

# Rethinking the Architecture of the Book: Unbinding the Spine of Paul Otlet's Positivist Encyclopaedism

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**Abstract:** Paul Otlet's exploration of the idea to record information in separate chunks or units according to the "monographic principle" has provoked considerable interest in information history for the way in which it resonates with the present tendency to conceive of information as detachable and manipulable units, whose retrieveability has become more important than the information itself. This paper aims to dissect within Otlet's historical and intellectual context the make-up of the positivist epistemology underpinning his concept of the "Universal Book." The "Universal Book" was of central importance in his theory of documentation as it proposed how documentalists—the new experts trained in documentary procedures—were to operate. These professionals were asked to gather facts or objective knowledge by removing the unwanted "dross" of subjectivity, and to synthesize those facts in an encyclopaedic form in order to make them ready for public use. Through an inquiry into the wide-ranging epistemological views prevalent in the French intellectual milieu in the belle époque—notably monism, energeticism, materialism, idealism and spiritualism—this paper questions the positivist label that has been attributed to his concept of documentation.

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## 1.0 Introduction

The question of "the future of the book" is one that has occupied each information age. While people such as George Landow see in today's new forms of multimedia and hypertext the creation of modes of reading and intellectual exchange that take us "beyond the book," others such as Umberto Eco stress that there are many historical precedents to the claim that the computer will kill the book, for example, in the idea that "photography will kill painting, movies will kill the theatre, television will kill movies, and so on"—which followed Victor Hugo's phrase "Ceci tuera cela" (meaning that the book will kill off the cathedral, and the alphabet will kill off images) (Landow 1996; Eco 1996, 13).

"The Future of the Book" as Paul Otlet (1868-1944) imagined it, lay in what he started to refer to as "the Universal Book" in 1903, a book which "abandons resolutely the traditional form of the bound volume, isolated and complete" (Otlet 1911). Universal Books were to be created, published and preserved by what Otlet called "Offices of Documentation," which he conceived to be a new kind of information service that would in the course of time replace libraries, which he strongly criticized for their conservative approach to information services and their outmoded cataloguing practices (Rayward 1997, 295).

Several historians and theoreticians of information science have described how the encyclopaedic project of Otlet was founded on the philosophy of positivism. W. Boyd Rayward affirms (1994b) that "Otlet's thinking must be placed within a nineteenth century Kuhnian paradigm of positivist science." Like Rayward, Bernd Frohmann also



Figure 1. Schema illustrating Otlet's conception of the encyclopaedic book—Archives Paul Otlet, Mundaneum, Mons (MDN), fonds EUM 3, farde 19, doc n° 8539.

underlines Otlet's positivism, and argues (2004) that he is concerned in the first place with what he calls “the epistemic content of documents.” Rieusset-Lemarié argues (1997, 303) that Otlet's positivism appears reductionist and optimistic, and even goes a step further by stating that his positivism is characterized by “an unscientific bias which can be attributed to an idealistic vision” but also leads “to an authoritarian, reductionistic conception of knowledge.” Ron Day disagrees with the positions of these scholars, and argues (1997, 315) instead that Otlet adopts, in the *Traité de Documentation* and in *Monde*, “a particular sort of pragmatic idealism” that “lacks (or is often cynical toward) the positivistic certainty of 19th century modernity.”

This paper aims to nuance and to provide insight into the compatibles and antinomies of different positivist principles underpinning his theory of documentation by reconstructing the intellectual context in which he envisioned “the Universal Book.” The inquiry in the positivist labelling of his work follows three stages that were involved in the creation of the Universal Book: 1) the analysis of information contained in books and documents; 2) the synthesis of the inspected pieces' information into an encyclopaedic form; and, 3) the consultation of the Universal Book leading to intellectual self-development.

## 2.0 Echoes of energeticism, monism and atomism in the process of codification

Although the development of the Universal Decimal Classification system by Otlet and La Fontaine is very much emphasized in historiography, this section argues that Otlet's conception of the index card, not unlike Foucault's definition of a “statement”—an enunciative formation that materially exists but never in isolation as Foucault also conceives it as a function to refer to other statements (Foucault [1969] 2002)—a merger between a piece of paper and an idea, a single piece of information set on paper that enables the user to make “correlations” as he called it on multiple levels thanks to the UDC system, is where his most original contribution to knowledge organization lies.

The standardized single leaf of paper was the building block of the Universal Book (Figure 1). The Universal Book, as Otlet imagined it, would contain a synthesis of all that had been written on a particular topic or discipline, and as such be an intermediary step towards the establishment of a “World Encyclopaedia” (Otlet 1938). The “World Encyclopaedia” was to take the form of a card catalogue organized as a series of cards stored in filing cabinets in conformity with the UDC tables, subdivided by

means of divisionary cards so as to offer “alveoli ready to receive the very marrow of essential publications.”

The first analytical phase toward that goal was to reduce the information in each document or book to the simplest possible statements or “facts,” and to eliminate all dubious observations (Frohmann 2008). Otlet adopted the “monographic principle” in 1908, from the International Monograph Society, which was founded by Karl Wilhelm Bührer and Adolf Saager in 1905—with Wilhelm Ostwald as the main supporter and Paul Otlet named Honorary President later (Schneiders 1982). The way in which *The Bridge* formulated its proposals for improving the organization of intellectual work was fully alive to Ostwald's scientific worldview of “energeticism,” powerfully summarized in the exhortation “Squander no energy. Utilize it!” This “energetic imperative” also left its mark on Otlet's thinking about documentation (Ostwald 1912, 248).

