson is saying: To take our Science to another stage, to penetrate the instinct (the mysterious intelligence) of the wasp, to penetrate evolution's formation of the organic structure of the wasp, humanity itself must move to a new evolutionary stage. Pure intellect alone is a dead-end stage of one evolutionary line. Humanity and Science must move to intellect guided by intuition. How science solves the origin of instinct and form (and their inescapable and intrinsic correlation) – this in essence will merge with the very form of sympathy (intuition) by which instinct itself solves problems.

Intuition, let us simply note here, is not all that mystical or mysterious when put into practice. Yes, it can be exemplified in meditation practices, where, as an example, for many a session, one intently contemplates a tree as the object of meditation, to the point where – as meditators have reported – one experiences oneself *as the tree*, sap literally flowing through one's being, branches growing, leaves budding. But Bergson describes the process

more mundanely: it can be absolute immersion in a subject – for years – reading, absorbing everything within it, contemplating a problem within the subject constantly. In other words, merging with the subject.

If there is an example, it certainly would be Bergson's own model of perception. Once one understands it, one can only stand back in complete awe. In his brief descriptions of how Life might form a being, or an eye, one says, "Wow, to go further, deeper, more detailed…this will take one heck of an intuitive absorption." To give a very brief idea of what I mean…

The Eye

The eye is massively complex – "an infinity of mechanisms." *Mechanism* attempts to explain the putting of all these "parts" together, gradually, by chance, with no ability to explain their correlation. *Finalism* sees all the parts brought together by a pre-conceived plan. Like a workman constructing a watch. (Finalism would correspond to the Intelligent Design position.) Beyond both: "Life does not proceed by the association and addition of elements, but by dissociation and division." (Bergson 1907/1911, 89) Note the extreme contrast – the simplicity of vision, the complexity of the eye. "…[this complexity] may be only the simple act of vision, divided for us into a mosaic of cells, whose order seems marvelous to us because we have conceived the whole as an assemblage" [of those so-loved "parts"]. (Bergson 1907/1911, 90)

> Nature has had no more trouble in making an eye than I have lifting my hand. Nature's simple act has divided itself automatically into an infinity of elements which are then found to be coordinated to one idea…just as the [in fact, indivisible] movement of my hand [from point A to point B across the continuum of points/positions] has dropped an infinity of points which are then found to satisfy one equation. (Bergson 1907/1911, 91).

This is what our intuition must penetrate.

To Return: Creating Mousetraps and Wasps

In the literature of the new (or extended) synthesis, Stuart Kauffman appears in some ways very Bergsonian. Kaufmann (2013) states: "No law entails the evolution of the biosphere." One key to this, he argues:

> We cannot name all the causal consequences or uses of any object, say a screwdriver, alone or with other objects. The set of uses appears to be both unbounded or "indefinite", and on-orderable. But this means we cannot know that we have ever "listed" all the uses of a screw driver alone or with other objects or process. (Kaufmann 2013, 519)

So, this looks very much like the commonsense knowledge problem I described that afflicts AI, to include the creation of mousetraps from components. My own thought on this began years ago in contemplating the implications of a program for "design" by Freeman and Newell (1971). Here a database, so to speak, was contemplated listing *objects* and their *functions*, specifically, for each object, the object's functional *requirements* and functional *provisions*. To design a KNIFE, the program discovered (in its database) that a BLADE provided "cutting" (a functional provision) and it has a functional requirement, namely, "being held." Matching to the functional requirement, a database search found HANDLE (which has a functional provision of "holding"); a "match" was made, a KNIFE was "designed."

The difficulty (of many), again, is that these functional provisions/requirements emerge only over transformations. The "provision" of the box-corner for "holding" (or "lodging") the pencil when it is employed as an "axe-handle" would hardly have been prelisted as a functional provision in a database, assuming a "box corner" was even a database entry, nor that the box-side has a functional provision for anchoring the rubber bands for the pencil-arrow. Again, trying to generalize this, from functions to "features" brings the same problem. A sock may be "floppy," but under a forceful swatting transformation, displays the needed "rigidity" to squash a fly. "Features" emerge over transformations. Needless to say, one cannot imagine a database with all possible transformations on objects. These cannot be pre-set, pre-defined.

