

The development of an idea of process

— Whitehead's process metaphysics, cosmology, theology.

What is it to be in process? I am going to present, here, the conceptual structure of a processual cosmos developed in the late philosophy of Alfred North Whitehead, and I will suggest that this structure is an important contribution to the ongoing inescapable project of considering and constructing metaphysical generalizations at the highest level of universality. In some of my other papers I discuss some contrasts and resonances between strong versions of process thought in Leibniz, Schelling, Hegel, Whitehead, Bergson, Heidegger and Deleuze, who share not only the explicit project of developing a more dynamic kind of concepts for Western thought, but also the understanding that such a project involves a sort of shift of the notion of thought and concept formation, from representation and description to participation and construction. But the process thinker par excellence, the one who made the expression of a concept of processuality the most explicit and central aim of his philosophical work, is Whitehead. Focusing attention on this central project as our entry into Whitehead's philosophy, the point of this paper will be to follow and discuss the project of thinking processually, in order to make its thrust available for further applications and explorations. Whitehead's *Process and Reality* is shaped to the needs of this project, but it does not carry the burden all alone, of providing such conceptual resources. Hence, the comparison of Whiteheadian process thought with resonant ideas in other thinkers will not emphasise the radicality and depth of Whitehead's thought somehow at the cost of those other more famous thinkers — rather, I will be interested in seeing, in the prism of the problem Whitehead formulated, the emergence of models for processual thought as a general need and possibility which is beginning to emerge in the foreground of the spirit of our time, and which would be emerging even if Whitehead's philosophy was entirely forgotten.

It is a curious fact that this almost happened. Whitehead's late and fully mature philosophy fell into a remarkable degree of oblivion after a short intensive rush of fame. The "vanishing" seems to be attributable, to a large extent at least, to the establishment in the 20th C of a rather small number of philosophical schools of a relatively closed character and with a strong tendency of seeing themselves as the overcoming of a metaphysical tradition. Whatever the reason may be for the virtual disappearance of Whitehead's late philosophy during most of the 20th C, it

is finally becoming visible again in the philosophical landscape at the turn of the 21st¹⁾.

For the short while when Whitehead's philosophical work was initially widely acknowledged, along with Bergson's, as a breakthrough to a new era of deep and creative thought, a central aspect of this reputation was the sense of deep originality coupled with a great difficulty of access — characteristics that I still think anyone who opens *Process and Reality* for the first time will confirm. The difficulty is not only one of style, it is very much due to Whitehead's gentle insistence that his reader considers the possibility of modifying some metaphysical categories which have been held so far beyond question, and adhered to by philosophical schools mutual in disagreement about so many kinds of other things, that they were rarely even stated. This is not an easy exercise. But attempts at understanding and discussing some of Whitehead's ideas without taking into account the full radicality of his suggestions have tended to produce quite counterintuitive and unreasonable statements hardly undeserving of the harsh criticism they have sometimes been exposed to²⁾.

We are going to aim our discussions at the heart of these difficulties, the systematic conceptualization of processuality. Therefore, I am also focusing on the late (post-1925) and mature philosophical works by Whitehead where the treatment of this problem becomes a main issue (even though much of his earlier work is certainly leading up to it) and particularly I focus on *Process and Reality* which is entirely devoted to this problem and is obviously Whitehead's major opus in systematic philosophy. As I am going to try to show, this heart of difficulties is not really so difficult to grasp or handle if we just avoid the tendency of downplaying the central metaphysical suggestion of processuality to a moderate alteration or translation of the traditional modernized metaphysical categories of time and substance. The central notion, in fact, is so simple and homely that the difficulty in appropriating Whitehead's philosophy may be to realize, in the first place, that something overflowing modern time and substance is going on here. Once we have seen the significance of the central radical problem of what it means to be in process, and once we have managed to ask questions about it in a form which does not presuppose a fundamental abstract structure of time and substance, Whitehead's constructions start to show their power of taking root in the concrete, effortlessly, as if with a power of their own.

¹⁾ G.R. Lucas: *The Rehabilitation of Whitehead*, SUNY 1989

²⁾ Grünbaum, A.: Whitehead's method of extensive abstraction. *British Journal for the Philosophy of Science*, 1954, 4, p.215-26

Think of permanence

What is it to be in process? What is the nature of becoming? This is a metaphysical question. It is metaphysical even if some ways of approaching it wrap it into an epistemological one. The very common reduction of “change” to epistemology can only function by assuming that a particular answer to this more fundamental metaphysical question is already settled. If one takes for granted that permanence is the ultimate nature of real things, then change is not in them, but with them at most. They move in spaces, spaces of possible states, physical positional space being the paradigmatic and perhaps fundamental instance. Obviously we should then address the workings of perception and cognition if we wish to ask how — and in which sense and to which extent — compositions of such movements can be taken as “change”.

As Rorty meditatively puts it: “Think of novelty as the sort of thing which happens when a cosmic ray scrambles a DNA molecule, thus sending things off in the direction of the orchids or the anthropoids.”³⁾ Rorty’s point is that we should get used to thinking in this modern “relaxed physicalist” fashion and not bother: the characteristics of cosmic rays and that kind of stuff is the business of physicists, and it is pretty boring business. Rather than bothering ourselves and perhaps even the physicist with speculations about the nature of real things, Rorty encourages those of us lucky enough to possess the time and means to get on with activities of greater significance for the meaning of human life: inventing modes of self-expression, producing within the realm of discourses what is, for all purposes relevant to us, lively “change” and “difference”.

But why not reverse Rorty’s mental exercise? Think of permanence as the sort of thing which happens when creative processes organize themselves into patterns which are passed on for a while with relatively high stability, such as DNA molecules and elementary particles? I suppose one noticeable difference is that we are much more accustomed to the first type of exercise proposed by Rorty, so that the second one will have much more of the feel of a metaphysical meditation. “Like flying without an airplane” as a physicist friend of mine said, with a mixture of horror and fascination, after reading an earlier version of this paper. It is obviously much more “speculative” in this sense. But does that make the first speculation more well grounded in anything else than our customs?

3) R. Rorty: *Contingency, Irony and Solidarity*, Cambridge 1989, p.17.

The drift of the following is not to suggest a version of the widespread visions of demiurgic⁴⁾ or pyrrhonic⁵⁾ character, to the effect that what is well grounded in our customs and practices is out of touch with the deeper nature of reality. In fact, the Whiteheadian vision of the ongoing necessary project of metaphysics implies that habitual structures in a form of life must have a very deep and very strong involvement with the nature of things. To begin with, let us acknowledge that the idea of stable, independent “immutable mobiles”, tracing trajectories through open spaces of possibility, has become a very general and very successful component of technology, science, thought and ordinary practice (ignoring for the moment any question of whether or how such spheres of life may be separated). If we are going to have a comprehensive metaphysical understanding of the universe we inhabit, then this habitual and habitational structure — the modernized notion of substance — must play an important role in it, as indeed it has done for some centuries.

Having a metaphysical interpretation of totality is not an option, it is inescapable. This insight is pivotal in Whitehead’s above mentioned ideas of the form and content of our processes of understanding, and I shall return to the discussion of it. What is to some extent optional, if this is correct, is how openly and completely we express our metaphysical scheme and how interested we are in developing it.

Whitehead did argue a revised ontology of process which may, as a first approximation, be expressed in terms of a reversal of well known speculative structures, or meditative techniques, much like the reversed Rortyan exercise just outlined. That is, Whitehead did promote a revision which may seem to some, at a first glance, like the complete replacement of old “relaxed” metaphysical schemes with something new and wild, or perhaps even a requirement that emancipated post-metaphysicians should surrender again to speculative dogma of the nature of things, if only a new set of dogma. However, Whitehead’s argument

4) The classical demiurgic vision of separation is, of course, Plato’s. The Demiurge himself is active in *Timaios*, whereas the great separation between ordinary human practice and the deeper nature of everything is at least as outspoken in the famous cave of *The Republic*.