The manner in which Otlet compares documentation to a metallurgic process was also influenced by Ernest Solvay's theory of “productivism,” which also had a profound influence on Ostwald's energeticism. Solvay, whom Ostwald (1910) considered to be the “father of social energetics,” held that all human activity should be striving for “productivity,” and that all work should be evaluated on the basis of the value of productivity. Solvay's theory was scientific, like that of Ostwald, in that it applied the scientific insights of physics and chemistry to the organization of society; and reductionistic in that it reduced the complexity of the organization of the social system to the problem of how to maximize efficiency in the production of material and non-material goods (Crombois 1997, 213).

Otlet's reduction of the task of organizing “mountains” of books to the ordering of “facts on cards” was kindred to energeticism and productivism not only in its call for efficiency—which also echoed in a more general way the Fordism and Taylorism of its time—but also in its reduction of complexity to its simplest elements. Similar to the analytic doctrine of “atomism,” or the view that the material universe is composed of small particles that can form relative stable structures—atoms—Otlet defined the “Biblion” as the smallest “intellectual unit” for the field of bibliography and documentation. Subsequently, these bibles were to be processed through codification or the analytic reduction of publications to their essential facts and the recording of these facts on separate notices.

As well as acknowledging the rapid development of atomic theory within chemistry, Otlet's application of the concept of the “atom” from physics and chemistry to the field of documentation also reflected the monism shared by Ostwald, by the Austrian physicist, sense physiologist and forerunner of logical positivism, Ernst Mach (1838–1916), and by the biologist and popularizer of Darwin's ideas, Ernst Haeckel (1834–1919). Haeckel had founded

the German Association of Monists in 1906 and Ostwald had acted as chairman. Between 1911 and 1915, in the period when he was also engaged in *The Bridge*, Ostwald used his Sunday sermons to preach his energeticist worldview as being the “goal of civilisation” (Ostwald 1913; Hakfoort 1992, 527). Ernst Mach had a great influence over Ostwald and Haeckel. Mach believed that there was an inner “telos” or purpose in nature and that the physical was continuous with the mental (Blackmore 1972). Similarly, Haeckel believed that there was an “indissoluble connection between energy and matter, between mind and embodiment” and used the term “substance” to describe that which united matter and spirit (Haeckel 1895, 9). According to Haeckel, atoms (the smallest particles of substance in motion) were endowed with a “soul,” which caused attraction and repulsion between them, and in their modification from one state into another, grounded the great evolution and development of the species, the psyche and the universe.

But despite Otlet's sympathies for the monistic worldview, what is important here is the fact that he compared his concept of “Encyclopaedic codification” or the ordering of analytic elements of knowledge in a “framework of a synthesis of facts and ideas,” to Mach's concept of “the economy of thought” (Otlet 1934, 431). Mach's doctrine of the economy of thought was an account of how science structures the greatest number of particular experiences under the least number of principles and laws (Blackmore 1972; Banks 2004). By arranging facts into patterns, and by grouping the more specific laws under the more general, scientists economized time and memory. In a manner similar to Ockam's “razor dictum,” which claims that entities are not to be multiplied without need, Mach argued that scientific laws are tools for mastering experience and predicting events by means of the fewest possible concepts. Codification was in a way Otlet's “razor.” It was supposed to guide documentalists in their work to “extract only the true knowledge from the mass of books, to eliminate the errors and repetitions, to organize the items of information in series, and to free the essential from that of only secondary importance” (Otlet 1934).

### 3.0 Structural objectivism and the synthetic classification of facts into logical structures

*The World Encyclopaedia*, the ultimate Universal Book and product of the (never ending) codification process, was imagined by Otlet to be a mirror or objective representation of scientific thought. This deterministic goal leads us to consider another positivistic characteristic in Otlet's theory of documentation: objectivism, or the belief that there is a mind-independent world which guarantees that an objective truth is possible and that objects of this

