

## Interpretations of the historicity of objects

- an interference of Latour and Whitehead  
in a cloud of relativistic electrons.

Niels V. Hansen, Dept. of Philosophy, Univ. of Aarhus, Denmark

### 1. Objects are histories

Objects don't just *have* histories, they *are* histories. Objects are histories temporarily halted — process patterns fixed in certain respects, but not in all respects, and for a particular purpose. No object is a passive block of ultimately inert existence.

I could stop my presentation at this point, having stated the strong thesis of process thought which is my concern... but the experience is that this doesn't settle everything, it settles nothing actually — it leaves a great space of possible interpretations, and it waits for concrete applications (which is pretty much the same thing). I am going to look at two significantly different projects of interpreting scientific objects and theories, deploying and developing a strong concept of process, two approaches which shed an interesting light on one another — and (this is my main focus) generally on the project of interpreting scientific objects and theories.

### 2. Latour and Whitehead

Bruno Latour's work is in the sociology of science, but it has led to an increasingly radical criticism of certain received metaphysical assumptions in the understanding of science, in ideas of scientific objects and their relation to scientific projects, and finally in the entire modern complex of science and culture. The metaphysical assumptions in question are criticized through studies of the concrete activity of actors such as scientists and institutions, which is shown to be inconsistent with, or even contrary to the assumptions. The metaphysical complex which is thus uncovered and shown to be inadequate is a substance scheme, a general tendency to suppress histories, processes, relations and the embodiment in local practices, so that objects, methods and distinctions come to be seen as independent of their production. In this criticism of the substance metaphysical complex, Latour's work has gradually led towards the positive formulation of efficient ways of speaking of what thus used to be suppressed — in effect, an alternative metaphoric or metaphysics or

grammar of *processes* and *mediations*.<sup>1)</sup> This movement has produced a very interesting resonance or interference with the work of Whitehead, the process thinker par excellence — a resonance we can intensify by asking Latour and Whitehead what it means for a scientific object to have or not to have — to be or not to be — *history*.

Alfred North Whitehead's mature philosophical work was a very explicit and systematic formulation of process metaphysics<sup>2)</sup>. It suffered the misfortune of almost complete oblivion as it emerged just at the point when Western thought turned massively against metaphysics — so that serious metaphysical discussion was closed down or at least reduced to the singular obsession of overcoming metaphysics altogether. Without going into details of that history I think we can safely say that the general experience has been that metaphysics was not overcome — that every overcoming of metaphysics could be shown to be itself heavily dependent on assumptions at least as metaphysical — and that we are generally emerging from militant antimetaphysics into a more open and reflexive way of criticizing and discussing metaphysical assumptions. As a consequence, Whitehead's constructive criticism of substance metaphysics seems to be finally beginning its history of reception now, with half a century's delay — as one sign of this, works by Whitehead have been translated into French as well as Danish<sup>3)</sup> for the first time in 1995.

I am not going to investigate the similarities and differences between Whitehead and Latour, in their criticisms of substantialism or formulation of process thought; nor will I attempt to trace or assess the importance of possible lines of influence, or use one

<sup>1)</sup> This trend is very outspoken in Latour's *We have never been modern* (1993) and the later articles, particularly *Les objets ont-ils une histoire? Rencontre de Pasteur et de Whitehead dans un bain d'acide lactique* in I. Stengers (ed.) *L'effet Whitehead* (1994). However, this is a general trend in Latour's work, a development which has obviously and openly taken place in an ongoing exchange with a number of philosophers, sociologists and historians of science, including Isabelle Stengers, Adrian Cussins, Gilles Deleuze and Michel Serres. For now, I will bracket out the discussion of the interesting details of the sources and histories of the process thought of Bruno Latour.

<sup>2)</sup> *Process and Reality* (1929, corrected version 1978) is Whitehead's most complete and systematic exposition of his process metaphysics. Whitehead's own historical route was a gradual move from mathematics to the logical foundation and construction of mathematics (the very well-known result of this phase is the *Principia Mathematica* which he wrote with his former student, Bertrand Russell) and from there to the formulation of a unique philosophy of process. Whitehead was inspired by Hegel 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." (*Process and Reality*, viii). This, paradoxically and unintendedly brought him closer to Hegel than the hegelians. There is also some influence from American pragmatism, notably Peirce and James, but again transformed radically. The books Whitehead wrote after 1929, and also (in most respects) his *Science and the modern world* and *Religion in the making* from 1925 and 1926, expose aspects of a fully developed process metaphysics whereas Whitehead's earlier works contain more partial (less radical) versions — which should perhaps be called "merely" event ontology.

<sup>3)</sup> In French, *Process and Reality*. In Danish, *Religion in the Making (Religionens Tilblivelse)*, published with a good general introduction to Whitehead's work by Niels H. Gregersen, and an extensive bibliography.

to legitimize the other's claims. My concern is the possibility of further unfoldment and application of the idea of historicity of objects, and — in that process — the attempt to clarify some apparently ambiguous points in the work of Latour as well as Whitehead. But even though I am not undertaking a comparative study I have to point out the most obvious difference: Philosophy of science cannot be naive anymore with regard to social and linguistic contexts - as it was for example in Leibniz or Carnap, and also somewhat in Whitehead. We will be doing post-Kuhnian and post-Wittgensteinian philosophy of science if we do philosophy of science at all. Latour's work certainly is no less sociological than Kuhn's — Latour will even sometimes claim to be "merely" a sociologist and no philosopher. But Latour's is a sociology which itself cannot be naive anymore: it cannot assume the categories and delimitations of the social sphere (or the linguistic for that matter) as a simply given platform beyond metaphysical discussion and explicitation. The difference between a sociological and a metaphysical point of departure in the philosophy of science is not disappearing, but it is becoming transparent.

It may seem that this difference leads Whitehead and Latour to apply the idea of the historicity of objects to the scientific process and its results in two completely incompatible or even contradictory ways. Whitehead starts out with the content of scientific theories and interprets them as expressing a processuality and historicity *in nature* which seems at first to be out there, pretty much independently of interactions with the scientific process. Whereas Latour starts out with the practical context of scientific and technological objects and interprets them as dynamic participants or actors *in the social/practical network* which seems at first to be in here, pretty much bracketing out the question of processuality or even historicity in nature. Thus, it may seem that this difference leads to a repetition of the now classical schism in the philosophy of science: a realist and a constructivist version of the historicity of objects.

