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Hyperdocumentation

Olivier Le Deuff

Intellectual Technologies Set coordinated by Jean-Max Noyer and  
Maryse Carmès (Volume 9)

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## Postface Beyond Otlet: Fragmented Encyclopedism

Jean-Max NOYER Emeritus University Professor

Olivier Le Deuff's work brings to life with talent the great narrative around Paul Otlet, but also Henri de La Fontaine, Suzanne Briet and Vannevar Bush, to name only some of those who accompany or follow him. This great narrative is that of a visionary Otlet, a profound thinker of the Book, of Knowledge and Learning and their future assemblages, carrying a project for democratic purposes and based on the belief in the identity between scientific knowledge and universal peace. This project was forged at the heart of European wars, conflicts, tragedies and hopes. This narrative is rooted in the commentary of the *Traité de documentation. Le livre sur le livre* that was published in Brussels in 1934 by Paul Otlet, in the inter-war period, or more precisely on the eve of the Second World War. It was also during these years (1935–1936) that E. Husserl wrote *The Crisis of European Sciences and Transcendental Phenomenology*.<sup>1</sup> What Husserl reproached to modern sciences was that they had created an impassable gap between them (the world of science) and the world of life, the surrounding world (of life). Gérard Granel<sup>2</sup> sums up the *Krisis*' explicit project thus to awaken (and accomplish once and for all) in the form of transcendental phenomenological absolute philosophy this

*1 Die krisis der europaischen wissenschaften und die transzendente phänomenologie, Edmund Husserl from volume VI of the Husserliana published in 1954, 16 years after the philosopher's death. 2Granel, G. (1976). Preface to Edmund Husserl, La crise des sciences européennes et la phénoménologie transcendantale. Gallimard, Paris, pp. III–IX.*

immanence of reason in man, which defines his humanity. But as Gérard Granel comments, Hegel's warning sounds like a knell: *A further word on the subject of issuing instructions on how the world ought to be: philosophy, at any rate,*

*always comes too late to perform this function. As the thought of the world, it appears only at a time when actuality has gone through its formative process and attained its completed state. This lesson of the concept is necessarily also apparent from history, namely that it is only when actuality has reached maturity that the ideal appears opposite the real and reconstructs this real world, which it has grasped in its substance, in the shape of an intellectual realm. When philosophy paints its grey in grey, a shape of life has grown old, and it cannot be rejuvenated, but only recognized, by the grey in grey of philosophy; the owl of Minerva begins its flight only with the onset of dusk.*<sup>3</sup>

Still to follow G. Granel, let us briefly recall some of the outstanding features of the 1930s; their events, tectonics and processes which, far from equilibrium, once again fractured the anthropotechnical and political foundations of Europe. Nazism takes center stage (in 1933, in a reptilian convulsion at its climax, perfectly staged, tens of thousands of books are publicly burned at the stake by students, teachers and members of the Nazi party authorities), Italy is under the rule of Mussolini, socialism has become Stalinism, liberal democracies are disintegrating, Orwell is in Catalonia against Franco. The fields of Physics are in full swing, the worlds of literature and art too. Everywhere in the world, geopolitical obsessions and desires of territorial capture and predation and of populations, in their archaisms and futurisms, are at work. Chaotization strategies are winning everywhere. Faced with this, the *Traité de Documentation* as a policy for the next world? It remains to be seen. For it is, to tell the truth, already too late. And the great questions about the relations between rationalisms, under the blows of their alliances with war machines and security machines, and the systems of organization of collective intelligences (in particular of science and technology) and their associated networks (memories, writings, classifications, libraries and databases) are only just beginning to emerge.

*3 Hegel, F. (1820). Preface. Elements of the Philosophy of Right.*

Until they became dominant and strategic in the early 1940s. Vannevar Bush will express this in a simple and powerful way.<sup>4</sup>

P.1. Back to the future: against, but very close to Paul Otlet

This great narrative must therefore, in our opinion, be nuanced. Paul Otlet came out of the attic where he had been confined<sup>5</sup> when the Internet burst on to the scene. Still trembling from the major disruption produced by this new anthropological stratum, (the digital fold being deployed) the documentary world found in Paul Otlet a valorizing figure, a humanist vision associated with an inherited progressive utopia. It also found some attractive concepts (such as the Hyperdocument) that enabled it to regain its footing and not sink under the radical digital and hypertextual wave, conceived and embodied by research and thought collectives, forged directly at the heart of increasingly complex, heterogeneous and dynamic knowledge production devices that needed to go beyond the modes of organization of knowledge conceived as an arrangement of essences. The documentary world was again looking for meaning, to stabilize the return of Order and the reaffirmation of a classical Rationalism. As J.-F. Füeg writes, taken up by Olivier Le Deuff: Paul Otlet was a 19th century man. He attended the Collège Saint Michel in Brussels and received a humanistic education there, bathed in the heritage of the Ancients. For him, the world

*4 Bush, V. (1945). As we may think. The Atlantic Monthly, Washington D.C., July. 5 In the 1880–90s, Otlet was hardly taught in France anymore, just evoked, and with the exception of a few female researchers (e.g. Sylvie Fayet Scribe, Arlette Boulogne, Isabelle Rieusset Lemarié), his thought was inert. See: Buckland, M.K. (1992). Emanuel Goldberg, electronic document retrieval, and Vannevar Bush's Memex. Journal of the American Society for Information Science, 43(4), 284–294. Day, R. (1997). Paul Otlet's book and the writing of social space. Journal of the American Society for Information Science, 48(4), 310–317. Rayward, W.B. (1999). H.G. Wells's idea of a World Brain: A critical reassessment. Journal of the American Society for Information Science, 50(7), 557–573. Rieusset-Lemarié, I. (1997). P. Otlet's Mundaneum and the international perspective in the history of documentation and information science. Journal of the American Society for Information Science, 48(4), 301–309.*

came from an Order and all his intellectual effort was marked by the will to bring it to light. He belongs to the lineage of Linnaeus, Buffon, Mendeleïev, of those tireless taxonomists who brought science to adulthood, that of Reason and organization. However, the obsession with classification led Otlet to frightening social visions. The Order allows Knowledge, which itself generates Good. Starting from these premises, he will end up persuading himself that there is only one just society and that scientists hold the key to it. (author's translation)<sup>6</sup>

Between the publication of the Book of Books, the invention of Bush's Memex which followed Goldberg's machine, and the rise in international tensions, the transformation of power relations, the 1930s saw the projects of an ambitious and great Documentary Policy following alongside the deployment of forces and impulses with strategies and goals contrary to what the founders of the League of Nations wanted and which tended to underestimate, or in any case not to "see", the effects of the diabolical waltz of insomniac and besieged reason, of the alliance between reptilian impulses and scientific and technical devices. Universalist goals therefore for those who believed in the pacifying virtues of education, in the benevolent desires of technoscience, in the convergence of passions for a shared democratic desire. The Internet had a project. It had already been thought of by Otlet, before Ted Nelson, before Berners Lee, etc. Utopia could become concrete. Phew! Documentation was saved. And the famous vision, that of a hidden and underground counter-revolution in the face of the initial rebirth, counter-revolution<sup>7</sup> in the

6 Füeg, J.F. (2003). *Ordo ab chaos : classer est la plus haute opération de l'esprit. Associations transnationales.*

7 As Dorothea Heinz and Bruno Latour note in connection with Foucault's famous epistemological break in *The Order of Things*, and quoting Stephen Toulmin, "in this little-known book that deals, once again, with the same transition between Rabelais and Descartes, between the prose of the world and the classical age, Toulmin turns the scientific revolution into a 'counter-revolution' carried out, precisely, in the name of order. This order that suddenly appears, after a century of religious wars, as the only way to put an end to disorder. But this order, praised by Foucault under the name of 'mathesis', no longer has anything to do with the history of Reason. It is a hard and cruel history of political epistemology that will put an end, and this is the originality of Toulmin's astonishing periodization, to what was alive, open and inventive in the true scientific revolution, the one he placed a century before, in the midst of the Renaissance." Perhaps the same is true now, when everywhere the reordering of knowledge (in the digital noosphere) is being given priority. See: Dorothea Heinz and Bruno Latour's "La prose du Monde s'est-elle vraiment interrompue?", the French version of Heniz, D. and Latour, B. (2012). *Bücherschau: Wiedergelesen II. Bildwelten des Wissens, Bredekamp, H. (ed.). Band 9, 1, pp. 99–102.* Stephen Toulmin (1990). *Cosmopolis. The Hidden Agenda of Modernity.* The University of Chicago Press, Chicago.

