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"MAN IS AN ADMIRABLE MACHINE" - A DANGEROUS IDEA ?

Timo Kaitaro*

Si VAUCANSON a sçu construire un Canard artificiel qui avancoit son Bec pour saisir la nourriture qu'on lui presentoit, l'AUTEUR du VAUCANSON n'auroit-IL pû construire un Automate qui imitât les Actions de l'homme ?

Je ne veux pas insinuer par là, que l'Homme est un pur Automate : je veux simplement donner à entendre qu'il est possible que des actions que nous attribuons à l'Ame, soient l'Effet d'une secrette Méchanique.¹

Charles Bonnet 1760

La Mettrie caused a scandal with his book titled *Man a machine* (*L'Homme machine* 1747). The book's reputation is still mostly based on the provoking title.

It is often cited as an example of mechanistic materialism, that is, a conception according to which the workings of the human mind can eventually be explained by the same mechanics as inanimate nature. If one looks closely at the text, it is, however, difficult to find evidence that La Mettrie would have presented such physicalistic views, which are familiar from some more modern reductionistic solutions to the mind-body problem. More perceptive commentators have observed this.² In fact, the work does

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¹ Charles BONNET, *Essai analytique sur les facultés de l'âme*, Copenhagen, Frères Ch. & Ant. Philibert, 1760, § 506.

² Ann THOMSON, "L'homme machine, mythe ou métaphore ?" *Dix-huitième siècle*, 20 (1988), pp. 368-376; Kathleen WELLMAN, *La Mettrie: Medicine, Philosophy, and Enlightenment*, Durham and London, Duke University Press, 1992.

not, in contrast to La Mettrie's earlier work *Histoire naturelle de l'âme* (1745), contain detailed mechanistic explanations of mental phenomena. The illusion involved in the mechanistic reading of the text stems from two sources, or, to be precise, from two kind of anachronisms: the metaphor of the title is understood either in the seventeenth-century context of Cartesian mechanistic physiology and the animal-machine hypothesis, or in the twentieth-century context of robotics and computer simulation of human cognition.

In addition to the fact that La Mettrie wrote his book in the eighteenth century, we should also remember that the metaphor of man as a machine was rather commonplace before La Mettrie. The quotation in the title of this paper is an example of the figurative uses of the term "machine" taken from the *Dictionnaire de l'Académie* (1694). The definition of this metaphorical sense, given in a modern dictionary of classical French, seems almost - but for the words "living or not" - a definition of the concept of organism: "*A whole formed of parts, or organs, which constitute a unity, living or not, and which produces specific effects without transmitting force from the outside ; organism, body.*"³

So, perhaps it was not exactly La Mettrie's idea of man as a machine that was deemed scandalous. There are other aspects of the work the consequences of which are in fact more dangerous from the point of view of orthodoxy. In addition to occasional mechanical metaphors, La Mettrie's book contains elements which could be called "vitalistic". When it refers to physiology, it is not to speculative theories about the physiological mechanisms serving mental operations, but to experiences and anecdotes that serve to prove that "*each small fibre, or part of organized body is moved by a principle which it has in itself (lui est propre)*".⁴ This naturally excludes not only explanations referring to a soul, but also Cartesian-type mechanistic explanations referring to movements communicated by

³ "*Ensemble des parties, des organes qui constituent un tout, vivant ou non, et produisant des effets déterminées sans transmettre une force au-dehors ; organisme, corps*", Gaston CAYROU, *Dictionnaire du français classique*, Paris, Klincksieck/Livre de Poche, 2001, entry "machine".