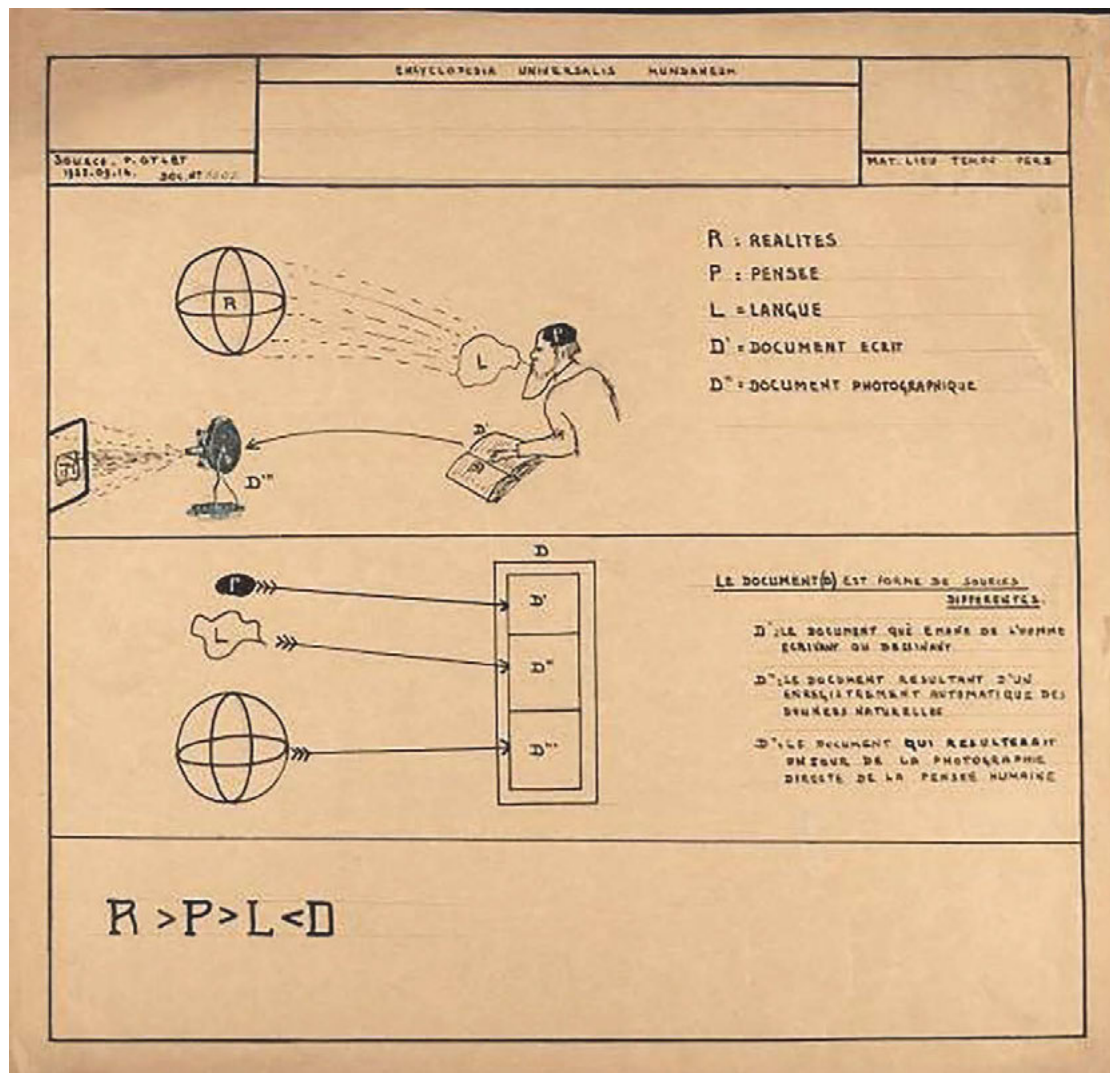


Figure 2. Schema explaining the representation and reproduction of observations through documentation (1932)—MDN, fonds Affiches (AFF), doc n° 5607, MUNDxxxxxx92\_2008\_0001\_MA.

world can be discovered, mirrored and represented (Bernstein 1985, 9).

The responsibility for the objective interpretation of observed “appearances” and for translating those observations into a document lay, Otlet observed, in the hands of the scientist or the author, but it was the responsibility of the documentalist to select and restructure the representations that scientists had made in an objective manner in what he called the Universal Book. “Every effort must be made” by documentalists, Otlet believed, to “suppress or mitigate” the “distortions and frictions” that occur in scientific documents because of wrong sensory perception, intellectual interpretation, linguistic translation or scientific evaluation (Otlet 1934a, 44). Whereas a document usually “emanates from a man who writes or draws,” it would be better to have documents that are the result of “an automatic recording of natural data,” as he mentions

in Figure 10, and perhaps “one day” in the future, he adds, one might even imagine that documents will result “from the immediate photography of human thought.” It is photography, or the mechanical (re)production of images of reality, uncontaminated by interpretation, that functions here as the model for documentation (Figure 2).

The epistemic value of objectivity that Otlet adopts for his analytic programme of documentation was a widely accepted value in scientific practices of his time. As Daston and Galison have shown, scientists had begun to yearn for an objective view of knowledge since around 1860. They used the term “objective” for that which aspires to be “knowledge that bears no trace of the knower,” and suppresses “certain aspects of the self, the scientific self” (Daston and Galison 2007, 22). Karl Pearson, for example, underlined the importance of the ethos of scientific objectivity in the *Grammar of Science* (1892) when he charac-



terized scientists as individuals who were capable of self-elimination in their judgements and of providing arguments which were as true for each individual mind as for their own (Pearson 1892, 6-8). Daston and Galison attribute the adjective “mechanical” to the objectivity of the second half of the nineteenth century: “By mechanical objectivity we mean the insistent drive to repress the wilful intervention of the artist-author, and to put instead a set of procedures that would, as it were, move nature to the page through a strict protocol, if not automatically.” The passive stance demanded by mechanical objectivity required of scientists, as Daston and Galison argue, “a will to willessness.” The man of science was portrayed as a man of action rather than as a solitary contemplative, and therefore the imperative of self-elimination in the scientific practices of the latter half of the nineteenth century demanded of the scientist a mighty effort of self-restraint. Turning the will inward upon itself was the supreme act of will. “The only way for the active self to attain the desired receptivity to nature was to turn its domineering will inward—to practice self-discipline, self-restraint, self-abnegation, self-annihilation, and a multitude of other techniques of self-imposed selflessness” (Daston and Galison 2007, 202). To put it briefly, objectivity meant the negating of subjectivity by the subject.

If objectivity was crucial in the codification process, structural objectivity was a key value in the classification process that came after. While codification is in “constant evolution” (“It is the condition of science itself”) (Otlet 1934, 411), classification was to be the final operation of synthesis that fixes the relations between facts (Frohmann 2008, 80). Otlet's definition of science as a classification is similar to the conception of science held by a structural objectivist, like the French mathematician and philosopher of science Henri Poincaré (1854-1912). Like Poincaré, Otlet thought that what scientists essentially did was to classify facts and thereby reveal the structure of objective knowledge. “A science that is well made, is a System,” Otlet observed, “and a system is a classification” (Otlet 1934, 431). In the Universal Book, each individual leaf or card on which a fact was registered, would be assigned a classification code, and thereby given a fixed place in the “intellectual architecture” of the Decimal Tables (Otlet 1934, 379). The classification code would situate the fact in relation to a wider set of facts, and thus makes the “place” of the fact clearly visible in the classification's hierarchy.

