Bergson, Gibson and the Image of the External World

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Abstract

The "hard problem," stated as it is only in terms of accounting for the origin of "qualia," has been misleading. The more general problem is explaining the origin of the image of the external world. Bergson had a unique solution to this problem, unrecognized yet today because it was a holographic solution formulated fifty years before the invention of holography. Gibson is Bergson's natural complement, critical to understanding the information that modulates the brain as a reconstructive wave passing through the external holographic field. The problem becomes, in actuality, an optical problem in physics, with another critical piece requiring a revision in physics' current model of time.

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The Hard Problem is the Image

I must begin with something in John Searle's 2015 book, titled, *Seeing Things as They Are: A Theory of Perception*. In it he notes, "…since the seventeenth century, I do not know of any Great Philosophers who even accepted Naïve or Direct Realism" (p. 22). To him, there are only seven "Great Philosophers," and only these are worth considering on the subject – Kant, Leibniz, Hegel, Descartes, Berkeley, Spinoza, and Hume. But, since we are speaking of seeing, a "greatness" designation is a function of one's ability to *see* greatness. Searle's list is a sad commentary on the state of philosophy. Missing, firstly, is Henri Bergson. Missing, secondly, his complement, the great philosopher-scientist of perception, J. J. Gibson.

The problem is that Bergson's theory has never been understood. Philosophy is totally unaware that Bergson had a solution to Chalmers' famous "hard problem," and further, that it is a *unique* solution, uncategorized, found nowhere in the supposedly exhaustive list of positions on perception Searle provides, namely, Representationalism, Phenomenalism, and Idealism. Searle thinks he is defending a fourth position, namely, Direct Realism. His entire "solution" relies on the rather discredited notion of *emergence*, that *somehow*, while watching the coffee cup on the table in front of us, with our spoon stirring the coffee, the image of this scene emerges from the biological processes in the brain. But this image, per Searle, is simply "in the head." He does triple flips in his efforts to show that he is not, in reality, an *indirect* realist – that is, as indirect realists hold, we are only seeing this "image in the head," not the actual objects – the cup, the spoon, the table – where they are, in front of us, "out there," within the external world. Searle, in truth, has absolutely no theory of seeing. He desperately needs the greatest of the direct realists, Bergson, and also – completely unmentioned in his book – J. J. Gibson.

The "hard problem," as formulated by David Chalmers, was roughly this: How, given any neural or computer architecture, does this architecture explain the *qualia* of the external world? Here "qualia" refers to the "whiteness" of the coffee cup, the "silveriness" of the spoon, the "clinking" of the spoon against the side of the cup. But this formulation has been extremely misleading. It has focused philosophy entirely on addressing the origin of qualia. This is so much so that when a theorist (like me) says he has (or at least knows of) a solution to the origin of the image of the external world, philosophers have no idea what he is talking about or why it is important.

This is the problem: What has been missed is that *form* is equally qualia, particularly obviously when considered in its dynamic aspect – rotating cubes, buzzing flies, falling, twisting leaves. Listen to Valerie Hardcastle's list of qualia: "… the conductor waving her hands, the musicians concentrating, patrons shifting in their seats, and the curtains gently and ever-so-slightly waving…" (*Locating Consciousness*, 1995, p. 1). In other words, she is entirely pointing to both time and dynamic forms. But forms fully populate our image of the external world – the cup, the stirring spoon, the table, the swirling coffee surface. In other words, *everything* in the image is qualia. The totality of the image is qualia. It is the origin of the image of the external world that is the more general problem. This is what must be explained.

Bergson's Model of the Origin of the Image

The creation of an image is an *optical* problem. It is actually a problem of physics. Though in this case, it is equally a problem of physics in regards to its concept of time. Bergson had a solution that covered both.

