

The Actual Indefinite in Bergson and Whitehead

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1.

I would like to thank Professor Lik Tong for providing me with a distinction which has been extremely useful. That is, the distinction between the crisp definite (my own term) and the "actual indefinite." Is there anything, in the world or in our experience of the world which is, but which is not a specific, well-delineated quality? There is a prejudice in contemporary philosophy against admitting that such is possible. For many, the mere possibility of such a thing (the actual indefinite) would be morally or perhaps epistemologically distasteful.

But I think (perhaps Professor Tong would agree) that in part this is because the actual indefinite is habitually confused with two other concepts: the ambiguous and the vague.

All of us who are teachers realize that one of our first tasks is to instruct our students in the avoidance or extirpation of ambiguity or vagueness in their writing. An amphiboly is a fallacy, not an achievement. If the newspaper text states "A wood warbler was discovered by Hazel Miller of Concord, while walking along the branch of a tree, singing, and in full view," the reporter is advised to rescramble his or her syntax and rescue Miss Phipps from an ambiguous existence. Similarly for vagueness. Like a weed, it sprawls unchecked through our students'

papers. No quantity of logical herbicide seems able to stamp it out. Certainly, no philosopher wants to be accused of encouraging such growth.

By what right then do I, then, against the grain of my own practice and the avowed imperatives of western philosophy, argue for the reality of the actual indefinite? Impugners of the actual indefinite will complain that whoever indulges (no doubt self-indulges) in the indefinite is trying to urge the nose of the camel of the irrational under the tent of rationality. But the goal of this essay is hardly irrationalism. It is, rather, a more satisfactory recourse to experience, coupled with a more cautious approach to the relations between language (formal, common, or other) and experience. If the result is a denial of the absolute hegemony of language and an affirmation of the right of the actual indefinite to exist, then I can at least protest that the gain in flexibility, imaginative possibility, and intellectual modesty provided by these conclusions might pave the way for increased insight—and perhaps for new linguistic (hence conceptual) inventions. In any case, I will insist that it is possible to hold that the actual indefinite exists, and that one can do so with good intellectual conscience.

The question of the actual indefinite could be approached from any number of standpoints. I propose to do so through a comparison of two twentieth-century philosophers, Alfred North Whitehead and Henri Bergson, whose attitudes towards the interface of language and reality, and towards "indefiniteness", are in sufficient contrast to make the comparison worthwhile.

Whitehead, the champion of language (Ultimately, I believe, the language of Principia Mathematica) fears for human rationality unless this language can be made perfectly consistent with process, creativity, becoming. Bergson, the critic of language, finds that language can be

expanded and made profounder by its confrontation with process (i.e. duration), but insists that no language can quite capture process, creativity, or becoming in flight.

It might be helpful here to mention a few facts about these two thinkers. Bergson's and Whitehead's lives overlapped. Born two years after Bergson, Whitehead outlived his French contemporary by six years, dying in 1947. (Bergson died in 1941.) Bergson was famous for his Creative Evolution (1907), Whitehead for Science and the Modern World (1925) but especially for Process and Reality (1929), his magnum opus. Both philosophers denied the reversibility of time, insisted on the reality of indeterminism, and explored the nature of creativity. But Bergson welcomed the indefinite, while Whitehead attempted to exorcize it. I will begin with an exposition and criticism of Whitehead, then proceed to explore Bergson's thought.

2.

The following passage (from Science and the Modern World) sums up Whitehead's philosophy, especially his philosophy of nature:

"The doctrine which I am maintaining is that the whole concept of materialism only applies to very abstract entities, the products of logical discernment. The concrete enduring entities are organisms, so that the plan of the whole influences the very characters of the various subordinate organisms which enter into it. In the case of a living animal, the mental states enter into the plan of the total organism and thus modify the plans of the successive subordinate organisms, such as electrons, are reached."¹

There is thus a subtle top-down causality for Whitehead in all living beings. For him the whole influences the subordinate parts. The converse is also true: in the case of a living animal the mental state is also profoundly influenced by the state of the body in its full complexity. But Whitehead's philosophy extends this conceptual scheme universally:

"...the principle of modification is perfectly general throughout nature, and represents no property peculiar to living bodies...this doctrine involves the abandonment of the traditional scientific materialism, and the substitution of an alternative doctrine of organism."²

The Cartesian impasse is thus outflanked. The world is comprised of organisms. Each has a mental and a physical pole, which affect each other.