⁴ "*Voilà beaucoup plus de faits qu'il n'en faut pour prouver d'une manière incontestable que chaque petite fibre, ou partie des corps organisés, se meut par un principe qui lui est propre, & dont l'action ne dépend point des nerfs, puisque les mouvements en question s'exercent, sans que les parties qui les manifestent aient, aucune commerce avec la circulation*", Julien OFFRAY de LA METTRIE, *L'Homme machine*, edited with an introductory monograph and notes by Aram VARTANIAN, Princeton, N.J., Princeton University Press, 1960, pp. 181-182.

impulsion from other bodies. La Mettrie presents a rich and dynamic conception of matter and its properties, which contrasts with Descartes' passive matter, reducible to extension (this aspect of La Mettrie's criticism of Descartes was already present in the *Histoire naturelle de l'âme*). In addition, La Mettrie emphasizes that the organic movements observed in separated parts of organisms, instead of being disordered, are regular.⁵ It was these elements of his materialism which were later elaborated and developed by Diderot, who, incredible as it may seem in the light of his texts, has also been described as a mechanistic materialist.⁶ For reasons explained in more detail below, I believe that the idea that parts of organisms have vital properties *in themselves*, is the keystone of the eighteenth-century French medical materialism.

I would like to provide some evidence to the effect that in the eighteenth-century it was rather vitalism than mechanism that was philosophically dangerous, in the sense of providing means for questioning the presuppositions of orthodox dualism. The eighteenth-century vitalism, exemplified by the Montpellierian school, could provide the foundations for a consistent materialism, something that mechanism could not do. But first, I would like to make the inverse point that mechanism was rather reassuring from the traditional dualist point of view. I will present a philosopher, Charles Bonnet, who, in contrast to the author of *L'Homme machine*, did not hesitate to present detailed mechanistic explanations of mental phenomena, but whose works, although he was occasionally suspected of materialism,⁷ did not cause a scandal for the obvious reason that his view despite, or rather - as I would claim - as a result of its mechanism, provided all the more reasons for postulating the existence of an immortal soul and an almighty Creator.

BONNET'S DUALIST MECHANISM

⁵ *Ibid.*, p. 182.

⁶ See Timo KAITARO, "The eighteenth century French materialists and mechanistic materialism", in J. ALAVUOTUNKI, A. LEIKOLA, J. MANNINEN and A.-L. RAISANENE (eds.), *Aufklärung und Französische Revolution II.*, University of Oulu, Publications of the Department of History, no. 3/1987, pp. 66-83.

⁷ Raymond SAVIOZ, *La Philosophie de Charles Bonnet de Genève*, Paris, J. Vrin, 1948, pp. 27, 133 and 226.

So, although it is probably not possible to find any strict mechanists among the eighteenth-century materialists,⁸ it is indeed possible to find properly mechanistic explanations of mental phenomena proposed during the eighteenth century. Despite the dualism of their proponents these accounts resemble rather closely the modern reductionistic materialist theories of mind, which are usually called identity theories. In such theories mental items, that is ideas, images, meanings, or whatever mental might be taken to exist, are considered to be in some sense identical with certain brain states.⁹ Psychological laws or regularities could then be explained by the physiology of the brain.

Paradoxically, during the eighteenth century such identities (so called type-type identities) were proposed by certain dualists, who postulated, for example, that there are specific fibres in the brain for each idea.¹⁰ Whatever differences there may be in the metaphysical interpretation of the brain-mind identities between the dualistic vs. materialistic theories, there seems to be no difference in so far as explaining the regularities of psychological phenomena is concerned. For example Charles Bonnet claimed that certain events in the soul are constantly associated with certain events in the brain.¹¹ The movements of certain fibres are the univocal physiological correlates of having the idea in mind, for example, having a certain sensation or a remembrance of the same sensation.¹² Thus for each regularity observed in the psychological level, like association, there would exist a corresponding physiological regularity. If a certain idea is able to bring forth another, this could be explained by the fact that the movements on which these ideas depend are related to each other in a way which explains mechanically that the ideas evoke one another.¹³ For example, Bonnet explains associations between sensations, and between sensations and the signs of language, by the communication of fibres, which can either be immediate or mediated by other bodies.¹⁴ Fibres which have been

⁸ See Timo KAITARO, *op. cit.*, and Charles T. WOLFE, "Machine et organicisme chez Diderot", *Recherches sur Diderot et l'Encyclopédie*, 26 (April 1999), pp. 213-231.

