

# Die Aufklärung in the Age of Philosophical Engineering

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**Abstract.** Has today's digital society succeeded in becoming mature? If not, how might a new Enlightenment philosophy and practice for the digital age be constructed that could hope to address this situation? Such a philosophy must take into account the irreducibly ambivalent, 'pharmacological' character of all technics and therefore all grammatisation and tertiary retention, and would thus be a philosophy not only of lights but of shadows. Grammatization is the process whereby fluxes or flows are made discrete; tertiary retention is the result of the spatialisation in which grammatisation consists, a process that began thirty thousand years ago. The relation between minds is co-ordinated via transindividuation, and transindividuation occurs according to conditions that are overdetermined by the characteristics of grammatisation. Whereas for several thousand years this resulted in the constitution of 'reading brains', today the conditions of knowledge and transindividuation result in a passage to the 'digital brain'. For this reason, the attempt to understand the material or hyper-material condition of knowledge must be placed at the heart of a new discipline of 'digital studies'. The pharmacological question raised by the passage from the reading to the digital brain is that of knowing what of the former must be preserved in the latter, and how this could be achieved. This means developing a 'general organology' through which the social, neurological and technical organs, and the way these condition the materialisation of thought, can be understood. Integral to such an organology must be consideration of the way in which neurological automatisms are exploited by technological automatisms, an exploitation that is destructive of what Plato called thinking for oneself. The task of philosophical engineering today should be to prevent this short-circuit of the psychosomatic and social organological layers, a task that implies the need for a thoroughgoing reinvention of social and educational organisations.

**Keywords.** Enlightenment, digitalisation, Nicholas Carr, philosophical engineering, Tim Berners-Lee, Michel Foucault, Walter Ong, Maryanne Wolf

## Introduction

Public access to the web is twenty years old. Through it, digital society has developed and spread throughout the entire world. But has this society become *mündig*, that is, *mature*, in Immanuel Kant's sense, when he used this term to define the age of Enlightenment as an *exit from minority*, from *Unmündigkeit* [1]? Certainly not: contemporary society seems, on the contrary, to have become profoundly regressive. Mental disorders, as well as environmental, economic, political and military problems, do not cease to proliferate and increase. And while traceability continues to expand, it seems it is mainly being used for behaviour profiling, and thus to increase the heteronomy of individuals rather than their autonomy.

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There are many ways in which digitalisation clearly holds promise, and socialising digitalisation in a reasoned and resolute way is (I am convinced of this) absolutely imperative if the world is to escape from the impasse in which the obsolete consumerist industrial model finds itself. But if this is the case, then this socialisation in turn requires the creation and negotiation of a *new legal framework* that itself presupposes the formation of new ‘Enlightenments’.

For this reason, it pleases me greatly that Neelie Kroes has called for a new Enlightenment philosophy for the digital age, just as Tim Berners-Lee and Harry Halpin have argued [2], in dialogue with the contrasting position of Vint Cerf (who developed the TCP-IP protocol) [3], that internet access must become a universal right. But what exactly does *access* mean here? Or again: what *type of access* should we claim will bring light or enlightenment, rather than darkness or shadow? And under what conditions will such access prove *beneficial* for individuals and the societies in which they live?

The challenge we face today is to respond to these questions, and in the first place to pose them in the correct terms. And to try to take the measure of these questions, we must see how Nicholas Carr, for example, in his book *The Shallows: What the Internet is Doing to Our Brains* [4], outlines the context that constitutes the theme of this global summit on the web.

The growth of digitalisation since 1992 has brought with it a genuine chain reaction that has transformed social life at its most public level, and the life of the psychic<sup>2</sup> individual at its most intimate level. *The Shallows* bears witness to the immense distress that has accompanied this meteoric rise – which increasingly seems to resemble a tsunami – and that has, by his own account, significantly disrupted the mental capacities of Nicholas Carr himself. And this tsunami threatens to wipe out all the inherited structures of civilisation on every continent, which may in turn produce immense disillusionment and tremendous disaffection [5].