While I commend Whitehead for his goals (an organismic, non-reductionist concept of nature) as well as for many of the plausible, imaginative ways in which he attempts to achieve them, it will become clear that I am not satisfied with many of his fundamental concepts as they now stand. It will be argued in what follows in that Whitehead's treatment of the realm of eternal ideas makes novelty as an ultimate fact a relative notion and reduces creativity to a choice between preexisting possibles. It will also be contended that his insistence on atomicity as fundamental to perception fails to deal adequately with our experience of qualitative continuity. It will also be argued that this same insistence on atomicity produces a strangely abstract notion of internal relations, which amounts not to an organismally related universe but to a set of entailments or mutual entailments between discrete parts. Reacting against mechanistic theories, it will be concluded, Whitehead takes up the atomistic premise common to most forms of mechanism, and creates a philosophy which in the end is an immense essay in combinatorial analysis. Though he will often use terms like vague or indefinite to describe experience, in the end we do not find the "actual indefinite" in his system.

The elements of which Whitehead's universe is composed are termed "eternal objects."

Examples of simple eternal objects would be a patch of red (a red sense datum) and/or brown

and/or blue or a triangular shape. Plato's eternal objects or "forms" are in general conceived by Plato as transcendent, while the world viewed by the senses is understood as only an imitation of a transcendent reality. Whitehead inverts this rubric. In themselves the eternal objects are only potentialities. Only in the actual, sensed world are they real.

But there is a bit more to it. The eternal objects in their entirety are said by Whitehead to be envisioned by God prior to any ingression into the world. "Prior" to this vision they are unordered, "disjunct". Viewed by God they are an organized set of potentials capable of ingressing (becoming instantiated in the world) and thus, one suspects, something more than bare potentiality. In any case, the important point here is to note that on Whitehead's view the eternal objects are all present:

"The primordial created fact is the unconditioned conceptual valuation of the entire multiplicity of eternal objects. This is the primordial nature of God."³

There can be no question here of Whitehead's meaning. God achieves for Whitehead the "complete conceptual valuation of all eternal objects"⁴. All eternal objects are present and all are known.

But there are two kinds of eternal objects: individual ("individual essence"⁵) and relational ("relational essence"⁶). If God envisions all eternal objects, he sees every combination of all of them whatsoever: all the individual essences as related in every possible way by all the relational essences. If this is true (and I believe this is inescapable) God sees every possibility, including all details, even if these be infinite in number. He thus sees the manuscript of Aristotle's Nichomachean Ethics before it is written and also the other possible versions of that work. What

he does not see is exactly what version will in fact be written. All possibles are given, and in total detail. Two things follow from this. The first is that in the last analysis there is no novelty in the universe. Or rather, there is relative novelty: novelty relative to what has transpired up to some present time, in the world. But one will search the world in vain for the slightest shred of concrete existence which escapes the iron law of possibility. Anything new in fact has always been.

Something else follows. Creativity is in a sense the most fundamental concept in Whitehead's categorial scheme: it is the "universal of universals"⁷ But it is reduced (once again, in the last analysis) to a choice between preexisting possibles. All possibility being present down to the last, most evanescent detail in the primordial nature of God, no other conclusion can follow. To create is to choose between preexistent possibles. Finite creatures might complain in this context that they are deprived of the capacity to create ultimately novel content. But they share in this inability with God himself. God too can only choose between possibles. As Leibniz contended.

Almost any Whiteheadian will object—should object — that these criticisms do not do justice either to Whitehead's amply demonstrated sense of the fluidity of the universe and of the reality of the new, of "freshness". Equally, Whiteheadians will —and should — object that these criticisms do no justice to the subtlety of Whitehead's treatment of creativity. I concede this. Nonetheless, I see no way to escape these two conclusions: For Whitehead no ultimate novelty exists, and creativity reduces to choice.

One further conclusion follows. If Whitehead is correct in his analysis of ultimate creativity, creativity contains and/or expresses nothing indefinite. All possibles are given as conceptually distinct — no fuzzy sets here. Any indefiniteness concerns, simply, the choice between such possibles. If this involves indefiniteness, it is a barren indefiniteness.

The next two sorts of criticism concern not the timeless completeness of the eternal objects but their discreteness. The first concerns Whitehead's treatment of continuity, the second his notion of internal relatedness.