5) Pyrrhonic ideas of the incapability of thought of expressing the nature of things have their classical spokesmen in Pyrrho and Sextus. But they also have highly modern spokesmen such as Hume and Wittgenstein, the latter representing, at least according to interpreters such as Kripke, a further radicalization of Hume’s self-acclaimed radical pyrrhonic scepticism. Hume is particularly interesting in this context because he explicitly states that it is *habit* that saves our understanding’s connection with structures in practice. Or perhaps better, what habit saves is practice and understanding is but its instrument for certain complex subprocedures. For Hume there is no such saving of a connection with the nature of things for *thought*, as thought is thought to inhabit a separate compartment of ideas which is as perfectly immanent to (us) minds as it is perfectly transcendent to (them) things. This points to an aspect of Hume’s pyrrhonism which will become relevant in the following: like many other modern epistemologists he implies a split cosmos of deprocessualized worldly substance on one side and desubstantialized mental process on the other.

is that we have never been beyond metaphysical thought, nor do we need to be beyond it in order to be in the progress of emancipation from frozen, dogmatic patterns of it. Furthermore, when Whitehead developed a systematic notion of process and suggested it as a carrying structure of a metaphysical scheme, the idea was not to replace habitual patterns of thought with some entirely new speculation claimed to carry authority into thought from a point of insight beyond the structures of familiar practices, things, projects and habits. On the contrary, Whitehead argued that the modernized classical categories of time, space and substance capture and express very well some important aspects of the patterns of activity which have come to shape much of modern science and modern life. Such effective patterns carry a kind of resonance which should not be ignored or downplayed in the development of metaphysical understandings of totality. Hence, their formation and refinement during the last few centuries constitutes a real progress, not just in an instrumental sense of the local effectivity of technologies and sciences seen in isolation from an entire life form, and not just in the utilitarian sense that they happened to be able to fulfill desires that happened to be those of the subjects at hand, but in a strong sense that something is learnt here of the nature of the cosmos⁶⁾. But there are other structures in our habitation of the universe than the ones adequately expressed in the modernized notion of substance, and the process of metaphysics should be just as committed towards those. Process patterns, in particular. Even if process patterns are aspects of (modern) life that we are accustomed to handling in more tacit manners, as if in the background of the substantial matters, it is an important part of the task of metaphysics — in contrast, perhaps, to the specific sciences — to bring about a coherent combined expression of implicit backgrounds and explicit foregrounds.

Furthermore, process features are not only background of our living reality anymore, if ever they were only that. Even if classical modern substance metaphysics has been closely involved with epistemological reflections showing that it cannot be logically derived from any particular set of evidence, even its skepticist “critics” never challenged that it does derive strength from experience in a wider sense — particularly from the experience of the successes of mechanical analysis during the first centuries of modern science and technology. However, it is becoming increasingly clear that this power of prediction and control of natural phenomena offered by mechanical analysis is local and needs to be balanced by

⁶⁾ In works more or less contemporary with *Process and Reality*, such as *Religion in the Making* and *Science and the Modern World*, Whitehead interprets concrete historical developments of religious and scientific structures as having generally progressed towards a more flexible, comprehensive and coherent appropriation and co-evolution of the cosmos — a progress which is, however, always endangered by a tendency of seeking fixpoints and ultimate securities in the latest innovations as universally and unproblematically applicable. Speculative philosophy has a twofold role to play here: to unfold the wisdom gained in the habitational structures, and to counteract the fixation by keeping open a space for creativity.

broader, e.g. ecological, perspectives. Recent emphasis on discourses of chaos and complexity seems to bring to light a new face of nature, as understood through the natural sciences. Nature looks increasingly unstable, and also increasingly historical. Continents and climate zones are adrift. A few generations have now known it for a fact that biological species, including humans, have changed radically, but this tendency of understanding the elements of nature as historical products is becoming increasingly general: even natural laws are now frequently referred to as belonging to particular “eras”, and all known particles of matter are now thought to be decaying spontaneously (in the very long run). In recent physical cosmology the most stable feature of the physical universe is pretty much the thermodynamic decay of every object, from elementary particles to galaxies. Process features emerge in the foreground of technology as well as science, as when large networking systems have to be planned, built, used, modified and repaired concurrently.

In summary, it is proposed that we ought to further develop our metaphysical schemes beyond modernized substance metaphysics, not in order to repeat once more the old proof of the ultimate ungroundedness of the powerful idea of modern substance (which has in fact become rather more metaphysically fixed and dominant for each such epistemological wave of “attack”) but to situate this idea’s formulation within a more comprehensive conceptual scheme which is also capable of giving voice to processuality — and this proposal is supported by two kinds of observation. One kind of observation regarding the implicit background processing underlying the substance-style matters in focus of modern projects, and another about the rising of processuality into the explicit foreground⁷⁾ in late modern institutions, disciplines and paradigmatic objects, particularly in science and technology.

Concreteness and concretion

In the following, the concept of “substance” simply means any idea of a thing, particle or component, which exists identically and permanently (through a finite or infinite interval of time), and is capable of having properties such as spatial position, qualities or relations to other substances, in such a way that the changing phenomena observed in the real world can be thought to be comprised of a

⁷⁾ I acknowledge that this nice metaphor, echoing Schelling’s demonic rising of the ground, is borrowed from Deleuze (*Difference & Repetition*, chp.1). Although this kind of observation of rising processuality can be made with so much greater force now than in the 1920’s, Whitehead does follow contemporary organicists like Bergson (and earlier ones like Hegel and Leibniz) in seeing, within the explicit object fields of the sciences, emerging structures with organic and processual characteristics, calling for a balancing the great significance of the science of mechanics.

number of stable substances with properties varying as functions of time. A prominent example of such an analysis by a substance scheme is the elementary particles of modern physics (putting aside for the moment the question whether there is a "bottom level" of truly elementary particles).

Obviously substance scheme analyses have proven very useful in a wide range of technical and scientific discourses and activities; and there is a strong tradition, at least since Aristotle, of generalizing the substance scheme into a metaphysical principle: the idea that everything must ultimately consist of substances. Typically, we take substance metaphysics for granted without explicitly formulating it as Aristotle did⁸⁾.

Although 20th century physics has introduced important elements of process-type analysis, we often cling to the substance scheme in their interpretation. For example, in 4-dimensional space-time or Minkowski space — a convenient structure for expressing special relativity — points correspond to *events* rather than particles. A very common interpretation of this is that future, present and past events, since they are allocated in one space, must have the same kind of existence. This is an extension of substance metaphysics: Particles may or may not exist identically and permanently in the classical sense which translates into continuity along a timelike path; but in any case the total system of worldlines and event nodes is thought of as a timeless fact to which ascriptions of change and becoming are strictly inappropriate (their meaning may of course be reconstructed in terms of indexicality and perspective).

Process metaphysics begins with the observation that any phenomenon we can understand, to whatever degree of accuracy and completeness, through an analysis in terms of *substances*, we may understand at least as well in terms of *processes*, in some adequate sense of this word.

As long as this adequate sense is not further specified this statement, that any substance analysis can be replaced by a process analysis, is close to being a useless tautology; because clearly we could construct some translation procedure in which each enduring object mentioned in the substance scheme is trivially parsed into a process scheme as a local and isolated string of processes of very short duration, in which each member passes on an outcome identical with the beginning conditions it took over from its predecessor process — except for a few transformed parameters corresponding to the interactions and changes of qualities prescribed by the substance analysis. If the process scheme just amounted to such

⁸⁾ These remarks are not intended to give a just representation of Aristotle. Actually his concept of substance should probably be read as much more process-like than the modern standard use of the term. Aristotle's paradigm case of a substance is not inert particles but living organisms — the same as Whitehead's paradigm case of a process!

a translation into an analysis with equivalent power, but requiring the postulation of a larger number of entities, it would hardly be interesting.