The key is in a passage is in his 1896 work, *Matter and Memory*. Bergson had just noted that there can be nothing like a "photograph" of the external world developed in the brain. We will find nothing remotely looking like the coffee cup and spoon inside the skull. We have seen this ever more clearly in the subsequent findings of neuroscience. But Bergson went on:

> But is it not obvious that the photograph, if photograph there be, *is already taken, already developed in the very heart of things and at all points in space*. No metaphysics, no physics can escape this conclusion. Build up the universe with atoms: Each of them is subject to the action, variable in quantity and quality according to the distance, exerted on it by all material atoms. Bring in Faraday's centers of force: The lines of force emitted in every direction from every center bring to bear upon each the influence of the whole material world. Call up the Leibnizian monads: Each is the mirror of the universe (MM, pp. 31-32, emphasis added).

This was certainly, to his contemporaries, one of Bergson's obscure passages. With the benefit of intervening events, it becomes clear. Fifty years before Gabor's 1947 discovery, Bergson had already envisioned the essence of holography. Let me review this phenomenon for the sake of clarity in what is to follow.

Holographic Reconstruction

A hologram is a photographic plate on which the interference pattern of two light waves is recorded (see Figure 1). One wave (the "reference" wave) is a wave of laser light that is directly beamed on the plate. The other wave (the "object" wave) is bounced off an object or objects, say a pyramid and ball, and also covers the plate. The two waves meet at the plate forming an interference pattern. This pattern looks nothing like the original scene, in this case, the pyramid and ball (cf. Kock, 1969; Caufield & Lu, 1970).

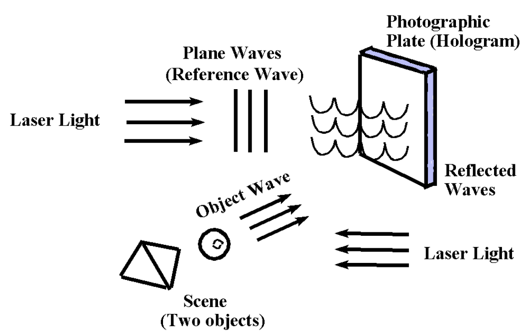

Figure 1. Construction of a Hologram

The "reconstructive" wave is a wave of the same frequency as the original reference wave, we'll say, "frequency 1." (See Figure 2.) When the reconstructive wave is beamed through the plate, a viewer now sees the pyramid and ball located in space as 3-D objects. The reconstructive wave is now "specific to" or specifies the pyramid and ball, i.e., the pyramid/ball as the source of the original reflected wave front.

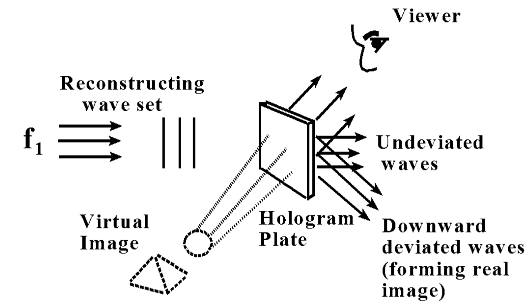

Figure 2. Reconstructing the Image (i.e., the Source of the Original Wave Front)

Using a different frequency of reference wave, say "frequency 2," we can beam the wave off yet another object, say a cup. Now we "modulate" the reconstructive wave to frequency 2 – we see the cup (Figure 3, right). Modulate back to frequency 1 – we see the pyramid and ball. Thus the wave fronts from many objects can be recorded on the plate, each via a different frequency of reference wave, and by *modulating* the reconstructive wave appropriately, from frequency to frequency, we can reconstruct each object's original wave front (or image),