The negativity of this new state of affairs continues to gain ground. Faced with this, we must assert the necessity and the positivity of a new state of law. And this means turning to the question of the relationship between technology and law. What we refer to as the law is in fact founded on writing. Now, digital technology constitutes the latest stage of writing. And just as in the age of Socrates writing was a *pharmakon*,<sup>3</sup> so too, today, we can say the same about the digital: it can lead either to the destruction of the mind or to its rebirth; to the destruction of spirit or to its renaissance.<sup>4</sup>

I would like here to elaborate the following points:

1. the constitution of a new state of law, a new rule of law, founded on digital writing, in fact presupposes a new age of Enlightenment(s);
2. these new Enlightenments must, however, conduct a critique of the limits of the philosophy of the *Aufklärung* itself, notably in relation to the questions

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<sup>2</sup> *Translator's note:* ‘Psychic’ is used here in Gilbert Simondon’s sense of ‘psychic and collective individuation’. See Gilbert Simondon, *L’individuation psychique et collective* (Paris: Aubier, 2007).

<sup>3</sup> *Translator's note:* In ancient Greek, *pharmakon* refers both to poison and remedy (and relates to the *pharmakos*, the scapegoat). Fundamental to the author’s position is that *all* forms of technics and technology possess this ambivalent, ‘pharmacological’ character, as he explains. Also important to his use of these terms is Jacques Derrida’s treatment of this theme in ‘Plato’s Pharmacy’, in *Dissemination* (London: Athlone, 1981), pp. 61–171.

<sup>4</sup> *Translator's note:* it should at all times be borne in mind that the French word *esprit* means both mind and spirit.

raised by ‘philosophical engineering’,<sup>5</sup> developed at W3C at the instigation of Tim Berners-Lee;

3. the new philosophy that must arise from the worldwide experience of the web, and more generally of the digital, across all cultures, an experience that is in this sense universal – this new philosophy, these new *Enlightenments*, cannot merely be that of digital *lights*: it must be a *philosophy of shadows* (and maybe of *shallows*, in Nicholas Carr’s terms), of the shadows that inevitably accompany all light.

We can no longer ignore the *irreducibly* ‘pharmacological’ – that is, ambivalent – character of writing, whether alphabetical or digital, etched in stone or inscribed on paper, or in silicon, or on screens of digital light. Writing, and more precisely printed writing, is the condition of (the) ‘enlightenment’, and it is for this reason that Kant says that he is addressing the ‘reading public’ [6]. But there is never light without shadow. And it is for this reason that Theodor Adorno and Max Horkheimer were able to perceive, in 1944, in the rationalisation of the world, the very opposite of reason or the *Aufklärung* [7].

This irreducible ambivalence applies to technology in general, and is what the twenty-first century, like Nicholas Carr, discovers on a daily basis through a thousand experiences of the limits and ambiguities of technological progress. But this *irreducible* ambivalence is what neither modern philosophy, nor ancient philosophy, have yet proven themselves capable of thinking. And faced with the new challenges of the digital world, this is what it is today *imperative* for us to understand: it is with this ambivalence that we must learn to think, and to live, differently.

## 1.

Unlike Tim Berners-Lee and Harry Halpin, Vint Cerf argues that internet access cannot be subject to legal regulation because digital technology is an artefact that can change – and that never stops changing. But was not writing itself, which in Greece lay at the origin of law as well as of geometrical thinking, equally artefactual? It is true that writing seems to have taken a stable, universal form as alphabetical writing, and it seems as though, as such, through this writing and through its apparent stability, it is the universal structures of language and, beyond language, the universal structures of thought, that have been discovered. This is how things may seem – but they are perhaps not quite so clear.

And herein lies what is truly at stake in the debate with that philosophy that we have inherited in the age of generalised digitalisation: what has been the role of writing and, beyond that, of technics, in the constitution of thought, and especially of that thought which was universalised through the Enlightenment and through its emancipatory discourse? The development of the web has made such a debate unavoidable – and it is a debate that I argue must be held in the framework of digital studies, and it is, within that framework, the fundamental question.