8 Yourcenar, M. (1968). *The Abyss.* Editions Gallimard, Paris.

face of the original explosion, the second rebirth (as soon as the sign was digitized) of writings, memories, knowledge and their heterogeneses, the explosion of semiotic regimes, new assemblages of forms, in short, new

conditions for Creativity. In short, the The Abyss 8 of the time, born of the cultural bubbling of the digitization of the sign and its procession of new writings and liberties, new paths and types of events, and heresies galore, had to be cooled down, and documentation, spokesperson for Reason and associated Orders, had to polish its dullness to advocate a relational ecology to the orders of disciplines, of scholastics, of knowledge achieved with closed eyes. I am hardly exaggerating.

Certainly Otlet realized the importance of the supports and technologies of the modes of transmission, of combinatorial modes like Bush later and like many before him, but he did not face the rise of divergent worlds, of cognitive ecologies in vertiginous differentiations or once again of the heterogenesis of knowledge, the abyssal extension of the doxic field. He did not call into question the classificatory order of essences, he was not shaken by the vacillations of rationalisms. Let us go further: in Paul Otlet and through his political commitment, the documentary world gave itself, in the very heart of its deepest disruption, in the fold of fear of its dispossession, new clothes bearing a revived humanist vision, a political project of access to Knowledge, reaffirming the encyclopedic project in the radiant horizon of the new anthropotechnical stratum.

The Net “was Paul Otlet plus Digital”!

Thus the documentation of essences, theorem-esque, could breathe against the model of a problematic documentation of futures, heterogeneity, translations, a documentation of events and not a hermetic documentation, in the alienated sense.

From a certain point of view, then, Paul Otlet’s vision comes from a distance from the Order. In the forms of the Masonic dream of Otlet and the League of Nations, taking up the long line of that very thing which for millennia has expressed and embodied in various forms what can be called an abstract documentary machine, Otlet and those who preceded him, as well as those who succeeded him, take up and translate once again, at great expense, elementary, archaic problems: what does it mean to preserve and store artifacts and traces? What do repeating, altering, and transforming mean? What does classifying mean? What does writing-reading mean? What does visualizing mean? What

effects do the assemblages that we make in this way produce in the orders of intelligences, imaginations, passions, reading-writing practices, socio-cognitive practices?

Documentary Diagrammatism that keeps coming to meet us, therefore, an abstract documentary machine understood not as an infrastructure “in the last instance, neither is it a transcendental Idea in supreme abstract or diagrammatic (and which) does not work to represent, even something real, but builds a future reality, a new type of reality. It is therefore not outside history, but always ‘before’ history, at every moment when it constitutes points of creation or potentiality.”<sup>9</sup> From this point of view, from the library of Ashurbanipal<sup>10</sup> to that of Alexandria, via the network of copyist monks, the tables of Chinese scholars,<sup>11</sup> in imperial China, the multiplicity of writing and reading devices, places of knowledge and classificatory thought,<sup>12</sup> which make up the very long history of collective intelligence. “Hypertextuality, Encyclopedism”, are systematically already there, are always already at work.<sup>13</sup> Since the beginning of the history of traces.

*9 Deleuze, G. and Guattari, F. (1981). Mille Plateaux; Capitalisme et schizophrénie. Éditions de Minuit, Paris, p. 177.*

*10 Jacob, C. (ed.). (2011). Lieux de savoirs 2 : les mains de l'Intellect, Albin Michel, Paris.*

*Herrenschmidt, C. (2007). Les trois écritures, Langue, nombre, code. Gallimard, Paris.*

*Herrenschmidt, C. (1999). “Écriture, monnaie, réseaux”. Le Debat, 106(4), 17–36.*

*11 Christian Jacob, idem.*

*12 Ibidem. 13 See on these points in particular Leroi-Gourhan, Bernard Stiegler.*

## Beyond the *Traité* and the *Krisis*

The *Traité* and the *Krisis* have long been intertwined and in tension (without really knowing it) in various forms. The conditions of production of memory and the conditions of production of thought, the conditions of production of the field of doxic immanence are today profoundly upset. It is a truism to say this. Stated again in a general way, the transformation of knowledge, of its modes of production, differentiation-fragmentation, but also of its circulation, the relationships between them and the fabrication of problems, all of this raises once again the question of how to “encycloped-ize” once again specialized and scattered knowledge, how to bring about the emergence of a new rationalism and thus a new culture, overcoming also what Bruno Latour in particular calls

the “great sharing”.<sup>14</sup>In his powerful article, at the end of the Manhattan Project (“As we may think”), Vannevar Bush places the stakes of knowledge and memory at the level of the conditions and primitive mechanisms of collective intelligences. “The human mind does not work that way. It operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain. It has other characteristics, of course; trails that are not frequently followed are prone to fade, items are not fully permanent, memory is transitory.

Yet the speed of action, the intricacy of trails, the detail of mental pictures, is awe-inspiring beyond all else in nature. Man cannot hope fully to duplicate this mental process artificially, but he certainly ought to be able to learn from it. In minor ways he may even improve, for his records have relative permanency.

The first idea, however, to be drawn from the analogy concerns selection. Selection by association, rather than indexing, may yet be mechanized. One cannot hope thus to equal the speed and flexibility with which the mind follows an associative trail, but it should be possible to beat the mind decisively in regard to the permanence and clarity of the items resurrected from storage.”

*14 Latour, B. (1983). Comment redistribuer le Grand Partage ? Revue de Synthèse, 110, 203–236*

And further on “Wholly new forms of encyclopedias will appear, ready made with a mesh of associative trails running through them, ready to be dropped into the memex and there amplified.”<sup>15</sup>

### P.3. The current documentary laboratory: some characteristics

#### P.3.1. Assemblages for new humanities?

The various problems related to the evolution of knowledge organizations, the various incarnations of the web and its future, and the transformations of socio-cognitive systems, are caught up in the intensive digging of collectives of thought. And the implementation, admittedly uncertain, of the conditions for the development and propagation, stabilized in time, of what could constitute the contours of a new general, open and processual culture, constitutes a major challenge for those who wish to define the forms of a new open rationalism,



expression and expressed at the same time, of cultural, philosophical and religious dissonances, dissonances stemming from the “unequal development” of rationalism attached to the techno-scientific sphere of the West and from the vast system of internal relations which make up the aggregates of collective intelligences. Aggregates and intelligences that constitute the weft of a vast and highly differentiated seamless fabric veiling the faces of the world. One of the possible questions could be: what knowledge system is developing today, based on the scientific and technical sphere and its rationalities? In Bertrand Saint Sernin’s analysis, “will the body of knowledge continue to take the form of an aggregate of specialties whose internal relations will remain imprecise? Or is their organic unity becoming visible? In the first hypothesis, we will at best have a classification of sciences; in the second, we will have a knowledge system. Each of the two parties has its advocates: in the past, the first had Mach and Duhem as its defenders; the second, Cournot and Whitehead.”<sup>16</sup> This problem is all the more decisive because of the need for a general ecology including non-human actors whose otherness is not irreducible for man, the understanding that goes with the continuous weaving of beings, artifacts, animals, plants, minerals, viruses – of the various orders of life,

*15 Bush, V. (1945). As we may think. The Atlantic Monthly, Washington D.C.*

*16 Saint-Sernin, B. (2007). Le rationalisme qui vient. Collection Tel (no. 346). Gallimard, Paris.*

including therefore that which relates to the continuation of life by non-organic means.<sup>17</sup> This necessity calls for an open dynamic cartography of knowledge assemblages, and this from documentary worlds. This point is important, because in the face of new human figures and ecologies in crisis, the capacity to inhabit the aggregates of knowledge assemblages, with their sometimes co-determined relationships, with their more or less floating systems of borders and internal hiatuses, becomes more demanding. Grammatologies continue to differentiate and semiotic pluralism, not exclusively linguistic, becomes more complex.