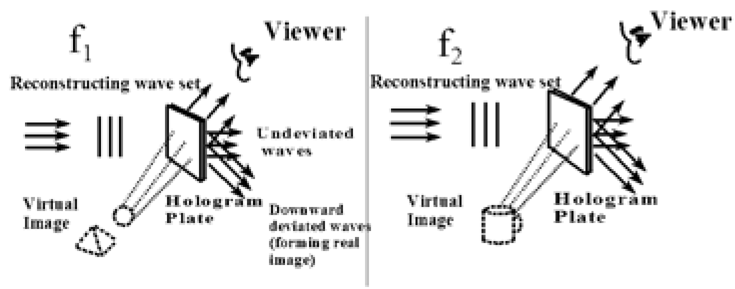

Figure 3. Modulating the Reconstructive Wave – From f_1 to f_2

Lastly we should note this: We can consider each point of the illuminated object as giving rise to a spherical wave which spreads over the entire hologram plate. As the reflected light bounced off the pyramid, for example, each point of the pyramid gave rise to a little spherical wave that expanded as it traveled towards the hologram plate, ultimately covering the entire plate. Thus we can consider the information for each point on the pyramid to be spread over the entire hologram. This has a converse, namely that *the information for the entire object is found at any* *point in the hologram*. At each point of the hologram is the information for the whole. A tiny corner of the hologram plate can be used to reconstruct the whole pyramid and ball, or the cup, or any of the objects recorded.

Extending Holographic Principles

This principle can be extended to the entire universe when viewed as a sea of waves, i.e., the universal field can be considered a vast interference pattern – a hologram. Bohm did so in 1980, in his *Wholeness and the Implicate Order*. And this is precisely where Bergson had already gone. Bergson had envisioned the universe as a holographic field (Robbins, 2000, 2006a, 2014). This was his *"…photograph already developed in the very heart of things and at all points in space*." But while Karl Pribram, in 1971, had argued that the *brain* is a form of hologram, Bergson had the correct model. He saw the brain as effectively creating the *modulated reconstructive wave* passing through this external holographic field. This brain-created wave is "specific to" a source, i.e., a subset of the vast information within the field, and by this process now an "image" of a portion of the field – our kitchen table, the coffee cup and the stirring spoon (Figure 4).

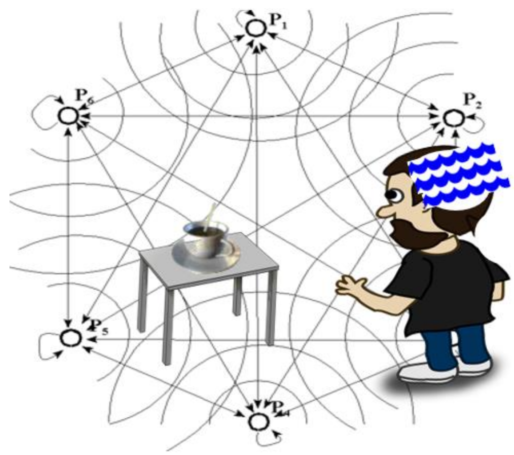

Figure 4. The brain acts as a reconstructive wave, passing through the holographic field, specifying a source within the field.

Hard after the "photograph" passage, Bergson noted:

> Only if when we consider any other given place in the universe we can regard the action of all matter as passing through it without resistance and without loss, and the photograph of the whole as translucent: Here there is wanting behind the plate the black screen on which the image could be shown. Our "zones of indetermination" [organisms] play in some sort the part of that screen. They add nothing to what is there; they effect merely this: *That the real action passes through, the virtual action remains* (MM, p. 32).

In Bergson's terms, the universal field is a vast field of "real actions" (one can read "waves," for concreteness) rippling everywhere – a vast 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. (MM, p. 28)

The subset of these actions (or information) that the brain-supported reconstructive wave picks out is a portion related to the body's action. This action-relatability is the information-selection principle from the "hologram." Thus, *perception*, as Bergson argued, *is virtual action*. We are seeing how we can act. The brain is not "generating" an image; it is not generating "experience." The image, as a specification of a dynamically changing subset of the field, is *within the external field*, right "where it says it is," not "in the brain." This is the ultimate in "externalism" (though never noted); the ultimate in direct (though far from naïve) realism.

Gibson – the Information for Modulation

For Gibson too, there is no "image" being generated "in the brain." But Gibson did not actually explain how the image comes about. We must place him in the holographic context of Bergson for his theory to truly make sense. For Gibson, there is information in the environment "specific to" – in his terms – the structure of the environment. The brain – yes, like a *wave* – is *resonating* with this information. Therefore, the brain itself is, yes, "specific to" the environment. Sound familiar?