Tim Berners-Lee and Harry Halpin propose a universal right to internet access, and that this right should be embodied in a philosophy designed to conceptually underpin

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<sup>5</sup> See Brian Runciman, interview with Tim Berners-Lee, ‘Isn’t it Semantic?’ (2006), available at: <http://www.bcs.org/content/conWebDoc/3337>. And see Harry Halpin and Alexandre Monnin (eds.), *Philosophical Engineering: Toward a Philosophy of the Web* (forthcoming 2013).

the web, a philosophy to which W3C would give rise. But if this is what Berners-Lee and Halpin propose, it is precisely because the web is a function of a digital technical system that could be otherwise, or which could even disappear. And if they argue that this is a right, it is because this philosophy and this stability must support the need to ensure not only a certain conception of the internet, its functions and its goals, but the sense of mental, intellectual, spiritual, social and noetic (the latter in Aristotle's sense) progress that digitalisation in general must constitute.

In order to deepen these formidable questions, we must take the measure of the following two points:

- first, the digital technical system constitutes a global and contributory publication and editorialisation system that radically transforms the 'public thing', given that the *res publica*, the republic, presupposes a form of publicness, of 'publicity' – what the Aufklärung called an *Öffentlichkeit* – sustained by publication processes
- second, this publication system is inscribed in the history of a process of grammatisation, which conditions all systems of publication: the concept of grammatisation, as forged by Sylvain Auroux, provides important ingredients for the discussion inaugurated by Tim Berners-Lee around what he referred to as philosophical engineering.

With the concept of grammatisation, Auroux was able to think the technical conditions of the appearance of grammata, of letters of the alphabet, and of their effects on the understanding and practice of language. And he was able to think these conditions for the pre-alphabetic conditions of grammata (ideograms and so on), right up to the linguistic technologies that Auroux calls 'language industries', passing by way of the printing press.

I have myself extended this concept by arguing that, more generally, grammatisation describes all technical processes that enable behavioural fluxes or flows to be made discrete (in the mathematical sense) and hence to be reproduced, meaning all those behavioural flows through which are expressed or imprinted the experiences of human beings (speaking, working, perceiving, interacting and so on). If grammatisation is understood in this way, then the digital is simply the most recent stage of grammatisation, a stage in which all behavioural models can now be grammatised and integrated through a planetary-wide industry of the production, collection, exploitation and distribution of digital traces.

## 2.

The grammatisation of behaviour consists in a spatialisation of time, given that behaviour is above all a form of time (a meaningful sequence of words, an operational sequence of gestures, a perceptual flow of sensations, and so on). Spatialising time means, for example, transforming the *temporal flow* of a speech, such as the one I am delivering to you here and now, into a *textual space*, a de-temporalised form of this speech: it is thus creating a spatial object. And this is what is going on, from alphabetic writing to digital technology, as Walter Ong made clear:

Writing [...] initiated what print and computers only continue, the reduction of dynamic sound to quiescent space [8].

This spatial object can be engraved on a wall, inscribed on a clay tablet, written or printed on paper, metastabilised on a silicon memory chip, and so on – and these various supports make possible *operations that are specific to each form of support*, that is, proper to each stage of grammatisation.

Spoken language is an example of what Edmund Husserl called a temporal object: that is, it is an auditory object that appears only in the course of disappearing. But when speech is written down, it is grammatised and thereby becomes a spatial object, that is, a *synoptically* visible object. And this *synopsis* makes possible an understanding that is both *analytic* (discretised) and *synthetic* (unified). This spatialisation is a materialisation. This does not mean that there was initially something ‘immaterial’ that subsequently became material: *nothing* is immaterial. For example, my speaking is material: it is produced by vocal organs that produce sound waves, which are themselves supported by molecules, composed of atoms, that begin to vibrate in the surrounding air, and so on.