#### P.4. Intelligences always already collective and machined

The fact that intelligences are always already machined, that emerging knowledge is the most singular in the midst of more or less important collective

assemblages, that intellectual technologies, devices, spaces and means of exchange and circulation of traces – that all this has been present for a very long time does not change the fact that since the beginning of the 20th century the conditions of production, circulation, the incessant work of commentary and re-writing, the construction of evidence and work on data (the obtained), the theoretical variations affecting paradigms and fabrication-invention of problems have been deeply transformed. The same is true for the conditions of reading, writing and attention modes.<sup>18</sup>

#### P.4.1. Working “by” and “in” infrastructures: the Open movement

Indexing, Classifying, Cataloguing, Connecting, Mapping, Visualizing, Navigating... these are always at the heart of cognitive practices. These functions are even amplified, they are differentiated and based, at the scales

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*18 Citton, Y.Y. (2014). Pour une écologie de l'attention. Le Seuil, Paris.*

*Hayles, K.N. (2012). How We Think: Digital Media and Contemporary Technogenesis. University of Chicago Press, Chicago.*

*Wolf, M. (2008). Proust and the Squid: The Story and Science of the Reading. Brain Harper Perennial, New York.*

where they are at work, on more or less complex writings and algorithms. Since the birth of the process known as open archiving aiming at transforming storage and access to scientific documentation in the form of ArXiv.<sup>19</sup> Paul Guinsparg, its creator, insists on the effects of this new type of infrastructure. From the effects “of maximum spontaneous participation, we can therefore expect not only increasingly automated interoperability between databases and the growing availability of online resources for algorithmic collection – articles, datasets, lecture notes, multimedia and software, tags, links, comments, corrections, contributions to ontologies and expertise-intensive links, all actively organized, will become increasingly important, acting to glue databases and texts into a more powerful knowledge structure.”<sup>20</sup>

And he goes on, the goal is indeed “the creation of a semi-supervised and self-sustaining knowledge structure, driven by synthetic concepts, free of

redundancy and ambiguity, researched, authenticated and put forward for novelty. Our browsing through the literature will then be much more complete, guided by algorithms allowing access to our own and users' behaviors; and our reading (will be) guided by links to explanatory and complementary resources related to words, equations, figures and data.”<sup>21</sup>

#### P.4.2. The community of works as an incompleteness in process of production

As always the community of works, and those of sciences are as incomplete in the process of production,<sup>22</sup> and under the conditions of the Digital they present themselves as a vast open domain of internal relations, a domain where the very notion of digital documentary object considered from the point of view of essences can no longer operate and where trajectories and morphogenesis of relations, transformations and deformations of relations are at the source of all semiotics, between metastability and fluidity, between emergence and effacement, between attraction and evanescence.

<sup>19</sup> Available at: [www.arXiv.org](http://www.arXiv.org).

<sup>20</sup> Ginsparg, P. (2011). *It was twenty years ago today...* [Online]. Available at: [arXiv.org; http://arxiv.org/abs/1108.2700](http://arxiv.org/abs/1108.2700).

<sup>21</sup> *Idem*.

<sup>22</sup> To follow Whitehead, A.N. (1929). *Process and Reality*. The Free Press, New York.

These are nodes and links, increasingly powerful and flexible markup languages to ontologies (“all the way down”?) fabricated from specific relationships and their procession of translations and boundaries, interstices and slots for cartographic practices opening up new connections and infinitely variable temporal openings, exploding analogical freedoms at the heart of “science circles”.

#### P.4.3. Relational complexes

Hence, in passing, the need for a renewed documentary conception where documents are thought and treated as “relational complexes”, flows and events. These relational complexes are defined by their power of connectivity, translation, and attraction. Each document is therefore a variety of relationships associated with a combinatorial capacity. It is defined by the more or less stable

system of relations of which it is both the expression and the expressed. In a different way, we can say that a document is an ecology with its borders + “n-points of view” that express the history of its outside, that is to say, folds and unfolds that constantly transform it. It is therefore the fruit of a coupling between its internal and external ecology, between what converges towards it, or allows itself to be captured, and what comes out of it. This is why the expression “relational complex”, which also correlates with a true intellectual energy, seems to us to give an account of the transformation.

#### P.4.4. Ontologies “all the way down” and the question of “reclosure”

Concerning the fabrication of ontologies (model, among other things, of the productive arrangement of knowledge) in order to automate a certain number of procedures and to facilitate elementary or complex functions of research practices, it is however advisable to recall a certain number of points. The fabrication of these ontologies is based on the modes of exposure of research on their documentary conditions. They come as an afterthought to the research activity itself.

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The fabrication of these ontologies is based on the modes of exposure of research on their documentary conditions. They come as an afterthought to the research

They participate reflexively in the improvement of research practices internal to the field from which they originate, as well as by fitting into larger and more heterogeneous documentary collections with diverse modes of progression, nomadic concepts and methods, translation processes, and the exploration-overlap of border zones.

This construction of ontologies is complex and rests on a collective work that oscillates between consensus and dissensus, between modeling the system of internal relations (inferences, analogies, abductions, construction and validation of proof, truth regimes) and “passages en force” against, all against the speculative dimensions of science, knowledge, and what one might call their imaginary world.<sup>23</sup>

But the ontologies in their claim to mean the process of research and thought are in a strong logical-semantic closure (C. Hewit<sup>24</sup>). It is therefore necessary, from the outset, to be concerned about the risks of autoimmune diseases generated by these approaches: reinforced dogmatisms, reducing boundaries, etc. Indeed, how do ontologies define their relationship to the “outside”? What can be called the “small outside” which is defined by the coupling between the field or discipline and its own milieu, outside of which is also that of the internal heterogeneses associated with heterogeneses straddling borders, and what could be called the “big outside”, that is, what makes a crack in what could be called a chaotic dome (“buckminster fuller”) of knowledge and which allows chaos to enter, based on broader, heterogeneous, unstable disciplines and corpora.

Put another way, is there a possible foreign policy for ontologies?<sup>25</sup>

23 Corbin, H. (2006). *L'Imagination créatrice dans le soufisme d'Ibn 'Arabî*. Entreal's Edition, Paris.

24 Hewitt, C. (2015). *Formalizing common sense reasoning for scalable inconsistency-robust information coordination using Direct Logic™ Reasoning and the Actor Model*. *Inconsistency Robustness*, {hal-01148501v12}.

25 In this general context, partial and relatively fragmented developments are nonetheless sufficiently advanced to converge towards local devices, locally operational infrastructures to change some of the conditions for carrying out research and reflection. Linked data, metadata grammars, the fabrication of ontologies with more or less productive borders, and complex thesauri designed from structured, semi-structured and unstructured data (in the most extensive sense: digital data, texts, hybrid documents, hypermedia), all offer extensive possibilities for search, navigation, association, but also analogical possibilities.

