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Bibliography: Bibliography for the *Collective Intelligence Game*

Pierre Lévy

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Bibliography

Bibliography for the *Collective Intelligence Game*
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One will find in this document...

1) A general presentation of the scientific context of "The Collective Intelligence Game": my own work and those related to the emerging transdisciplinary field of Collective Intelligence. 2) An annotated bibliographical selection 3) An extensive bibliography

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Scientific Context

A natural sequence of already continued work

The project of Collective Intelligence Game prolongs much of my previous work.

In my 1991 book, The Dynamic Ideography (L'Idéographie dynamique) which studied the role of the visual representations in thinking (Denis), I had initiated a work on the new possibilities of iconic and interactive writing on computer screens, able to represent the mental models rather than the sounds (Johnson-Laird) and to make the complex phenomena and the abstract structures visible (Tufte). The Collective Intelligence Game continues and supplements this line of research. It will also be for me the occasion to continue to explore the knowledge engineering processes (see my work of 1992, Computer Programming Considered as a Fine Art - De la Programmation considérée comme un des Beau-Arts).

My other 1992 book, The Trees of Knowledge (Les Arbres de connaissances, in collaboration with Michel Authier), described a digital system, based on a dynamic mapping of "the knowledge space" of human groups, for the communication between individuals, trainers and employers. Making visible the know-how of communities, the trees of knowledge help to design regional development strategies, to control trainings and formations and to manage the human resources of companies, while recognizing the diversity of competences of people and empowering learners. This collective intelligence booster was actually programmed and marketed by the company Trivium

SA, still active, which I helped to found in 1992 (see for example: www.globenet.org/arbor). The Knowledge Tree is recognized as a pioneer software in the field of knowledge management.

In addition to my work related to the design and use of technical tools for the support of collective intelligence, I have worked for many years on a general theory. In my 1990 book The Technologies of Intelligence. The Future of Thought in the Digital Era (Les Technologies de l'Intelligence. Le futur de la pensée à l'ère informatique), I announced the global interconnection of computers, the generalization of hypertext and I provided the theoretical foundations for what I then called the "cognitive ecology", four years before the public outburst of the Web. Thereafter, the majority of my theoretical works looked further into the concept of collective intelligence in various fields such as epistemology, economics and politics (see Collective Intelligence in 1994, Becoming Virtual (Qu'est-ce que le virtuel?) in 1995, Cyberculture in 1997, World Philosophy in 2000, Cyberdemocracy - Cyberdémocratie - in 2002).

A research theme in expansion

Beyond my own work, many researches have focused on collective intelligence in the last forty years, with a remarkable increase in the last ten years; this increase was due to the development of the Internet and to the growing importance of the economy of knowledge. Even if names differ, a common object seems to emerge: Noosphere of Teilhard de Chardin, Ecology of Mind of Gregory Bateson, Ecology of Representations of Dan Sperber, Collective Subject of Michel Serres, the Cybiont or symbiotic man of Joel de Rosnay, the Hive Mind of Kevin Kelly, the Connective Intelligence of Derrick de Kerckhove, the Super Brain of Francis Heylighen, the Global Brain of H. Bloom, the Emergent Intelligence of Steven Johnson, etc.

Biology

Furthermore studies on human collective intelligence are nourished by a great number of disciplines and research fields. The following paragraphs can only give us a faint idea of what has been done so far. A fruitful biological philosophy, often near to a radical constructivist epistemology (von Foerster), did much to bring the concept of self organized complex communication systems closer to the concept of cognitive system: research on cellular death (Ameisen), on biological organization and theory of information (Atlan), on the autopoiesis and autonomy of living systems (Maturana, Varela), or on organisms considered as evolving ecosystems (Kupiec & Sonigo). Sociobiology, through studying the phenomena of communication and collective intelligence in animal societies (Wilson), and in particular in the societies of apes (Cheney & Seyfarth), informs us about the biological basis of human collective intelligence.