One can speak of a *visibly* spatialising materialisation to the extent that there is a passage from an invisible, and as such indiscernible, and unthinkable material state, to another state, a state that can be analysed, criticised and manipulated – in both senses of the verb ‘manipulate’. That is, this is a state:

1. on which analytical operations *can be performed*, and intelligibility can be produced; and it is a state
2. with which one can *manipulate minds* – Socrates accused the Sophists of doing precisely this with writing, the latter being the spatialisation of the time of what he called ‘living speech’ [9].

If grammatisation is therefore a process of materialisation, hominisation is itself, and in a very general way, a process of materialisation: man is the living being who fabricates tools, and in so doing he transforms the world by never ceasing to *materialise anticipations* – what Husserl called protentions,<sup>6</sup> and I shall explain below why I must express this through the vocabulary of the founder of phenomenology.

Grammatisation is a very specific type of materialisation within a much larger process of materialisation of all kinds that Georges Canguilhem called ‘technical life’ – which distinguishes us from other living things.<sup>7</sup>

Grammatisation begins during the Upper Paleolithic era, some two million years after technical life first arose. It enabled mental and behavioural flows to be made discrete, and thus enabled *new* mental and behavioural models to be created. In the course of materialisation, and the spatialisation in which it consists, the constitutive elements of grammatised mental and behavioural flows are made discrete, and temporal mental realities, which have become identifiable through lists of finite, analysable and calculable elements, are *modified in return*.

The visible and tangible reality emerging from this spatialisation constitutes an object that belongs to the class of things that I refer to as tertiary retention. I borrow the term ‘retention’ from Husserl. Retention refers to what is retained, through a mnemonic function itself constitutive of a consciousness, that is, of a psychic apparatus. Within this psychic retention, Husserl distinguishes two types of retention, one he refers to as *primary* and the other as *secondary*.

<sup>6</sup> See Edmund Husserl, *On the Phenomenology of the Consciousness of Internal Time (1893–1917)* (Dordrecht: Kluwer, 1991).

<sup>7</sup> See Georges Canguilhem, *The Normal and the Pathological* (New York: Zone Books, 1991), pp. 200–201.

Secondary retention, which is the constitutive element of a mental state that is always based on a memory, was originally *primary* retention: primary in this case means retained in the course of a *perception*, and through the *process* of this perception, but *in the present*, which means that primary retention is *not yet a memory*, even if it is *already* a retention. To *perceive* a phenomenon is to *retain and unify*, in the course of the perception of the phenomenon, everything that appears as the identical ‘content’ of the perception (of the perceived phenomenon) but which each time presents a different aspect (an *Abschätzung*).

A primary retention is what, constituting the course of a present experience, is destined to become a secondary retention for somebody who has lived this experience, which subsequently becomes past experience – secondary because, no longer being perceived, it is imprinted in the memory of the one who had the experience, from where it may be reactivated.

But a retention, as deriving from a flux and emerging from the temporal course of experience, can also become *tertiary* through the spatialisation in which consists the grammatisation (and more generally, in which consists *any technical materialisation process*) of the flow of retentions. This mental reality can thus be *projected onto a support that is neither cerebral nor psychic but rather technical*. The web grants access to such a space, through which shared, digital tertiary retentions are projected and introjected, constituting as such a new public, global and contributory space, functioning at the speed of light. What light and what shadow, what Enlightenment and what Darkness, can and must this bring us?

### 3.

Michel Foucault spoke about the materialisation of knowledge in *The Archaeology of Knowledge* – but without placing it in the context of the grammatisation process, nor by understanding it in relation to primary and secondary retention – at a time when he was interested in the archives that make possible all knowledge [10]. Knowledge is above all a collection of archived traces, that is, ordered and modelled traces, thereby constituting an order – and submitted to this order and to this model, which orders these traces. Knowledge, modelled in this way, thus conserves the trace of the old from which it comes, and of which it is the rebirth and the transformation, through a process that Plato described as an *anamnesis*.