Furthermore, in analogy with the mathematical assumption that every algebraic equation corresponds to a geometrical figure, Otlet (1935, XXI) conceived the geometrical Sphaera Mundaneum (Figure 3) to be the diagrammatic translation of his algebraic “Equation of the World” (Figure 4), an enumeration of his metaphysics written down in a notational system that emulated that of

other disciplines such as “mathematics, logic, chemistry, geography, and music” (Otlet 1935, 401):

The equation of the world—the world presents itself as the development of one great equation, the terms of which are all developed to the appropriate level of detail and arranged according to suitable sub-classifications, and whose terms are used with sufficient concision to allow us, at a glance, to perceive and reflect on their respective relations.

The desire to explain the world as an indivisible system in which everything is connected to everything else according to regular laws is characteristically positivist (Simon 1963, 45; Turner 2000, 35; Bryant 1985, 12-22). Yet, this desire is also to be found in the symbolism that “has been realized in modern times by Boole, Peano, Burali, Whitehead, Russell” (Otlet 1934, 74). Otlet intended the UDC to be a form of “pasigraphy,” (Rayward 1994a, 169) a universal, quasi-mathematical language capable of describing “the logical consideration of relations and of systems of relations” (Otlet 1934, 75). Following in the line of the logicians, he aimed to represent concepts by means of a notational system, to discover the existing relations between those concepts, and even to invent new relations between them. Documentation would in its perfection become “an extension of Logic, which is the science of ordering ideas,” and would lead to a mechanical revelation of relations.

In analogy with logic, which is traditionally conceived of as the language of the human brain, or of reasoning itself, Otlet believed that classification could become the language capable of describing how reasoning occurred within books and documents. Books and documents can be compared to a “brain” or a “psychisme,” he believed, because they enable us to make logical relations between facts in the same way as our mind enables us “to relate the greatest number of ideas; to see clearly and rapidly the relations of analogy and difference, and to store them in memory.” “The mechanism of the book” is an “exteriorisation of the brain itself,” Otlet reasoned, and it records facts in a way that is similar to the way in which human consciousness “sees relations and links successive events” (Otlet 1934, 423-6).

#### 4.0 Personal use and the development of the self (“le moi”)

Following the process of analysis and synthesis of publications that take place in order to create the Universal Book, a third stage is involved in order to make this world of knowledge ready for personal use and consultation. For that purpose, he envisioned what he called a “Mundothèque” (Figure 5); a device by means of which an individual is able

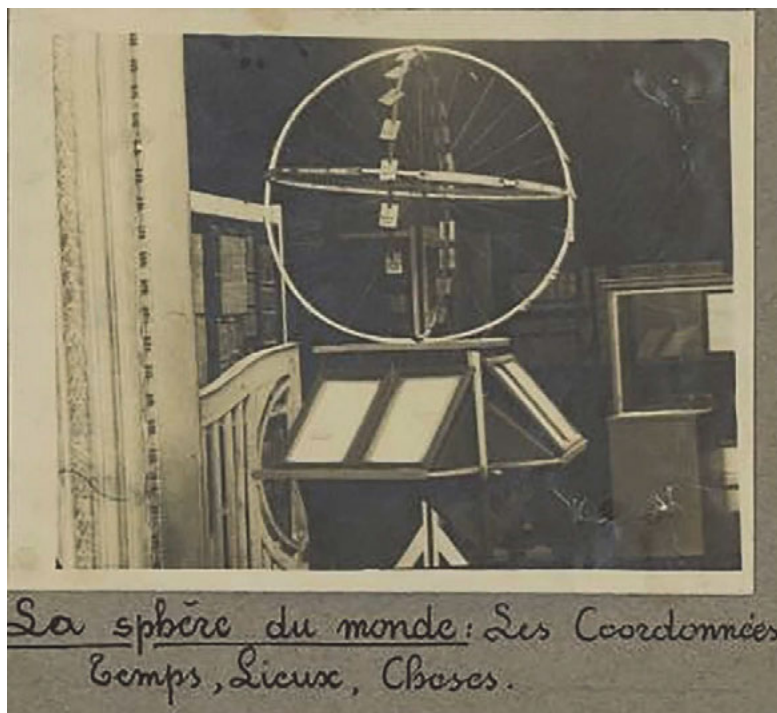


Figure 3. Photograph of the ‘Sphere of the World’ in the Introductory Hall of the International Museum in Brussels—MDN, fonds Musée International, scan nr. Mundaneum\_A400008.