Philosophy, anthropology, history

In counterpoint, the philosophical, evolutionary and cognitive approaches of language help us to understand why human collective intelligence belongs to another order than that of animal collective intelligence (Austin, Bickerton, Deakon, Jackendoff, Mithen, Pinker, Vygotsky, Wittgenstein). Philosophy and anthropology teach us how techniques are constitutive of a collective intelligence of humanity that goes through a constant transformation (Deleuze and Guattari, Leroi-Gourhan, Simondon, Stiegler). Since the works of Innis and McLuhan, significant historical (Eisenstein) and anthropological (Goody) studies were devoted to the cultural metamorphosis related to the changes of communication systems. Let us mention in particular the birth of the "mediologic" field under the impulse of Régis Debray in France.

Economy and knowledge management

The growing proximity of different trends in economic and management sciences is a clear sign of a polarization towards the issue of collective intelligence: the emergence of the knowledge economy (Hayek, Machlup, Porat, Simon), a new insistence on the role of social capital (trust and quality of social bonds) as a foundation of prosperity (Fukuyama, Putnam), the growing popularity of knowledge management and of different theories on learning organization since fifteen years (Senge, Stewart and innumerable authors, like Morey, D., Maybury, Mr. & Thuraisingham, B. or Levin, R., Locke, C, Searls, D., Weinberger, D. for a less conventional approach).

Sociology, Sociology of sciences

The incipient sociology of the virtual and of the Internet (Jones, Gauntlet, Bell), the sociology of networks (Scott, Degenne & Forsé, Wellman), the success of the theories of the information society (Castells), the theory of society as a closed self-organizing system (Luhman), the recent approaches of cultural evolution in terms of complex

ecologies of representations, ideas or "memes" (Dawkins, Sperber, Dennett), bring equally their contribution to the understanding of collective intelligence phenomena. Some recent developments of sociology and history of sciences (Callon, Latour, Stengers), explaining the effective processes of producing knowledge in the scientific community, give us precious indications on the mechanisms of collective intelligence on a key ground.

Network art and cognitive sciences

The new artistic forms with digital support, notably those which are based on sampling, set in online systems or devoted to interactions in virtual worlds, support indeed new forms of cooperativeness and, at the same time they symbolize the emergence of an explicit culture of collective intelligence (Ascott, Balpe, Packer & Jordan).
Last but not least, cognitive sciences themselves increasingly focus on the study of the cognitive properties emerging from collective phenomena. The "society of mind" described by Minsky, the parallel distributed processing model of intelligence (McLelland), the neural darwinism (Edelman), the distributed intelligence in robotics (Brooks), the multi-agent systems, the simulations of "artificial life" halfway between cognitive sciences, theoretical ecology and the theory of evolution (Langston)... all these approaches have in common the growth of cognitive characteristics from social or ecological processes.
Starting a tradition of research
Despite the number and the success of publications concerning the theme of collective intelligence, still it is not possible to speak of a scientific field. The time has come to go beyond brilliant works and suggestive metaphors in order to start a real tradition of scientific research about this issue, along with a particular stress on technically increased intelligence of human communities.
The constitution of collective intelligence as scientific object, that is our general aim, can be divided into three particular related objectives:

> **1) proposing a scientific theory of collective intelligence,**
> **2) elaborating a methodology for collecting and processing data,**
> **3) constituting a community of international and multidisciplinary research.**

In the official request (presented in autumn 2001) that allowed me to get the Canada Research Chair on collective intelligence at the University of Ottawa, I wrote: "Our theoretical work will concern the construction of a causal model of collective intelligence. The elements of this model and the relations between these elements will have to be, as far as possible, measurable and in any case precisely observable by researchers studying phenomena of collective intelligence on different grounds. Moreover, such a model will have to work as an observation scheme. The construction of an explicative causal (consequently operative), general (abstract) and verifiable model of human collective intelligence phenomena aims at reaching the following objectives: 1) obtaining observations coming from different grounds for the construction of a corpus of coherent knowledge, capable to increase and therefore to lay the basis for a real field of scientific research; 2) allowing observers to constantly improve and modify the model; 3) allowing different communities to use the results of this new research field in order to improve their processes of collective intelligence in an operating way".