What Whitehead attempted to show is that process thought can start with assumptions which are in an important sense *simpler* and allow accurate analyses of a *wider* range of phenomena than those of the substance scheme. I believe this attempt was much more successful than is generally recognized, but this depends on two difficult but interesting questions: comparing the *simplicity* of metaphysical assumptions, and comparing the *extent* of phenomena covered.

At a first glance Whitehead's score on simplicity looks unfavourable. *PR* opens with an elaborate exposition of process metaphysical assumptions in the form of a table of 41 (!) "categories". However, this abundance of "categories" should not be read as corresponding to a similar multiplicity of basic kinds of entities or basic laws — they are really a very explicit description of *one* kind of entity: the process. Whitehead saw the need of a quite elaborate exposition of the basic concept of process in order to stay clear of the substance scheme which could otherwise habitually enter a philosophical discussion of terms like time, space, identity, causality, etc. In other words, the fact that one scheme strongly dominates the current discourse may necessitate a verbose formulation of an alternative scheme, so that simplicity in the suggested sense is not necessarily associated with brevity.

Although Whitehead's process thought is formulated in abstract and speculative terms, it is a philosophical effort of starting with a minimum of conceptual violence done to the concrete world with its complex, transitory phenomena and ambiguous demarcations — minimizing what he calls the "fallacy of misplaced concreteness" characterized by "neglecting the degree of abstraction involved when an actual entity is considered merely so far as it exemplifies certain categories of thought" (*PR*, p.6/8).

Substance, space and time are major examples of useful abstractions whose power of reflecting all aspects of real phenomena has been overestimated. They tend to bracket out the *dynamic* aspects of things, by which I wish to point at some of the most obvious and intimate features of the world of our immediate experience and action: the fundamental difference between the inexorable given-ness of the past, the acuteness of the present moment, and the openness of the future — and the way people and other living things are striving in this present moment, with all their powers of force and creativity, to use the given to realize the best (or at least, the least frightening) possibilities. Although these aspects are well known parts of our reality, many scientists and philosophers of science have argued that since they don't make much sense in the context of explicit scientific representations of the physical world, such expressions of "becoming" are illusory, a false perspective,

mind-dependent. In short, the failure of physical science to make sense of dynamism is held to imply that time is ultimately static⁹⁾.

In contrast, process metaphysics implies a version of the thesis of "dynamic time" or "becoming": a radicalized version in which real entities are so inseparable from dynamism that they cannot accurately be described as subject to change and becoming — rather they *are* change and becoming, and this dynamism cannot generally be separated and reduced to a quantity, time. This does not, for Whitehead, render the quantitative, physical notion of time invalid, unreal or uninteresting at all, but it places it in a context which need be made explicit if "time" is discussed at a high level of universality — that is, as carrying implications beyond the local projects which can take for granted the patterns which enable a time system locally.

A note on the idea that time is not universally defined:

The idea of universal, unambiguously given time, in this context, enfolds the claim that a universal separation can be made (or better, exists in a readymade form) between pure change without content ("time") and pure content without change ("substance") and furthermore, that the pure change comes in a quantizable form. Process thought, in the form radical enough to make a relevant difference, implies the contrary claim that *not only* do things exist (or more precisely, things go on) without carrying such a readymade cut in their nature, *it is also* that the cut cannot be made, except locally, and even then at certain expenses. "Expenses" means: even the most trivial and mechanically clock-like physical process can be seen as "happening in time", as a sequence of stages, whether continuous or discontinuous, only by abstracting from some aspects of the happening. Still, time — and space — are an extremely effective way of analysing certain aspects of the happening through virtual parts and stages. "Physical time expresses some features of the growth but not the growth of the features."¹⁰⁾ Furthermore, the conditions of emergence of a time system are given a central place in Whitehead's philosophy of nature: time is a feature of many physical systems, in the Whiteheadian analysis, it is certainly not dependent on "subjectivity" in any kind of sense that restricts such patterns to exist in the sphere of human consciousness or human

9) Such arguments are frequent in the literature. Particularly clear and detailed expositions are given in A.Grünbaum: *Philosophical problems of space and time*, New York 1963, p.314-330; A.Grünbaum: *Modern science and Zeno's paradoxes*, London 1968, p. 7-37.

10) *PR*, p.283/434. Some Whitehead scholars have interpreted such statements as referring to two kinds of time, a process time and a physical time — so that dynamic becoming would be a kind of additional temporal dimension in which the process, complete with temporal and spatial relations, takes shape. E.g. *P.Hurley: Time in the earlier and later Whitehead*, in *D.R. Griffin (ed.): Physics and the ultimate significance of time, SUNY 1986, p.87ff.* This is inaccurate, particularly if it is taken to imply two kinds of temporal extension or two kinds of temporal dynamism, or one of each (this would be a restatement of McTaggart's A- and B-series). Whitehead's point is that there is basically one kind of dynamism in every process, and one or several possibilities of extracting patterns and common features of more or less extensive character.

practice only. There is another sense in which time might be said to be subject dependent in Whitehead's process metaphysics by virtue of *everything* being subject dependent: an essential aspect of every process whatsoever is termed "subjectivity" — this will be treated below.

A note on the idea that time is relational and dynamic

The thesis of ultimate inseparability of change and content implies that time is interpreted relationally (as a system of temporal relations between events) rather than absolutely (as a reality prior to and independent of events). Thus, the process account of time is relational as well as dynamic, a combination which may seem problematic. The thesis of dynamic time (which, in its classical versions, such as Newton's, claims a realistic interpretation of "now" as a point with a special kind of ontological significance passing through the continuum of time) would seem to be incompatible with a relational interpretation of time because the relations involved contain only a relative temporal order (they are B-relations in McTaggart's sense) but no particular privileged "now" event (no A-relations)¹¹⁾. Furthermore, the special theory of relativity has combined spatial and temporal relations in a way which reveals the construction of a serial temporal order of all events to be relative to velocity; and without a unique order obviously the idea of a progression of a cosmic now is in trouble¹²⁾. However, in process metaphysics it is possible to combine dynamic and relational views by restating "becoming" without reference to the passage of a cosmic now-pointer, and even without requiring a unique temporal order of all events. This becomes possible by understanding becoming in terms of something more simple or primitive than time, as the unfolding (the "conrescence" with Whitehead's term) whereby each process transforms open possibilities into definite facts. The pivotal simplicity of the concept of process is unfolded below, and a more technical expansion of this point into a reconciliation of "dynamic time" and the special theory of relativity will be developed in a forthcoming article¹³⁾.

The process relational account of continua of time and space amounts to a reconstruction of them as systematic patterns in some particularly uniform

11) The classical discussion of relational vs. absolute time is the argument between Leibniz and Clarke (who represented Newton): See *The Leibniz-Clarke Correspondence*, ed. H.G. Alexander, Manchester 1956. For a modern discussion of relationism and platonism, see W.H. Newton-Smith: *The Structure of Time*, London 1980. McTaggart's concepts of A-series and B-series which express the purified ideas of dynamic and static time are omnipresent in 20th century discussions of time in analytical philosophy. McTaggart's argument, originally published in 1908, is found in J.M.E. McTaggart: *The Nature of Existence*, Cambridge 1927.

12) This type of argument against dynamic time on the basis of the special theory of relativity has been raised by several authors — e.g. H. Putnam: *Time and Physical Geometry*, in: *Mathematics, Matter and Method*, Philosophical Papers, Vol.1, Cambridge 1975, p.198-205.

13) Chp. 6 — "RELATIVITY" — in this thesis.

relations within a family of processes. Descriptions of the working of this system is what Whitehead calls *morphological* analysis, contrasting it to other modes of *genetic* analysis which focus on more dynamic features and relations — e.g. of causal and teleological character. The aspects covered by genetic analysis are roughly those that go beyond the substance scheme, and what distinguishes Whitehead's radical process thought from more moderate versions of event ontology is the explicit formulation of a concept of process whose dynamism underlies its extensive features. Radical process metaphysics explicitly drops the assumption that change is ultimately composed of movement. [However, to drop a metaphysical assumption of a sufficient traditional authority to usually “go without saying” requires more, in practice, than simply pointing out that this assumption does not stand on any ground of necessity — it requires the explicit positive formulation of a metaphysical alternative. Hence the importance of Whitehead's fundamental question: “what is a process” — and of his suggestion of a systematic answer.]