According to Whitehead, all perceptual contents are distinct and externally related. He calls these eternal objects sensa. (in Anglo-American philosophy the phrase "sense data" is often used in its place.) At the same time he holds that in ordinary sense perception we encounter continuity. Continuity is correlated by him not with reality but with "appearance": it is only "potential".⁸ By this he means that continuity exists as material fit for unique division into distinct parts. But this assumption about continuity lacks phenomenological support. Take an ordinary visible color spectrum. Whitehead believes that, logic being logic, the spectrum must consist of distinct sensa: discrete shades of color, each of a different hue. But it is clear that a color spectrum presents us with a continuous qualitative transition every bit as real and, indeed, more fundamental than any collection of distinct shades we might choose to isolate from it. That is, in this transition there are no natural "breaks". Rather, there is interpenetration. The violet at the end of the spectrum interpenetrates the violets towards the left which, finally, interpenetrate the dark blue. If someone were to say that to talk in this way is to surrender to irrationalism, I would respond, first, that rationality must surely involve the closest attention to the content and

the texture of experience and, second, that admission of interpenetration into the data of perception does not eliminate real distinctions. We continue to correctly distinguish the purple from the blue and the blue from the green. We are not left conceptually stranded. But it is not simply a matter of the color spectrum. We find ourselves confronted with countless continuous qualia: the sea-change of dawning light, the clarinet glissando at the beginning of Rhapsody in Blue, the auditory Doppler effect, etc. Such examples, I believe, successfully resist Whitehead's atomistic analysis of continuous qualia. Where there is interpenetration, no continuum can be cut without the loss of a fundamental character. Unless of course one means by "continuum" a mathematical continuum or its analogue. But — to cut the argument short --- a mathematical "continuum" presents us with discontinuity, infinitely repeated. Observed continua, involving interpenetration, also involve an actual indefinite.

The third criticism, as noted above, concerns Whitehead's treatment of internal and external relations. Roughly: an external relation is one in which the terms of a relation in no way require each other. Two Newtonian mass particles — or two ships that pass in the night without a foghorn audible — embody external relations. If one did not exist, the other would remain exactly as it always was. Internal relations (and again, roughly speaking) are those whose terms in some sense require each other. In his *Whitehead and Bradley: A Comparative Analysis*⁹, Leemon B. Mc MeHenry argues convincingly that Whitehead's treatment of internal and external relations derives from his effort to find a way between the extreme monism of F.H. Bradley and the extreme atomism of, for example, David Hume. Whitehead is convinced that individual essence (say, a shade of red) must be taken to be indivisible. Hence each eternal object is a kind of conceptual and (even when ingressed) perceptual atom. Beyond such termini

of perception and conception there is no further distinction. It then follows that all such eternal objects (“simple” eternal objects¹⁰) are externally related to each other. The patch of red does not infest the adjacent patch of green with its character. At most they form a “contrast”¹¹. And yet, Whitehead insists that internal relations are absolutely necessary to the universe generally and his own philosophy in particular. His doctrine of internal relations, however, turns out to be puzzling. It might be thought that an internal relation is one in which the terms of the relation (however many) are changed by being in the relation. Friendship seems to be a case in point: a lasting friendship to some extent transforms both of its participants. This, however, is not acceptable for Whitehead, for whom relations, as we have seen, can not transform their terms. What Whitehead means by internal relations, then, is disjunct entailment or mutual entailment. That is, internal relations are necessary relations, but not exclusively so. A line necessarily is required in a triangle, or in a square, or in an, e.g., acute angle. The line is not transfigured by this relationship, in any degree. But it is required by and necessitated in the triangle.

The problem with this is that any “wholes” in Whitehead’s universe turn out to be comprised of atomic elements. These are held to be held together by logical entailments, whose multiplicity marks the limits of what is possible. A straight line might be necessarily related to triangles, rectangles, tetrahedrons, etc. Though Whitehead sometimes speaks of eternal objects as being “a unity”¹² or an “integration”¹³ or “mutually sensitive”¹⁴, in the concrescence (the coming to be) of the actual occasions that make up the world, the concrescent unity is for him both static and purely formal. The components of a concrescence can not be sensitive to each other. They are by definition indifferent to each other. Again – and I hope I am not becoming tiresome – no actual

indefinite is allowed to exist in actual occasions, though Whitehead's language might lead one to think otherwise.