#### P.4.5. Vertigo IEML as “lingua characteristicum universalis”

These problems are even at the source of a project such as Pierre Lévy's, with IEML (Information Economy MetaLanguage). He writes: *I propose the construction of a sixth layer – based on IEML – above the semantic Web. IEML proposes a semantic coordinate system independent of natural languages, capable of addressing an infinite number of different subjects and able to serve as a basis for calculating relationships between concepts. IEML was designed to translate the most diverse ontologies into each other and to interconnect different disciplines and points of view within the same addressing system. The IEML language uses XML and translates ontologies. It is therefore not a competitor to the semantic Web on which it is based, at least from a technical point of view. IEML aims to solve the problems of communication between ontologies and compatibility between local information architectures that the semantic Web has made it possible to pose, but cannot solve at the level where it is located. In short, the IEML language, with the Collective Intelligence Protocol (CIP) that organizes its digital addressing, aims to constitute a new software layer for cyberspace, opening the way to renewed cognitive computing (semantic and pragmatic calculations) as well as new uses of the Internet oriented towards the development of collective intelligence, the distributed management of the information economy and the self-organizing governance of a multifactorial and interdependent human development.*<sup>26</sup>

#### P.4.6. Other approaches and hybridization



However, in the search for “infrastructures for transversality” we must extend our effort towards other approaches – bottom-up – for variable ontologies<sup>27</sup> (“putting variation at the heart of ontologies”?) dominated by statistical methods, so that the inventive, speculative movement can feed into the assemblages of socio-cognitive rhizomes and their interstices through which the movements of research and thought occur.

In short, the place of the chaososes of thought, of the perforated and multifractal associations, of what makes creativity possible, of what makes there be more or less controlled heterogeneses at the heart of the relatively homogeneous pastes of research and its slowdowns (logical instances, combinatorics with their conditions and their transmission systems, their algorithmic worlds).

This is why we believe that more than ever before, we need to understand what should be the layout of the intellectual technologies that we should be aiming for, within the framework of digital memory infrastructures. And, depending on the levels of scale at which practices are deployed, we need to take into account the relationships between metastability(/ies) and instability(/ies), between standards to produce homogeneity and other standards tools to enter once again, or straddle border zones. Between what needs to be synchronized and the diachronization that needs to be maintained. The write-read loops are also powerful because they are constantly producing events in thought or research.

Another conception tries to take into account the communication practices “associated with the conduct of ephemeral interactions between remote users while offering representations, often of a graphic nature, of the social networks thus constituted”. This posture is thus opposed to the logicist approach of the formal semantic Web. It defends a pragmatic conception of

26 Lévy, P. (2006). *IEML : finalités et structure*. Working paper [Online]. Available at: [https://archivesic.ccsd.cnrs.fr/sic\\_00067773](https://archivesic.ccsd.cnrs.fr/sic_00067773). See also: <https://pierrelevyblog.com/tag/ieml/>.

27 We borrow (and transpose) “onto-ethology” from Alliez, E. (1993). *La signature du monde ou qu’est-ce que la philosophie de Deleuze-Guattari*. Éditions du Cerf, Paris. More specifically, see Chapter III, “Onto-ethologies”: “It is up to this non-Galilean science ‘to highlight the chaos in which the brain itself plunges as a subject of knowledge’ (p. 203) emerging in the course of uncertain connections, according to rhizomatic figures giving rise to individuations and bifurcations. So without cognitivism – indeed, ‘cognitivism, as a Galilean science of understanding, encounters exactly the same difficulties as the Galilean

*sciences of nature' (p. 50) – a constant crossover must be made between contemporary images of thought and the state of knowledge about the brain ('as an uncertain nervous system'). So the question becomes that of an ethology of thought capable of following the unknown furrows that every new creation (of concepts, functions, or sensations) traces in the brain: 'new connections, new spawning, new synapses...' (p. 50). Like a material image that the biology of the brain discovers with its own means and which is not without conditioning the onto-ethological nature of the concept". We use "onto-ethology" in a more pragmatic sense.*

information and communication processes, while considering linguistics and semiotics in a more open way.

According to this vision, the web is understood above all as a document management tool facilitating cooperative interpersonal transactions, possibly very asynchronous and distributed between individual and collective actors engaged in exchanges, debates and controversies in a wide variety of fields. According to this vision of the Web, document management modalities and tools must be partly designed by actors engaged in active cooperation. Among these tools, the socio-semantic Web recommends maps of themes or description networks that can be considered as belonging to semiotic ontologies."

In the perspective of the deployment of the new assemblages associated with the creative exploitation of hypertextual logic, we believe that there is thus a great interest in not leaving the field free to the only formalism evoked by T. Berners-Lee's "cake".

#### P.4.7. "There is no path, the path is made by walking"<sup>29</sup>

In search of infometric chains: when maps of the dynamics of science and their networks are not only used to represent, but to open up the movements of reading and pathways, analogies, simulations: "mapping in the reading", "mapping in the writing" in a way. The creation of this type of tool is essential in order to deploy new "transversal" reading configurations, nomadic and percolative readings, new pragmatics internal to reading modes.<sup>30</sup> The texts, the practices of writing and reading of which they are the expression and the expressed, are always labyrinthine machines, with n dimensions, which do not cease to create the conditions of their own dismantling, that is to say of re-writing, re-reading, of interpretative work, which do not cease to open towards

an ever-increasing number of gaps, breakthroughs, virtual paths, of which only some will be actualized.

28 Zacklad, M. (2005). *Introduction aux ontologies sémiotiques dans le Web Socio Sémantique* [Online]. Available at: [http://archivesic.ccsd.cnrs.fr/sic\\_00001479](http://archivesic.ccsd.cnrs.fr/sic_00001479).

29 “You who walk, there is no path, the path is made by walking” – Antonio Machado.

30 Ramsay, S. (2011). *Reading Machines: Toward an Algorithmic Criticism*, University of Illinois, Urbana, Chicago and Springfield.

They are never dense and full blocks, they are like Serpienski’s cube or Menger’s sponge, territories with a potentially infinite surface area, open and connectable to the off-field of each of our worlds, texts that constitute our associated milieu, our eco-cognitive niche. They are hypercomplex and “différentielle”<sup>31</sup> architectures creating the material and ideal conditions for a permanent tension in the midst of cuts, boundaries, border zones, holes and voids. Full and complete positivities of these machines of emptiness, of fractures, of breakdowns, by which the movement of thought is generated, against, wholly against the combinatorics and their constraints, of signs and of traces.

Full and complete positivity of the processes of chaotization from which emerge (sovereign self-organizations), under the conditions of production of these textual machines, local orders, metastable forms of thought. Readingwriting, therefore, as complex art(s) of real and imaginary cartographies for a strange territory that does not pre-exist it, if not as a virtual milieu associated with textualities not yet connected, between the bright and black positivity of writing, of repeated inscriptions and the obscure, sometimes icy and volcanic positivity of the voids, of the twice-punctured spaces that are coupled to them.

This is the work of reading: from an initial linearity or platitude, this act of deciphering, crumpling, twisting, stitching the text to open a living milieu where meaning can unfold? It is by going through it, by mapping it that we actualize it. But while we fold it back on itself, thus producing its relationship to itself, its autonomous life, its semantic aura, we also relate the text to other texts, to other discourses, to images, to affects, to all the fluctuating reserve of desires and signs that constitute us. Here, it is no longer the unity of the text that is at stake, but the construction of the self, a construction always to be redone, unfinished. This time, the text is no longer crumpled, folded into a ball on itself, but cut up, pulverized, distributed, evaluated according to the criteria of a subjectivity that

gives birth to itself. 32

31 *Différance* by Jacques Derrida. See: Derrida, J. (1982) *Margins of Philosophy* (translated by Alan Bass). University of Chicago Press, Chicago, pp. 3–27.