The distinction between genetic and morphological analysis is given the highest rank of importance by Whitehead — the rank next to that of the overarching concept of process — in his use of these two terms of this distinction to organize *Process and Reality* into main parts. However, like Whitehead, we shall focus first and foremost upon the *genetic* aspect, because this is where a dimension entirely different from traditional treatments of time comes in. However, it is not that the morphological analysis reduces to a mere repetition of the more conventional treatment in terms of time, space and substance taken for given, stable commodities. Rather, the morphological analysis assumes the task of constructing these, that is, of showing their constrictability and its conditions, in a world of processuality not a priori constrained to fit into any particular morphological scheme. In fact, it is a highly significant aspect of the historical development of Whitehead's thought, that the morphological

1.1.: The simple concept of process

A process simply means a transition which happens in a definite situation and yields a definite result. It includes and conveys its situation, but the situation does not completely determine the result — a process is more or less creative and self-organizing.¹⁴⁾

Basically this is all there is to it, but it may need some clarifications.

¹⁴⁾ This is a compressed and simplified statement of Whitehead's "categorical scheme" (*PR*, p. 18/27 - 30/45 — it omits definitions of many technical details, such as the relations between processes, part-processes and societies of processes.

Firstly, the terms "situation" and "result" should not be taken in a sense which relies on substances and substantial continua. The situation (the "universe") of a given process means simply a set of other processes (past, i.e. completed processes). The "result", similarly, means the way the completed process becomes part of the universe for other processes. In addition, Whitehead specifies that no two processes can spring from the same situation — as he points out, this is part of the principle of relativity (the further identification of this limitation of the causal "universe" with a particular speed is connected with the definition of a metric — which is, as we shall see, considered a more local matter). These parts of the definition of process hardly contains any controversial metaphysical claims, and as I implied above, without further specification it is not clear that it would be very different from the substance scheme. ("The principle of relativity, *PR* 22/33.)

Secondly, the statement that the situation does not completely determine the result of any process is indeed a controversial metaphysical claim. If we wanted to reduce metaphysical assumptions to the minimum we should rather be saying that the situation does not necessarily determine the result of every process. As it stands, Whitehead's claim is just as strong as the reverse claim (that of complete determinism): Whitehead claims, as part of his definition, that every process is (more or less) *creative* or *inventive*. This means, it is not only non-determined in the passive sense of a stochastic event with a fixed outcome space and probability distribution, but rather in an active sense of being able to produce something new and even striving for a "better" organization of the situation (the nature of this teleological moment — striving and value — is discussed below). This claim of "creativity in expression of the situation" obviously does not imply that the range of possible outcomes is unaffected by the situation, or that there cannot be large classes of processes which in certain respects follow relatively stable laws with a very good approximation. (According to Whitehead only the most complex processes in nature are strongly creative, but all processes have a minimum of creativity. In other words, no process can only transmit — it necessarily leaves its mark.) However, this positive claim of creativity is really the centre of a genuine concept of process, I would argue. The combined claim of creativity, dynamism and teleology expressed in Whiteheadian terms such as "advance into novelty" and "creative advance" is the backbone of process thought which makes it a real and interesting alternative. It makes a distinct sense of claiming that things actually *happen*, that there is an ontological difference between past and future events — a strong but simple intuitive claim reflecting common language and immediate experience, and the same intuitive content which the idea of a cosmic now-pointer traversing a continuum of time awkwardly attempts to translate into the substance scheme. If and when something genuinely new is thus produced — such productive ongoings must be the interesting units for analysis. Whereas, if and when nothing essentially changes and emerges, enduring objects and structures are the interesting units.

There is a fourth aspect of the simple concept of process we must try to clarify in order to get on to that central point: What counts as one individual process? Obviously the biological organism is the main paradigm for such a unit. Whitehead does not point to one specific level of nature — but he does discuss subatomic transitions as well as complex organic functions and even entire organisms as one process. This is confusing in the first place, particularly since Whitehead makes a point of distinguishing between a process in the full sense, and process-like sub-processes and aggregates ("societies") of processes ("Categories of Existence", *PR* p.22/33). However, what characterizes a process unit for Whitehead is not its scale but, again, the teleological moment. A concrete process can be divided in different ways, according to different perspectives, but the resulting subprocess will be "only subordinate... A reference to the complete actuality is required to give the reason why such a prehension [i.e. sub-process, nvh] is what it is in respect to its subjective form. This subjective form is determined by the subjective aim at further integration, so as to obtain the 'satisfaction' of the completed subject. In other words, final causation and atomism are interconnected philosophical principles" (*PR* p. 19/29). So, the sub-process is like a limb or organ in a living organism. Its structure, growth and movement can be studied in much the same way as that of the whole organism, but this analysis will be more incomplete in the sense that it depends on a teleological reference to the whole organism. In Whitehead's terms, the teleological moment of striving towards "further integration" is "subjectivity", so that all processes are subjects. This has earned Whitehead a dubious reputation of "pan-psychism" which is not accurate — since he distinguishes sharply between subjectivity and psyche (consciousness), and ascribes the latter only to a few species of very complex subjects. Whitehead's subjectivity is not cartesian thinking being, but rather hegelian self-production.¹⁵⁾ The many subprocesses in an organism are one unit by virtue of the common and coordinated aim at producing and reproducing the organism — i.e., producing a particular type of complex order. Since it may be possible to recognize order and aims at several levels (e.g., cellular, individual, social) it seems that Whitehead's sharp distinction between processes,

¹⁵⁾ "Living substance is the being which truly is subject — or, with other words, it is the being which is real only in so far as it is the movement of producing itself, the movement of mediating becoming-something-different-from-itself (sichanderswerden) with itself." (G.W.F. Hegel: *Phänomenologie des Geistes*, Suhrkamp edition, p.23, author's translation.) Whitehead's concept of process was inspired by Hegel's work in a peculiar way. Apparently he never read Hegel, but he was influenced by — and personally acquainted with — the british "hegelians", particularly McTaggart. However, Whitehead was dissatisfied with the subjectivism and atemporalism he was taught to think of as hegelian, and thought of his own position as "a transformation of some of the main doctrines of absolute idealism onto a realistic basis". (*PR*, xiii/viii) This, paradoxically and unintendedly, brought him closer to Hegel than the hegelians. Whitehead uses the term "subject-superject" to signify the project character of the subject: it is the goal of its activities, not really existing it strives through them to attain full, stable, non-contradictory existence.

subprocesses and super-processes must be relative to the discussion of a specific level of aims, i.e., methodological rather than ontological.¹⁶⁾

2. A process account of order and extension

So far we have limited the scope of this discussion to the idea of the process character of *entities in* the world. If we expand the scope to a questioning of the substantial nature of the shapes and regularities these entities embody — the *structures of* the world — process metaphysics becomes more interesting and more controversial, suggesting a relational alternative to platonic interpretations of not only time and space but of form and order altogether.

In traditional understandings of regularity the material which is ordered is so by virtue of a correspondence with abstract form elements (e.g., geometric elements or numerical magnitudes). Since the form element is supposed to be what is invariant, independent of variations of material and context, whenever the correspondence relation holds, its own existence is held to lie beyond its accidental "embodiments", passive and timeless. But according to the process view, patterns, correspondences and modes of difference and similarity are all involved in movement — they cannot and need not be assumed to exist as "super-substances" beyond the actual ongoings in the world. The alternative is that concrete processes themselves create the order — not only in the ordinary weak sense of producing a state manifesting some pattern of order, but also in the strong sense of interacting with the patterns, changing or even creating them. This process account of all order as product in a strong sense is a central point in process metaphysics.