See: **0-researchabstract.doc**

Below, one will find a bibliographical selection with commentary, followed by an extensive bibliography.

Bibliographical selection with accompanying notes on collective intelligence in the era of cyberculture

Anger R. (Ed.), foreword by D. Dennett, Darwinizing Culture: The Status of Memetics as a Science, Oxford U. P. 2000
A good introduction to the approach of cultural phenomena in "darwinian" terms. In the cultural sphere, according to a suggestion of Richard Dawkins, the gene is replaced by the "meme", from whence the term "memetics". How do ideas reproduce and which type of ecology do they form?

Bateson, G. Steps to an Ecology of Mind, 2 vol., Chandler, NY, 1972. French

translation: Vers une écologie de l'esprit, tomes 1 et 2, Seuil, 1977 et 1980
Bateson is a multi-field researcher who began his career as an anthropologist, fell in love with the cybernetic ideas at the end of the Forties and remained interested throughout his life in the processes of communication and thought, viewed from a systemic and ecological point of view. One of the fathers of the concept of collective intelligence.

Bloom, H., Global Brain. The Evolution of Mass Mind from the Big Bang to the 21st Century, John Willey and Sons, NY-Toronto, 2000
From the biosphere to cyberspace, passing through social and cultural systems, complex evolutionary phenomena are considered by Bloom as cognitive processes.

Castells, M., The Information Age, Economy, Society and Culture, (3 vol.) Blackwell, Oxford, 1998. French translation, Fayard 1998 and 1999.
Three volumes of almost 400 pages each, full with statistics and facts, on the new networked society and the information era. The approach is mainly sociological.

Digital Opportunity Initiative (Final Report) Creating a Development Dynamic, United Nations, NY, 2001 On line: http://www.opt-init.org/
A report ordered by the United Nations to overcome the problems of the digital divide and to move forward development opportunities thanks to the new digital medias. An impassioned strategic approach, with many concrete examples and hyperlinks.

Hayek, F. The Use of Knowledge in Society, American Economic Review, XXXV, No. 4; September, 1945, 519-30. **HayekUseOfKnowledge.html**
One of the first texts in which the father of contemporary liberalism analyzes the market as a kind of self-organizing cognitive system, allowing actors armed with very incomplete information and with divergent objectives to make the best possible use of supplies at hand. The prices are considered as emerging signals, which inspire a non-centralized coordination.

Heylighen, F. & alii, Principia Cybernetica Web
(http://pespmc1.vub.ac.be/DEFAULT.html)
A collective interactive work animated by Francis Heyligen on the Web. Principia cybernetica uses the theories of evolution and complex systems to describe the progressive emergence of a "global brain" or a superorganism which is increasingly structured by the Internet.

Kelly, K., Out of Control,. The New Biology of Machines, Social Systems and the Economic World, Addison Wesley, NY, 1994
A biological, ecological and evolutionist approach to social phenomena. The hive mind is much more intelligent than that of the bee and the development of the telecommunications networks makes our human hives more complex and more creative.

Kerckhove (de), D., Connected Intelligence, Somerville House, Toronto, 1997 (French translation: L'intelligence des réseaux, Odile Jacob, 2000)
An enthusiastic vision of the new civilization based on the interactive communication networks by the successor of Marshall McLuhan at the University of Toronto.

Levine, R., Locke, C., Searls, D., Weinberger, D., The Cluetrain Manifesto, the End of Business as Usual, Perseus Books, Cambridge, Mass., 1999.
On line : http://www.cluetrain.com/
A renewed approach of management, marketing and public relations which fully integrates the Web revolution and the electronic mail. The authors expose their theory of the market regarded as a network of conversations (on line and in real time) in which consumers and salesmen belong to the same interdependent community.