But worse, these transformations must occur in that time that is an *indivisible flow*, and this again brings us back to Bergson's model of individual conscious perception – the brain, as a modulated reconstructive wave, intrinsically embedded within the indivisible

transformation of the holographic field, specifying a past transformation of the field – coffee being stirred. This *individual* model is telling us the basis on which we must scale to the universal problem of evolution, and the creation, not of mousetraps, but of biological devices – birds, butterflies, bees.

Kaufmann adds:

> Now consider an evolving cell in which one or more objects or processes, each with myriad causal consequences, finds a novel use that we cannot prestate, but which enhances the fitness of the cell, and so is grafted by natural selection into the evolving biosphere. This "finding of a novel use that we cannot prestate" occurs *all* the time. The famous flagellar motor of some bacteria made use, via Darwinian *preadaptations or exaptations*…of fragments of its flagellar proteins that were serving entirely different functions in other bacteria." (Kaufmann 2013, 519, emphasis added).

"Exaptation." This (and other names) was precisely what we saw the evolutionists (Kevin Miller, Dennett, Shermer, Dawkins…) all use to implicitly appeal to a form of (cosmic) AI program, as though they've solved the problem of commonsense knowledge. Kauffman would have to be saying that exaptation is nothing like AI, and requires an entirely different form of cosmic "device." But, unfortunately, he says all this is effected by natural selection. Not possible. We are back to the problem of irreducible complexity: the mouse trap must have all the parts to be functional, to be selected. And – the wasp must know *all* the places to sting the cricket.[2]

When we created the "crossbow mousetrap," it was done so on the basis of a *knowledge about a desired function* (to kill, disable, or trap a mouse) and on *knowledge of the mouse* – how it can be killed (cut off head, pierce it) or be trapped given its action capabilities (we

[2] Since this writing, Kauffman and Roli (2021) have argued in terms of affordances not being computable, or "UTMs [Universal Turing Machines], at least those not embodied, cannot find new affordances," though elsewhere they state, "…we are not merely embodied UTMS." "Affordances" have tended to carry a precise meaning in ecological psychology discussion as a relation (mathematical) between bodily action capabilities and the environment, e.g., "climbability" as the ratio of stair riser height to knee height. Extending this usage to a pencil poking a mouse or a box corner securely lodging the pencil seemed a bit too much of an extension, and in 2002/2012, I stayed in the standard framework of functional provisions, properties, etc. Further, the affordance term tends to obscure the structure of invariance laws at their core. Kauffman and Roli, I might note, in their analysis, still think finding affordances is possible by natural selection, and more critically, are unaware of the classic metaphysic of space and time at the core of these problems.

must make a “prison cell” trap). This knowledge about both mice and the intended function was integral in creating some form of trap. Equally so, even were Dr. Kauffman to create a wasp from components, there is still that knowledge (manifesting as “instinct”) that was guiding the design, e.g., the vulnerability of the caterpillar (for the stinger), nest creation, nectar slurping, what the young need. This still must be addressed and accounted for; it is still part of the problem of creating mousetraps, wasps or beetles.

So, Kauffman holds:

a) Natural selection still works, is operative.
b) Irreducible complexity is not a problem.

Why b? Intelligent Design proponents argue via the massive improbability of natural selection selecting all the changes simultaneously. But Kaufmann argues, given there is “no law of evolution” and the unforeseen uses of parts, probabilities can no longer be computed; we don’t know the “space.” This is an easy escape route. Too easy. Examples abound where things are just mathematically fixed. In the case of proteins, we know the space. There are 20 amino acids, they can only be joined in, say, 2035 ways that will get a string that is 35 amino acids long – a peptide. There isn’t any question as to what the space is.

The difficulty is the same for the pencil. There is an enormous number of possible functions:

- Pungi stake
- Spear
- Axe Handle
- Pillar/support
- Fuel/fire
- Fork
- Stirrer
- Prison cell bar

- Baton
- Etc.

You can't state *all* the uses of a part, but you can make a huge finite list for each, and assign probabilities of use. Then you quickly get the massive joint improbability of selecting the correct uses for the combination of all the different parts required for the total transformation. But we have seen already that this is only the beginning of the problem: one cannot pre-define all the possible transformations under which functions or features emerge.