32 Lévy, P. (1998). *Qu'est ce que le virtuel ? La Découverte, Paris.*

This is why, in the face of these processes, one could risk missing the tangle of logics, types of causalities, and couplings, combinatorial and associative games, and differential relationships between full and empty if one did not take the measure of the scale levels of indefinitely open writingreading practices, the complex and shifting granularity of the sets of documents and associated actor-authors, the mapping and orientation aids in the making, the metastability and processuality of hyperdocuments, as well as communities of works.

In this context, the author can only be thought of as a “multiplicity” expression and expressed form of his associated circles of interpretative communities in which he is included or which target him. The various forms of “text mining” applied to Twitter-type exchanges within scientific communities, as well as the so-called Clickstream analyses<sup>33</sup> to follow the more or less erratic movements (including serendipity) of these paths could be partly revealed. This poses a major problem concerning the constitution of these corpuses. The latter open up to what we can call the intimacy of the cerebralities during research work. To what extent is this desirable?

The new writings make increasingly visible the fact that it is (alone or with others) a collective arrangement of enunciation, a milieu in the midst of other collective assemblages, crossing them and passing through them.

Partial inscription, then, of “that”, that is, of this collective arrangement, of this collective memory in fact, distributed according to specific diagrams, heterogeneous, hybrid networks, but also of this complex attractor of traces, conceptual or other trajectories, intertwined, that is the text (in these two senses), an attractor negotiating vis-à-vis others, its power to capture and translate moving semiotics.

## P.5. Uncertain area

Thought then unfolds within and from this uncertain zone formed at the junction of subduction and convection movements generated by the couplings between the productivity of neural combinatorial constraints and the productivity of

combinatorial constraints linked to writing modes,

33 Bollen, J., Van de Sompel, H., Hagberg, A., Bettencourt, L., Chute, R., Rodriguez, M.A., Balakireva, L. (2009). *Clickstream data yields high-resolution maps of science*. *PLoS ONE*,4(3): e4803 [Online]. Available at: <https://doi.org/10.1371/journal.pone.0004803>.

## P.6. Against the smothering paste of the homogeneous

Movements of subduction by which the chaotic combinations of the most frail thoughts, the most uncertain trajectories, the most subtle ratios of speed and slowness will unfold in a black alchemy. Movements of convection by which, against and entirely against the materiality of traces, their repetition, their ordered combinations, will unfold cuts, faults, fractures, crevices, lines of leakage and between them links, connections, bridges, etc. Against the suffocating paste of homogeneity, against the anesthetizing ether of chaos, all determination is negation.

In this context, questions and problems of the morphogenesis of meaning, processes of inscription, repetition, transmission, translation, non-essentialist models of communication, criticism of traditional patterns of information theory (driven by second-generation cybernetics (autopoiesis), and new conceptions of biology) unfold “astride” disciplinary boundaries.

And the translation migration, the percolation of theoretical concepts and tools, which is in no way a transgression (i.e. an installation in a radically new afterlife, or the illegitimate overcoming of norm(s)), takes place in a stronger and more creative way in very varied regimes of discourse and writing.

What seems most obvious is, first of all, the awareness of having to think differently about the question of the collective, of giving it a preponderant, central place, whatever the level of scale at which we consider the phenomena.

Secondly, it is the introduction at the heart of heterogeneous multiplicities, as conditions for their more or less stable emergence, of a great variety of types of “couplings” allowing the permanent participation of collective, hybrid phenomena to be taken into account, in the course of which numerous micro-events, micro-actants, and unrelated mediations constantly occur in a more or less disordered manner, converging and diverging in the course of complex processes of actualization and differentiation.

Thirdly, it is the attempt to think about the interlocking of these couplings, the ascending and descending modes and the various modes of processes that result from them, with regimes of redundancy and specific creative alteration. Fourthly, it is the effort to extend these requirements and axioms into an ever-growing number of phenomena and (research) processes conceived as incomplete studies in the production<sup>34</sup>process.

It is a question of apprehending the field of dynamics and communicational informational devices, as a procedural field, always open, where the notions of stability, morphogenetic metastability take the place of essences. From this point of view, all the inherited and still dominant interactionist models based on large sharing and monovalent ontologies are more and more strongly contested.

Numerous associations are thus involved in this vast hyper-pragmatics within which the multiplicity of communicational practices and devices leads to singular instantiations of this generalized hyperpragmatics according to the actors, mediations and levels of scales. These contributions, which are not the only ones, are far from being negligible in order to apprehend the current evolutions of the digital encyclopedic project. This is a set of reasons why the characters of the digital document must be “hollowed out”, since we consider the sets of digital memories associated in a hypertextual-type network, and we want to understand the modes of exploitation in the making.

### P.6.1. Onto-ethologies and emergence

We have just explained in part the current state in the universe of the digital memories of science, of the movement of knowledge through more or less complex intersections. This setting in motion involves metalanguage assemblages or a geographic grammar allowing navigation in the heterogeneous space of ontologies or “onto-ethologies” that describe the specific knowledge that constitutes the general and processual scientific knowledge available on the Web, in order to establish new connections. It seems preferable, rather than putting all the weight on modeling in the form of ontologies, to access the definition of “onto-ethologies” because

they express the socio-cognitive structures<sup>35</sup> carried by the corpuses, translations and processes at work at the very heart of the communities.

The “structuring” (formalization) of texts and documents, as well as their filtering, must be considered, in their technical aspects, under a double constraint. On the one hand, it is necessary to be able to deal with populations of digital texts that can be permanently re-composed and transformed; on the other hand, it is necessary to produce tools for the intellectual exploration and exploitation of these populations, tools for the representation of their constitutive processualities that favor, as we have already said, analogical, associationist and combinatorial capacities, according to multiple levels of organization.

## P.7. “Perplication” in knowledge

In a context of increased fragmentation and differentiation of sciences (and knowledge), they are at the same time and necessarily “crossing” each other relatively and are in a kind of “perplication”<sup>36</sup> meaning they must be increasingly considered as more or less transitional states, metastable

<sup>35</sup> Callon, D.M., Rip, A., Law, J. (1986). *Mapping the Dynamics of Science and Technology, Sociology of Science in the Real World*. Palgrave Macmillan, UK; Mutschke, P. and Haase, A.Q. (2001). *Collaboration and cognitive structures in social science research fields. Towards socio-cognitive analysis in information systems*. *Scientometrics*, 52(3), 487502 [Online]. Available at: doi:10.1023/A:1014256102041.

Mutschke, P. and Haase, A.Q. (2011). *Science models as value-added services for scholarly information systems*. *Scientometrics*, 89(1), 34964 [Online]. Available at: doi:10.1007/s11192-011-0430-x.

More recently, in the continuation of the sociology of Latourian sciences, see Venturini, T. (2012). *Great Expectations méthodes quali-quantitative et analyse des réseaux sociaux*. In *L'ère post-média. Humanités digitales et cultures numériques*, Fourmentraux, J-P. (ed.). Hermann, Paris, pp. 39–51; Jacomy, M., Girard, P., Ooghe-Tabanou, B., Venturini, T. (2016). *Hyphe, a curation-oriented approach to web crawling for the social sciences*, *International AAAI Conference on Web and Social Media*. Cologne, Germany, al-01293078v1.

Wyatt, S., Milojević, S., Park, H., Leydesdorff, L. (2015). *Quantitative and Qualitative STS: The intellectual and practical contributions of scientometrics*. SSRN Scholarly Paper, ID

2588336, *Social Science Research Network [Online]*. Available at: [papers.ssrn.com](http://papers.ssrn.com), doi:10.2139/ssrn.2588336.

36 “Perplication”, see Deleuze, G. (1968). *Différence et Répétition*. Presses universitaires de France Paris. (Perplication, in the sense that, being complicated one within the other, all the elements return through all the others, and all the others through each one).

problem organizations, with their multiplicities, their recursivities, and their digital empires, their methods, their algorithms and models, their specific zones of construction of evidence, evidence in turn enveloped by other zones, those of indeterminacy, through which the “futures” propagate and which feed the analogical liberties of the interstices that research (to varying degrees) and thought carry, interstices immanent to their trials.