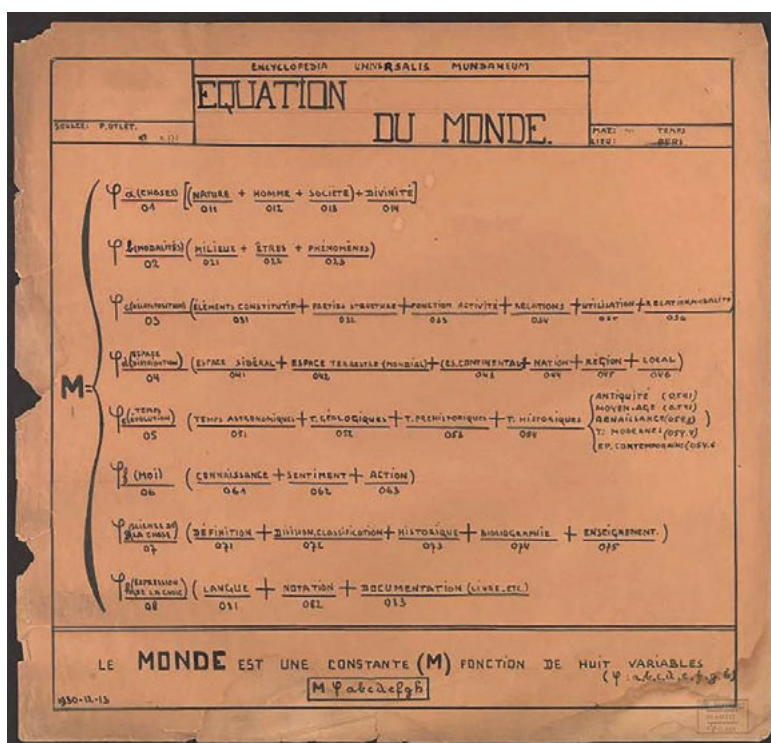


Figure 4. Paul Otlet, *Equation of the World* (1930)—MDN, AFF, fonds EUM, doc n°. 4773, doc nr. 00010512, scan nr. Mundaneum-000008.

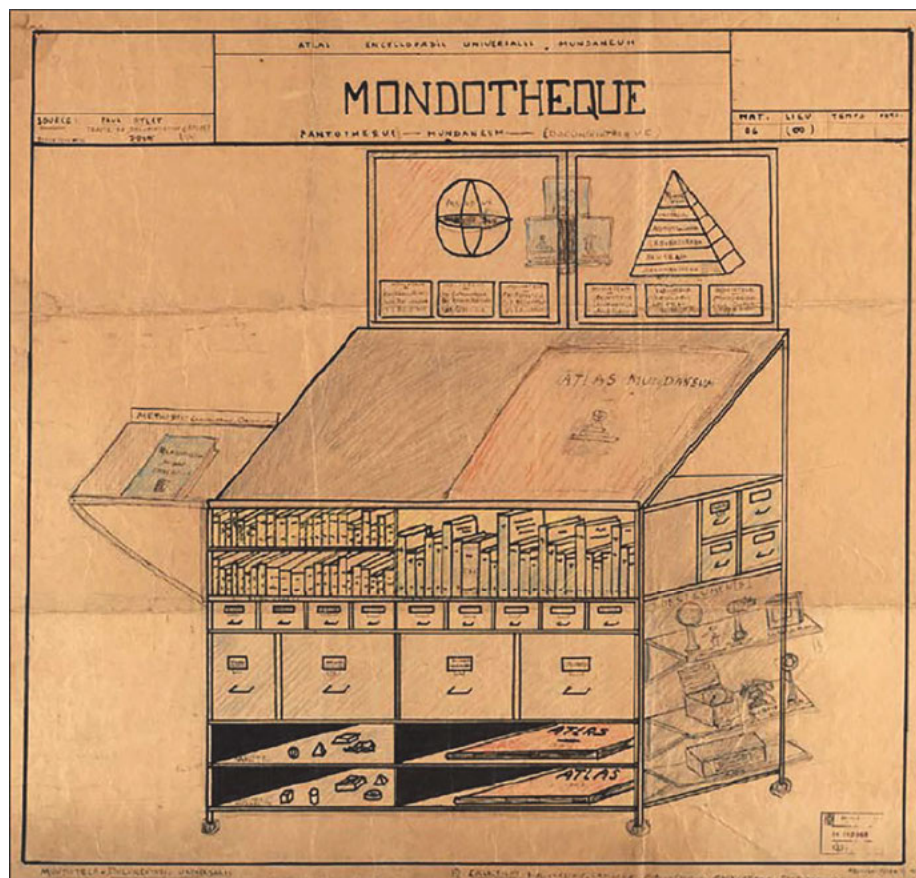


Figure 5. Paul Otlet, Mondothèque. Pantothèque, Mundaneum, Documentothèque (1941)—MDN, AFF, doc nr. 00 009063, doc n° 8141, scan nr. MUND- 00009063\_2008\_0001\_MA.

to consult the Universal Encyclopaedia and develop his “Personal Documentation.” Similar to the Memex described by Vannevar Bush in 1945, it used microfilm for storing and providing quick access to large quantities of information. Like our personal computers, the Mundothèque made use of “hardware” (e.g., a telephone, a screen to read microfilm, a television, a micro); a “browser” (the UDC catalogue); and a personal collection of “documents.” Furthermore, like our PC’s that are connected to the world wide web, the Mundothèque was envisaged as being connected to the Universal Network of Documentation.

The Mundothèque was in a sense Otlet’s answer to the ultimate epistemological goal of documentation: to bring a sort of “God’s-Eye-view” of the universe of knowledge within the reach of every individual (Otlet 1934a, 390-1):

Man would no longer need documentation if he were to become an omniscient being like God himself. A less ultimate degree would create an instrumentation acting across distance which would combine at the same time radio, x-rays, cinema and microscopic photography. All the things of the universe and all those of man would be registered from afar as they were

produced. Thus, the moving image of the world would be established—its memory, its true duplicate. From afar, anyone would be able to read the passage, expanded or limited to the desired subject that could be projected on his individual screen. Thus, in his armchair, anyone would be able to contemplate the whole of creation or particular parts of it.

While objectivism, as Mark Johnson (1987, x) defines it, is the belief that “there is one correct “God’s-Eye-view” about what the world really is like,” Otlet envisions the use of documentation in terms of an instrument that bridges as far as possible the gap between the personal perspective of the individual self and the omniscient God’s-Eye-view.