Central as it is, this point has been overlooked by some Whitehead scholars, because Whitehead's terminology seems to imply a commitment to platonic form.

¹⁶⁾ The important point here is that process metaphysics does *not require* the existence of (or, particularly, our knowledge of) a privileged (or stable) layer of primary entities — nor does it need to positively rule it out. David Ray Griffin has made me aware that some remarks by Whitehead in *Science and the Modern World* (1925) seems to favour its existence. For example: "It seems very unlikely that there should be any infinite regress in nature" (p.103, 1967 paperback edition). However it is significant that Whitehead expresses this in terms of probability, and in the context of a discussion about suitable units for physical analysis: "The organisms of biology include as ingredients the smaller organisms of physics; but there is at present no evidence that the smaller of the physical organisms can be analyzed into component organisms. It may be so." The kind of evidence absent in 1925 is abundant by now. Whether or not the new, smaller units of physical analysis correspond to a layer of processes of greater or smaller ontological primacy is an interesting question, but not crucial for the present application. In any case the distinction between process and subprocess (prehension) in *PR* makes it clear that Whitehead does not identify ontological primacy with the smallest possible unit of analysis. As I see it, process metaphysics is concerned with making as rich as possible the formulation of a grammar for expressing and analysing processes and process families while minimizing fixed apriori requirements on their structure. Accordingly, Griffin is definitely right that Whitehead does not positively deny the nonexistence of a "bottom layer" of primary processes.

In Whitehead's table of categories, and throughout his discussions, he explicitly refers to what he calls "eternal objects, or pure potentials for the specific determination of fact, or forms of definiteness" (*PR*, p.22/32). which can be included into the becoming of an actual process along with the completed processes in the past or "universe" of the process. But even though Whitehead expresses great veneration for Plato's philosophy, he understands forms in a way very different from the substance-like interpretation traditionally associated with platonism. Firstly, Whitehead states that these eternal objects themselves do not specify what their inclusion into an actual entity would mean or how it would take place. Consequently, the inclusion of an element of form is either a creative act in which the process invents a way of making the element relevant and a "mode of ingression", or it is an act of reactualizing modes of inclusion and relevance invented somewhere down the line of predecessor processes¹⁷. Secondly, Whitehead discusses even the most basic regularities we know — including geometry and laws of physics — as patterns evolved by certain "societies" of processes and local to their "epochs". This means that the relatively stable orders in the known universe — indeed a necessary condition for there being anything to know — cannot be secured by the pure transcendent forms themselves but only by "tradition" in a generalized sense, immanent in large families of processes. The order of nature is described by Whitehead as a more or less hierarchical system of more or less distinct layers of order, the most basic layers — e.g. the dimensionality of space — being locally dominant and very stable in large ("cosmic") epochs, as generalized patterns of relation ("The order of nature", *PR* p.83/127-109/167). In conclusion, the participation of eternal objects in Whitehead's system serves to specify the relational and mediated role of pure forms, allowing us to see their own contribution as more minimal. In this light it could seem that Whitehead might as well have denied their existence altogether since the process aspects characterized as creativity, tradition and modes have to do the work anyway. Instead, he makes his radical non-essentialist point in a

¹⁷ "an eternal object can be described only in terms of its potentiality for ingression into the becoming of actual entities... The term 'ingression' refers to the particular mode in which the potentiality of an eternal object is realized in a particular actual entity, contributing to the definiteness of that actual entity... It is a complete mistake to ask how concrete particular fact can be built up out of universals. The answer is: in no way. The true philosophical question is: how can concrete fact exhibit entities abstract from itself and yet participated in its own nature?" *PR*, p.23/34. "In its ingression into any one actual entity, either as relevant or as irrelevant, it retains its potentiality of indefinite diversity of modes of ingression, a potential indetermination rendered determinate in this instance. The definite ingression into a particular actual entity is not to be conceived as the sheer evocation of that eternal object from 'not-being' into 'being'; it is the evocation of determination out of indetermination." *PR*, p.149/226.

metaphysically lighter way which does not require a positive claim of the nonexistence of pure form¹⁸).

2.1 Complexity and teleology

The suggested process account of order constructively criticizes assumptions of transcendent order principles existing independently of ordering processes and of what is being ordered. The critique applies to transcendent order principles of a mechanistic type (mechanical laws understood as pure necessity independent of the purely contingent conditions of the system they rule) as well as to models of external teleology (activity guided or forced towards prefigured end states given in independence of the actual situation).¹⁹ What replaces the external power of transcendent regularities over actual ongoings in the world is self-organization.

The notion of self-organization is teleological, but requires a modification of the meaning of telos from externally fixed (or divinely predetermined) goal states to what Whitehead characterizes as striving towards *higher* order or — with a concept central in many recent scientific developments — towards *complexity*. But this process sense of complexity can't be captured in a set or hierarchy of form elements that it could be the maximal or most precise manifestation of — this would bring us back to external teleology. Thus it cannot be identical with what is

¹⁸ Although ideas of pure platonic form can probably find much less explicit support now than it could at the time Whitehead wrote, this doesn't generally mean that consistent alternatives are given. One exception is Kripke's argument that common metaphysical accounts of human rule-following — learning by (a limited number of) examples, and/or recognition of context-free abstract patterns — are ultimately untenable and must be replaced by a participatory account in terms of a community with common interests and practices involving that of mutual correction, allowing language and tradition to gradually solidify although no part of such a system of rules is absolutely solid or unchangeable (S.A. Kripke: *Wittgenstein on rules and private language*, Oxford 1982.) Cf. Wittgenstein's "slowly changing riverbed" picture of certainty and practical tradition, *Über Gewissheit (On Certainty)*, §95-100.) It is not clear how much of Kripke's argument can be transferred to regularities displayed by non-human natural processes, if anything at all. What concerns us here is that Kripke's account of rules of behaviour is an example of a process account of order, showing that consistent alternatives to platonic accounts have been seriously attempted but are not uncontroversial.

¹⁹ The similarity of classical mechanistic determinism and classical external (prefigured end-state) teleology which is frequently stated as its antithesis approaches the point of identity when the claims are taken in their strongest sense. Strong determinism implies complete backwards causation just as well as forward (descriptions according to quantum mechanics and relativity doesn't change this) so under its premises we must say that end states determine the course of events in exactly the same sense we say beginning conditions do. A counterintuitive consequence is that we would then have to call any actually achieved state the telos of the previous movements. Classically, deterministic views have been combined with divine design arguments, so that natural laws as well as beginning ("creation") conditions were taken to be decided by divine wisdom in order to secure a certain end state, such as a world suitable for human beings. (As pointed out in various versions of modern "anthropic" arguments this end state very tightly restricts — almost determines — cosmic events previous to it.) Whether beginning or end conditions are taken to completely determine the course of events, it is clear that real creative activity will then be completely removed from the system in question. On a cosmological scale this results in a "substance theism" according to which the real creative activity, the divine, is absolutely removed from created events.

defined and measured in mathematical and information theoretical concepts of complexity²⁰.

If the complexity associated with process teleology cannot be captured in formal definitions, we must ask if there are other ways it can be characterized — otherwise our claim is empty. Whitehead does suggest another kind of dynamical characterization of richness or complexity: the ability to turn the multiplicity of an entity's universe into a coherent expression. Closely connected with the creative dynamism and striving of the process is the necessities of the situation, its conflicting facts and patterns. The striving towards order is characterized as the overcoming or digestion of the foreign and irrelevant, or what is characterized well through a (hegel-inspired) notion of *negativity*.