## P.8. Doxic tensions in fragmented Encyclopedism

If we quickly summarize the main questions raised by the current modes of production, circulation and exploitation of knowledge (scientific or not), the first concerns the tension between stable knowledge and metastable knowledge – even unstable knowledge when it emerges far from equilibrium, in areas of dissensus and indeterminacy. The second concerns the variation in differential relationships between regimes for evaluating scientific knowledge, regimes for legitimizing knowledge in general, and thus the management of points of view. The third question concerns the management-representation of processes and morphogenesis that express dynamics, “conceptual ethologies” and collective assemblages of denunciation, with the unprecedented multiplication of recursive loops, forming the associated, more or less shifting, milieu of this knowledge. This is one of the reasons why the question of controversies in general and in the scientific and socio-technical fields in particular has taken on such great importance. Last but not least, the last point (which we have already highlighted) concerns the writing technologies (including interfaces) involved in socio-cognitive innovation.

### P.8.1. Networks in the digital milieu

In the same way that intelligence is “always engineered-already”<sup>37</sup> and collective, we can also say that knowledge is “always engineered-already” and collective. There is a great variety of intelligences, a great variety of knowledge.



The “milieus”<sup>38</sup> from which knowledge unfolds and lives have profoundly evolved over the last few centuries. We have said that these milieus,

*37 See, among others, Bernard Stiegler, Bruno Latour and Edwin Hutchins.*

*38 In the sense of Gilbert Simondon.*

in as much as they are collective assemblages of enunciation coupled with collective equipment for the subjectivation<sup>39</sup> of concrete assemblages that are necessarily heterogeneous, comprise an ever-increasing number of writing systems, modes of storage, boundary objects, modes of transmission and repetition, and expression substances, and involve a large number of methodologies and algorithms.<sup>40</sup>

## P.8.2. Figures of the network

And the figures of the Network, at the heart of fragmented encyclopedism, are closely related to the types of recursive loops, interface-synapses proposed. Proliferation therefore of the figure of the network, of the network as a concept, of networks as devices, as territories, as organizational modes, producing knowledge. And of networks, we are constantly making maps, making graphs. There are nodes and edges. We measure the links, we study the connectivity, stability, metastability, recursivity, resistance or, on the contrary, the fragility of knowledge networks. We are still measuring their performativity. They are distributed according to a complex geology.

We are faced with very varied and hybrid forms of knowledge networks. These forms are a function of the types of actors that constitute them. They are expressed between two modes, one dominantly centered, hierarchically distributed, fractal or even multifractal (at the organizational and idea-based ideological level, at the level of norms, rules, routines, interfaces and border objects, immanent to production processes) and the other dominantly acentered, distributed, multifractal.<sup>41</sup>

*39 Guattari, F. (1989). Cartographies Schizoanalytiques. Éditions Galilée, Paris. 40Carmes, M. and Noyer, J.-M. (2014). L'irrésistible montée de l'algorithmique. Méthodes et concepts en SHS, Les Cahiers du numérique, 10, 63–102.*

*41 In a famous article, Pierre Rosenthal and Jean Petitot highlighted the importance of carefully considering the language of acentrism. “It would be simplistic to think that the*

*hierarchical concepts imposed by those who exercise power really correspond to the nature of things. Biological organisms, animal societies, as we say human 'hordes' of all kinds, reveal, on closer inspection, centres almost everywhere, or even an absence of centre. The history of artificial organisms is also revealing. Driven by the ambient myth of hierarchism, the first architects of electronic machines gave all power to a single central organ. But ironically, this central organ very quickly became congested, and we began to dream of a computing factory that was acentric, a bit like the brain, and that would carry out numerous operations in parallel, spread over a vast area and according to local initiatives, the coordination of which has yet to be conceived." "It is undeniable, however, that it is customary to consider the notion of centralization as a kind of obligatory correlation to that of system or organization, and this custom no doubt stems from the difficulty we have in conceiving what regulation is to ensure the coherence, the stability of a social form. Admitting the primacy of hierarchical structures amounts to privileging tree-like structures, to considering that the circulation of information must unfold like a river (against the current for directive information)." Rosenthal, P. and Petitot, J. (1974). Automates asocial et systèmes acentrés. Communications,22.*

But, whatever the mode, associated with the technopolitical dimensions of the protocols, the question of interfaces, of connectors, the software question haunts (or should haunt) the encyclopedic outburst. In fact, the network assemblages that we use today to produce knowledge are organized (as never before) in strata, levels, and intertwined territories, these levels and territories being connected by multiple paths, more or less numerous recursive loops based on software, more or less sophisticated intellectual techniques, and new cartographic practices.

## P.9. Machine interfaces

And the possibility of making the most of the complexity of these collectives depends on the ability to develop high levels of description combined with combinatorics and, to a certain extent, automated writings. All this is based on the dispersion (according to various techno-political and legal criteria) of machine interfaces equipped with filtering, indexing, search, contextualization, mapping, annotation systems, data processing software and efficient hypermedia scripts. In the framework of networks and collectives that produce knowledge, it is less the network form that is strategic than those of protocols and those of the "machinic interfaces" between hypertextual memories between the actors involved in the ultimate recursive loops.

### P.9.1. Variations in speed and slowness among encyclopedic pragmatics

The variation of the speed and slowness ratios is decisive here. This reserve of “variations” through the differentiation of textualities as encoding and decoding spaces, through the differentiation of the relationships between order and “random”, resonates with the variation in the relationships between synchronization constraints and guarantees that diachronization processes will remain open. This applies to all collective assemblages in general, and a fortiori to collective assemblages of enunciations<sup>42</sup> that produce and circulate knowledge. Writings, routines, memories, synchronization, resonance, convergence, coordination have always been at the heart of the functioning of complex collective entities and the work process, including the intellectual work process. The relationships of speed and slowness are at the heart of multiple analogical processes. They also traverse the entire system of relations between the various types of retentions.<sup>43</sup>

### P.10. Knowledge, thought in the encyclopedism in splintered form

At this point, it is necessary to clarify what we mean by Knowledge, which should not be confused with Thought. Their differences and relationships again have to do with speed and slowness, with acceleration and deceleration. We refer here to the dazzling pages of *What is Philosophy?*<sup>44</sup>

*42 In the sense of Deleuze and Guattari.*

*43 We choose here the presentation that Bernard Stiegler gives in: Stiegler, B. (2004). De la misère symbolique, 1, L'époque hyperindustrielle, Éditions Galilée, Paris: “The I is also a consciousness consisting of a flow of primary retention (...) what the consciousness retains in the now of the flow in which it consists ... my conscious life consists essentially of such retentions. (...) Now these retentions are selections ... you don't retain everything that can be retained.” (Note by Bernard Stiegler: What can be retained as relations: primary retentions are in effect relations). “These selections are made through filters, which are the secondary retentions that your memory retains and that constitute your experience. And I posit that the life of consciousness consists of such assemblages of primary retentions, noted R1, filtered by secondary retentions, noted R2, while the ratios of primary and secondary retentions are overdetermined by what I call tertiary retentions, R3 – these R3s relating as much to technical individuation as to the process of grammatization that runs through it. (...) One should obviously not believe that such a flow is a regular line. It is less a line than a fabric or a weft, what I have called the fabric of my time, such as patterns and designs, where primary*

*retention is also the recurrence, the return, the ritornello and the revival of that which insists. In the end, the flow is a whirling spiral where events can occur". See also from another point of view, La ritournelle, Deleuze, G. and Guattari, F. (1981). Mille Plateaux, Éditions de Minuit, London.*

“Thought claims ‘only’ the movement that can be carried to infinity. What thought claims in law, what it selects, is infinite movement or the movement of infinity. It is that movement which constitutes the image of thought”. And in a certain way, to think is “to give consistency without losing anything of the infinite, it is very different from the problem of science, which seeks to give references to chaos, on condition that it renounces infinite movement and speed.”