For many contemporary philosophers, as I have noted in the introduction, this conclusion will come as a not a criticism but as a mark of excellence. Surely perfect clarity is what we want. The problem is that Whitehead often speaks as if this were not the case, and that indefiniteness, vagueness and ambiguity were important, even fundamental features of experience and of the world. This is especially evident in his distinction (a very helpful distinction) between perception in the mode of presentational immediacy and perception in the mode of causal efficacy¹⁵. Presentational immediacy is clear, crisp, definite; causal efficacy, by contrast, is vague,¹⁶ indistinct,¹⁷ dim¹⁸. These two modes of perception are as different as clear vision at noon on a sunlit day and the dim disorientation experienced in waking at early dawn. This distinction is, I believe, an important addition to our concept of perception, and Whitehead is right to insist on its primacy. The problem is that in Whitehead's universe, given his most fundamental assumptions, everything that is perceived, in whatever mode, is made up of sensa and each sensum is radically distinct from every other. It follows that the data of causal efficacy are also to be analyzed into sensa. It will not be surprising, then, to find Whitehead pointing out that perception in the mode of causal efficacy consists of the "transmission" of eternal objects¹⁹, consisting of "elements A,B,C"²⁰, and sharing eternal objects with the mode of presentational immediacy (PR168-183)²¹. Inescapably, for his philosophy the dim, the vague and the indeterminate turn out to be discrete, crisp, and definite after all.

Much more could be said along these lines. But I will spare the reader and proceed to talk briefly about Bergson's philosophy where, as will be easily surmised, the actual indefinite is given not free reign but at any rate, the right to exist.

3.

Where Whitehead develops a classical metaphysical system, with each mode of being carefully demarcated and all consequences accurately (and in his case mutually) deducible, Bergson takes a quasi-experimental, more phenomenological approach; gradually developing his vision of the nature of things through what he terms integral experience²². Such a philosophy need not be disbalanced or inconsistent, however. All of his investigations maintain throughout the concept of duration: a creative and preservative becoming, attempting to see how this concept is developed in broader and contrasting realms of discourse. Where Whitehead assumes coherence, as an axiom, Bergson searches for it.

Bergson's concept of duration was formed through an effort to transcend mathematical and/or quasi-mathematical concepts as these were found particularly in associationist psychology and in Newtonian physics (I can not help noting here that these are introverted and extroverted versions of the same paradigm.). In the case of the self, Bergson's methodical probings arrived at data concerning the human self, which he believed had never been clearly grasped before:

"What I find beneath these clear-cut crystals and this superficial congelation is a continuity of flow comparable to no other flowing I have ever seen. It is a succession of states each one of which announces what follows and contains what precedes. Strictly speaking they do not constitute multiple states until I have

already got beyond them, and turn around to observe their trail. While I was experiencing them they were so solidly organized, so profoundly animated with a common life, that I could never have said where any one of them finished or the next one began."²³

It follows from this that each component or "state" (Bergson holds, like Whitehead, that there are a multiplicity of states, though he protests, as we will see. that these are not like the states presumed in associationist psychology. Each is in itself "fugitive",²⁴ "unstable",²⁵ "fluid"²⁶. He adds that these data interpenetrate²⁷. As in a holograph, so in the self. Each part is contained in each part. That is, not only is it not clear that we can carve out even the simplest mental content without losing something in the process, it is even less clear that such states, if isolated in some way, will be fixed, static, unchanging. The ease with which Whitehead finds distinct sensa (of the "subjective species") in the human self ought to put us on guard. If we probe deeply enough beneath Humean psychological appearances, is this what we really find?

It will be objected that at least some way of analyzing the states of consciousness must be produced, and Whitehead, in vivid contrast to Bergson, allows this. Bergson seems merely to protest that we shouldn't try to find the "parts" of mental life: or so it appears. But I believe that this is not true, in spite of appearances. Bergson in fact develops a conceptual scheme which allows us to discriminate "real parts"²⁸ or "actual parts"²⁹ of consciousness from partial notions or fragmented parts. In the Fall-Winter, 1999 number of *Process Studies* I have shown that Bergson develops a qualitative calculus analogous to the infinitesimal calculus of the mathematicians, a qualitative calculus which enables him to differentiate the real parts of consciousness, showing them to be briefer durations than the duration of consciousness per se³⁰. Parts of these briefer durations, if indeed these exist, may be differentiated by deriving these as briefer durations still. Consciousness thus can be broken down not as a set of discrete units all

