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The Brain, A Living Machine

Jean-Pierre Henry

Following on from the first dossier on the human brain, devoted essentially to what the cognitive sciences and neurosciences teach us about our lifelong learning capacities (*Futuribles* 428, January-February 2019), we are publishing a second dossier on the plasticity of the brain, its ability to modify its operation over the course of its life as a function of experience.

Since this second dossier is more concerned with the morphology and operation of the brain, it relates more to the life sciences and is, for obvious reasons, introduced by Jean-Pierre Henry who has coordinated all the contributions. His article first explains how the brain is formed (*in utero*) from the sixth week after conception, then how it is shaped throughout existence and how it is permanently regenerating in the hippocampus. Henry then explains how the brain's capacities develop — particularly those required for memory.

In the third part of his article, Jean-Pierre Henry sets out the pathologies the brain may suffer (particularly cerebrovascular accidents) and the progress made in their treatment. Going beyond this, with reference to the challenges that may confront the brain as it ages (particularly Alzheimer's, Parkinson's and ALS, which affect a large number of individuals), he shows how plasticity enables the brain to find solutions in cases of dysfunction, and the advances that may ensue from this in the understanding of these pathologies and the potential therapeutic responses to them.

The Brain: Anatomy and Function The Antagonism between Human Brain Plasticity, the Weight of Dogma and the Uncontrolled Explosion of Artificial Intelligence

Hugues Duffau

Continuing Jean-Pierre Henry's argument, Hugues Duffau shows that the brain's plasticity, its permanent capacity to reorganize itself to adapt to circumstances, ensues from

the fact that it is an extremely complex system, all of whose parts function interactively, by processes into which he affords us some insights here. Accordingly, Duffau addresses the very widespread idea that each area of the brain corresponds to a given function (movement, language, memory, emotion etc.), a theory known as localizationism. That idea, he asserts, is refuted by the observation of the chain reactions that connect all the parts of the brain that become activated, bringing into play that synaptic plasticity so specific to the human brain, which, incidentally, distinguishes it fundamentally from what is called Artificial Intelligence.

The author, a famous neurosurgeon, is certainly well placed to show, for example, that the ablation of a cerebral lesion cannot be performed without respecting the entirety of the dynamic neuronal network that is unique to each person and constantly evolving — which, to reiterate, is not the case with machines. He reports on the progress achieved in the understanding of the anatomy and highly complex functions of the brain, since it is now possible to map these with ever-increasing accuracy and, where necessary, repair them. Lastly, he alerts us to the risks inherent in artificial neural networks — a pale copy, in his view, of human neuronal networks — which could ultimately result in a deterioration of the neuro-plasticity of the human brain.

Dreams, Sleep and Memory: Brain Plasticity at the Heart of Memory, Sleep and Brain-Machine Interfaces

Karim Benchenane

Karim Benchenane's article, the third contribution to our dossier on brain plasticity, revisits this notion to explain that it covers "the way experience will, in the long term, modify the effectiveness with which neurons are able to communicate among themselves." Though he stresses the primordial role of the earliest years, he nonetheless observes that, contrary to what we had long thought, this plasticity lasts a whole lifetime.

Benchenane then explains the mechanisms governing memory, while stressing that there

are different forms — most notably, short-term and long-term memory — not all of them dependent on the hippocampus. Then, as learning and memorization consume a large part of the energy required for brain functioning, he reminds us of the importance of sleep, which is required for physical recovery. He is careful also to underscore that these processes are still subjects of scientific controversy, which he lays out here very clearly and interestingly.

Lastly, Benchenane alerts us to the risk of falling victim, as we sleep, to social conditioning and he closes his article with some thoughts on brain-machine interactions, a subject to which we shall return in our third dossier on the brain, to be published at the end of the year.

Restoration of Sight and Brain Plasticity

Serge Picaud

As part of our second dossier on the human brain, Serge Picaud sets out how vision works by the retina and its photoreceptors transmitting the appropriate visual information to the brain. But he also shows that there are many pathologies of vision — some hereditary and others more complex — and, for some years now, the possibility of restoring a form of vision has been emerging.

Detailing current and potential scientific advances, Picaud demonstrates, for example, the progress achieved in terms of gene therapy which now makes it possible, particularly where there is hereditary pathology, to remedy cell degeneration by introducing a functional repair gene. No less impressive are cell therapy and artificial retinas (or retinal prostheses) that make it possible to restore the sight of patients who have lost their photoreceptors.

Impressive progress has been achieved in restoring the sight of individuals who were blind from birth or have fallen victim to various illnesses, including age-related macular degeneration (AMD) — more than a million individuals in France. And, indeed, sight plays a crucial role in brain activity and plasticity.

A Trend Survey of French Values: More Personal Freedom, More Demands in the Collective Sphere

Pierre Bréchon

For more than 35 years *Futuribles* has shown an interest in the evolution of value systems

and the study of their transformation, regularly reporting the findings of the surveys carried out every 9-10 years as part of the European Values Study. The latest wave of such surveys was carried out in 2017-18 and Pierre Bréchon outlines the first lessons from these as they relate to France.