As an example of this information, Gibson held that the ground surface naturally "specifies" distance. Berkeley, had argued that the points ABCD on the line of Figure 5 project to the same point on the retina, therefore, he stated, there is no information for depth. But Gibson argued that the points on the ground, WXYZ, via a projective transformation, preserve the same relative distances on the retina. There is indeed information "specific to" distance.

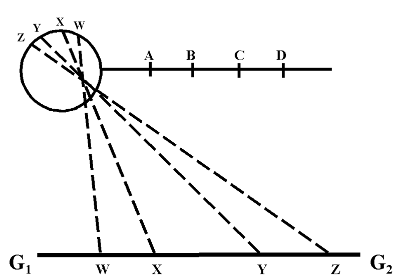

Figure 5. The "Ground"

The ground surface is even more highly structured. There is a texture gradient of texture units (circles in Figure 6). These could be little rocks, grains of sand on a beach, a field of grass. The horizontal distance (S) between each unit is inversely proportional to the distance from the observer, that is, the law, $S \propto 1/d$ (d = the distance from the observer). The vertical separation is by the law, $S \propto 1/d^2$. If I move the cup back and forth, its height appears constant. Why? As I move the cup at the back towards the front, there is a constant ratio – the height of the cup (S) increases proportionally as the number of rows (N) of occluded texture units decreases, from 4 rows (rear) to 2 rows (front position) or $S \propto 1/N$. Note the relation to action. This ratio is information used for modulating the hand to grasp the cup in motion. It is the information underlying *virtual action*.

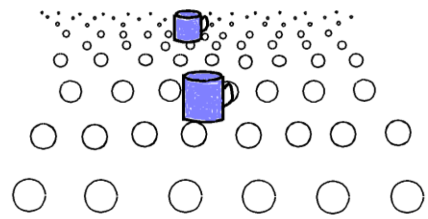

Figure 6. Texture Gradient

When this surface is put in motion, it becomes a flow field of velocity vectors (Figure 7). The value of each vector is $v \propto 1/d^2$. The fastest moving vectors are closest to the eye. The slower moving vectors are farther away. There is a ratio defined over this flow termed *tau*. It specifies *severity of impending impact* (Kim, Turvey and Carello, 1993). It too is used for guiding action, for example a bird or a pilot uses the *tau* value to modulate or control his landing for a gentle touch down (Figure 8).

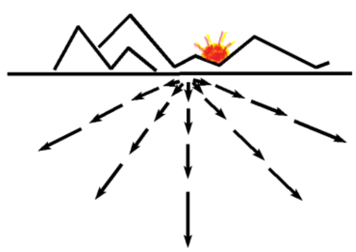

Figure 7. Flow Field – A Gradient of Velocity Vectors

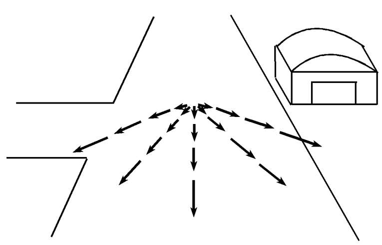

Figure 8. Flow Field – Tau Value for Landing

These flow fields specify form. Figure 9 is a "Gibsonian cube." As a side turns towards you, there is an expanding flow field. As a side turns away, there is a contracting flow field. The top is a radial flow field. The "edges" and "vertices" of the cube are now simply sharp breaks – discontinuities – in these flows.

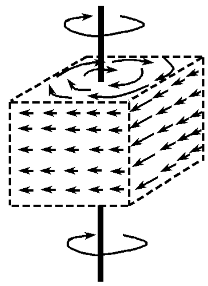

Figure 9. The Gibsonian Cube – a Partitioned Set of Flow Fields

This makes the specification of form very "dicey." There is an inherent *uncertainty* involved in the brain's processing of these velocity flows that I will not go into here (Robbins, 2004). But consider the velocity vectors defining the perimeter of a rotating ellipse (Figure 10). If the ellipse rotates too quickly, the speed of the motion breaks a constraint ("motion is slow and smooth") used by the brain in its processing. The ellipse loses its rigidity; it becomes a wobbly, distorting figure. This is "Mussati's illusion" (Weiss, Simoncelli and Adelson, 2002).