The conservation of traces of the past is what enables the constitution of circuits of collective individuation across time and in the framework of a discipline. Such disciplines govern the relations between minds, which individuate themselves in concert, and in the course of intergenerational transmission, through which a *transindividuation process* is concretised, producing what Gilbert Simondon called the transindividual and forming meanings.<sup>8</sup> The *conditions* of this process, however, are *over-determined* by the *characteristics of grammatisation*, that is, by the characteristics of the archival supports that are the tertiary retentions of different epochs: ideograms, manuscripts, texts, prints, records, databases, metadata, and so on.

The archive is material, according to Foucault, and knowledge is *essentially* archived. This means that the materiality of the archive is not something that occurs after

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<sup>8</sup> See Gilbert Simondon, ‘The Genesis of the Individual’, in Jonathan Crary and Sanford Kwinter (eds.), *Incorporations* (New York: Zone Books, 1992), pp. 297–319.

the fact in order to record something that would have occurred *before* its materialisation: the latter *is* the very production of knowledge. This materialisation doesn't come *after* the form that it conserves, and it must be thought beyond the opposition of matter and form: it constitutes a hyper-material.

The hyper-materiality of knowledge must, in the epoch of the web and the new transindividuation processes it produces, be studied as the condition of construction of rational forms of knowledge and of knowledge in general. We must situate the study of the hyper-materiality of knowledge within the framework of a *general organology* that studies the supports and instruments of every form of knowledge. And in the contemporary context, this study of hyper-materiality must be placed at the heart of *digital studies*, which must itself become the new unifying and trans-disciplinary model for every form of academic knowledge.

General organology studies the relations between the three types of organs characteristic of technical life: physiological organs, technical organs and social organisations. Grammaticisation began thirty thousand years ago, inaugurating a specific stage of the process of the co-evolution of these three organological spheres, which are inseparable from one another. This is shown in an extremely clear way by the neurophysiology of reading, through which, as Maryanne Wolf puts it, the brain is literally *written* by the socio-technical organs, and where our own brains, which she calls 'reading brains', were once written by alphabetical writing, but are now written by digital writing:

We were never born to read. Human beings invented reading only a few thousand years ago. And with this invention, we rearranged the very organization of our brain, which in turn expanded the way we were able to think, which altered the intellectual evolution of our species [11].

Now, with the web, we are living through a passage from the *reading brain* to the *digital brain*, and this raises a thousand questions of rights and duties, in particular with regard to the younger generations:

[W]e make the transition from a reading brain to an increasingly digital one. [...] Reading evolved historically [...] and [...] restructured its biological underpinnings in the brain [of what must be thought of] as a literate species [12].

And during this transition, the point is to know 'what [it] is important to preserve' [13].

It is a question of knowing what must be preserved, *within* the *digital brain*, of that which characterised the *reading brain*, given that writing new circuits in the brain can erase or make illegible the old circuits.

*The writing of the psycho-physiological organs through the socio-technical organs* constitutes the reality of the history of thought, that is, of what Hegel called and described as the phenomenology of *Geist* – except that, within the phenomenology of tertiary retention I am talking about here, technics is the main dynamic factor, and is so precisely insofar as it constitutes a system of tertiary retention, this dynamic being ignored by Hegel [14].<sup>9</sup>

The emergence of digital technologies, of the internet and the web, which is also the age of industrial tertiary retention, is obviously the new page (a hypertextual and hyper-material page) on which is being inscribed and read (in HTML5) the history of thought – through what must be understood as a new system of publication constituting a new public thing, a new *res publica*.

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<sup>9</sup> See Bernard Stiegler, *États de choc: Bêtise et savoir au XXI<sup>e</sup> siècle* (Paris: Mille et une nuits, 2012), Ch. 5.

The web is an apparatus of reading and writing founded on *automata* that enable the production of metadata on the basis of digital metalanguages, modifying what, in *The Archaeology of Knowledge*, Foucault called enunciative modalities and discursive formations. All this can be thought only on the condition of studying in detail the neurophysiological, technological and socio-political conditions of the materialisation of the time of thinking (and not only of thinking, but also of life and of the unthought of what one calls noetic beings, which is also, undoubtedly, of their unconscious, in the Freudian sense).