Thought is not arborescent, it is rather of rhizomatic type. But it is constantly unfolding from narrative devices and writings (not exclusively linguistic) of machinic assemblage that slow it down and stabilize it, and which are more or less complex hybrids of tree and rhizome, under very heterogeneous combinatorics, combinatorics among which formal thought is a powerful special case.

It is thus deployed against, but also everything against it and can be defined as the permanent reconquest of new gears and slowness, of infinite movement, of the highest speeds. Reconquest “in the wild”, that is to say, in the interstices that are both proposed to it and that it also creates, through permanent coups de force against the slowing down of the production of knowledge and know-how. But to what extent do the emerging fashions accept, or partially allow, for increased resonance with the infinite movements of thought is a very difficult, perhaps meaningless question.

However, we continue to think that more than ever we must question the effects of variations in modes of PCC (Production, Circulation, Consumption) of knowledge, of new relationships of speed and slowness between memories, reading and writing practices, of new relationships between gaps, voids and fills, cuts and links in the digital context, on the infinite speeds that concepts aim at, on everything that happens at or from the boundaries of subcognition<sup>45</sup> and chaotic processes.<sup>46</sup>

44 *“The plan of immanence is not a concept that is thought out or conceivable, but the image of thought, the image it gives itself of what it means to think, to make use of thought, to orient oneself in thought. It is not a method, because any method eventually concerns concepts and presupposes such an image. Nor is it knowledge about the brain and how it works (...) nor is it the opinion that one has of thinking, of these forms of these goals and these means at such and such a time.” Deleuze, G. and Guattari, F. (1991). Qu’est ce que la philosophie ? Éditions de Minuit, Paris.*

## P.11. What criteriology for encyclopedic writings?

Writings are evaluated and imposed, among other things, on the basis of what they open up in terms of creativity and invention, of whether they carry new combinatorial modes like so many possible hermeneutics. If one sought to establish a certain number of requirements or demands from which one could evaluate the contribution of new intellectual technologies, for fragmented encyclopedism, starting from the renewed tension between a tree-like, essentialist and rhizomatic and processual vision of the pragmatics which produce knowledge, would be of the greatest interest.

The ideal and material assemblages that produce knowledge must favor the exercise of a certain number of fundamental cognitive practices, and thus reflexivity and critical work on the conceptual frames of reference that determine the structural conditions of visibility of sciences, and their strength of intelligibility. In our opinion, a certain number of points, processes and constraints on which the new digital technologies are likely to influence should be examined in a systematic way.

A number of points have already been partly mentioned. First of all the combinatorial constraints, the social or collective transmissions of these constraints, the metastability of these constraints and the expression substances on which they operate. These constraints are more or less numerous depending on the semiotics considered. Linked to the previous point is the capacity to increase, to multiply the number of relationships and simultaneously the growth of zones of indeterminacy and interstices. This is a delicate point, since from certain thresholds and under conditions of hyperconnectivity, there can be tension, even a double constraint. Certainly the increase of associative, analogical

45 Hofstadter, D. (1979). *Gödel, Escher, Bach: An Eternal Golden Braid*. Basic Books, New York.

46 Deleuze, G. and Guattari, F. (1991). *Qu'est ce que la philosophie ?* Éditions de Minuit, Paris; and Guattari, F. (1992). *Chaosmose*. Éditions Galilée, Paris.

capacities is central and the possibilities of establishing connections between data, problems, models and the heterogeneity of these connections are central. But in order to prevent the densification of networks of relations, connections, etc. from turning into a more or less homogeneous and suffocating paste, interfaces, black boxes, self-simplifying processes are needed that create holes, leakage lines, interstices that permanently open up the vacuum. It is necessary to be careful that the emerging writings and the automation of certain socio-cognitive tasks do not alter the contingency, the indeterminism of languages, the conditionality, the slippage of descriptions, etc.

Then the question of analogy (of its future) is reworked again, as well as abduction. How do new intellectual technologies influence analogical power, the ability, for example, to shift abstract components of a description from one domain to another? How do they affect the centrality of slidability, to follow here Douglas Hofstadter?<sup>47</sup> At the individual and collective level, what is the impact on the establishment of connections “that are made through the tape, without having to do anything with causality”, connections that “are just as essential in that they allow us to put facts into perspective – to compare what actually exists with what, according to our way of looking at things, might have happened or might even happen”?<sup>48</sup>

How do they affect the modes of repetition, synchronization and diachronization at work within knowledge production and circulation devices at any level of scale? How does this work the various ways of

<sup>47</sup>Hofstadter, D. (1979). *Gödel, Escher, Bach: An Eternal Golden Braid*, Basic Books, New York; and Hofstadter, D. (1995). *Fluid Concepts and Creative Analogies: Computer Models of the Fundamental Mechanisms of Thought*. Basic Books, New York. See also Hofstadter, D. (1988). *Ma Thémagie*. Interéditions, Paris. This central characteristic that is slippability is also linked to modes of writing, to collective assemblages that convoke “multiplicities of

*individuals, technological, mechanical, economic multiplicities.” Slippability has to do with the constitutions of subjectivities and is thus situated from the outset, like them, on a transindividual (Guattari), pre-individual (Simondon) scale.*

*48 The importance now given to the notion of serendipity is the expression, the symptom that the change of scale also affects relationships, and there is a great temptation to consider cognitive ecology as a vast arrangement of interconnected graphs. It is also an indication that while the probability of establishing connections or networks of connections conducive to creativity seems to have increased, making serendipity (in all its forms) more central requires the development of more elaborate intellectual technologies. This is particularly visible in the case of the new generation of search engines, engines that offer open information search logics, proposing more intuitive search and association practices. These approaches, based on the production of new maps and the complex processing of documentary corpuses, offer renewed conditions for serendipity, adapted to changes in scale.*

introducing differences in repetition? How do new intellectual technologies increase the quality of description of collective assemblages of enunciation (which are themselves immanent to concrete machinic assemblages)? In this case, what are the tools that promote the emergence of new cartographic practices and with them new socio-cognitive territories? In the world of “Encyclopedism in fragments”, taking into account the changes in documentary scales associated with a multifractal vision of knowledge is decisive, if only for the conception of a political economy of reflexivity. Incidentally, this also applies to new organizational forms, for example, to the question of mastering information and communication systems in companies and administrations, where the constraint of “mapping in the making” is very strong.

In the universe of digital memories, Encyclopedism then takes the form of a metalanguage allowing navigation in the heterogeneous space of ontologies or “onto-ethologies”<sup>49</sup> which describe the specific knowledge constituting the general and processual scientific knowledge available on the Web. For, rather than ontologies, it is necessary to be able to access the definition of “onto-ethologies”: they express the socio-cognitive structures carried by the corpuses, translations and processualities at work at the very heart of communities.

## P.12. Boundaries in fragmented encyclopedism: dissensus

In this general context, the question of boundaries is brought to a new critical point, as they must be considered as fluctuating zones or crossroads of problem

or concept trajectories. By allowing the partial exhibition of the procedural dimensions of the documents resulting from the research, the new editorial devices should, as we have said, be able to make it possible to apprehend these border zones. From this point of view, the representation that must be sought is that of these morphogeneses and must express the local dynamics and concepts that constitute the associated, more or less moving, milieu of the knowledge represented by the documents resulting from the research. The constitution of fields of knowledge, disciplines and research communities is in fact progressively revealed through the increasing differentiation of the types of documents that circulate. It should be noted

*49 We borrow (and transpose) "onto-ethology" from Alliez, É. (1993). La signature du monde ou qu'est-ce que la philosophie de Deleuze-Guattari. Éditions du Cerf, Paris*

that the three expressions used are not equivalent and cover different assemblages. Their rules of operation and their processes of constitution and standardization, as well as the ways in which these boundaries are made and constituted as subjects, are variable. This is why each scientific assemblage, in the form of a discipline, is intended to be reflexive at the very moment when it attempts to theorize (and politicize) the question of boundaries more, the latter being seen as a device for filtering and controlling knowledge, with the consequence of possible drifts that could be described as autoimmune (scholasticism, dogmatism, lack of reflexivity, etc.). However, the very conditions of production of these frontiers lead them to take on processual aspects, likely to give rise to increasingly heterogeneous assemblages.