But process thought generally tends to undermine ideas of absolutely separate spheres of subjective and objective, or social and natural, not claiming such differences to be nonexistent or inessential but interpreting them as dynamic and relational polarities. And Latour and Whitehead both tend to claim that they are neither constructivists or realists, or that they are both. Hopefully the following will contribute to showing that this is indeed the case.

Still this difference allows Latour to add something which is definitely not there in Whitehead — and in this sense Latour is being overly modest when he credits Whitehead for inspiring his approach. What is new here — a genuine innovation — and very promising from the viewpoint of a process thought enthusiast, is the very explicit use of process concepts in the context of historical processes in the history of science (something Whitehead only did in very general terms and particularly *not* where the problematic double character of nature's historicity — real and socially

constituted — comes into focus). Particularly, our society's history is not understood as a dimension separate from the natural (and here, Whitehead's metaphysics is a help in avoiding metaphysical splits), therefore without any discontinuity Latour can analyze more natural kinds of things easily and naturally through the central frame of understanding the social, historicity. Latour captures this in concepts such as "variable ontologies": existence of natural objects varies, not just in a way *analogous* to the variations of existence of paradigmatically social objects (institutions, conventions, fashions), it varies through the *same kinds of processes*. More than that — as Latour's examples show, the variations of existence of social and natural entities are so intimately connected that they may to a high degree happen in the very same concrete processes.

### 3: An ambiguity in Latour?

An ambiguity apparently arises here. The history of a typical natural entity — say, lactic acid ferment — could either be thought of as

**a:** comprised 100% of the type of historical events described in Latour's work — namely, processes in which the branching network of "the collective", in the sense of *our* particular collective, shapes the relationally defined essence of the object in new / modified ways. Or it could be thought as

**b:** shaped by that *together* with other equally real histories / collectives separate from ours — relatively and temporarily separate if not necessarily permanently separate. In particular, the history of nature would then not be a product of our collective's anthropological structures in a sense stronger or deeper than the sense in which these very structures are a product of the enormously long history of natural collectives, with crucial episodes taking place long before our collective existed in any more than a very implicit seed form. Many readers tend to take Latour's "historicity of nature" according to option a, and there are points in "We Have Never Been Modern"<sup>4)</sup> as well as the more recent articles which could seem to point in this direction: a direction we might call a reformulated but not radically changed version of social constructivism. However I am convinced that the other interpretation is deeper and more powerful, and also much more in agreement with Latour's overall project — a philosophy of science which transcends the dichotomy between naive realism and naive constructivism — and much closer to the strong process thought of Whitehead as well as Hegel.

**3.1:** There seems to be a **classical problem** regarding our possibility of doing what I just suggested: speaking of (the historicity or any other trait of) that which is outside some kind of sphere circumscribing "us" as speaking, constituting, modifying — i.e. speaking of that which is outside some set of relations to us including "speaking

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4) B. Latour: *We Have Never Been Modern* (1993) — translated from *Nous n'avons jamais été modernes* (1991).

about". The problem of course is that of **transcendence**, even if it is here no longer consciousness, language, praxis, or society which would play the role of transcendental subject, but our collective including various types of actors with various degrees of natural / cultural / institutional character. Does the Latourian picture now force us to say (Heidegger says something like this in *Sein und Zeit* with regard to beings not yet encountered and interpreted in human practice) that those nonhumans which have not yet been initiated into our collective through hammer beats or songs "sleep inside the mountain" until that magic moment (particularly they have no historicity because that is Dasein's particular character)? This kind of transcendence may save us from the (poetic/metaphysical) trouble of giving expression to the not (yet) constituted, categorized, controlled, stabilized, turned into "immutable mobiles"... but at a very dear price, that of letting the cosmos be reduced to, devoured by, history - by our collective's history.

**3.1.1:** The point of transcendence is touched, for example, several times in a very recent article by Latour<sup>5</sup>. For example, on p.8: there is no judge (on the relative existence of a phenomenon) above the collective and beyond the reach of history. Clearly there is no (absolute) judge (absolutely) beyond all history and collectivity [unless we are willing to let history be eaten by cosmos — a fixed barren cosmos that is, imagined as unable to come up with any further surprises] but what about cofactors of determinedness which are not (yet) members of (our) collective? Pointing in the other direction, note 9 on p.15: things deprived of the human mind are doing very well — as well as they do, I take it, deprived of human practice, Dasein's interpretation, or involvement in our particular collective of humans-and-nonhumans — and it is indeed ridiculous to imagine the distinction between *in itself* and *for us*, as traditionally implied in the notion of *an-sich*, to have fundamental significance.

**3.1.2:** "The point is not **adding speech** to a speechless world", Latour answered when I brought up the transcendence point in our correspondence. I agree that it is not particularly important for the world to be spoken of. Speech is a wonderful strong and refined way of extending and creating relations but it is not fundamentally different from so many other fantastic ways and modes of giving yourself and expressing your universe, not even very nice if losing too much of its connectedness to other modes; also speech clearly emerges from other strong ways of "enunciation" (a fine expression for the asymmetric relation of condescended to new condescended process, as long as we don't imply reduction to "information" or the like, as I know Latour wouldn't) and itself gives birth to further modes like the one we are using right now. Still, what we are up to *is* shaping, interpreting and synthesizing the universe further by means of language and a host of related enunciation modes; and what I am trying to discuss is the devastating effect the transcendental cutoff has on language: stiffness, closedness around the well-known, barren-ness, reduction to mere games of immutable mobiles which are so efficient locally but contain no insight as to why — not to mention where they are or where they are going — no cosmos and no history. Kantian-style transcendence expresses the modern "homeless existence on the periphery of the cosmos" (Løgstrup<sup>6</sup>).