Kauffman is trying to save natural selection [per (a)] as the mechanism – a virtual algorithm – for evolution. A lost cause. The unforeseen uses of "parts" by evolution – yes, exactly, but the universe must be a far different form of creative device – nothing like a Turing computer. The transformations on these parts – transformations that must occur over an indivisible time are a fatal enough problem for any mechanistic [abstract space-based] conception of this, but notice, the "parts" themselves are no longer simply the "same part." The pencil is no longer truly a pencil, the box corner is far from a simple "corner." Thus part of this difficulty is the very focus of science on "parts" – on *reusing* parts, on *rearranging* parts – to create new devices. This is to say, in this framework, there is no room for *true creation*. Bergson would note:

> …if after the fact *we could know these causes in detail*, we could explain them by the form that has been produced; *foreseeing the form* is out of the question. (Bergson 1907/1911, 27, emphasis added)

But "causality" is a creature of the classic metaphysic:

> Such is the case with astronomical, physical and chemical facts, with facts which form part of a system in which elements supposed to be unchanging and merely put together, in which the only changes *are changes of position*, in which there is no theoretical absurdity in imagining that things are restored to their place, in which, consequently the same elementary phenomena can be repeated. (Bergson 1907/1911, 27).

The billiard ball model is the standard paradigm here: We apply the "same" forces, the "same" vectors, to the "same" billiard ball: we get the same path for the ball, over and over, and this is deemed a "law." But NONE of these things are actually the same from instant to instant. The billiard ball is not the same, the cue is not the same, the force is not the same – only *practically* the same. It is a practicality that largely works for phyics, astronomy, chemisty, but increasingly less so as we move towards the biological. Nothing is actually the "same" in a universal field that is constantly changing, no matter how small the interval of time examined. Thus:

> But against this idea of the absolute originality and unforeseeability of forms our whole intellect rises in revolt" (Bergson 1907/1911, 27)…[for to our science]… "*What you call an unforeseeable form is only a new arrangement of old elements* (ib, 30)

For Science, the epitome of intellect….

> …in dealing with things, science is only concerned with the aspect of repetition. Though the whole be original, science will always manage to analyze it into elements or aspects that are absolutely a reproduction of the past. (ib, 27).

But this is only possible in the abstract space and the abstract time (again, a dimension of the abstract space) of the classic metaphysic – an absolutely homogeneous, perfectly repeatable continuum. And this metaphysic is the child of the intellect. And this intellect is only a *cut out*, an *aspect* within the ever-transforming Whole of the universal field. This is why intellect *must* be augmented by intuition. But this should be placed in the context of Bergson's larger vision of this evolving Whole.

Bergson's Larger Vision of the Transforming Field

This transforming Whole is both physical and psychical. In Bergson's framework, it has two aspects: the *extended* (matter) and the *in-extensive* (the psychical). The in-extensive pushes forth, so to speak, *continually*, both as the emerging forms of evolution and more mundanely, as the everyday (and at every instant) extended world of matter. This is to say

this impetus, this creation, is *continuous*. As noted, the refined, logical extension of the extended world – the abstract space expressed in the classic metaphysic – is but the *ideal limit* of this thrust; it is never truly reached, but extended matter comes close enough for the geometric method of physics to, by and large, work very well, but ever less so as we move back upwards so to speak, away from this ideal limit, towards the original impetus or source, first into the biological and further upwards, to the psychological.

Bergson noted that this "impetus" driving evolution is but a metaphor/image. It is the essence of the psychical to enfold a confused plurality of interpenetrating terms. The psychical elements within a dream are not truly separable – these do not exist in an abstract space. The complex psychical state of a Beethoven while he imagined the fifth symphony is not something describable using independent "elements." It appears to be so only afterwards, as this intermingled complex of interpenetrating "elements" is expressed with a quill pen in the extended world of matter as separate "notes" on a manuscript. Only in [abstract] space is distinct multiplicity possible. "But what is psychical cannot entirely correspond with space, nor enter perfectly into categories of understanding." (Bergson 1907/1911, 257).

Certainly, this is not the framework of materialism. Biology can wait, fruitlessly I would predict (Robbins 2014), for the quintessential expression of the materialist framework and its spatial metaphysic – AI, neural networks, deep learning networks – to solve the commonsense knowledge problem and effect true creativity, or one can accept that we are dealing with, indeed, *creative evolution*, and that to deal with this reality we need a new framework, a new metaphysic, namely, the temporal metaphysic of Bergson, yes, even a model of consciousness incorporating a solution to the hard problem. When this larger framework on the universe is grasped, one can see that for comprehending and penetrating evolutionary development, it becomes a fundamental necessity to meet this requirement: the achievement of a higher union of the two evolutionary lines – of instinct, of intellect. This takes the form of intuition – to which intellect becomes the scribe and expositor.

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