on the same level but as a hierarchy of durations, giving us parts, and, if needed, parts of these parts, etc. The fundamental theorem of the calculus, on which this procedure is modeled, allows the mathematician to differentiate and thus arrive at a derivative, and then differentiate this again to get the second derivative, and so on ad indefinitum . Bergson's qualitative and durational calculus allows the analogous procedure. Few have understood this aspect of Bergson's thought. My purpose in introducing it here is to show that Bergson's position allows him to segregate the parts of consciousness without losing their fluidity. To "differentiate" consciousness we do not have to be sense data theorists. Hence the following conclusion: Bergson's notion of the self and its components makes room for the actual indefinite both at the level of the self and of its subordinate durations, since at all levels each component contains content derived from participation in higher levels of duration and since each level is conceived as dynamic. To use a well-known example from the history of philosophy, each component of the self—even if differentiable—is for Bergson still "personal" in the way that Descartes' piece of wax still contains the color and the smell of the honeycomb from which it is taken. For Bergson, real indefiniteness exists at all levels.

Bergson's key notion of duration is extended by him after its first analysis in *Time and Free Will* (1890) to the question of mind-body (hence mind-matter) relationships in *Matter and Memory* (1896). His concept of intuition and his corollary qualitative calculus are developed in *An Introduction to Metaphysics* (1903). In *Creative Evolution* (1907) his theory of knowledge and his metaphysics are extended to include a theory of physical cosmology and a "vitalistic" theory of evolution. Finally, in *The Two Sources of Morality and Religion* (1932) his ideas receive their final form in a theory of religious and social evolution.

In the section above on Whitehead, three fundamental doctrines of Whitehead are examined: his treatment of creativity, his understanding of continuous qualia, finally, his treatment of internal and external relations. To fully deal with Bergson's treatment of his most basic notion of qualitative transition, i.e. duration, would require another lecture, much longer than the present one. I will therefore deal with it below briefly and schematically. Here I will deal with the differences between Bergson's and Whitehead's notions of creativity.

If for Whitehead, I have argued, creativity is defined in the last analysis as choice between preexisting possibles. For Bergson, by contrast, creativity expresses something which is initially at least partly indefinite: indefinite because the shape of things to come is nowhere fully performed, nowhere precise. This is because for him possibilities are created, not presupposed sub speciae aeternitatus. Bergson thus states, in his essay "The Possible and the Real":

"The fault of those doctrines – rare indeed in the history of philosophy – which have succeeded in leaving room for indetermination and freedom in the world, is to have failed to see what their affirmation implied. When they spoke of indetermination, of freedom, they meant by indetermination a competition between possibles, by freedom a choice between possibles—as if possibility was not created by freedom itself! As if any other hypothesis, by affirming an ideal pre-existence of the possible to the real, did not reduce the new to a mere rearrangement of positive elements!"³¹

For Bergson to be creative is literally to create possibilities. It follows from this that the new (i.e. novelty) cannot be a rearrangement, however complex, of pre-existing possibles.

Creativity would thus involve not only some real indefiniteness in the future of the present event (in the sense that all possibles could not be spelled out ahead of time); it would necessarily involve actual indefiniteness in the present, where the creative act is being prepared. But it

should be added that where Bergson believes that to define possibility and creativity as Whitehead does is to be condemned to strict determinism, Whitehead's example proves that this is not true. So far as I can see, Whitehead has every right to his indeterminism.

As for the question of continuous qualia, the example of the color spectrum appears to me entirely convincing. But the color spectrum is inherently static. The really serious question for process-relational philosophy is whether the so-called stream of consciousness is continuous or discontinuous. Whitehead appears on this question to be the champion of sheer discontinuity, Bergson the proponent of sheer continuity. I can not accept either horn of this dilemma as given: Bergson's rhythms of duration allow for elements of discontinuity, Whitehead's concepts of "transition"³², "prehension"³³, and the "vector character" of prehension³⁴ suggest the possibility of an element of continuity between present and past. (On these points I would like to signal Jorge Nobo's treatment of this issue in his Whitehead's Metaphysics of Extension and solidarity.)³⁵

To deal with these questions (which would require and extensive analysis) I would like to move the question of the continuity/discontinuity of duration to a different level, that of the duration of non-living matter.: composed, Whitehead states, of actual occasions. Here a real question emerges. People who knew Whitehead often recounted to me Whitehead's description of the train ride from Cambridge down to London, understood in terms of quantum physics. The distance is sixty miles, and Whitehead used to jest that in quantum terms this involved spending one minute at each milepost. It is a trip I have taken many times, and Whitehead's example never failed to strike me. The trouble is that quantum physics as later developed fails to give this

reassuringly simple picture. Where Whitehead describes successive actual occasions as each taking up a definite quantum of space and time, classical quantum physics fails to find such definite quanta. Rather, one's quest for them is interrupted by Heisenberg's "uncertainly relations". If we look for definite location, infinite momentum emerges. If we look for definite time, we find ourselves beset with infinite energy. Most students of Whitehead concede that Whitehead never dealt with this problem. It is easy to see why. It would have required a thoroughgoing reworking of his categorial scheme.