**3.2:** With the concept of process at hand it is not difficult to see how any logical need of permanent **transcendence evaporates**: through analysis in terms of mediations forming temporary, partial, local and relationally determined subject-object polarities rather than preexisting poles of absolutely inner knowing, transcendent to the world, and absolutely foreign object-in-itself. Latour presents this important moment of a process concept of subject clearly in WHNBM<sup>4</sup>), and in studies like the "Boa Vista Pedofil"<sup>7</sup>) beautifully illustrates how the myriad of mediating processes in this "middle kingdom" work in practice. We just need to take care the infectious modern idea of epistemological transcendence doesn't repeat itself now in new key concepts such as that of process or collective. It is quite enlightening to use the figure of transcendence to illuminate virtual stages a process or collective may be subdivided into — i.e. by saying that the natural-process-in-itself is virtually transcendent to the cognitive-and-controlling process which handles it via constitution of it into "immutable mobiles". But this transcending process is reified and mystified when we forget it is not only local but also limited to a particular pattern of relation amongst processes which are in other respects not so homeless. E.g., the mediations on the edge of the Boa Vista Forest<sup>7</sup>) (the practical established procedures through which the object — the forest — is very gradually turned into representations: maps, graphs, numbers) are typically performed by actors with a much more extensive and dynamic involvement in the situation than that which is channelled through the cognitive web which is Latour's focus. No mediation passes without leaving its mark, none is permanently or necessarily invisible — or better unheard, unfeelable, inexpressible — this is why "new" facets or better, with a Whiteheadian term, missing halves of the evidence<sup>8</sup>), can be brought to light as in Latour's studies. This is very much what Whitehead invites us to do to light up missing halves of sensory perception and everyday experience: becoming aware of the gentle underlying sensation of bodily processes etc.

This bringing to light or awareness of overseen halves involves expression through languages, professional institutions and methods, science studies journals, etc. We cannot expect this to happen through mere extension of a language with a given structure and semantics; rather it happens only insofar as the language is allowed to change, only insofar as the mediating processes now mediated are allowed to backfire on mediation modes and methods. And just such picking up of backfirings and echoes seems to be a meta-methodological insight or knack very central to Latour's work.

<sup>5</sup> B. Latour: "Did Ramses II die of Tuberculosis? On the partial existence of existing and non-existing objects". Chapter prepared for Lorraine Daston and Jurgen Renn: *The Coming into Being and the Passing Away of Scientific Objects* (submitted to Chicago University Press)

<sup>6</sup> A main thesis in the late work of the Danish theologian K.E. Løgstrup (1905-1981). See e.g. his *Metaphysics I-IV* which is presently being published in English.

<sup>7</sup> B. Latour: "The 'pedofil' of Boa Vista: a Photo-Philosophical Montage", *Common Knowledge* 4 (1 1995): 144-187.

<sup>8</sup> A.N. Whitehead: *Modes of Thought* (1966 / 1938) p. 154.

#### 4: Collectives and immutable mobiles

**Two key terms** used in Latour's writings seem particularly rich yet lightweight ways of carrying a strong concept of process into analyses of concrete cases of history of science. I would like to say what I make of them — this may give Latour a chance of pointing out where I possibly twist them unduly — and then I will attempt to use them on some interesting borderline cases, electrons and relativity. The two terms beautifully contain our theme: *Collective* containing "historicity", *Immutable mobile* containing "objects".

**4.1: The immutable mobile** is a clear and sharp piece of metaphysics of time, characterizing the decontextualization which happens to any object as it is constituted through a substance scheme in order to become available to algorithms of prediction and procedures of control: The immutable mobile is everything my old car ought to be, pretends to be, but unfortunately is not. It is the effective bracketing out of history and its replacement by a homogenous scale of time: the object seen as absolutely stable (substantial) in-itself and as tracing, as a function of time, a trajectory through a well-defined (metric) space of atemporally existing potential states. Change reduced to movement, the Newtonian ideal, whereas the process undercurrent of thought knows movement in any stable space to be an idealized limit case of change. (The working of this relationistic space-producing idealization is what Whitehead traces in his notorious Method of Extensive Abstraction<sup>9</sup> which he keeps repeating with slight improvements, as if compulsively, throughout a series of otherwise very different philosophical books.)

**4.1.2: Sketch of a general history of immutable mobiles:** "Prescientific" philosophy of nature is preoccupied with change, science with movement. The first step is of course the construction of immutable states (classical statics, Archimedes) and purified space (geometry); the second step is the maximization of mobility through the geometrization of movement (classical mechanics, Newton). A curious detail in the history of immutable mobiles is that Newton himself and his fellows were still enthusiastic practitioners of alchemy. (Ignis *mutat* res, probably something we should look further into.) Furthermore, of course thermodynamics (third step) is the science of just those aspects of matter which actively resist treatment in terms of immutable mobiles — a science generalizing and maximizing an ingenious trick allowing us to measure this resistance and even make it interchangeable, mobile; taming the power of fire by channelling it into manageable motion. Alas, with irreversible loss, but at least one we can now calculate and partially control by moving it to some place, beyond the exhaust pipe, where it doesn't immediately bother us — or, hopefully, anyone we know too well. Of course the bulk of anarchistic and active phenomena are still not efficiently handled, even with the most refined versions of this trick. If my

<sup>9</sup> The most complete version is the one in *Process and Reality*, p.283-333.

analysis of the second law of thermodynamics<sup>10</sup> is anywhere near correct this is as impossible as the perpetuum mobile of the first two kinds. (Information theory and molecular biology are frequently said to be making what amounts to an efficient fourth step into complexity and life — maybe they are; in any case what they deal with is exactly the aspects which have given foothold for some stabilization of immutable mobiles, hence the absurdities and difficulties which come up when *definitions* of life and complexity are attempted.)

**4.2: The collective:** the anthropological notion of the tribe's world, complete with its intricate network of human and nonhuman actors, makes it possible to overcome the need (and void the possibility) of permanently isolating something purely social against something purely natural. This is particularly clear when the notion of collective is explicitly combined with the notion of relational essences: humans and nonhumans alike, as well as social and natural entities alike, are shaped by their role in the collective. This sounds like social constructivism but it is not quite, since full-fledged constructivism must assume that there is a constructed and a constructing part — that there is real subjectivity, historicity on the one part, the social, and that the other part, the natural and for that matter the institutional constructions, have only secondary status: projections of the social. (For example, this would imply that what was there in Pouchet's<sup>11</sup> flasks was not *really* spontaneous generation — it was spoken of and treated as "spontaneous generation" for social and historical reasons — but at the price that any object we now take seriously must be placed in the same kind of quotation marks.) The master argument, which Latour also applies in WHNBM<sup>4</sup>, is that the social itself then becomes exactly the kind of object that was criticized: non-relational, ahistorical apriori fact. It is clear enough that the *collective* is proposed as the alternative to such a dualist picture; namely the fully relational family of entities mutually shaping and defining each other. (And it is clear enough, for example, that this kind of picture implies that it is true that the flasks contain essences whose ontologies are historically variable — there is no transcendent platform from where the quotation marks can be written with any more than ordinary local significance.)