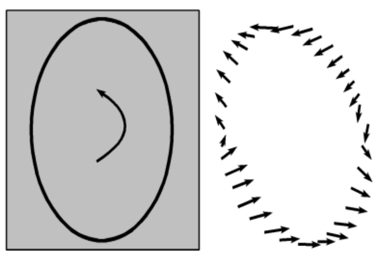

Figure 10. Rotating Ellipse – Velocity Vectors

Take a cube made of wire edges. (See Figure 11). Let it rotate. The cube has a symmetry period of four, i.e., it is carried or mapped onto itself 4 times in a full 360 degree rotation. If we strobe the cube (with a strobe light) at an integral multiple of this period – 4, 8, 12 times per full rotation, it is seen as a cube rotating. If strobed out of phase – 5, 9, 13 times per rotation – it is seen as a distorted, plastically changing, non-rigid, wobbling object – definitely not a cube.

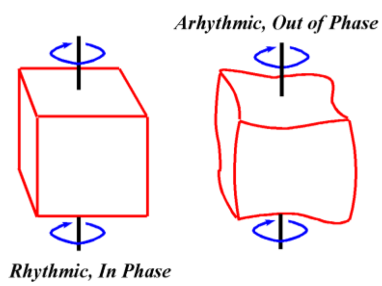

Figure 11. Rotating Wire Cubes

The specification of the external field then is always an *optimal specification*, that is, a probabilistic specification, based on the inherent uncertainties in determining the velocities of these flows, and therefore on the best information available (constraint broken in the deforming cube case: possibly that "spatial symmetry implies temporal symmetry"). If I take a reconstructive wave containing frequency 1 and frequency 2, and pass it through the hologram of Figure 3, a composite, fuzzed image of both the pyramid-ball and the cup is specified. This too is an optimal specification based on information in the hologram. The rotating, plastically deforming not-a-cube is in fact a vast, extended 4D structure in time, in this case, again, a structure being *optimally specified* given the strobe/information conditions. This "optimality," together with retrieving memories from the field and mixing them in the specified perception (another aspect of Bergson's theory), is the basis for the illusions that indirect realism – the "all is in the head" position – wrongly thinks critical to its position.

Now if we put these invariance laws together relative to some event, say, stirring coffee with a spoon, we get what I term an event *invariance structure*. A partial list of the laws involved:

- A radial flow field defined over the swirling liquid
- An adiabatic invariant re the spoon, i.e., a ratio of energy of oscillation to frequency of oscillation (Kugler and Turvey, 1987)
- An inertial tensor defining the various momenta of the spoon (Turvey and Carello, 1995)
- Acoustical invariants
- Ratios relative to texture gradients and flows for the form, size constancy, even our grasping of the cup (Savelsbergh, Whiting and Bootsma, 1991)
- And more…

Given our brain is specifying (or "specific to," a la Gibson) the coffee cup and the swirling liquid surface "out there" while we stir the liquid, it is this dynamic invariance structure, with its invariants defined only over time (and all *coordinate* with each other, hence no need for "binding"), that is *driving the modulation pattern* of the brain as a specifying reconstructive wave.

Bergson – The Alternative to the Computer Model of Mind

The brain as a very concrete wave – a reconstructive wave – is very counter to the computer or computational model of mind. Yet there are indications that we are moving to this view of the brain. The neuroscientist authors of the recent book, *The Relativistic Brain* (2015), argue that recent findings in neuroscience indicate that the neural processes, when taken in larger, group scale, are creating electro-magnetic fields. In other words, the brain is indeed a very concrete device, as concrete as an AC motor generating an electric field of force.