Lévy, P., Les technologies de l'intelligence. L'avenir de la pensée à l'ère informatique, La Découverte, Paris, 1990
This book describes the interconnection of computers and announces the importance of hypertext 4 years before the emergence of the Web. The computer is analysed as a support for intellectual technologies transforming the cognitive ecology of our societies.

Lévy, P. Collective intelligence, Perseus, Cambridge Mass. American translation: 1997 (original french version: L'intelligence collective. Pour une anthropologie du cyberespace La Découverte, Paris, 1994)
The Book describe the project of a civilization of collective intelligence which would fully utilize the best potentialities of cyberspace. First published in 1994, the same year as the public growth of the Web.

Lévy, P. Becoming Virtual, Plenum, NY, (Original french version Qu'est-ce que le virtuel? La Découverte, Paris, 1995)
A philosophical reflection on the contemporary changes of the body, the text and the

economy. The book shows that the phenomenon of virtualization was constitutive of the human kind from the beginning in its three basic dimensions: language, technology and complex social institutions.

Lévy, P., Cyberculture, Odile Jacob, Paris, 1997
A presentation of the new emerging culture from a humanistic prospect... and an attempt to respond to the doubts and fears which opposes to the cyberculture.

Lévy, P., World Philosophie: le marché, le cyberespace, la conscience, Odile Jacob, Paris, 2000
A positive vision (despite everything!) of the extension of cyberspace, which is placed in the perspective of a multi-secular process of unification and expansion of humanity consciousness.

Lévy, P., Cyberdémocratie: Essai de philosophie politique, Odile Jacob, Paris, 2002
This book describes the transformation of the world public sphere due to the growth of the Internet and the first steps of the E-government. The investigation is prolonged by a project of global cyberdemocracy using all the resources of the Net. Hundreds of hypertextual links concerning the political life on the Internet exemplify the theory.
The links online: http://www.odilejacob.fr/indexcyber.asp

Lévy, P., online!, A list of hyperlinks about collective intelligence in the cyberspace: **liensIC.html**

McLuhan, M., Understanding Media: The Extensions of Man, New American Library, NY, 1964. French translation: Pour comprendre les médias. Mame-Seuil, Paris- Montreal, 1968
A basic text, which foresaw in the advent of the electronic extension of the nervous system of man, the beginning of a world consciousness. McLuhan taught us how to interpret cultural evolution according to the history of media.

Packer, R., Jordan, K., Multimedia, from Wagner to Virtual Reality, Norton, NY, 2001
A collection of the main "historical" texts of the thinkers and visionaries of multimedia and the Internet.

Rheingold, H., Virtual Community, new edition, MIT Press, 2000
A first hand analysis of one of the most significant sociological phenomenon, since the end of the eighties: the emergence of virtual communities.

Rosnay (de), J., Symbiotic Man, Mc Graw Hill, 2000 (original French version: L'homme symbiotique, Seuil, Paris, 1995)
A fascinating and scientifically well informed vision of the human superorganism in the process of constitution by interactive communication networks.

Teilhard de Chardin, P. The Phenomenon of Man, Harper, NY, 1975 (first french edition: Le Phénomène humain, Seuil, Paris, 1955)
The author, Jesuit paleontologist and mystic, was one of the first to reconcile faith and evolutionary reason with such force. He conceives evolution like a continuous and infinite ascent towards more complexity and conscience, i.e. towards God. The constitution of an increasingly inter-connected and co-operating humanity thanks to the progress of science, technique, and the media was the grand vision of a philosopher considered today as "Patron Saint" of the Network. Teilhard de Chardin has baptized "noosphere" the ecology of mind that prolongs and envelopes the biosphere as a growing spiritual stratum.