**4.2.1: Are there complete, closed or primary collectives?** But this returns us to my notorious question which I will now expand: The collective is a cosmos-and-history, but is it a *closed* one? What I was trying to ask before is, how is it delimited in respect

<sup>10</sup> N.V. Hansen: *Process thought, teleology and thermodynamics*, submitted for publ., preprint available by FTP from Phil-Preprints.L.Chiba-U.ac.jp: /pub/preprints/Phil-of-Science/Hansen.Process,\_Teleology,\_and\_Thermodynamics

<sup>11</sup> Pouchet: scientific adversary of Pasteur, claimed e.g. lactic acid fermentation to be a spontaneous process in contrast to Pasteur's theory of contamination with a microscopic biological factor. The dynamics of this particular scientific controversy and the resulting change of scientific objects is studied thoroughly in several works by Latour, particularly "Les objets ont-ils une histoire?...", in I. Stengers (ed.): *L'effet Whitehead*, Paris 1994.

to what is outside? Now I bring in another aspect: what about sub-collectives and super-collectives? Are there, e.g., clinical and scientific collectives, in this sense, which take the role of actors in say, a Western-civilization collective, which is again actor in something like a biosphere collective?

Surely there are quasi-collectives, partial collectives which behave to a large extent like the more complete collectives they are connected with or part of — that is, groups of strongly related humans and nonhumans whose histories can be explained/narrated by referring *mostly* to internal actors and factors but *sometimes* need reference to the more complete collective — say, clinical practice in Finland in the 60'ies. There would also seem to be quasi-collectives on the upper side: concatenations of collectives which are only accidentally related through rare or narrow interactions — say, the collective of all cultures in Eurasia before Alexander. But can we point out any collective with no such "quasi" to it at all, an absolutely complete collective? This would seem a questionable and in any case an unnecessary claim.

**4.2.2: Excursion to process metaphysics: are there primary processes?** This question is completely analogous to a modification or explicitation of Whitehead's general concept of process I have suggested elsewhere<sup>10</sup>: I have argued that there is no need to assume a primary level — at least not in an absolute sense, since it may well be that analyses of a particular collective are presently unable to yield in practice something larger or smaller which is more whole, self-sufficient, autonomous, traceable or whatever. Whitehead's own formulations are at least ambiguous in this respect. If I am right that this applies to the collective — which would, in the suggested interpretation of the Whiteheadian concept of process, be a special case of very rich processes — then between collectives there would be various significant process-relations such as inclusion, branching, recursivity, just as there would be a strong tendency of rejoining into new wholes with characteristics not simply derived from the parts — otherwise the collective would not be significant; we should always find the best explanations by tracing the tiniest individuals.

But all of this implies that no collective has absolute autonomy, also when it comes to relational essences, *even if* we follow Latour's radical point that nothing beyond the collective is judge — because "the collective" is not one thing.

**4.2.3: Trojan Horse for realism?** Now, this means that a confusing thing happens when we take this step explicitly (and this may be why Latour hasn't done it): some kind of revised version of naive scientific realism seems to install itself anew. For example, what about Bhaskar's<sup>12</sup> idea of transcendental realism according to which there is *something* out there, "generative mechanisms" of an utterly non-socially-

determined nature, which we need not and perhaps cannot say are isomorphic with our theories but which do causally co-determine the successes of our ventures in such a way that some theoretical and ontological statements have practical resonance while others don't? I would say we are still just as far from even this modified realism as we are (hopefully) from any modified social constructivism! Why? For several reasons. First, we have no reason to accept standards of "success" or social progress as unambiguous and purely social transcendental objects; it is historically emerged/emergent and incarnated in paradigmatic "natural" objects. Secondly, even transcendental realism's supposedly completely indeterminate terms such as "something" and "generative mechanism" still subtly carry a highly problematic constraint on what may possibly be out there: that it is somehow substantial, somehow basically the immutable mobile kind of thing, even if it is not (cannot be) isomorphic with the specified immutable mobiles we deal with. Thirdly, and most important I think: If we accept that relational co-factors from outside the circle of a given collective co-determine objects within the collective, it is crucial to see that these relations beyond the collective's sphere are just as mutual as those inside; and that consequently even the universe of cofactors outside are not simply determined-in-itself — this co-editing is mutual, so that ideal Bhaskarian utterly non-socially-determined something can be only completely outside of our universe, outside of what we deal with, or (at least metaphorically — by a metaphor I shall further unfold in a moment) outside of the relativistic "light cone" defined by the first social event. At most, certain types of things we deal with can be *relatively* unaffected, by being *typically* or *mostly* shaped by relations our collective is not part of; but just as Latour has argued, our collective may at some point acquire the power of offering them a radically new kind of relations and thereby reshape them. Now someone might want to say that this is evading the question of the outside by letting it be somewhat inside anyway; we probably need to discuss the limits of collectives a bit further.