**P.13. Borders being everywhere, the critical scientific work consists in making them evolve towards zones of transformation and creation**

Under the pressure of new modes of writing and digital memories, these border zones are the result of complex and permanent movements of territorialization-deterritorialization, decontextualization-recontextualization. Research work (and thinking) based on these zones must take into account the fact that these zones, with their internal and external margins, their dispersion, are gradually becoming valid for themselves

To access these areas, taking into account the increasingly fractal nature of the research fronts, the highlighting and clearer representation of dissensus appears



to be one of the challenges of the new encyclopedism. These frontier zones end up acquiring a relative autonomy that allows them to enter into combinatorial relationships with new or renewed “eco-cognitive assemblages”. No longer belonging to what they separate, they gradually dig gaps that will open the way to new conceptual and scientific imaginations.

The point here is not so much to take the measure of the differences that may arise between several disciplines that are beginning to reflect on each other, but rather of the more or less labile research fronts, which develop when “one realizes that it has to solve for its own account and with its own means a problem similar to the one that arises in another”. 50

*50 It is then that 50 Deleuze, G. (2003). Deux régimes de fous. Éditions de Minuit, Paris.*

fields of knowledge and communities confront each other in the course of risk-taking and struggles that are the occasion to test the resistance of disciplinary assemblages. These conflicts reveal interdisciplinary uncertainties and openings that emerge from the internal pragmatics that make up these fields, disciplines and communities. The new encyclopedic modes must therefore allow us to inhabit the assemblages where conceptual or scientific confrontations are created and developed, in a cultural universe where phenomena of divergent actualization will certainly proliferate.

This is why we are advocating that new editorial functions be associated with digital editorial modes. In our view, the essential functions are precisely those that make it possible to map the socio-cognitive dynamics, areas of controversy and transversal processes that operate at the heart of scientific activity.

#### P.14. Fragmented encyclopedism: a milieu for controversy?

In the framework that is ours, giving the means to “inhabit” the co-existence of points of view and the work of controversies is therefore an important task.

What does it mean to describe-study a controversy? A controversy is expressed in very different modes and narratives and through different actors. It is rarely symmetrical (i.e. the actors or groups of actors that feed it are not only heterogeneous, but also occupy positions of strength that can sometimes be very

variable. This is because of the very networks of actors who are allied and converge for this or that position, discourse, etc.). Describing a controversy does not consist, therefore, only in identifying the different positions of the actors (from their own discourses), but in describing the forces that precisely give strength to their own narratives and their arguments, to the way they fabricate evidence, to the way they make alliances that are sometimes if not unnatural, then complex, as the good anthropologist Machiavelli once taught us, as the good ethnologist of science Latour has shown us in his now canonical analysis of the Pouchet/Pasteur controversy.

To describe a controversy is therefore to describe in a crude way, to describe the alliances and chains of actors that give strength to the statements of one and the other. It is not just a matter of naming points of disagreement and agreement, but of showing the forces that sustain and fabricate them. Describing a controversy therefore implies being the narrator and cartographer of many narratives and discourses; being able to make the more or less long chains of “translation” appear, which will come to clash and thus intertwine and constitute the place or places where the “dossoï logoi” will try to take over or will be able to negotiate. Controversies manifest this massive fact that discourses and narratives are bearers (ultimately and primarily) of disputes and conflicts.

Controversy is on the side of the Agon, even when policed in the garb of science, “reasons and interests” clash. To describe a controversy is to describe each actor or network of actors as a heterogeneous set of forces going to battle against another actor or set of actors with other forces.

This is why the constitution of corpora is central. These corpuses must be large and they must be made up of all the documents, or in any case the greatest number of documents left by the actors in the course of their practices. All these documents are at the same time behavioral traces, traces of the trajectories and transformations of the actors, semantic traces, semantic social milieus, traces of the narrative genres, semiotics used, etc. all of which can be found in the corpus. Corpus analyses for controversies thus consist in producing cartographies to express the morphology of interactions between actors (or actors in the Latvian sense) and thus to qualify the interacting actors, each of the actors or groups of actors being himself at the crossing of the more or less complex assemblages of

his own networks. The tension in the controversy leads to hybridizations, transforming the positions of each (in part) within the controversy.

There are thus two kinds of transformations (or heterogeneses) in the course of a controversy: (1) those that affect the operational closure of a camp (of an actor or group of actors), of a field on the occasion of events that activate this or that state in themselves; and (2) those that express the general deformation of the field of confrontation in which disputes are expressed.

To make the map of a controversy is therefore to play on the modes of analysis, the types of traces and scales and the regular if not permanent redefinition of black boxes, and thus make several maps. To get to the heart of the matter, the “essentialist” and molar map of the actors identified in the controversy, the maps of the network(s) and internal dynamics, etc. that constitute the actors, the maps of the border zones and of the hybridizations that may or may not appear during the controversies.

Moreover, there are two more ways of conceiving these maps: either as more or less static representations of these dynamic interactions and transformations, or as intelligibility and filtering devices giving access to forces and actors as they are expressed, for example, through more or less heterogeneous documents, showing the constituent networks of evidence and types of discourse. To put it another way, maps to enable new connections to be made within and between assemblages in a state of controversy.

To describe a controversy is therefore to show the more or less complex networks (with their relative deformation) of actors who confront each other and form the controversy itself. Cartography is therefore an active element in controversies: whoever makes and imposes the best maps deforms the controversy to his or her advantage. What one seeks to gain, when one decides to report on a controversy, to provide various modes of intelligibility, is a means of understanding how each actor in a controversy can and does transform himself on the basis of what his milieu (which on the one hand is made up of the other competing or conflicting actors) makes of him, and in doing so, transform to a greater or lesser extent the assemblage of the controversy itself. The methods of datamining applied to controversies must aim at the heterogeneous co-differentiation of the actors and thus make visible the process of

individuation of the controversy itself, that is the “controversial co-construction” of knowledge (especially scientific knowledge), in order to give access to the diversity of points of view and to show the necessity of conflicts.

#### P.14.1. From encyclopedism in fragments to encyclopedism of flows and whirlpools

We look from the inside of the world at fragments of the topological brain-world conversion whose documentary universes are the expression and act of expressing, under the variable conditions of multiple writing regimes and expression substances, of cerebralities in increasingly spider-like and plastic networks. And we look at the interior of the world through “singularizing points of view” that we are able to extract from the encyclopedic hubbub, from the swarming of Data (of the various types of Data in action).

We fold and unfold, we fold and unfold ourselves in what is ultimately only a gigantic digital veil ensuring the manifestation both near and far of an endless reserve of the virtual, and which never ceases to engage itself and engage us in processes of actualization in the service of our projected fabulations. These commitments are actualized under the power of the scriptures and their substances of expression, in immensely numerous forms, bearers of the possible, always opening in a singular way to the awareness of an endless finality in the play of the conditions of Creativity. Encyclopedism can then be seen as a “Middle Kingdom” between Virtual and Actual,<sup>51</sup> a world of becoming and heterogeneity. It is a place of spiraling and whirling practices, a place and theater of cognitive operations for events and collections of singularities.

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