The simplest way of coping with negativity or incompatibilities in the situation is simple negation or suppression of part of the conditions. But suppression can never be complete, in Whitehead's terms it always "leaves a scar of birth" (*PR* p.226/346), making the organization inflexible, as if locking up part of the system's power in the strain of suppression. On the other hand, one of the important characteristics of processes with a "higher" degree of organization is that they are able to utilize negativity, productively turning contradictions into "contrasts", contrasts of contrasts, etc. In other words, higher forms of organization are highly dynamic, capable of repeatedly building and rebuilding rich syntheses so that "nothing is lost". Obviously living organisms is the key metaphor for process order and this tendency towards complex "higher" forms of order. Or more precisely, organisms are not supposed to be a *metaphor* of process order, they are obviously self-organizing — what the process view claims is that this is not a local feature of a few very special systems, but a deep and general feature of nature — deeper than e.g. the laws of mechanics which are interpreted as a *result* of it²¹). Life is a particularly strong expression of process order.

²⁰ For a spectrum of interesting attempts see Zurek (ed): *Complexity, entropy and the physics of information* (1990). Several of the formal definitions bring to light some crucial aspects of complexity, but it is a common theme in the discussions that there are at least very great difficulties in getting a formal definition in agreement with our intuitive evaluations of degrees of complexity in natural, technical and social contexts. Some of the definitions suggested resemble the process view somewhat process view by taking into account the *work* or *creativity* it takes to systematize a field of chaotic information: see C.Bennett: *How to define complexity and why*, *ibid*.

²¹ A similar understanding that it is complex self-organizing systems rather than simple mechanical systems which are "the general case" of physical structure finds several expressions in recent philosophy of science, e.g. by Robert Rosen, *Theoretical Biology and Complexity, Orlando 1985* and the Ilya Prigogine & Isabelle Stengers, *Order out of Chaos, New York 1984*. This thesis does not imply that mechanical analysis is not universally applicable to certain aspects of natural systems. For example, the description of the movement of the planets in the solar system is a paradigm success of mechanics, this physical system includes the Earth which is in this limited sense part of a mechanical system. Similarly, an indefinite number of aspects of a living organism are analyzable in simple, mechanical terms.

Again, in analogy or generalization from living organisms, a test of the relevance of a particular organization of the universe by a process or a process "society" is its viability: its ability to extend and reproduce this order. Thus, a generalized form of darwinian selection is included in the picture, as a description of the simplest way negativity works (not the only way, complex organisms are increasingly able to combine it with *learning*, i.e. surviving and integrating "negative" experiences of failure). We don't have to claim that this "darwinian" selection *only* allows particularly high degrees of complexity. In spite of their inflexibility, some simple "inorganic" societies can survive throughout very long epochs, particularly if they produce the kind of environment they depend upon (or the opposite in some specific respect, leading to states of oscillation). The suggestion is only that negativity and creative self-organization gradually bring about increasingly complex forms which may well coexist with simple forms, and in many respects be superimposed on them.

Teleology is usually taken to mean, by proponents as well as opponents, what I called external teleology: the understanding of organic or other natural phenomena through analogy with things made according to human intention or design, i.e. as the expression of a plan by a power beyond the natural phenomena. This view is opposed by most scientists for historical and other good reasons. It should be clear from the above that the process view of order unfolds a different "internal" type of teleology which incorporates and situates mechanical analyses and darwinian selection rather than contradicting them^{22/23}).

²² Timothy Lenoir (*The strategy of life, teleology and mechanics in nineteenth German biology, Reidel, Dordrecht, 1982*) shows that the 19th century biological tradition developed in the intellectual climate of german idealism not only grounded modern biology with ideas of evolution and embryology but also developed an idea of organic teleology quite different from the "external" teleological dogmatism that opposed darwinism in order to protect religiously motivated dogma of divine foresight. Lenoir's thesis is that modern biology has inherited a strong aversion to teleology even while it depends on implicit teleological concepts of "function" etc. to connect its particular analyses to an understandable and practically coherent science. A similar point is argued by the author in a recent article (*N.V.Hansen: Livets mål og mider, Philosophia, Århus 1994*). Ernest Nagel (*E.Nagel: Teleology Revisited, Columbia Univ.Press 1979*) has similarly argued that teleological explanations play a vital role in biology, but he attempts to translate them into combinations of mechanical explanations of a particular structure. The author has argued that this translation pushes part of the power of teleological explanation back into tacit assumptions so that the translation is necessarily incomplete (*op. cit.*). If teleology is an indispensable part of scientific explanations we must find an acceptable concept of it. Although Nagel presents a range of different interpretations of teleological explanations he does not seem to be aware of the possibility of "internal teleology".

²³ Whitehead does indeed connect the striving of nature with theology, but Whitehead's point here is exactly the suggestion of a "process theology" which does not identify God with an unmoved mover or with an "imperial ruler". "There is, however, in the Galilean origin of Christianity another suggestion... It does not emphasize the ruling Caesar, or the ruthless moralist, or the unmoved mover. It dwells upon the tender elements in the world, which slowly and in quietness operate by love... Love neither rules, nor is it unmoved; also it is a little oblivious as to morals." (*PR*, p.342/520.) This "process God" is an extension of the thesis of creativity, striving and complexity, combining it with the affirmation of life's intrinsic value. Whitehead's religious interpretation is "internal" like his notion of teleology. The religious interpretation is not essential for the aspects of process thought suggested in the present article, but it is completely consistent with them.

2.2 Extensive abstraction

Although the process account of order holds all order to be the product of concrete processes, some patterns function in a way which is *in practice* context independent because their context requirements are met throughout the epoch. This quasi-permanent quasi-platonic status is outspoken for the simple inorganic patterns which render some aspects of natural phenomena very predictable and controllable. In contrast, organic patterns are those that are more dynamic (further from equilibrium) and complex, and hence less predictable in detail. But this contrast is held to be only a question of degree: no patterns are ultimately beyond change and becoming.

Whitehead's analysis of extensive order sets out with a set of relations connected with division of actual processes. As we saw, it is possible to divide a process unit into virtual subprocesses, but at the cost of losing sight of some of the internal connection, so that some features of the subprocesses will seem arbitrary. There are "genetic" types of analysis based on divisions which preserve some of the dynamism, i.e. subprocesses constituted by causal and/or teleological relations. Extensive analysis is based on divisions with respect to something more external to the dynamism of the process.

For example, space-like splits can be introduced by division into non-interacting "parallel" virtual subprocesses, each one taken to have only a part of the actual universe as its condition and to yield only a part of the result of the actual process. In this way a process (and its genetically related neighbourhood) is split into virtual regions. Similarly, a timelike split is produced by division into "serial" virtual stages so that the second stage is assumed to start with a finished and definite result of the first stage. Obviously general spatiotemporal splits can be introduced in similar ways. Whitehead's point about something being lost in extensive analysis means that these cuts cannot be made clean in all respects. For example, the virtual stage 1 may be affected by a "striving" moment which has no observable source because it has no expression before the virtual stage 2. This is not a mystical effect of stage 2 on its own past but a limitation of the universal applicability of the concept of point of time to real processes. There is a similar limitation for spatial position (locality)²⁴.