**4.2.4: Pointing out paradigmatic collectives.** We might say, as implied so far, that collective means simply a circle of related entities with relationally and historically determined essences — this is quite accurate I think, but dangerously incomplete. For this would mean that the best candidates for the term collective would be those circles which are most complete in the sense self-sufficient and closed. For example, in my discussion of the Bhaskarian something, it might seem that the relevant collective framing the relationally determined thing is the total physical cosmos including every entity which is already in or may some day enter into some relation to any other entity. But this sliding upwards towards the absolute of all-including collective is (just as the sliding downwards towards the absolute of smallest atomic units) a sliding away from the meaningfulness and usefulness of the term collective. Why? Because we don't want or need to get stuck in claims of the existence of an already definite and closed universe of all the things-we-may-someday-encounter, or of ultimate smallest building blocks; and because collective (just as process) allows

12) All of Roy Bhaskar's works, e.g. *A Realist Theory of Science*, 2nd ed., Brighton 1978.

a shift of emphasis from absolute endpoints to intermediaries, it is a concept allowing navigation in the middle kingdom of mediations, an optic for making visible polarity-extending ongoing rather than hypostatized fixed preexisting poles. In practice, this kind of slide towards ideal endpoints is held somewhat in check just because of the well-chosen, basically ethnographical, metaphoric of "collective": paradigmatic examples of collectivity in practice are not on the scales of galaxy superclusters or quarks but, say, "the clinical practice in Finland in the 60'ies", or a tribe. Why? Not because of a particular scale of physical size, and not because of closed completeness, I would say — there is another attribute which is much more central to the paradigmatically collective, and which I take to be also central to the paradigmatically processual: creation of wholes, production and reproduction of unified meaning, internally-teleological creativity, self-organization. (Subjectivity you might also say, but then this term must be carefully kept from sliding out of its Whitehead/Hegelian processual sense.) Such a characterization of the term collective would allow us to loosen it from our own particular collective without forcing us to say collective wherever there is a web of relations. So again, a computer or an automobile is not a collective in any very interesting sense, even though both of them contain a pretty firmly packed network of relations. Also, Copenhagen is not so much of a collective, even though a lot of the relations of the actors there are "turned inwards" — because the formative, creative relationality it participates in is to a very high degree the general Western-cosmopolitan one. (Some very spirited cities may have some more of it — perhaps Paris deserves such a predicate somewhat more? This would be not only a compliment, it would also imply that Paris is more tribe-like, parochial.)

**4.2.4.1:** I am inclined to follow both Hegel and Whitehead one step further into this kind of process analysis of cultural collectives: The collective (the highly living/historical "society") exists by virtue of a spirit, in the sense of Whitehead's "superject": a meaning, a total interpretation of life, a synthesis of forms, invented, projected and striven towards in and through the collective; therefore the religious language of cultures are a major cohesive (collectivity-producing) force. Thus Athena actually grounded Athens just as Jahve blessed Israel in his peculiar ambiguous way. The decay of religious language is the fragmentation of the language-using collective. Still, religious coherence is much more alive than priests and atheists alike would like to think (language is not the same as conviction, it is much deeper, and then of course there is the whole collection of practices and artefacts more or less involved with the language) and to whatever degree the decay of religious language has happened, the last thing which could remedy that is clerical conservatism: our old god *is* significantly dead along with the empires he got caught up in (Cf. Whitehead's "final interpretation"). Furthermore, the prophets of Scientific Truth who attempt to take over the keys to the Kingdom and raise new altars here and there (Cf. Tipler's "Physics of Immortality") are not much of a new source of spirit; the residents in their temples are very much the same old tribes' guys.

**4.2.5: The historicity of collectives.** Summarizing the above, the collective is a family of "actors" (i.e. sub-collectives or relatively enduring entities relationally defined). What makes a set of actors a collective is not closedness but what I would call strong common becoming or history. Not being closed I don't take collective to

have to correspond to items with sharp borders. The interesting ones typically overlap spatially and/or temporally and with respect to participating actors — as, say, Judean, Hellenistic, Christian and modern culture do. As Latour stresses, members of collectives are not all human, I would like to further specify that some interesting collectives have no human members.

The collective is the paradigmatic bearer of the strongest version of process or dynamism, *history*.

We are speaking of history in a strong sense here, otherwise the thesis of historicity of objects would be rather meaningless. History here does not simply mean worldlines or similar mappings of movements of (multiplicities of) unchanging objects through uniform preexisting n-dimensional space as a function of 1-dimensional time; as implied above such objects ("immutable mobiles") and their spatiotemporal extensions are constituted exactly by the bracketing out of history. Instead, history must be taken to imply real change, "fundamental" change, i.e. change of fundamentals, irreversible emergence, modification of spaces of possibility, change and perishing of participating actors. Also, I would claim, real and strong historicity implies not only change in some such deep sense but the further strengthened requirement of *development* — not in the sense that history always or automatically moves towards what is in an absolute sense better or higher, but rather in the sense that actors and collectives strive towards the good and high as invented-discovered-constructed so far. Furthermore this teleological element is anything but automatic, it is not invincible or even autonomous — it is broken, and breakdowns of teleologies are of fundamental significance for historicity. Breakdowns happen because of "internal" inconsistency and "external" conflicts with "environment" collectives — in the process view we are able to see that these two kinds of conflict are not different (internal consistency is defined by the system's essence which is again shaped by relations to the outside. And vice versa.). In short, I think we have to say that there is no history without emergence, change, creativity and telos although history is utterly violent with the forms of teleology it produces along its course. The teleological collectivizing moments in question, apart from changing, do not have to be ever fully conscious, fully described, or otherwise available in full depth to anyone, particularly to the agents in the collective in question — they probably never are, cf. Marx, Freud, Jung...

This is just a clumsy attempt of isolating some aspects of the strong notion of history which have been wonderfully exposed by great modern philosophers of historicity such as Heidegger and Hegel. This strong sense of historicity is if not generally accepted then at least a very influential modern line of thought as long as the collectives assuming the role of historical subjects are human societies. Within this clause I also think it is safe to say that the commonsense notion of history is quite "strong". But we are discussing here the possibility of taking such strong historicity beyond human society, of reconnecting history with cosmos.

## 5. Two streams of history at one time?

Cosmos, or nature, doesn't have one but (at least) two streams of history. One of them is documented by antiquated science texts, outdated lab equipment, etc.; the other by fossils dug out from the ground, faint microwave signals, and the like. It is uncontroversial to use the word history in both of these respects, but this is because it is rarely taken to mean that natural objects really have a history in any strong sense like the one I just sketched. That natural objects should be really historical in just one of these respects is a quite radical thought — their combination is almost unthinkable: one history swallows the other. What I hope we are approaching is a way of allowing an ongoing hermeneutic circle of mutual digestion rather than keeping one fat, satiated, lazy dragon. This would coincide, I believe, with the passing from mere abstract ironic reflexivity (deconstructions of deconstructions of beliefs involved in the scientific process) to a constructive historical philosophy of science and nature (which might produce clues of more appropriate ways of relating to science and nature).