Bibliography

Ameisen, J. C., La Sculpture du vivant, Seuil, Paris, 1999
Anger R. (Ed.), foreword by D. Dennett, Darwinizing Culture: The Status of Memetics as a Science, Oxford U. P. 2000
Ascott, R. (Ed.) Reframing Consciousness, Intellect Books, Exeter (UK), 1999
Atlan, H., Les Etincelles de hasard, T. 1 : Connaissance spermatique, Seuil, 1999
Atlan, H., Entre le cristal et la fumée, Seuil, Paris, 1979
Atlan, H., L'Organisation biologique et la théorie de l'information, Hermann, Paris, 1972
Austin, J. L., How to Do Things With Words, Oxford U. P. 1962
Balpe, J. P., Contextes de l'art numérique, Hermès science, Paris, 2000
Bateson, G. Steps to an Ecology of Mind, 2 vol., Chandler, NY, 1972
Bateson, G., Mind and Nature, Bantham, NY, 1979
Bell, D. & Kennedy, B. M., (Eds.), The Cybercultures Reader, Routledge, London & NY, 2000
Bickerton, D., Language and Human Behavior, University of Washington Press, Seattle, 1995
Brooks, R.A. & Steels, L. (eds.), The Artificial Life Route to Artificial Intelligence:

Building Embodied Situated Agents, Lawrence Erlbaum Associates, Inc., Hillsdale, NJ, 1995

Callon, M. (dir.), La Science et ses réseaux, La Découverte, Paris, 1989

Castells, M., The Information Age, Economy, Society and Culture, (3 vol.) Blackwell, Oxford, 1998

Centre pour la recherche et l'innovation dans l'enseignement, Knowledge Management in the Learning Society, OCDE, Paris, 1999

Cheney, D. L., Seyfarth, R. M., How Monkeys See the World. Inside the Mind of Another Species, University of Chicago Press, 1990

Dawkins, R., The Blind Watchmaker, Norton, NY, 1986

Dawkins, R., The Selfish Gene, Oxford UP, NY, 1976

Deacon, T. W., The Symbolic Species: The Coevolution of Language and the Brain, Norton, NY, 1997

Debray, R., Cours de médiologie générale, Paris, Gallimard, 1991.

Degenne, A., Forsé, M., Les réseaux sociaux, Armand Colin, Paris, 1994.

Deleuze, G. & Guattari, F., Mille Plateaux, Capitalisme et schizophrénie, Minuit, Paris, 1980

Denis, M. Image et cognition, PUF, Paris, 1989

Digital Opportunity Initiative (Final Report) Creating a Development Dynamic, United Nations, NY, 2001

Edelman, G., Neural Darwinism, Basic Books, New York,1987

Eisenstein, E., The Printing Revolution in Early Modern Europe, Cambridge University Press, 1983

Foerster (von), H., Observing Systems, Intersystems, Seaside CA, 1981

Foray, D., L'économie de la connaissance, La Découverte, Paris, 2000

Fukuyama, F., Social Capital and Civil Society, Communication at the Conference on Second Generation Reform, IMF, Washington DC, 1999 (**fukuyama.htm**)

Fukuyama, F., Trust, the Social Virtues and the Creation of Prosperity, Hamish Hamilton, London, 1995

Gauntlett, D. (ed.), Web.Studies. Rewiring Media Studies for the Digital Age, Arnold, London, 2000

Goody, J., The Domestication of the Savage Mind, Cambridge University Press, 1987

Goody, J., The Logic of Writing and the Organization of Society, Cambridge University Press, 1987

Hayek, F. Economics and Knowledge, in Economica IV (new ser., 1937), 33-54.