The centrality of the personal self in Otlet’s theory of documentation is paralleled and supported by an idealist epistemological framework that is centralized around the self or “le moi.” Otlet defined the self or “le moi” as a sort of inner viewpoint or state of consciousness (1935, 336):

The self is thus: firstly, the consciousness of everyone through which the entire world of sensation and perception is brought to a central point; secondly, emo-



tion; thirdly, the inner life according to the different levels of altitude at which things are placed, from bottom or abyss, to peaks and culminating points.

Otlet referred for his conception of the self to Adolphe Garnier, François Guizot and Pierre Paul Royer-Collard, all philosophers from the first half of the nineteenth century who supported the eclectic school of Victor Cousin, (Copleston 1975, 37) that was opposed by positivists such as Comte and Taine because of its vague spiritualism (Simon 1963, 122). This emphasis on the active character of the self or “le moi” reveals the influence on his epistemology of the spiritualist movement in France which runs from Cousin, de Biran and Ravaisson through Lachelier, Fouillée and others to Bergson, and which insists on the spontaneity of the human will and considers the human spirit to be a key to the nature of reality (Copleston 1975, 155–156).

Otlet especially held Fouillée “in most affection” because of his “general formula, the *idée-force*,” which reconciled

the Platonist idealist understanding of consciousness with a Comtean positivist approach to science (Fouillée 1896). It combines the concept of energy (or “force”) as understood in modern science, with the concept of “idea” as it is understood in psychology as a state of consciousness, in a view that he dubbed “voluntarist idealism” (Fouillée 1913). Ideas were, for Fouillée, not just platonic mental reproductions of an object, but real forces that tend to realize themselves (Fouillée 1890; Fouillée 1908). To think a thing is already in some sense, to desire it, and therefore Fouillée considers every idea as a commencement of action and movement (Gunn 1921, 69). It is the same kind of interaction between the physical and the mental world that we find in Figure 3 in which Otlet illustrates in ten steps how the existing world is continuously transformed by mankind through “the cycle of intellectual work” (Figure 6).

The circular schema *Universalism* (Figure 7) further illustrates the spiritualist tendencies of Otlet's personalist epistemology. The self is shown to make use of the three fundamental faculties of knowledge, sentiment and action,

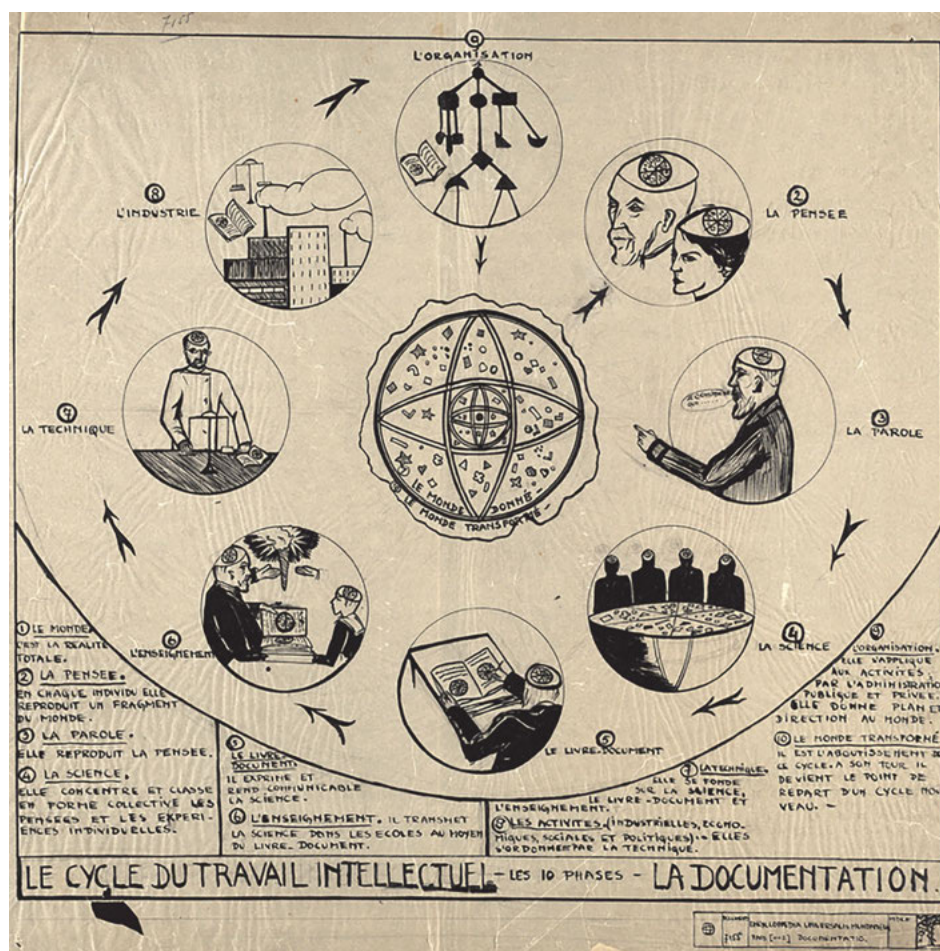


Figure 6. Paul Otlet, Illustration of the changing world of knowledge because it is subject to the cycle of documentation and intellectual work (1921)—MDN, AFF, pars documentation, doc n°7155, scan nr. MUND-xxxxxx13\_2008\_0001\_MA.