In the computational model, abstract computations are given all the work, and any device is sufficient – from an abacus, to a register machine using beans and shoe boxes, to a Turing machine with an infinite tape – as long as the computations can be carried out, the *concrete dynamics* are irrelevant. But abstract computations cannot account for consciousness – or conscious perception. We need a real, concrete, specific dynamics (Robbins, 2014). You don't make an AC motor from rubber bands, toothpicks and shoe boxes. Or a modulated reconstructive wave. This is why, as folks like Searle hold, "the biology is important."

In this, we move to the "broad computation" Turing recognized in his "O-machines," where, for example, a protein instantly finds the optimal solution to the otherwise computationally intractable problem of its 3-D configuration, simply by following the laws of physics in its concrete, analog domain. What the computational model sees as abstract "computations" in the brain should be viewed as constraints – via the invariants – embodied in the constantly modulated form of this very concrete wave that is the brain, a wave specifying an image of the external field.

Time in Bergson's Model – the *Temporal* Metaphysic

This is where the optical problem becomes also a problem in physics' model of time. This specified image is an image of the *past*. When we see a fly buzzing by, his wings beating 200 times per second, we are seeing a blurred summation of an already long past history of the fly's motion, i.e., we are seeing the fly as a *past* transformation of a (small) portion of the external, holographic field. How is this past-specification possible? Here we must bring in Bergson's model of time.

Underlying current physics is the *classic metaphysic* of space and time. Relativity is simply the logical epitome of this metaphysic. Beneath the metaphysic is an abstract space. This space is, in Bergson's terms, "a principle of infinite divisibility." When an object, say, our buzzing fly, moves from point A to point B, it is conceived to trace a trajectory or line (a space). (See Figure 12). The line consists of a set of points, and each point momentarily passed over by the object is conceived to correspond to an "instant" of time. Thus time, in this framework, is treated as just another dimension of this abstract space. But when motion is treated merely as a set of points, and as the line is infinitely divisible, then to explain the motion between each pair of static, immobile points, we must insert a new line with its points, beginning the process over again – ad infinitum, i.e., an infinite regress. This treatment, Bergson argued, is the root cause of Zeno's paradoxes. Achilles, continually halving the distance to the tortoise as he runs along this infinitely divisible line or space, never catches the tortoise. The flying arrow, per Zeno, "never moves," for at any "instant" it is at rest at a static point in this space.

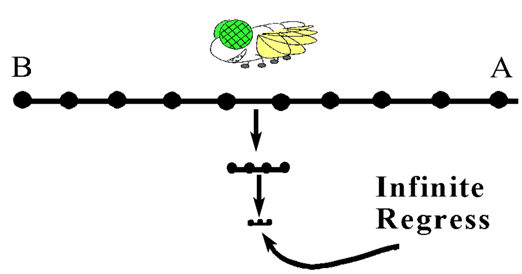

Figure 12. Motion Treated as a Set of Static Points

For Bergson, motion (thus the transformation of the universal field, namely, time) must be treated as *indivisible*. Achilles moves in indivisible steps; he most certainly catches the hare. Motion, Bergson argued, should be conceived as a melody where each "note" (instant) interpenetrates or permeates the next, each reflecting the entire series, forming an organic whole. From this perspective, the motion of time itself carries an elementary form of *memory*. In the classic metaphysic, where time (or the motion of the ever transforming universal field) consists of a series of discrete "instants," each instant falls into the past when the next instant (the "present" instant) arrives. As the "past" is our symbol of non-existence, the brain, itself only existing for the duration of that instant, is assigned the task of somehow instantly storing each "present" instant to preserve it. No. This transformation is indivisible. Therefore the brain, as a reconstructive wave, is perfectly able to optimally specify the past motion of the holographic field – stirring spoons, buzzing flies, falling, twisting leaves, plastically deforming not-cubes – all transforming in an indivisible flow. The brain is not relying on mythical, logically impossible, short term storage areas of static memory (yet to be found) to store these flows (Robbins, 2020).