Latour has followed in detail one kind of stream, showing how the lactic acid ferment's essence "trembles" just as much as Pasteur's and those of several political / scientific / institutional entities, during their strongly historical interaction. This idea is radical, but at least clear and simple as long as we take it to mean that there is one circle of mutually defining agents, one collective, whose historical dynamics generates the whole story. This clarity seems to be destroyed by the suggestion that there is more to the ferment's history than our collective's history — that there are codefining factors out of its reach through spatial and/or temporal displacement or much larger than it. It seems that such an interpretation confuses the idea of historicity of nature, making it impossible to accommodate the idea that any ongoings local to our collective could change this more global essence.

But as Latour has pointed out, his own strong notion of relational-processual essence overcomes this kind of impossibility: when the family of fermentation processes in question are offered a completely new kind of relational context in Pasteur's lab, a kind never seen before in the entire history and spatial range of fermentation processes, then even if these new relations only form very locally to begin with, they can indeed radically change its relational essence, globally. Of course the new relation type must be a catchy one then, one which resonates well with the actors involved. Once the resonance is struck, in Pasteur's laboratory, the new pattern of relations and with it the altered relational essence may propagate out from there. As Latour also shows, propagation of the new natural item happens by work, mediations, negotiations, step by step. The beauty of this interpretation is that the "tremblings" of history run immanently, through local "shivers" in the world; not transcendently and through an instantaneous "jerk" affecting the entire cosmos at once as if from some transcendental place outside it. The entire cosmos? Yes, because even if lactic acid ferment can safely be thought of as bounded by the Earth's

biosphere, Latour takes this example, rightly I think, to be typical of the historicity of objects — so we might as well discuss the history of an object with a more extended distribution.

**5.1: Electrons.** Were electrons always there ("always everywhere")? It would of course undermine the whole idea of historicity if we placed any layer of natural entities, no matter how "deep", on a platform outside of the historicity of objects. Recent versions of physical theories are themselves less and less inclined to grant absolute stability, independent of local/epochal conditions, to any elementary particle. Apart from that, it must obviously be possible to trace the stabilization of electrons within our collective in the same way as Latour traced the lactic acid ferment. I have not attempted to trace the steps through which the electron was stabilized in this sense — presumably during the late 1800's and mediated by work of Lorenz, Thomson and Zeeman — but if I am right in assuming that "basic" physical objects such as electrons are not excluded from this kind of historicity then presumably we can say that electrons came into being during that period, almost 100% nonexistent in 1800 and almost 100% existing in 1900.

I would like to use the example of the electron to work out a bit more detail in the theory of stabilization of objects. In the insert of the "partial existence" paper<sup>5)</sup> (p.6) Latour outlines such a stabilization of an entity as an "association profile of other entities called elements of a network", and further describe different versions of a stabilized object as recombinations of such elements into dynamic "programs" which may support or counteract each other. In the case of electrons, the elements would be laboratory equipment, physicists, previously stabilized electric and magnetic phenomena, and presumably a host of institutional and economical actors which can't be separated from electric and magnetic phenomena either. Now of course, the whole picture would immediately collapse into something ahistorical if we thought of these "elements" as themselves ultimately given, stable, non-relational — so obviously Latour means to introduce them as stable interchangeable "elements" only in a first approximative characterization of the shifts happening to the one relational object in question. Thus, we cannot and need not assume a permanent list of primary actors or a given layer of primary processes.

Such a renunciation of implicit or structural substance would have an equally strong bearing on sociology of science and on process metaphysics.

**5.1.2: The question of primary (process) entities repeated.** In some versions of process metaphysics, nature is thought of as consisting of micro-processes corresponding to, say, elementary particle events. Whitehead is frequently taken to be claiming such a primary process layer when he distinguishes sharply between processes, sub-processes ("prehensions") and combined processes ("nexuses"), but as

I have argued elsewhere<sup>13)</sup> Whitehead's distinction can be understood as always local to the identification of a family of process under study in a particular context. In any case we can use the idea of the historicity of the electron to either clarify or radicalize the process view in this respect: we can, whether or not this goes beyond Whitehead, avoid claims of absolutely primary process entities. What there may be, instead, is relatively stable types of processes which cannot presently be divided or combined in any way producing something more autonomous. What makes processes more or less individual and autonomous, in this case, could be linked with final causation or self-causation (this would be very Whiteheadian), rather than with a particular and fixed scale - say, the size of microorganisms or electrons. Now again, either we could talk about even such multiple possible division modes in ahistorical terms - that types of natural things exist with certain preexisting potentials for divisions in different respects, or even that types of social agents (Chirac?) exist with certain predispositions to atomize their environment in particular repeatable ways. Or we could say that the division modes, the dispositions, and the layers of more or less individual subentities are themselves historical accomplishments.

**5.1.3: A strongly dynamic interpretation.** In the latter case it might indeed make lots of sense to say, in analogy with Latour's statements about other scientific objects such as the lactic acid ferment, that electrons have come about quite recently, as a successful division of certain phenomena into what is in important respects well-behaved individual pieces. This would bind electrons and electronic projects tightly together into something aptly described by the term collective. For the layer of electronic processes will then not so much be stabilized by virtue of their own telos or autopoiesis but rather by virtue of the new collective's common circuit of telos and autopoiesis. Division and concatenation, immutable mobile formation and collective formation, thus seem to be very intimately connected, but as Latour says in WHNBM<sup>4)</sup> we suppress the new wholes ("hybrids") in our understanding while pretending the new parts were always there.

I find such a radically processual account of natural (and cultural) processes and entities as historical and constructed, plausible — but I still think "the nature" of processes thus constructed fires back, in a certain sense, upon the formation of immutable mobiles as well as collectives. Even if we completely renounce on ahistorical fundamentals in nature and culture determining e.g. the true entities or laws of physics, there are certain aspects of the *historical* nature of things which force some peculiar features upon efficient immutable mobiles. Or with other words, even if we accept that the construction of a natural entity changes its "elements" radically,

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13) *Process thought, teleology and thermodynamics*, submitted for publication — and also in my dissertation *Tidens natur og naturens tid*, p.73.

the constructed entities and networks still light up the history of nature as much as they conceal it.