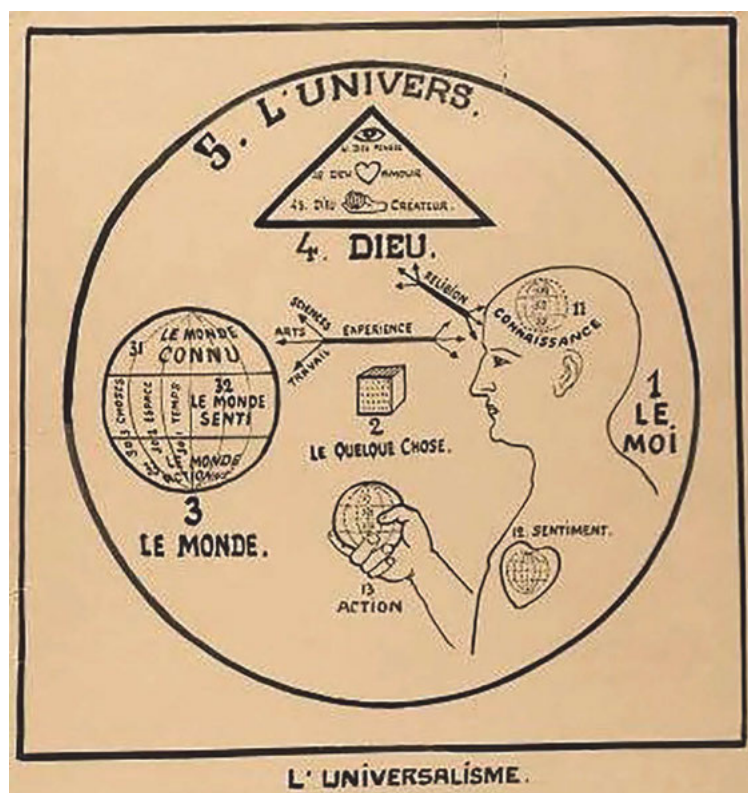


Figure 7. Paul Otlet, *Universalism* (n.d.)—MDN, EUM, MDN, AFF, scan nr. Mundaneum\_017\_stitched.

which define and recur in the way that a person experiences the “World” (mediated by the thing or “le quelque chose”) by means of “science, the arts and labour;” which lead to a “World” that is at the same time “known, sensed and operated;” and that even defines one’s personal religious relation with a higher transcendental reality or God (as “Thought, Love and Creator”). As we learn from Fouillée, the trinity of knowledge-sentiment-action was a key-concept of Platonic idealism (although it should be noted that Comte in his political philosophy also took the same trinity to heart) (Fouillée 1875, 85-114; Comte [1851] 1875). Fouillée himself thought that the faculties of knowledge, sentiment, and action should not be divided in an eclectic manner, but should be considered as simultaneously present in each state of consciousness. Like Fouillée, Otlet believed that (Otlet 1935, 336): “The self, the human being, has three aspects: firstly, knowledge; secondly, sentiment; thirdly, activity. These aspects are always interlocked and linked by mutual interaction.”

## 5.0 Conclusion

In conclusion, the label of positivism attributed to Otlet’s programme of documentation is too imprecise to characterize its different epistemological tenets. In his overview

of the prevailing philosophical doctrines in France around 1920, Dominique Parodi (1920, 485) asserts that “one of the most general tendencies that we have observed consists in concluding that there is an antinomy between existence and thought.” Similarly, Otlet concluded (1935, 355) that there were “Two great types of systems: firstly, monism (positivism, energeticism, materialism); and secondly, idealism (spiritualism, Thomism).” Otlet’s theory of documentation, in which the concept of the Universal Book takes a central place, is grounded epistemologically by these different systems on different levels and in varying degrees of importance. The analytic phase borrowed its theoretical basis foremost from energeticism and monism; the synthetic phase sought laws and structures that celebrated a positivist version of structural objectivity; while the dissemination of the encyclopedia was framed in spiritualist terms as an instrument of self-development.

## References

- Banks E. C. 2004. “The Philosophical Roots of Ernst Mach’s Economy of Thought.” *Synthese* 139: 23-53.
- Bernstein, Richard J. 1985. *Beyond Objectivism and Relativism: Science, Hermeneutics and Praxis*. Philadelphia: University of Pennsylvania Press.