This notion of the indivisibility of motion or time is knocking at physics door. Nottale, in 1996, argued, very bluntly, that space-time is non-differentiable. Differentiation implies infinite divisibility, as when we divide the slope of a triangle, or a motion from point A to point B, into successively smaller sections – ultimately "taking a limit" to arbitrarily end what is in fact an infinite operation. In the fractal context of Nottale, with the awesome implications of the nature of fractals, every where one looks at the geodesic curves of space-time, ultimately at the most infinitesimal of scales, one finds an inflection point, meaning – the curves cannot be differentiated. Lynds, in 2003, echoing Bergson, implicitly also reinforcing Nottale from a different direction, argued that there can be no static instant underlying any dynamic physical process. There is constant change. No matter how infinitely small the interval examined, there is change. If there were such a truly static instant, the entire universe would be frozen, never to change again. No value then can be fixed with certainty. Every equation of physics is subject to uncertainty. It is an intrinsic tradeoff – uncertainty for constant change.

Thus Bergson argued that there must be *real* motion (MM, Ch. 4, p. 254). Any and all motion cannot become *rest* simply upon perspective, as in the very mistaken current interpretations of relativity (this is another story I must neglect here, though cf. Robbins, 2010, 2013). We may not be able to say which objects are in motion, which objects are at rest, but real motion there must be. Stars explode. Trees grow. Mountain ranges arise. We must view the *whole as changing*, he argued, as though a kaleidoscope. Thus, he stated, what we term the "motions" of separate "objects" become *changes or transferences of state* within this global transformation or motion (like waves in the sea). It is a transformation with an inherent simultaneity, and it is indivisible – like a melody.

Back then to our buzzing fly, specified as a portion of the past, indivisible transformation of the matter-field: The fly, his wings a-blur, is also a reflection of the *scale of time* imposed upon the field by the dynamics – physical and chemical – of the brain. Here we go to an implication (clearly seen by Bergson, MM, Ch.4) that the authors of *The Relativistic Brain* did not see. These authors envisioned a constraint on the global processing velocity of the brain. But the value of this constraint can be changed. Introduce a catalyst or set of catalysts into the brain. A catalyst supports an increase in the velocity of chemical flows that otherwise would require a higher input of energy, and thus it can raise the chemical velocities in the neural processes supporting this dynamic "wave" that is the brain. Raise the chemical velocities (or, shorthand – the *energy state*) to a certain level – the fly is now specified as flapping his wings slowly, like a heron. Increase the velocities yet more – the fly is now motionless, his wings moving not at all. Raise the velocities yet more – we begin to see the fly as the liquid, vibrating, crystalline structure that it is (cf., Robbins & Logan, in press). The holographic field can be "specified" at an infinity of scales of time.

Note, by the way, this very time-scaling *is* "qualia." But find this anywhere in the vast discussion on the hard problem – the problem of time is utterly ungrasped. Note too that all this is integrally related to perception as *virtual action*, i.e., that the brain has selected information to specify from the holographic field on the very basis of action. The heron-like fly must be a veridical specification of how we can *act*. In this case, that we could reach out slowly and grasp the fly by his wing-tip. This is enactivism at its ultimate. It should ultimately be testable.

Time Scales and Invariance Laws

If we can do this in principle, that is, raise the energy state of the brain, then we must assume that nature has allowed for it (note, even increasing temperature increases chemical velocities). This reinforces why it is Gibson's invariance laws that are *required*, that are necessary for specification of the external world. Effectively, by changing scales, then, somewhat analogous to relativity, we are changing the "space-time partition." The essence of relativity is that it is *only* invariance laws that hold across all partitions, e.g., we have d=vt in one observer's reference system (say, at rest), and d'=vt' in another observer's reference system (in motion).

As an example, take Pittenger and Shaw's (1975) law for the aging transformation of the human head (Figure 13). Aging is a very slow transformation in our normal scale of time. The head growth or change is specified by a strain transformation on a cardioid figure placed over the skull and placed upon a coordinate system. Strain stretches the cardioid (and skull) in all directions as though it were on a rubber sheet. Increasing the strain value increases the "aging." Were the head transforming rapidly before us – a very fast scale – it is yet this strain law (an invariance law) that would be specifying how to modulate the hand to grasp the rapidly transforming head.