⁹ Cynthia MACDONALD, *Brain-Mind Identity Theories*, London, Routledge, 1989.

¹⁰ Timo KAITARO, "Ideas in the Brain: The Localization of Memory Traces in the Eighteenth Century", *Journal of the History of Philosophy*, 37 (1999), pp. 301-322.

¹¹ Charles BONNET, *Essai analytique sur les facultés de l'âme*, *op. cit.*, § 75.

¹² *Ibid.*, §§ 85 & 87.

¹³ *Ibid.*, § 73.

¹⁴ *Ibid.*, §§ 601 & 789ff.

simultaneously affected (*ébranlées*) acquire a tendency to affect one another reciprocally.¹⁵ In addition, the brain has a tendency to form a habit of reproducing perceptions in the same order in which they have constantly succeeded each other.¹⁶ From the reasonably plausible fact that the movements of the fibres dispose them to the same movements, Bonnet reasons that the repetition of these movements in the same order disposes the fibres to execute the movements in this order.¹⁷ He attempts to provide a quasi-physical explanation of this mechanism.¹⁸ Reasoning by syllogisms can equally be explained mechanically: the bundles of fibres which correspond to the premisses act on each other and on the bundle of fibres corresponding to the conclusion.¹⁹

Such a scheme is able to explain the regularities observed in the way ideas follow each other by referring to the corresponding physiological events. Now, it must be observed that what it cannot explain is the correspondence between mental items and physiological events itself. Likewise the interaction between mind and body is a problem in such a dualistic scheme. One ends up referring to the universal laws of the mind-body union instituted by the Almighty, which are unfortunately incomprehensible for our limited understanding. Bonnet admits that he ignores how the movements of certain fibres in the brain are able to produce ideas in the soul or how the soul is able TO act on the body; the union of these two substances which have nothing in common is a mystery.²⁰ So Bonnet does not explain how the mechanisms of the body result in mental phenomena, for the simple reason that according to him they actually do not result from bodily movements. They have nothing in common with movement, so they just *seem* to result from them.²¹ Bonnet says that the movements of fibres are "natural signs" of ideas.²² Ideas are joined by God to material fibres contingently: the union of the mind and the body is

¹⁵ *Ibid.*, § 641.

¹⁶ *Ibid.*, § 624.

¹⁷ *Ibid.*, § 629.

¹⁸ *Ibid.*, §§ 641-649.

¹⁹ *Ibid.*, § 256.

²⁰ *Ibid.*, §§ 6, 46 and 126 ; see also Raymond SAVIOZ, *op.cit.*, p. 141.

²¹ Charles BONNET, *op.cit.*, § 29.

²² *Ibid.*, p. xxi.

arbitrary, dependent on the will of God.²³ But, interestingly, in Bonnet the reference to the mysteries of creation is coupled with a possibility of mechanistic explanation.

In the short *Analyse abrégée* of his *Essai analytique* contained in his *Palingénésie* Bonnet refers to the fact that fibres are organs or small machines and that their specific function could be explained by their internal constitution.²⁴ Thus we could have a mechanistic (although finalistic) account of the idea-fibre correspondence. But this explanation refers to preformed machines and to their creator. It has its natural place in the preformationist philosophy of Bonnet, in which even miracles had their explanation in mechanisms set already at creation to cause the correct miracle at the proper moment.²⁵ What appears miraculous and mysterious is eventually based on the way God has put up his machinery at creation.

In reading Bonnet's mechanistic accounts of mental phenomena one starts to wonder for what Bonnet needs the soul after all. But in addition to the union of the soul and the body, there is another thing which Bonnet's mechanistic account cannot explain: the unity of the self. The sentiment of self as the unity of mental phenomena is something that according to Bonnet cannot reside in a material substance.²⁶ This is the challenge that Diderot takes up in his *Rêve de d'Alembert*: the unity of the self can reside in a material substance.

DIDEROT AND THE MONTPELLIERIAN VITALISTS

Diderot had obviously read Bonnet's works in preparing his *Éléments de physiologie*.²⁷ One can also find echoes of Bonnet in Diderot's works (the spider analogy, the notion of harmonies produced by fibres, arguments against freedom of indifference etc.).²⁸ However, his conception

²³ *Ibid.*, § 119.