It is for this reason that we must develop a general organology capable of specifying the characteristics, the course and the stakes of a process that began in the Upper Paleolithic as the materialisation of the flux of consciousness, projecting new kinds of mental representations forged through this very projection – and which we shall now see is also an *intro*-jection.

#### 4.

From out of this rupestral projection, which is also the birth of art, the exteriorisation of the content of the mind begins to unfurl. After the Neolithic age, specific retentional forms appeared, making it possible for mental content to be controlled: the earliest forms of calculation, then the step-by-step recording of geometric reasoning. The mind or spirit, self-controlling and self-critical, thereby constitutes the origin of *logos* – this is what Husserl realised in 1936, when he grasped that the origin of geometry was founded on literal (that is, lettered) tertiary retention [15].

From the origin of philosophy, and up until our own time, this process has been *concealed*: its study was made *impossible* by the metaphysics of *fundamental ontology* – conceived as an ontology of *pure* thought, that is, an ontology of thought prior to the *impurity of its exteriorisation*. Kant would call this thought ‘*a priori*’, and metaphysics would take it to be the only *true* knowledge, in the presumption that being precedes becoming, and is thereby knowable.

Today, grammatisation continues to spread and accelerate, and it transforms all forms of knowledge. And this is occurring at a time when we are also learning from neurophysiology that cerebral plasticity – and the transformation of what Maryanne Wolf calls ‘mental circuitry’ through the introduction of tertiary retentions (literal tertiary retention, for example) – *is* thinking: thinking consists in the production of *new circuits*, through the materialisation process that comes to modify existing circuits, and sometimes to destroy them, the question being to know what must be ‘preserved’.

The mind, then, is *constituted* through the introjection of tertiary retention, and today this has become visible, because neurophysiologists can study it experimentally. These researchers are equipped with tools and apparatus designed to observe mental life, that is, the *movements* occurring *within* the cerebral apparatus, such as introjection, but also and above all *between* this apparatus and the tertiary retentional apparatus deriving from grammatisation, that is, from the projection of the mind outside itself.

The fact that the exteriorisation of the mind is the *condition* of its constitution means that the mind cannot be some pure substance that, by exteriorising itself, alienates itself through this exteriorisation. The *constitution* of the mind through its exteriorisation is its *expression*, resulting from a prior *impression*. The projection of the mind outside itself *constitutes* the mind through its materialisation and spatialisation as a

movement: the mind is as such mobility, motility and emotion (and this is how we should interpret the theses of Antonio Damasio) [16].

This projection that is constitutive of the mind, however, can also lead to its evacuation: it makes possible what Socrates described – the short-circuiting or bypassing of the life of the mind via an exteriorisation *without return*, that is, without re-interiorisation. Projection can, in fact, constitute a mind only insofar as it is *re-temporalised*: what has been spatialised must then be *individuated* and ‘interiorised’ in order to come to life. Tertiary retention is dead, and it remains so if it does not transform, in turn, the secondary retentions of the psychic individual affected by this tertiary retention.

This transformation of the individual is possible because the latter has, for example, ‘literalised’ his or her own brain, which has thus become a ‘reading brain’, and is therefore now a fabric woven from literalised secondary retentions, that is, textualised secondary retentions, and becomes as such the object of constant self-interpretation. It is for this reason that Joseph Epstein can write that ‘we are what we read’ [17].

And this is what Walter Ong made comprehensible when he wrote of literate human beings:

[They are] beings whose thought processes do not grow out of simply natural powers but out of these powers as structured, directly or indirectly, by the technology of writing. Without writing, the literate mind would not and could not think as it does, not only when engaged in writing, but normally even when it is composing its thoughts in oral form [18].

In other words, even when they speak, and express themselves orally, literate human beings are reading themselves and interpreting themselves *to the letter*. That is, they are ‘literally’ in the course of writing themselves, given that everything they read is inscribed within their brains, and given that everything they read reactivates and reinterprets the previously written, and textually written, circuits of their secondary retentions: *literate human beings speak like the book that they are and that they read*.