Hayek, F. Law, Legislation and Liberty, 3 vol, Routledge & Kegan Paul, London, 1979

Hayek, F. The Use of Knowledge in Society, American Economic Review, XXXV, No. 4; September, 1945, 519-30

Herman, A. & Swiss, T. (eds.), The World Wide Web and Contemporary Cultural Theory, Routledge, London & NY, 2000

Heylighen F. The World-Wide Web as a Super-Brain: From Metaphor to Model, in Cybernetics and Systems '96, R. Trappl (ed.), World Science, Singapore, 1998

Heylighen, F. & alii, Principia Cybernetica Web (http://pespmc1.vub.ac.be/DEFAULT.html)

Innis, H., Empire and Communication, University of Toronto Press, 1950

Jackendoff, R., Languages of the Mind, MIT Press, 1992

Johnson, S., Emergence, The Connected Lives of Ants, Brains, Cities and Software, Scribner, NY, 2001

Johnson-Laird, P. N., Mental Models, Harvard University Press, England, 1983

Jones, S. (ed.), Cybersociety 2.0 : Revisiting Computer-Mediated Communication and Community, Sage, Thousand Oaks,1998

Kelly, K., Out of Control,. The New Biology of Machines, Social Systems and the Economic World, Addison Wesley, NY, 1994

Kerckhove (de), D., Connected Intelligence, Somerville House, Toronto, 1997

Kupiec J. & Sonigo, P. Ni Dieu ni Gène, Seuil, Paris, 2000

Langton, C. G., (ed.) Artificial Life, Santa Fe Institute Studies in the Sciences of Complexity Procedings, vol. 6, Addison Wesley, Redwood, Calif., 1989

Latour, B., Science in Action, Open University Press, Milton Keynes, 1987

Leroi-Gourhan, A. Le geste et la parole , Albin Michel, Paris, 1963

Levin, R., Locke, C., Searls, D., Weinberger, D., The Cluetrain Manifesto, the End of Business as Usual, Perseus Books, Cambridge, Mass., 1999

Lévy, P., La Machine Univers. Création, cognition et culture informatique, La Découverte, Paris, 1987

Lévy, P., Les technologies de l'intelligence. L'avenir de la pensée à l'ère informatique, La Découverte, Paris, 1990

Lévy, P., L'idéographie dynamique. Vers une imagination artificielle? La Découverte, Paris, 1991

Lévy, P., De la programmation considérée comme un des beaux-arts, La Découverte, Paris, 1992

Lévy, P. L'intelligence collective. Pour une anthropologie du cyberespace La Découverte, Paris, 1994

Lévy, P., Qu'est-ce que le virtuel? La Découverte, Paris, 1995

Lévy, P., Cyberculture, Odile Jacob, Paris, 1997

Lévy, P., La place de la médiologie dans le Trivium in Les Cahiers de médiologie, n°6,

deuxième semestre, Gallimard, Paris, 1998, p.43 à 58

Lévy, P., World Philosophie: le marché, le cyberespace, la conscience, Odile Jacob, Paris, 2000

Lévy, P., Cyberdémocratie: Essai de philosophie politique, Odile Jacob, Paris, 2002

Luhmann, N., Ecological Communication, University of Chicago Press, 1989.

Luhmann, N., Reality of the Mass Media, Stanford University Press, 2000

Machlup, F., Knowledge, its Creation, Distribution and Economic Signifiance, 3 vol, Princeton UP, 1984

Mayer-Kress, G., Barczys, C., The Global Brain as an Emergent Structure from the Worldwide Computing Network, and its Implications for Modeling,The Information Society, vol. 11, n#1 (Jan-Mar 1995), p. 1-27

McLelland, J. L., Rumelhart, D. E. and the PDP Research Group, Parallel Distributed Processing: Explorations in the Micro-Structure of Cognition, 2 vol. MIT Press, 1986

McLuhan, M., Understanding Media: The Extensions of Man, New American Library, NY, 1964.