Whitehead developed a generalized theory of extension based on a minimal set of (topological) assumptions about a minimal type of objects called *regions* (which

24) Whitehead's own language in expressing these limitations strongly suggests that he was well aware of the quantum mechanical limitations expressed in e.g. Heisenberg's uncertainty principle and that he intended the limitations of extensive division to be at least a close analogy. "Each process presupposes the entire quantum... The problem dominating the concrescence is the actualization of the quantum in solido." The lectures which became *PR* were given in 1927, shortly after Schrödinger's and Heisenberg's successful mathematization of quantum mechanics (1925 and 1926).

represent processes, subprocesses and groups of processes as subject to virtual extensive splits) and a number of simple extensive relations like inclusion, non-inclusion, overlapping, non-overlapping. It is a constructivist theory of a peculiar realist variety; the construction described is not taken to be an exclusively human act, it is a collective product of the epoch. This theory ("the Method of Extensive Abstraction") has not received the attention it deserves; it is often assumed to have been refuted by Adolf Grünbaum's attack, but — as I will argue in a following article — Grünbaum's argument is partly erroneous and what it partly accomplishes to refute is something different from Whitehead's method²⁵. The method rests on two inventive definitions. The first step is the idea of "abstractive sets" — a way of defining points, instants etc. as classes of convergent sets of regions, analogous to reconstructions of points described elsewhere in literature²⁶. The second and more unusual step is the definition of a property of "ovate-ness" which allows a definition of straightness — lines, planes and other "flat loci" without metric assumptions. An interesting feature of "ovateness" is that it cannot be defined for a single region but only as a collective property of a class of regions mutually related in a specific topological manner²⁷. The existence of an ovate class in a family of processes means that a coherent pattern can be identified in those extensive divisions which are relevant (real possibilities) in the epoch. The dimensionality of space, its type of geometry (euclidean, hyperbolic, etc.), congruence and finally metric properties can then be constructed. The construction rests on "ovate classes" (and, in some cases, other modes of "analogous function" determining one of several possible definitions of congruence). Congruence is "only definable as a certain definite analogy of function in a systematic complex which embraces both congruent elements" (*PR* p.333/508).

The method of constructing extensive features on the basis of process features makes potentiality the core of extension. While actual processes are seen as "incurably atomic" (with no intrinsic relationship to points or regions of any space), "continuity concerns what is potential" (*PR* p.61/95). This continuous potentiality refers to the openness of the future, but also to what might have been the case, in

25) A. Grünbaum: *Whitehead's Method of Extensive Abstraction*, British Journal for the Philosophy of Science, 1954, 4, p.215-226. For mysterious reasons Grünbaum attacks only the first step of Whitehead's method: the reconstruction of points in terms of regions. The most substantial of the 5 attack points is Grünbaum's claim that such a mathematical reconstruction is in principle incapable of reproducing the non-zero measure of intervals of real numbers. The other points of Grünbaum's attack rest on a mysterious misreading of Whitehead's "regions" as synonymous with "regions given in sensory experience".

26) For example, a procedure very similar to Whitehead's first step is described in W.H. Newton-Smith: *The Structure of Time*, 1980, p.134ff.

27) Very roughly, the members of an ovate class are regions which can overlap only "once": think of the difference between the way egg-shapes can overlap and the way banana-shapes can overlap. *PR*, 303/462.

the past — in the simple extensive respects. The ordering and construction of the world as such a field of potentiality and spatiotemporal extension is identified with a basic ongoing cognitive activity of complex organisms (similar to the "aesthetic" constitution of perception described by Kant): "Perception in the mode of presentational immediacy". The point is, of course, that this systematic presentation of potentialities makes it possible for these organisms to project partial goals and strategies and comparing them with experience — a basic representation of the collective rhythms of the environment forming a framework for [the productive organization of] particular experience.

The geometric and chronometric regularities expressed by "the method of extensive abstraction" belong to the simplest level of form. They are closely connected with the next layer of basic physical laws (as in General Relativity where physics and geometry are hardly separable).

Time is part of the spatiotemporal extensive continuum and as such not involved in the dynamic happening of the process. Still, the constructed (space)time is an effective way of analysing the happening through virtual stages. "Physical time expresses some features of the growth but not the growth of the features."²⁸⁾

Cosmic, divine and collective adventure

Whitehead's philosophy of process is obviously closely associated with a very general idea of *progress*; it may even be said to be an attempt to take the high modern notion of progress to the highest possible degree of universal applicability. For some present day readers of late modern or "post"modern orientation who are otherwise sympathetic to the pragmatist and non-substantialist thrust in Whitehead's thought, this has seemed an unwelcome and disposable feature. However, it cannot be disposed of without letting go of the central and radical notion of strong processuality. As we saw process, in the strong sense that makes it a metaphysically interesting concept, involves not only change but also creativity, and creativity involves not only the negative characteristic of the unpredictable but also the positive characteristic of invention. Everything depends on the exact sense of "invention" here, so of course we shall discuss it below. Other present day readers have attempted to produce a softened or moderated version of

²⁸⁾ *PR*, p.283/434. Some Whitehead scholars have interpreted such statements as referring to two kinds of time, a process time and a physical time — so that dynamic becoming would be a kind of additional temporal dimension in which the process, complete with temporal and spatial relations, takes shape. E.g. *P.Hurley: Time in the earlier and later Whitehead*, in *D.R. Griffin (ed.): Physics and the ultimate significance of time, SUNY 1986*, p.87ff. This is inaccurate, particularly if it is taken to imply two kinds of temporal extension or two kinds of temporal dynamism, or one of each (this would be a restatement of McTaggart's A- and B-series). Whitehead's point is that there is basically one kind of dynamism in every process, and one or several possibilities of extracting patterns and common features of more or less extensive character.

Whitehead by restricting the applicability of the notion of creative advance to biological organisms and human business, but this is a serious betrayal of the universalizing commitment of the metaphysical project. If process is proposed as a universal metaphysical structure and process implies evolution, progress or advance in some positive sense, then there is no way to escape it: Whitehead is seriously proposing that everything, that existence as such, is evolutionary. I shall try to show how this apparently naive tenet is a great strength.

At the time when Whitehead wrote, in the first decades of the 20th C, modern thought had generally not yet taken up the great renunciation upon naive ideas of progress, especially as far as the developments of science, technology and society are concerned. Also, there was a widespread if perhaps not quite as unanimous excitement about the emerging discoveries of deep time and nature's history, and several thinkers such as James, Alexander, McTaggart and Bergson had preceded Whitehead in expressing ideas of a thoroughly evolutionary cosmos. As had indeed most of the entire movement of romanticism and German Idealism. Whitehead was very much aware of the thoughtless and unimaginative self-indulgence which follows when we automatically hail as "progress" whatever happened to lead to the world we know and the way we inhabit it, but he was equally aware of the paradoxically similar insensitive self-satisfaction which follows from the reverse understanding of the processes that led up to the present state of affairs as an extremely improbable senseless chance stumbling upon an assemblage workable and inhabitable. Hence, it was essential for Whitehead to express the notion of progress in such a way that could allow an appreciation of the creative blasts of innovative production of something valuable along the path, and even of the steady regular activity of reproducing and extending such value, but which could also support the understanding of the way developments can, and in fact very often did, turn inert, destructive and even disastrous.

The key that enables this required sensitivity and flexibility in the application of notions of progress and invention is, according to Whitehead, again closely associated with a sufficiently rich and strong idea of universal processuality. What makes us sometimes incapable of appreciating the innovative is fixed standards of usefulness and value. The standards or forms that we acknowledge at least human and perhaps other processes as striving towards are held to be themselves beyond process, and this works two ways, towards past and towards future. The first way, it makes us insensitive of the accomplishments of creativity and innovation that went into the construction of the life forms and projects we are, and the second way it restricts the further playfulness or the appreciation of the play with other standards or forms. Obviously, at least to any parent to young children, any appreciation of play is itself playful, so that the two ways of appreciation called for are not really distinct, and this observation points to another feature of novelty

stressed by Whitehead. Innovation is not just a matter of form, it is also a form of matter — or in other words, what invention is about is not just to find ways of making something in the situation fit a given purpose, it is just as much to invent some interesting project, never conceived before perhaps, that may be approached with the materials at hand. It is finding a way of making dynamic sense of the situation. The more dynamic and the more complete, the “better” and more consequential it will be. In this vision, the legitimacy of the democratic election procedure, the seeing of the eye, the pumping of the heart, even the reproduction of the biological organism and the stability of the electron, were not there as ideal standards or projects waiting for some lump of matter to fill them in. They had to be invented in the first place, by the same lumps of matter, already rich in histories of ideal invention.