²⁴ Charles BONNET, *Palingénésie philosophique*, 2 vols, Genève, Chez Claude Philibert et Barthelemei Chirol, 1769, vol. I, pp. 18-19.

²⁵ Raymond SAVIOZ, *op.cit.*, pp. 125-131.

²⁶ Charles BONNET, *Essai analytique*, *op. cit.*; xix-xx, §§ 2 and 509.

²⁷ Denis DIDEROT, *Éléments de physiologie*, critical edition with an introduction and notes by Jean Mayer, Paris, Librairie Marcel Didier, 1964, pp. xiii-xiv.

²⁸ In his *Essai* C. BONNET presents the spider analogy (§ 775) and the notion of harmonies produced by the fibres (§§ 520ff), which are echoed in DIDEROT's *Rêve de d'Alembert*'s spider

of the relation between the mental and the material and of the role of mechanistic explanations is completely different. In contrast to Bonnet, Diderot discarded mechanism and avoided postulating specific identities between mental items and physiological states.²⁹ Because of this he also avoided the problems related to the interaction of the body and the soul. Instead, he was faced with the problem which the dualists like Bonnet had solved simply by postulating the immaterial soul. He was faced with the traditional arguments against materialism based on the contrast between the unity of the mental and the divisibility of matter.³⁰ Diderot tried to answer these objections by formulating a version of materialism in which material organisms were not seen as machines whose workings could be analysed in terms of the interactions between their constituent parts, but as unified organic wholes, which could more plausibly form the basis of mental phenomena than machines.³¹ This involved, as a logical counterpart of the denial of the Cartesian immaterial soul, the idea that matter has other properties than those described by Cartesian metaphysics, something which La Mettrie had already emphasized before Diderot in his *Histoire naturelle de l'âme*.³²

The radicalness of Diderot's antireductionistic and non-mechanistic materialism lies in the fact that his position allowed material organisms properties that the mechanistic view did not allow: namely those that were traditionally the prerogative of the immaterial soul. One of the functions of the Cartesian soul was to allow the organism provided with it properties that were not reducible to mechanics. Sensibility was one of these. In Diderot's philosophy sensibility became a property of matter, at least of matter organized in a certain fashion.

and harpsichord analogies. The argument against freedom of indifference in the *Réfutation d'Hemsterhuis* evoking acts done from the motive of proving freedom of indifference (D. DIDEROT, *Oeuvres complètes*, edited by R. LEWINTER, 15 vols, Le Club Français du Livre, Paris 1971, vol. XI, pp. 263-264) is a variation of the same theme in BONNET's *Essai* (§ 461).

²⁹ Timo KAITARO, *Diderot's Holism: Philosophical Anti-Reductionism and Its Medical Background*, Frankfurt am Main, Peter Lang, 1997, and "Ideas in the Brain : The Localization of Memory Traces in the Eighteenth Century", *op. cit.*.

³⁰ Timo KAITARO *Diderot's Holism*, *op. cit.*, pp. 90-92 ; see also Ben Lazare MIJUSKOVIC, *The Achilles of Rationalist Arguments*, The Hague, Martinus Nijhoff, 1974.

³¹ Timo KAITARO, *Diderot's Holism*, *op. cit.*.

³² Julien OFFRAY de LA METTRIE, *Histoire naturelle de l'âme*, 1745.