Minsky, M., The Society of Mind, Simon and Schuster, NY, 1997

Mitchell, W. J., City of Bits: Space, Place, and the Infobahn, MIT Press, Cambridge, Mass., 1998

Mithen, S., The Prehistory of the Mind. The cognitive Origins of Art and Science, Thames & Hudson, London, 1996

Morey, D., Maybury, M. & Thuraisingham, B. (Ed.), Knowledge Management, Classic and Contemporary Works, MIT Press. Cambridge Mass., 2000

Morin, Edgar, La Méthode 4 - Les Idées, leur habitat, leur vie, leur moeurs, leur organisation, Seuil, Paris, 1991

Packer, R., Jordan, K., Multimedia, from Wagner to Virtual Reality, Norton, NY, 2001

Park, J. & Hunting, S. (Editors), XML Topic Maps: Creating and Using Topic Maps for the Web, Addison Wesley, NY, 2002

Peirce, C. S., Ecrits sur le signe (rassemblés par G. Deledalle), Le Seuil, Paris, 1978

Popper, K. La connaissance objective, trad. Jean-Jacques Rosat, Flammarion, Paris, 1998 (Objective Knowledge, Oxford UP 1979)

Porat, M. & Rubin, M. The Information Economy, Government Printing Office, Washington DC, 1977

Rheingold, H., Virtual Community, new edition, MIT Press, 2000

Rifkin, J., The Age of Access, G. P. Putnam's son, NY, 2000

Rosnay (de), J., L'homme symbiotique, Seuil, Paris, 1995

Russell, P., The Global Brain Awakens: Our Next Evolutionary Leap, 1996

Scott, John, Social Network Analysis, sec. edition, SAGE Publications, London, 2000

Senge, P., The Fifth Discipline: The Art and Practice of the Learning Organisation, Random House, 1990

Serres, M. Le Passage du Nord-Ouest, Minuit, Paris, 1980

Serres, M. Le Système de Leibniz et ses modèles mathématiques, PUF, Paris, 1968

Serres, M., La Communication, Minuit, Paris, 1968

Simon, H., Models of Bounded Rationality: Behavioural Economics and Buisness Organisation, 2 vol. MIT Press, Cambridge, MA, 1982

Simon, H., Sciences of the Artificial, MIT Press, 1969

Simondon, G. Du mode d'existence des objets techniques, Aubier, Paris, 1958

Sowa, J. F. Conceptual Structures: Information Processing in Mind and Machine, Addison-Wesley, Reading, MA., 1984

Sowa, J. F. Knowledge Representation: Logical, Philosophical, and Computational Foundations, Brooks/Cole Publishing Co., Pacific Grove, CA, 2000

Sperber, D. La Contagion des idées, Odile Jacob, Paris, 1996

Stengers, I. L'invention des sciences modernes, La Découverte, Paris, 1993

Stengers, I., Cosmopolitiques (7 vol.), La Découverte, Paris, 1997

Stiegler, B., La technique et le temps, T.1 : la faute d'Epiméthée ; T. 2 : la désorientation ; Galilée, Paris, 1994, 1996

Stewart, T. A. Intellectual Capital: The New Wealth of Organizations, Doubleday/Nicholas Brealy, NY, 1997

Teilhard de Chardin, P. Le Phénomène humain, Seuil, Paris, 1955

Tufte, E. R. The Visual Display of Quantitative Information, Graphic Press, Cheshire (Connecticut), 1987

UNDP (United Nations for Human Development Program) Making Technologies Work for Human Development, Oxford UP, NY & Oxford, 2001

Varela, F. Autonomie et connaissance, Seuil, Paris, 1989

Varela, F., Thompson, E., Rosh, E., The Embodied Mind: Cognitive Science and Human Experience, MIT Press, Cambridge, Mass. 1991

Vigotsky, L., Thought and Language, MIT Press, 1986 (1st russian edition: 1934)

Wellman, Barry ed., Networks in the Global Village . Westview Press, Boulder, CO, 1999.

Wilson, E. O., Sociobiology, the New Synthesis, Harvard UP, Cambridge, Mass. 1975

Wittgenstein, L., Philosophical Investigations, Blackwell, Oxford, 1958

Whitehead, A. N., Aventures d'idées (trad. J-M. Breuvart et A. Parmentier), Cerf, Paris, 1993 (Adventures of Ideas, 1933).

::CrossReference

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