This is the immanent and adventurous character of innovation and progress, and it is important to affirm it if our belief in progress — for those of us who still subscribe to anything of the sort — is not to turn stale and counterproductive. We should avoid the temptation to restrict progress to the continued repetition of well known accomplishments, and we should welcome the multifaceted adventure and the involvement of overseen elements in the situation. This does have a price, of course. The notion of adventure is closely associated with risk. However, Whitehead pointed out that although there may be some degree of choice of how much of a risk to assume, there is no complete security — except perhaps the certainty that the avoidance of adventure leads to “atrophied decay”.

This is not Whitehead’s entire story, however. There is a soft kind of security or perhaps assuredness after all — a little bit like the playful mother or father capable of appreciating the play. It is Whitehead’s version of the spiritual side of life which functions, as far as I can see, as a kind of inspiration and assistance of every bit of the cosmos to give itself to further adventure. In what he calls the “final interpretation” — following upon the formulation of the process metaphysical reconstructions of substance, causality, teleology, extension and finally progress — Whitehead outlines the idea of a process theology which would be able to express certain essential religious structures in such a way that their type of rationality could cohere with structures of science and progress. The two “catholic” world religions of Buddhism and Christianity are explicitly indicated as main sources of such a project, as they have come far in respect to rationalization already. Even the divine needs to be grasped in terms of processuality, according to Whitehead. An image of God posed as permanently separate from the world would be a cosmological amplification of the tradition of substance metaphysics, it would understand creativity and created things as belonging to separate realms and it would certainly not encourage us to look for creative production of value in the thick of things — at most, it would encourage the kind of creativity that pertains to

souls as they may be sort of half divine, and it would then be understood that such creativity would have the high modern form of breaking free of material and other constraints. Process theology attempts to reconstruct this image so that worldly and divine are co-evolving “polarities”. Even if divinity conserves some of the likeness of human subjectivity, it is now in terms of the “superject”, the self-producing project — and of a branching and joining history of active experiences. This way, the divine can be with humble things. Rather than “imperial ruler”, the divine can have the role of “fellow sufferer who understands”.

The participating process divinity cannot stay uninvolved and apart from worldly processes, as if in a spiritual compartment of its own. One consequence is that She²⁹⁾ must, just like human subjectivity, be not only dynamically self-producing but also incurably beset by multiplicity — there is no way She could be the unitary substance of classical theism. This is so already because of the genuine multiplicity of the processual cosmos as required in the *Categorical Scheme’s* “Principle of Relativity”³⁰⁾, implying that there is not one but many parallel histories, and hence no singular order of events for a participatory God to have anything like Her unitary stream of experiences and acts in. (I will discuss this aspect of process theology further in another paper dealing with relativity and simultaneity³¹⁾.) Hence there is no way of issuing the traditional guarantee of the theist God saving the individual human soul.

Still, as I mentioned, if there is no “hard” guarantee, there is a certain soft kind of parental reassurance involved anyway. God, on Whitehead’s account, has not one but two natures, one *primordial*, the other *consequent*. This expresses two roles that the divine plays in respect to everything that happens. First, God is involved as inspiring and imparting a sense of value, “appetition” and love. It is quite clear that Whitehead does not think of this in terms of God predetermining a particular finite telos to each particular entity, this would ruin the sense of immanent creativity and bring us back to classical external teleology. It is more like a whispering, a “lure for feeling”, the sense that something can be done with the situation at hand and also this moment of reassurance that entering the adventure

²⁹⁾ There is a good reason to refer to Whitehead’s notion of divinity with a personal pronoun, as he explicitly conserves and develops the traditional close analogy with human subjectivity. There may even be a good reason to capitalize the pronoun to express extraordinary veneration. But there is no reason to stick with the preference of the masculine pronoun, except for the continuity of the Judeo-Christian-Islamic tradition. But this is not a good reason in this context because this continuity clearly tends to enfold the transmission of the image of the “imperial ruler” kind of divinity. Whitehead sticks with the tradition here without giving any reason, I give this tiny contribution to balancing it, also without further reason at least at this point.

³⁰⁾ *Process and Reality*, p. 22-23

³¹⁾ Chp. 5 in the present collection of papers

of creativity will be worth it. In other words, Whitehead does not follow the tradition of withdrawing creativity from the world into God, even though his God is participating in every small worldly event. God just inspires and encourages, contributes to the sense of value and adventure like the playful parent. In fact She does quite a bit more than that, when we turn to the *consequent* nature: God makes sure that creative and loving acts will not have been in vain — in this sense She does indeed conserve something of the “saving” function of the traditional theist God — I venture the suggestion that Whitehead has Her conserve every bit of that function worth conserving. There are two modes of this salvation and “immortality” of the act. Firstly, the act is transmitted into the world of branching streams, as a datum for daughter processes, granddaughter processes, etc. Here, the function of God is to whisper to every subsequent process in such a way that inspires them to find even the slightest traces of creativity and love particularly interesting parts of the situation worth positive “prehension” and expression. Secondly, expressions of love and creativity are simply immediately “saved” in the divine, entering its consequent nature. Here, God is again a process just like every worldly ongoing: previous acts in a causal universe enters Her nature.

I am not going to enter a more detailed study of Whitehead’s process theology which is anyway not given with the same completeness as the rest of the system but rather as an outline. Even if Whitehead sees this outline as belonging within the Mosaic-Islamic-Christian framework with its emphasis on a divine Person, in contrast to the Hindu-Taoist-Buddhist tradition’s impersonal principle on the surface of which there are many divine personalities if any at all, it is quite clear that the outline has much in common with the other religion he recognizes as “catholic”, namely Buddhism, especially in its most philosophical expressions. Particularly I would like to point to Nagarjuna’s dialectics which obviously pertains to all events, the thinking of the meditator and the burning of the wood equally — and which aims at bringing forth in everything the “Buddha Nature” which has exactly the twofold nature ascribed by Whitehead to his divinity: the “primordial” impulse to proceed actively in such a way that can nourish the salvation of everything, and the “subsequent” merging with that which is neither being or non-being but the sense of everything. However, Whitehead is right that there is still a fine dividing line here between East and West, a difference between an Eastern tendency of identity known (and usually feared) in the West as *pantheism* — although there is no God so that *pan-Buddh-ism* or *pan-Shunyata-ism* might be better — and a Western tendency of difference which is refined by Whitehead into *pan-en-theism*: God is not the world but in it.

Of course it makes no sense to attempt to determine here whether East or West is right. But I would like to submit the view that the formulation of a philosophical

framework which makes the contrast philosophically interesting and debateable from both sides would be a major and adventurous progress.

There is one more observation I would like to make regarding the discussion of progress and adventure as well as that regarding God’s nature(s). Just as we discussed in the case of the metaphysical structure of classical modern *substance*, it seems that the notion of *divinity* and more recently that of *progress* have been under an ever increasing pressure of skepticist attacks and dissolution throughout the modern period. This has a remarkably small effect upon them. Indeed, it would seem that the modern tradition of skepticist dissolutions has a rather conservative effect upon our metaphysical assumptions. It is as if we say, like Hume did in the cases of substance and causality: it is absolutely ungrounded, but in practice we need something like that, so we must proceed as if it was absolutely grounded. In other words, by dissolving the classical theist God and the classical cumulative progress with general all-out skepticist arguments, what we “emancipate” ourselves from, at least to some degree, is the possibility of speculation, that is, of the explicit attempt at creative production and testing of possibly more adequate metaphysical alternatives in the light of evolving experience and practice. Whitehead, then, is interesting as one of the few contemporary thinkers to undertake the adventure of seriously considering real changes of metaphysical structure or attitude. This involves a strong moment of affirmation. Could God be something more involved than an absent Creator? Could progress be something wilder than cumulative?

If such an approach is feasible, metaphysics is the collective adventure of making as communicable and dynamically relevant as possible the totality of the world we are discovering and co-creating. In Whitehead’s view it is perfectly feasible because we are organizing processes in the middle of a world of organizing processes. What is not feasible is to halt this collective adventure without dwindling in playfulness, relevance and power as participants in a cosmos which is, whether we like it or not, adventurous.