**5.2: Relativity vs. electronic history** I am going to perform a somewhat bizarre thought experiment with the history of electrons to illustrate this. If we don't buy the idea that electrons were always everywhere, I assume what we say instead is that once this new resonance is struck, say, in one lab or in one spatially limited subcollective of physicists and related processes, it propagates out from there. At some point of time it may, if it is successful, consequently be stabilized to a high degree somewhere else, where it wasn't before. In the "partial existence"<sup>5)</sup> paper Latour describes this with the metaphor of viral contamination. Now I get to the monstrous part: assuming for the sake of the thought experiment that the relational patterns dubbed electrons were never formed before in some collective at a physically remote place, in the Andromeda Nebula for example, and assuming that this particular pattern, or maybe mutated but recognizable successors of it, can "survive" under conditions sufficiently different from those in its "original host" quasicollective, we can ask at what time the "wavefront" of this historical change contaminates a planet in Andromeda, a few million light years from here?

I am aware of a lot of objections which could be raised to this; but I don't think we need to get lost in a discussion of the extent to which we can say that particular relational objects such as French cheese, electrons or lactic acid ferment propagate or stabilize beyond local collectives such as Provençal dairies, Western civilization or the Earth's biosphere. Obviously the thought experiment can be modified endlessly using different objects and collectives; it is not even necessary to postulate propagation into collectives beyond a particular "home" collective: alternatively this one collective could just be thought to be physically large. But there is one important kind of objection I think we should not accept: the objection that the question of the speed of the propagation of relational essences mixes up categories, that the physical propagation of electrons and the historical propagation of electrons belong to two completely separate realms. Stabilization and propagation of historical stages and versions of objects is, as Latour has pointed out so often, immanent in the world, it is nothing but mediating processes in the world.

The serious question illustrated by the Andromeda example is not whether and when electrons exist in a particular faraway place, but whether the concept of partial and variable existence unfolded in Latour's latest papers corresponds to a singular historical index of stages of one collective, so that the stage of existence of a particular object within the collective must be thought of as changing the cosmos in an instant. Paradoxes would obviously arise if the historicity of the electron or any other object is thought of as gaining cosmic-scale extension instantaneously; paradoxes stemming from the grammar of physical time and space, from special relativity. Thus in Andromeda the time the instantaneous influence arrives would vary by thousands of years depending on the choice of inertial system (and of course there



is not necessarily a "natural" way to fix one; those corresponding to centres of gravity in sender and receiver would typically not coincide). But the whole point is that these absurdities will come up only if we cling to a metaphysical split: the non-naturalness of history and the non-historicity of nature.

Without such a split, we will simply accept that historical change propagates through ordinary processes and hence traverses physical space at an ordinary, limited speed. Since this takes time, this again implies that the "elements" combining in the electron pattern may be combined otherwise in a place not yet infected, so that "wavefronts" of historical change may meet, in fight or synthesis. Whether or not we wish to say that such a wavefront of electronic existence ever reaches the Andromeda, we are freed from the metaphysical burden of claiming one stage of the history of existence of objects to have absolute cosmic privilege. Thus, finally, this reflection implies that the history of objects cannot be captured in one serial narrative; rather we get a picture of streams of history endlessly branching out and recombining as patterns change and propagate in a universe without absolute simultaneity — respecting, in effect, the constraints imposed by the special theory relativity.

With other words, without the split we end up with another funny claim which may at first seem reactionary to those of us who try to go beyond what Latour calls the ahistorization of nature: the claim that some physical theories, such as special relativity, disclose constraints on the history of objects. This is just what I want to suggest that they do. I also want to suggest that this is far from ahistorical, that it is indeed a consequence of the most radically historical current in Latour's own work.

### 6: Special relativity as a theory of history

The special theory of relativity is itself obviously just as much of a historical product as the electron: clearly we are not lifted out of historical limitation as soon as we consider some pattern called a theory rather than an entity. I also referred to entities such as galaxies and planets and to metric conventions such as light years, in order to produce the paradox I claim to be involved in the idea of simultaneous historicity (i.e. history as one unique serial narrative); again these could be criticized for being themselves historical. As could the speed of light. This is all true but doesn't weaken the point of the whole exercise: the special theory of relativity brings out a constraint on history — on the ways history can happen as well as on the ways it can be told. In this respect special relativity is not only passively historical in the sense of something produced historically, and it is not only passively ahistorical in the sense of a tool allowing the efficient construction of immutable mobile networks and hence the bracketing out of the historicity of things; the very same theoretical structure is actively historical in the sense that it reveals a feature of strong historicity, even a feature too radical to be included in many common versions of the notion of history: historical locality, the irreducibility of real histories to one serial narrative, or particularly to one (topological-and-metrical) axis of time, the nonexistence of a

"unique seriality of events" (Whitehead)<sup>14</sup>. Many (including Einstein himself, at least at a certain stage) have believed that special relativity ruled out the backbone of history, dynamism (i.e., temporality, dynamic change, real change, becoming<sup>15</sup>) because we have become so accustomed to understanding dynamism in terms of the passage of a now-pointer across a cosmic time axis. But this contradiction between relativity and becoming vanishes as soon as we leave the classical notion that dynamism and change happen within a container of uniform temporal extension, and regard temporal extension as produced by activity rather than underlying it. A detailed account of such general reconstruction of extension is, again, given in Whitehead's method of extensive abstraction. The classical notion has given rise to attempts to bracket out relativity in order to conserve a classical concept of history or becoming, or vice versa, I have attempted elsewhere to give a more detailed account of these problems and their suggested process solution<sup>16</sup>.

Thus freed from classical substance-metaphysical ideas of underlying continua, special relativity can be seen to carry a concept of "dynamic locality": the idea that every ongoing process has a particular and limited universe of completed predecessor processes and itself in turn, when completed, becomes available to particular branching lines of successor processes: a downward (root) and upward branching family tree converging in one stream of history only at this one particular happening. This coming together and splitting apart is the dynamic coming into being for every process during its actual happening, but there is no basis, and no need, for saying which other processes, in the multitude of parallel branching trees, have their actuality "at the same time".