What Maryanne Wolf adds, however, building on the work of Stanislas Dehaene, is that the acquisition of new retentional competences, through the interiorisation of tertiary retentions, can also recycle ‘existing [...] circuits’ [19], that is, destroy them, and that this is the reason it is a matter of knowing what must be ‘preserved’. Moreover, Socrates argued that *exteriorisation cannot occur without re-interiorisation*, that is, *without individuation*. Such individuation is required in order to produce real thoughts, and this is why we must, as a law and a duty, struggle against the slide into sophism.

What consequences can we draw from these considerations within the framework of our encounter here, and from the perspective of a reactivation of the Enlightenment project in the age of the web? I will conclude by attempting to give a broad outline of an answer to this question.

## 5.

*The writing of the brain* is the writing of *capacities enabling brains to cooperate* – notably through the constitution of communities of *reading (that is, lettered or literate) brains*, or *digital brains*. Socrates, however, argued that by enabling souls (and their brains) to be short-circuited or bypassed, the writing of the brain can also destroy both noetic and social capacities, and result in structural incapacitation, that is, lead to an inability to think for oneself.

This means that the interiorisation of technical organs by the cerebral organ, which is thereby reorganised, constitutes a new stage of thinking only on the condition that social organisations exist to ensure this interiorisation – such as, for example, the *paideia* (education) practiced at Plato's academy. The question of what must be preserved thus involves not just cerebral circuits, but social circuits.

We cannot re-constitute internet access, therefore, without completely rethinking the formation and transmission of knowledge with a view to ensuring a historical understanding of the role of tertiary retention in the constitution, as well as the destruction of knowledge, and with a view to deriving, on this basis, a practical and theoretical understanding of the digital tertiary retentions that transform cerebral and social organisations. Without such a politics, the inevitable destiny of the *digital brain* is to find itself slowly but surely *short-circuited by automata*, and thus find itself incapable of constituting a new form of society with other *digital brains*.

Automatisation makes digitalisation possible, but although it immeasurably increases the *power* of the mind (as rationalisation), it can also destroy the mind's *knowledge* (as rationality). A 'pharmacological' thinking of the digital must study the contradictory dimensions of automatisation in order to counteract its destructive effects on knowledge. The point is not merely to ensure that there is a right to access the internet, but of having a right and a duty to know (through education) that invisible automatisms exist, and that these may elude *digital brains* – and may manipulate these brains without teaching them how they should themselves be manipulated, how they should be handled.

This question arises in a context in which neuromarketing is today in a position to directly solicit the automatisms of the lower layers of the cerebral organs by short-circuiting the networks inscribed through education in the neo-cortex. The automatisms of the nervous system are in this way combining with technological automatisms: this is the threat (that is, the shadow) against which new Enlightenments must struggle.

Thinking is, above all, the history of grammatisation; the history of the relations of projections and introjections occurring between the cerebral apparatus and tertiary retentions. It is for this reason that the question of *philosophical engineering*, posed by Tim Berners-Lee, comes to the fore. Philosophical engineering must lead to a close articulation between psychosomatic organs, technological organs and social organisations, while ensuring that the technological layer does not short-circuit the psychosomatic and social layers.

It is a question of articulating the social web with the semantic web in an intelligent way. The social web and the semantic web must not be opposed, but rather composed – through social and educational organisations that must themselves be completely rethought on the basis of this perspective. It is thus a question of what we, at the Institut de recherche et d'innovation,<sup>10</sup> call transindividuation technologies, through which the organs of contributive society must be constituted.

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<sup>10</sup> See: [http://www.iri.centrepompidou.fr/?lang=en\\_us](http://www.iri.centrepompidou.fr/?lang=en_us).

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- [13] *Ibid.*
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- [17] Joseph Epstein, cited in *ibid.*, p. 5.
- [18] Ong, *Orality and Literacy*, p. 77.
- [19] Marianne Wolf, *Proust and the Squid: The Story and the Science of the Reading Brain* (New York: Harper, 2007), p. 12.