- Blackmore, John T. 1972. *Ernst Mach: His Work, Life, and Influence*. Berkeley, CA: University of California Press.
- Bryant, Christopher G. A. 1985. *Positivism in Social Theory and Research*. Contemporary Social Theory: Theoretical Traditions in the Social Sciences. Houndmills, Basingstoke, Hampshire: Macmillan.
- Comte, Auguste. (1851) 1875. *System of Positive Polity. Vol. 1, General View of Positivism and, Introductory Principles*, trans. J.H. Bridges. London: Longmans, Green.
- Copleston, Frederick Charles. (1975) 2003. *A History of Philosophy*. New ed. London: Continuum.
- Crombois, Jean-François. 1997. "Énergétisme et productivisme: La pensée morale, sociale et politique d'Ernest Solvay." In *Ernest Solvay et son temps*, ed. Andrée Despy-Meyer and Didier Devriese. Brussels: Archives de l'Université de Bruxelles, 209-20.
- Day, Ron. 1997. "Paul Otlet's Book and the Writing of Social Space." *Journal of the American Society for Information Science* 48: 310-17.
- Daston, Lorraine and Peter Galison. 2007. *Objectivity*. New York: Zone.
- Eco, Umberto. 1996. "Afterword." In *The Future of the Book*, ed. Geoffrey Nunberg. Berkeley, CA: University of California Press, 295-306.
- Foucault, Michel. (1969) 2002. *The Archeology of Knowledge*, trans. A.M. Sheridan Smith. Routledge Classics. London: Routledge. Translation of *L'archéologie du savoir*.
- Fouillée, Alfred. 1875. *Histoire de la philosophie*. Paris: Librairie CH. Delagrave.
- Fouillée, Alfred. 1890. *L'évolutionnisme des idées-forces*. Paris: Felix Alcan.
- Fouillée, Alfred. 1896. *Le mouvement idéaliste et la réaction contre la science positive*. Bibliothèque de philosophie contemporaine. Paris: Felix Alcan.
- Fouillée, Alfred. 1908. *Morale des idées-forces*, 2e éd. Bibliothèque de philosophie contemporaine 267. Paris: Felix Alcan.
- Fouillée, Alfred. 1913. *Esquisse d'une interpretation du monde*. Bibliothèque de philosophie contemporaine. Paris: Felix Alcan.
- Frohmann, Bernd. 2001. "Discourse and Documentation: Some Implications for Pedagogy and Research." *Journal of Library and Information Science Education* 42: 12-26.
- Frohmann, Bernd. 2004. *Deflating Information: From Science Studies to Documentation*. Toronto: University of Toronto Press.
- Frohmann, Bernd. 2008. "The Role of Facts in Paul Otlet's Modernist Project of Documentation." In *European Modernism and the Information Society: Informing the Present, Understanding the Past*, ed. W. Boyd Rayward. Aldershot: Ashgate, 75-88.
- Gunn, J. Alexander. (1921) 2011. *Modern French Philosophy: A Study of the Development since Comte*. Miami: HardPress Publishing.
- Haeckel Ernst. (1895) 2004. *Monism as Connecting Religion and Science*, trans. J. Gilchrist. Whitefish, MT: Kessinger Publishing. Translation of *Monismus als Band zwischen Religion und Wissenschaft*.
- Hakfoort, Casper. 1992. "Science Deified: Wilhelm Ostwald's Energeticist World-View and the History of Scientism." *Annals of Science* 49: 525-44.
- Hapke, Thomas. "Roots of Mediating Information: Aspects of the German Information Movement." In *European Modernism and the Information Society: Informing the Present, Understanding the Past*, ed. W. Boyd Rayward. Aldershot: Ashgate, 307-27.
- Johnson, Mark. 1987. *The Body in The Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago: University of Chicago Press.
- Landow, George. 1996. "Twenty Minutes into the Future: Or, How Are We Moving Beyond the Book?" In *The Future of the Book*, ed. Geoffrey Nunberg. Turnhout: Brepols, 209-37.
- Ostwald, Wilhelm. 1910. *Les fondements énergétiques de la science de la civilisation*, trans. E. Philippi. Bibliothèque sociologique internationale. Paris: V. Giard & E. Brière. Translation of *Energetische Grundlagen der Kulturwissenschaft*.
- Ostwald, Wilhelm. 1912. *Der energetische Imperativ*. Leipzig: Akademische Verlagsgesellschaft.
- Ostwald, Wilhelm. 1913. *Monism as the Goal of Civilization*. Hamburg: International Committee of Monism.
- Otlet, Paul. 1903. "Les Sciences bibliographiques et la documentation." *Bulletin de l'Institut international de bibliographie* 8: 125-47.
- Otlet, Paul. 1911. *L'avenir du livre et de la bibliographie*. Institut International de Bibliographie publication 117. Brussels: Institut International de Bibliographie.
- Otlet, Paul. 1934a. *Traité de documentation: Le livre sur le livre, théorie et pratique*. Bruxelles: Editiones Mundaneum.
- Otlet, Paul. 1934b. "La documentation personnelle." March 11, 1934. MS nr. 3745. Fonds Encyclopaedia universalis Mundaneum. Personal Papers Paul Otlet. Mundaneum. Mons.
- Otlet, Paul. 1935. *Monde: Essai d'universalisme: Connaissance du monde, sentiment du monde, action organisée et plan du monde*. Brussels: Mundaneum.
- Otlet, Paul. 1938. "Le livre universel: Le livre de demain; Encyclopédie mondiale; Réseau de documentation." In *Atlas de documentation*, ed. Paul Otlet, Note no. 8338, 8 December 1938, Personal Papers Paul Otlet, Mundaneum, Mons.
- Parodi, Dominique. 1920. *La philosophie contemporaine en France: Essai de classification des doctrines*, 2.éd revue. Paris: Felix Alcan.

- Pearson, Karl. 1892 *The Grammar of Science*. The Contemporary Science Series. London: Walter Scott.
- Rayward, W. Boyd. 1994a. "Some Schemes for Restructuring and Mobilising Information in Documents: A Historical Perspective." *Information Processing & Management* 30: 163-75.
- Rayward, W. Boyd. 1994b. "Visions of Xanadu: Paul Otlet (1968-1944) and Hypertext." *Journal of the American Society for Information Science* 45: 235-50.
- Rayward, W. Boyd. 1997. "The Origins of Information Science and the International Institute of Bibliography/International Federation for Information and Documentation (FID)." *Journal of the American Society for Information Science* 48: 289-300.
- Rieusset-Lemarié, Isabelle. 1997. "Otlet's Mundaneum and the International Perspective in the History of Documentation and Information Science." *Journal of the American Society of Information Science* 48: 301-9.
- Simon, Walter Michael. 1963. *European Positivism in the Nineteenth Century: An Essay in Intellectual History*. Ithaca: Cornell University Press.
- Schneiders, Paul. 1982. *De bibliotheek- en documentatiebeweging 1880-1914: Bibliografische ondernemingen rond 1900*. PhD diss., Universiteit van Amsterdam.
- Turner J.H. 2000. "The Origins of Positivism: The Contributions of Auguste Comte and Herbert Spencer." In *Handbook of Social Theory*, ed. George Ritzer and Barry Smart. London: SAGE, 30-42.