The contrast between Diderot's and Bonnet's views becomes apparent, if one examines how the unity of the organism is conceptualized in their respective views. Analysing the body mechanically destroys the unity of the organism that is obvious in naive perception: the immediately perceived teleology of the whole is analysed in terms of the mechanical interaction between the parts of the organism. A mechanist is able to reconstruct the unity of the organism in the form of a rationally understandable unity typical of machines: each part can be understood according to its functional role as a means to an end. Such explanations tend to be inescapably finalistic and they usually refer to something immaterial which has the reason and consciousness that the body in itself, considered as a mechanism, is lacking: thus the teleology of the movements of the body could either be explained by a rational soul or by the Creator. In the original Cartesian scheme the first kind of explanation (that involving the immaterial soul) is applicable to voluntary movements and the latter (that involving God) to natural physiological functions - and to passions, in so far as they inform us of what is good for the body. Bonnet's preformationism tends to emphasize even more strongly the direct role of God in the creation of the machinery of the body. And although Bonnet claims to support the system of physical influence (that is, interactionism) instead of the system of occasional causes or that of pre-established harmony,³³ he ends up by denying any real causal powers to the soul and claiming that actions which we attribute to the soul are in fact the effect of "secret mechanisms".³⁴ And of course he evokes the author of the automaton (*ibid.*) and the fact that the execution of the will depends on the immediate action of the "prime mover" (*premier moteur*) - this, he observes, requires no explanation: "*the system of occasional causes is enough well known*".³⁵

In contrast, within a monistic "vitalistic" materialism functions of the organism are immanent and not to be looked for in any immaterial transcendent entities, God or the soul. Vital properties, such as Haller's "irritability" and the "sensibility" of the vitalists are in such materialism simply properties of matter, on which capacity of matter to form organized wholes is based. The sensibility of the parts was seen as a precondition for them being able to perform their function as parts of a unified organism

³³ Charles BONNET, *Essai analytique*, *op. cit.*, pp. xxii-xxiii.

³⁴ *Ibid.*, § 506.

³⁵ "*Cela n'a pas besoin d'explication ; & on connaît assez le Système des Causes Occasionnelles*", *Ibid.*, § 507.

(here Diderot could rely on ideas developed by Maupertuis, Bordeu and others).

In the *Rêve de d'Alembert* Diderot seems to hesitate whether sensibility is a general property of matter or the result of organization: he writes that it is either one or the other.³⁶ I think that the reason why Diderot did not accept the simple solution that sensibility results merely from organization is that, if sensibility is taken to be a primitive property of matter, or at least as a potential property which is actualized when it is properly organized,³⁷ the fact that matter tends to organize itself could be explained by something inherent in matter itself without recourse to anything external to matter. If sensibility results from organization one is faced with the problem of explaining this organization, whereas if matter has some vital properties, some kind of elementary form of sensibility, this could be used in explaining its tendency to form organized wholes.³⁸ This was more dangerous than mechanism, since it attributed matter more than its due, more than the passive faculties characteristic of tools and machines with their implicit reference to their maker and user.

In the dualist universe, the elements of which organisms are formed could not be allowed a life of their own: in material nature itself there are no final causes, and the teleological order can only result from something that transcends the passive mechanical properties of matter. In so far as we are not usually conscious of our normal vital physiological processes, in Cartesian dualism their telos was provided by the Providence.

DUALISM, MATERIALISM AND THE NEED FOR BRAIN-MIND IDENTITIES

Voluntary action, however, considered as the result of the interaction of the soul and body, requires some additional theoretical props: a kind of an "interface" where the soul is able to interact with the machine: "the seat of the soul". In so far as the rational soul is seen, as it is in the case of perception and voluntary movement, as the "user" of the mechanisms of

³⁶ DIDEROT, *Oeuvres complètes*, edited by J. AASSEZAT and M. TOURNEUX (= AT), 20 vols, Paris, Garnier 1875 – 1879, vol. II, p. 116.

³⁷ DIDEROT, *Correspondance*, edited by G. ROTH and J. VARLOOT, 16 vols, Paris, Éditions de Minuit, 1955 – 1970, vol. V, p. 138-142.

³⁸ KAITARO, *Diderot's Holism*, *op. cit.*, p. 104 ; DIDEROT, AT II, pp. 49-50.

the body, a certain kind of univocal correspondence and correlation between material and mental entities seems to be required. The parts of the machinery must have stable and univocal functions (imagine how anyone could, even an immaterial soul, use machines that are unpredictable and spontaneous). How could a soul calculate with ideas by using fibres, if the same fibres could represent now this and now that, depending on the context (as the signs of natural language do)? How could a soul even distinguish sensations, if there was no one-to-one correspondence between ideas and anatomical entities or physiological events in the brain where the soul traditionally has its seat? How could it interact with the outside, if it could not predict the actions that result from sending animal spirits to certain pores in the brain rather than others?