It is possible that at some later date quantum physics will be again reformulated, perhaps in a way that reinstates the sheer discontinuity of pre-classical quantum theory. Or some very different picture may emerge. As things now stand, however, it is not difficult to find the actual indefinite at the level of quantum measurement. Or in Bergson's treatment of material duration.

Two final points. This talk began with the admission that ambiguity and vagueness are quite reasonably regarded as bad things, to be avoided or preempted. I hope that what has been said so far makes it clear that some sorts of ambiguity and vagueness, arrived at through a process of reflective analysis, are not a function of confusion or of thoughtlessness, but rather of the world we inhabit and, legitimately, of thought.

At the beginning of this talk, some mention was made of concepts of the nature and function of language. I will simply state my conviction that though Whitehead's magnificent metaphysical construction was developed with an eye to the precise application of mathematics to reality, views which accept the actual indefinite are more likely not to propose such a stringent criterion

of applicability as Whitehead does. But they are, if understood, more likely to suggest that forms of mathematics might be found which, though extremely fruitful, do not require a one to one correspondence of mathematics to the presumed precise articulations of reality. I refer here, in conclusion, to fractional and fractal geometries, nonlinear dynamics, chaos theory, the theory of fuzzy sets, and theories of dissipative structures. And to Gödel's Proof.

Notes

1. Alfred North Whitehead, *Science and the Modern World* (New York: The Free Press, 1967), 79.
2. Alfred North Whitehead, *Science and the Modern World*, 79-80.
3. Alfred North Whitehead, *Process and Reality* (New York: The Free Press, 1978), 31.
4. Alfred North Whitehead, *Process and Reality*, 32.
5. Alfred North Whitehead, *Process and Reality*, 115.
6. Ibid.
7. Alfred North Whitehead, *Process and Reality*, 20.
8. Alfred North Whitehead, *Process and Reality*, 61.
9. Leemon McHenry, *Whitehead and Bradley: A Comparative Analysis* (Albany: State University of New York Press, 1992), 213.
10. Alfred North Whitehead, *Process and Reality*, 114-115.
11. Alfred North Whitehead, *Process and Reality*, 24, 228.
12. Alfred North Whitehead, *Process and Reality*, 108.
13. Alfred North Whitehead, *Process and Reality*, 290.

14. Alfred North Whitehead, *Process and Reality*, 285.
15. Alfred North Whitehead, *Process and Reality*, 61-65, 168-183.
16. Alfred North Whitehead, *Process and Reality*, 116.
17. Alfred North Whitehead, *Process and Reality*, 169.
18. Alfred North Whitehead, *Process and Reality*, 176.
19. Alfred North Whitehead. *Process and Reality*. 58.
20. Alfred North Whitehead, *Process and Reality*, 116.
21. Alfred North Whitehead, *Process and Reality*, 168-183.
22. Henri Bergson, *The Creative Mind* (New York: Philosophical Library, 1946), 237.
23. Henri Bergson, *The Creative Mind*, 192.
24. Henri Bergson, *Time and Free Will* (London: Allen and Unwin, 1950), 132.
25. Ibid.
26. Henri Bergson, *Time and Free Will*, 129.
27. Henri Bergson, *Time and Free Will*, 100
28. Henri Bergson, *The Creative Mind*, 202.
29. Henri Bergson, *The Creative Mind*, 198.
30. Pete A. Y. Gunter. "Bergson, Mathematics, and Creativity." *Process Studies*, 28 (1999), 268-288.
31. Henri Bergson, *The Creative Mind*, 123.
32. Alfred North Whitehead, *Process and Reality*, 55.
33. Alfred North Whitehead, *Process and Reality*, 19, 168.
34. Alfred North Whitehead, *Process and Reality*. 19, 317.

35. Jorge Nobo, *Whitehead's Metaphysics of Extension and Solidarity* (Albany: State University of New York Press, 1986), 439.