(Obviously this double branching tree corresponds to the forward and backward light cone in the metaphoric special relativity is traditionally illustrated with.)

This implies two closely related constraints on every possible stream of history: it is local, in the sense that it is informed by and shaped by a particular limited part of the totality; and it is able to affect only a limited branching part of the totality. Limited scope and power. Outside the limits there are other histories which are beyond its surveillance and control. Whitehead saw this radically historical or processual aspect of the content of special relativity and took it to be of such fundamental significance as to be included in the "Categories" characterizing the central concept of process, with his "Principle of Relativity", just as he repeatedly stressed the corollary that strong dynamism does not imply a unique seriality of events.

<sup>14</sup> A.N. Whitehead: *Process and Reality* (Corrected edition, 1978), p. 35.

<sup>15</sup> A technical argument for this ruling out of dynamism is presented by several authors, e.g. in H. Putnam's *Time and Physical Geometry*, Mind, Matter and Method, Philosophical Papers, Vol. 1, Cambridge 1975, p. 198-205.

<sup>16</sup> The technical argument for this compatibility of process dynamism and special relativity is sketched in my article on time and thermodynamics (see note 10), it will be further unfolded in a forthcoming article.

It is particularly interesting in our discussion to see special relativity as specifying a limitation of ideal possibilities of knowledge and power — because it translates very well into a restriction on realization of the general ideal Latour has termed representation and delegation, and which he describes exactly as the overriding of the limitations of locality. Clearly special relativity does not rule out representation and delegation, rather it shows some limitations — limitations which are increasingly important to handle for engineers of increasingly large networks of representation and delegation.

This is a general trend in Whitehead's process philosophy of nature: the interpretation of some of the weirdest features of the new physics — of relativity theory and quantum mechanics — as consequences of the process / historical character of reality and as understandable in terms of his process metaphysics. I have tried to show<sup>10</sup> that the strangest regularity described in thermodynamics, the second law, can similarly be interpreted as a necessary expression of the strong concept of process suggested by Whitehead. What do we make of this? Is Whitehead (and are his followers) hypostatizing part of physics as ahistorical essences anyway, and should we try to radicalize the historization here? I don't think so, because at a closer look these process metaphysical structures which we appear to be asked to accept as permeating into any true physics really all share a certain negative character. That is, they are (like Gödel's theorems) more or less surprising statements of what cannot be done, even though received metaphysical presuppositions may seem to imply that they can. These limitations are not so much limitations of creativity and understanding as they are limits of availability and representation. In quantum mechanics, limits to spatiotemporal divisibility and spatiotemporal locality. In relativity theory, limits of scope in terms of causing and causable zones. In thermodynamics, resistance to specific fixed types of order. No doubt the way such limitations become relevant in various forms of technology and theory can vary tremendously; and no doubt the introduction of the speed of light or the statistical mechanical descriptions of microstates very much shape the facts of relativity and thermodynamics. But even if we are learning how to understand natural objects as historical, and even if obviously theories of natural science are at least as historically constructed, it is perfectly possible for (some of) the very same theories to play the role of mediators of basic structures of historicity.

This is my final suggestion, I think it is best stated as a question:

Even if science serves, as Latour shows, to reconstruct objects by blocking out their history and maximizing mobility and control, isn't it true that at the same time it displays history and shows the limitations of mobility and control? Indeed, if this is not the case, it is very difficult to see how science studies or any other attempt to reflect on what science is doing, or any attempt at speaking of the "lost" historicity of objects, can be held possible without claiming a radical asymmetry between

descriptions of histories and descriptions of nature, one of them constructed, passively historical and disguising, the other truthful, actively historical and revealing. Isn't it, finally, that an interesting notion of historicity of objects must imply a double-sided hermeneutics of history and nature, allowing us to follow the branchings and joinings, diffusions and convergences, across any such borders of virtual transcendence.

Dare we believe that if we can develop and deploy such strongly processual ways of speaking of scientific objects, this may contribute to new and more caring styles of engineering? As Latour suggests in WHNBM<sup>4</sup>) it may have such an effect by restoring awareness of the networks and hybrids produced when artefacts, machines and objects are made — looking into the eyes of the "monsters". What I am suggesting here is that a parallel way it may have such an effect is the building of an appreciative understanding of nonhuman as well as human nature as full of collectives and histories. Gods, perhaps, if one likes.

By the way, collectives and histories are not holy in the sense that they should not be interfered with. Collectives and histories are nothing but interference.

*Note on extension:* This note is relevant only if it is found objectionable that ahistorical and unambiguous notions of temporal and spatial extension are taken for granted here and there in my remarks. I haven't thoroughly discussed the peculiar role extension plays in the aspects of historicity I have discussed. This may seem a major deficiency. Notions of extension are used without explicit disclaimers, for example in the discussion of the long extension of histories preceding that of our collective and in the discussions of special relativity. Clearly radical process views such as Whitehead's imply that extension too, time and space too, are historical accomplishments so that comparisons of temporal and spatial extension will always be relative to local types of historical relation. With other words, when the process families in question become sufficiently different, we cannot assume that it makes very much sense to compare their extensions; at least it will require us to practically construct mediators and common denominators. This implies that the large spatial dislocations I introduced in the relativity example, and the large temporal dislocation I mentioned when talking about collective histories in our distant past, cannot necessarily be taken as unambiguous hard facts in the context of the histories of objects. But the *size* of the dislocations only serves to dramatize my points, the central issues can be stated in more qualitative "purely" historical terms which don't rely on particular extensive continua: historical locality, the historical relation of "distant" past in the sense that many processes of radical change have come between, the historical relation of "distant" contemporaries (in the relativistic sense) which can be defined in terms of the historically closest common predecessor. The identification

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of the limits of the forward and backward dynamic "family trees" of a process with 4-dimensional "light cones" in Minkowski space, specifically the fixation of a particular limiting speed (that of light) can, as Whitehead points out, be local to particular families of processes ("cosmic epochs") while the backbone "historical" principle of relativity cannot, if we assume the process scheme's validity.

(This obviously is a question "deeper" than the coordination of temporal and spatial systems local to inertial systems thematized in special relativity. The procedures laid out in Einstein's theory assume the existence and unambiguity of metrics given an inertial system.)