The context independence required by the Bonnet-type theory was reached by postulating unanalyzable and univocal simple ideas which correspond to the physiological elements involved in sensation.³⁹ All mental ideas and concepts have their physiological correlates in the brain. Complex ideas result from a combination of simple ideas and of the movements corresponding to these.⁴⁰ Voluntary movements are explained with a similar scheme. Bonnet writes that voluntary acts are triggered by will's application to the idea of the movement, which idea augments the movement in the fibres corresponding to the idea.⁴¹ Thus the mental is translatable into the physiological and vice versa, and the place where this actually takes place is the seat of the soul, the place where all the nerves originate.⁴²

But, this correspondence is more difficult to figure out than one would imagine, since the movements involved in any act are almost always different depending on bodily posture: thus two acts subsumable under the same idea, for example "opening the window", do not necessarily involve the same muscular movements. What we intend and have in mind is the intentional action and not the muscle movements. Thus there should be something in the seat of the soul that corresponds not only to the different

³⁹ Charles BONNET, *Essai analytique, op. cit.*, §§ 202-204.

⁴⁰ *Ibid.*, § 205.

⁴¹ *Ibid.*, § 480-483.

⁴² *Ibid.*, § 27-31 and 795.

muscle movements under their physical description but to the act under its intentional description.⁴³

In this context, La Mettrie's critique of Stahl's animism is pertinent. The materialist observes that in such a scheme the soul would be in the machine as a flute player, opening suitable holes and closing others, in order to produce the required muscle movements. But La Mettrie observes that this would be like a flautist executing brilliant cadences by playing with an infinity of holes that are unknown to it.⁴⁴ The Cartesian mechanist could of course rely on automatical reflex-like learned movement complexes which can be triggered off as a whole (along the lines of Bonnet's explanation of associations cited above). But most automatical actions are not stereotypical movement complexes but intelligent and context sensitive reactions, as Diderot observes in his *Éléments de physiologie*: a man walking absent-mindedly avoids obstacles without being conscious of them. This cannot be simply a result of pre-established habits, since the obstacles are novel.⁴⁵

The same problem arises with sensation: the stimuli presenting a circle are different depending on the circle's relative position in respect to the observer. The bodily mechanisms should be able to translate these different stimuli so that in the seat of the soul something that corresponds simply and unequivocally to the idea of a circle is received. In so far as this translation is supposedly taken care of by bodily mechanisms, there seems to be no role for the soul in the explanation of perception as a psychological phenomenon. Like the coordination of voluntary movements the recognition of sensations is already beyond its realm. Thus the explanations of perception and movement end up being mechanical and the role of the seat of the soul seems only to provide the mysterious place where the soul interacts with bodily mechanisms.

I have tried to show that the need to postulate material counterparts of mental ideas in the brain is motivated by dualist assumptions. For the interaction of the soul and body requires the presence of material

⁴³ For intentional descriptions and their relation to descriptions of muscular movements, see for example G. E. M. ANSCOMBE, *Intention*. Oxford, Basil Blackwell, 1976; Charles TAYLOR, *The Explanation of Behavior*, London, Routledge & Kegan Paul, 1970, and G. H. von WRIGHT, *Explanation and Understanding*, London, Routledge & Kegan Paul, 1975.

⁴⁴ Julien OFFRAY de LA METTRIE, *L'Homme machine*, *op. cit.*, p. 187.