In the context of social crisis that has beset the country since November 2018, the long-term analysis Pierre Bréchon provides here on the evolution of French values with regard to lives and society, brings useful perspective. Without disputing the difficulties they may encounter in everyday life (in terms of incomes, jobs etc.), Bréchon stresses that, judging by the latest surveys, society is not in danger of falling apart in France, the values of tolerance and respect for others continue to advance, and happiness levels are as high as before and remain stable etc. Individualization continues to increase, attachment to the protective state remains as it was, political involvement is stable and religion still steadily in decline. However, the attitude to democracy is more complex and the demand for public order remains high. Though these last two points suggest that a certain vigilance is required to maintain French attachment to democracy and France's political institutions, the results of the 2017-18 surveys run counter, more generally, to the ambient pessimism.

A Changing Economy in the Age of Scarcity. Towards a New Development Model: Why and How?

Hélène Le Teno

In September 2018, we began a series on the role of enterprises in constructing the common good and we have already published various articles — of analysis, feedback and personal testimony — on this theme in *Futuribles* 426, 427 and 429. Employing an admittedly different approach, the thinking presented here by Hélène Le Teno addresses the issue of how businesses can avail themselves of the context of an increasing scarcity of resources we are seeing today to trigger a change in the economic model.

Hélène Le Teno reminds us first what this move into an era of scarcity consists in, and why the physical limits of our planet require us to look again at the way we produce. She stresses the limitations of an economic growth that would tend to ignore the constraints of the biosphere and the need to

orient ourselves toward a genuinely sustainable development model. In her view, we now have to “do better with much less” and create a situation in which the economy’s main actors — enterprises — can reason along these lines and find ways to develop in a “transition economy”. A shift occurred in the United States and Europe with the emergence of the notion of “benefit corporations/companies”. It is essential now that new accounting and financing mechanisms — some examples of which Le Teno presents here — are developed, to enable economic actors to leave “extractive capitalism” behind and shift to a common-interest capitalism.

Businesses, Corporate Social Responsibility and Beyond: Thoughts on a Survey on Post-CSR Enterprises

Marthe de La Taille-Rivero

It is more than 40 years since Corporate Social Responsibility (CSR) emerged as a precise concept that was destined to spread around the economic world. It was actually in 1976 that the Organization for Economic Cooperation and Development (OECD) adopted a list of guiding principles which aimed to provide a frame of reference for it. Since then, CSR has gradually become institutionalized in Europe (European Commission Green Paper in 2001; 2014 directive requiring enterprises to publish their CSR assessment etc.) and businesses seem generally to be playing their part.

Continuing the series on the role of enterprises in constructing the common good (begin in *Futuribles* 426 and continuing in 427 and 429), Marthe de La Taille-Rivero shows here, drawing on a report published in late 2018 by the Institut de l’Entreprise on post-CSR business, how enterprises have taken on board this demand for CSR, particularly in France. This report also stresses how, given the new social and environmental challenges etc., they could go beyond classical CSR and “put shareholders at the core of the reactor”, with the aim of promoting the public good. It argues that the next stage could consist in allying shareholder profit to the general interest, with the business being placed at the centre of the equation.

A Whiff of Fascism(s) in the Air: On the Use of Lying in Politics

André-Yves Portnoff

At the European elections of May 2019, the parties of the extreme Right tripled their

seats in the European Parliament by comparison with 2014. This result confirms that more or less all over Europe ultra-nationalist and populist parties are making progress and using the democratic process to move in on the institutions that govern us. Nevertheless, we should not have any illusions about the profiles of these parties, as André-Yves Portnoff shows here, drawing on the Italian example: their only democratic arguments are window-dressing and they are expert in the manipulation of crowds and truth. This is how it is with the Italian neo-fascists who, through an idiosyncratic rewriting of history and of the Mussolinian past, peddle falsehoods and employ disinformation to attract votes, while maintaining systems of collusion and corruption very far distant from the virtuous conduct they claim to advocate. This Forum aims to dissect these stratagems and to warn of methods that might rapidly spread to other extremist groups.

What is Russia’s International Strategy?

Jean-François Drevet

Since Russia’s annexation of Crimea in spring 2014, relations between Moscow and the European Union have been quite tense and are still affected by the sanctions policy, while awaiting resolution of Russia’s differences with Ukraine. Added to this are Russia’s active role alongside the Syrian government in the civil war that has ravaged that country for the last eight years, and other international positions adopted by Moscow, which Jean-François Drevet reminds us of here.

In this somewhat turbulent context, sizing up Russia’s international strategy, its aims, limits and perspectives, is an essential prerequisite for assessing how relations between Brussels and Moscow might evolve. This is what this column aims to do and, while it reminds us that Moscow is no longer the international giant of old, it also shows us the cards Russia still holds, particularly in Asia by dint of its geographical centrality, and, indeed, with regard to Washington. In both these cases, as in its relations with the EU, the return to constructive cooperation requires us not to underestimate Russia and to focus on reciprocal interests. ■

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N° 431, juillet-août 2019

- ➔ La mutation de l'économie à l'ère de la rareté. Vers un nouveau modèle de développement : pourquoi et comment ?, par Hélène Le Teno
- ➔ Entreprises, RSE et au-delà. À propos d'une enquête sur l'entreprise post-RSE, par Marthe de La Taille-Rivero



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