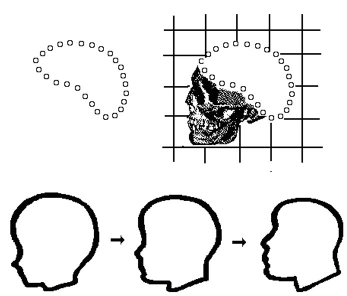

Figure 13. The Aging of the Facial Profile – a Strain Transformation applied to a Cardioid

But this brings us to another of Bergson's obscure passages: "*Questions relating to subject and object, to their distinction and their union, must be put in terms of time rather than of space*" (MM, p. 77).

Subject and Object and Time – Bergson's Unique Panpsychism

We have seen that Bergson viewed the universal field as holographic. We have seen that he held the dynamic transformation of this holographic field as indivisible, where each "instant" interpenetrates, permeates the next, as the notes of a melody, and where each note (instant) reflects the entire preceding series of notes. There is a deep implication in this. If the state of each point/event in the field reflects the influences of the whole, in fact the *history* of the whole, then, in effect, each "point" at the null scale of time (i.e., at the infinitely smallest scale) has an elementary awareness of the whole. Bergson called this "pure perception." It is as though, stretched across the universal matter-field, is a vast, vibrant "web" of awareness. It is a highly *coherent* web; the threadlike "fibers" are taut, a light flick with a finger sends reverberations instantly throughout the whole. This "web," with its, a) basic, elemental awareness and, b) its fundamental, primary memory as the web transforms indivisibly over time, carries the elementary attributes of mind. Yes, this is a unique *panpsychism* – we do not need tiny, "proto-conscious" particles here, where the consciousness of each is somehow, in some mysterious, inexplicable way, *aggregated* or "combined" (Chalmers, 2016) together to form a larger consciousness (i.e., our experience – our perception of the stirring coffee) such as that of humans, or even of chipmunks. The concept of the brain as a specifying reconstructive wave is the resolution to this "aggregation" problem.

So, note, this is the *null scale* of time, not the scale of buzzing flies, stirring spoons or falling leaves. Whether the chipmunk's or the human's, the brain — as a reconstructive wave embedded in this field, passing through it – is specifying past portions of the change of this field at a particular scale of time – a buzzing fly, or a heron-like fly. The brain is establishing a certain *ratio* relative to the micro-events of the matter-field – in the fly's case, the micro-events making up the body of the fly, his wing beats, his internal processes. If we were to conceive of our body and the fly side by side within the universal field at the null or infinitely small scale of time, we see there is no spatial differentiation between our body and the fly. Both of these "objects" are simply phases – transferences of state – within the global transformation of this field. But allow the brain to gradually apply an increasing time-scale in its specification: the outlines of the fly begin to emerge, then the shimmering oscillations of his vibrant, organic crystalline structure, then slowly he begins to flap his wings, and then becomes the buzzing being of normal scale. The essential unity of the two within the matter-field – our body and the little fly – is never broken. We arrive at Bergson's principle: *subject is differentiating from object, not in terms of space, but of time*.

To give a respectful bow to our Japanese friends here, let me slightly modify one of those koans of Zen, this one from the master, Bassui. From, "Who is it that hears?" the koan becomes, "Who is it that sees?" The basis of the experiential answer of Zen enlightenment is clear: There is no one that sees. What is being specified – at a *given scale of time* – is a time-scale-modified, perspective-based, action-relevant form of the elementary awareness defined throughout the holographic field,.

Yes, in such a solution to the hard problem, in such a model of perception, there are profound consequences for the nature of memory, cognition and thought, all of which are waiting to be explored (cf., for a start, Robbins, 2002, 2006b, 2009, 2017, 2020) and which begin to form a complete and concrete alternative to the computer model of mind.

So, this is Bergson – the great and unique panpsychist, the original externalist, the radical enactivist, the powerful direct realist – all unrecognized, not only by Searle, but by most of the philosophic world.

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