⁴⁵ Denis DIDEROT, *Éléments de physiologie*, *op. cit.*, pp. 285-286.

counterparts of ideas in the brain in order that the translation of mechanical movements to mental ideas and vice versa can take place in the seat of the soul. In contrast, if there is no separate soul and if the mental is merely the way the organism works as a unified whole, there is no need to postulate that the parts of the machine or their properties correspond to the mental properties or states of the whole in a univocal way; any more than the parts of the mechanism of a clock need to represent temporal concepts - unless, and to this I will return, there is someone *outside* the watch using it for measuring time, only then could a certain hand be said to represent minutes and another hours.

In contrast to dualistic mechanism, in Diderot's organicist philosophy the autonomy of the lower levels in the hierarchic structure of the organism and the polyvalency of organs are parts of the theory itself. Sensibility and functional sympathies exist at all levels of organization from the simple organic molecules via organs and systems of organs to the organism as a whole.⁴⁶ Since sensibility is not dependent on the "centre" of the organism (corresponding to Bonnet's seat of the soul), the bodily aspects of perception and movement are not mechanical and the mental is not something that is added to this mechanism somewhere where the brain and the mind interact. Without destroying the hierarchy of organic levels and the corresponding hierarchy of values, Diderot's model simultaneously makes room for the creativity of life, and denies correspondingly creation and the notion of stable order involved in it. The unity of the organism is not the transparent rational unity of a machine, where each part has a clearly defined and preconceived function. In contrast, the unity of the organism, as Diderot sees it, can result in the same as way as unity is achieved in a work of art: as a system of deformities which are interrelated, well connected and necessary.⁴⁷ Just like in a work of art one is able to "*save the inevitable dissonances*",⁴⁸ the creation of a harmonious organism is based on the capacity of life to assimilate and use the contingent, the monstrous and the accidental.

THE AMBIGUITY OF THE MECHANICAL MODELS

⁴⁶ Timo KAITARO, *Diderot's Holism, op. cit.*, pp. 98ff.

⁴⁷ *Id.*, p. 213 ; Denis DIDEROT, AT X, p. 516.

⁴⁸ Timo KAITARO, *Diderot's Holism, op. cit.*, pp. 213-214 ; Denis DIDEROT, AT X, p. 187 and 200.

Thus far the contrast between machines and organisms seems rather simple. But I would like to point out an interesting ambiguity of mechanical metaphors, which I have already touched above. In the beginning of the eighteenth century it was common to compare mental functions and their relationship to their material or physiological basis to the relation of the function of a clock to its mechanism.⁴⁹ La Mettrie refers to this analogy in the context of Locke's thinking matter argument. He writes: "*In fact, asking whether matter can think, without considering it otherwise than in itself, is tantamount to asking whether matter can mark the hours*".⁵⁰

Such arguments are ambiguous because they can be read as reductionistic arguments: although the clock has functional properties (that of showing time), it is still a machine and everything in the way it works is amenable to mechanistic explanation. But the argument could also be inverted. It could be taken as a proof that complex material systems can have non-physical, *i.e.* functional properties, that their parts do not have.

But in order to get rid of this ambiguity we should distinguish two senses of the word "mechanism". André Pichot has suggested that one distinguishes between "machinism" and "mechanism".⁵¹ According to him a physiology which regards animals as machines is not strictly speaking mechanistic since it is implicitly finalistic. It is not mechanistic in the sense that Cartesian embryology (or cosmology) is. But it may be too late to change the use of the term "mechanist", which has traditionally been used to refer to conceptions that are in fact machinistic and not properly mechanistic. So, I will stick to the common use, but will specify below each time which meaning I am referring to.

Thus we could have a mechanical explanation of the way a clock works (or rather how its parts move) without any reference to its function. Such an explanation could be provided even if the clock would not be functional, that is, if it would fail to show time correctly. On the other hand, we could have an explanation of the clock in terms of its function : once we

⁴⁹ For references, see Timo KAITARO, *Diderot's Holism*, *op. cit.*, pp. 93-95.

⁵⁰ "*En effet, demander si la Matière peut penser, sans la considérer qu'en elle même, c'est demander si la Matière peut marquer les heures*", *L'Homme machine*, *op. cit.*, p. 150.

⁵¹ André PICHOT, *Histoire de la notion de vie*, Paris, Gallimard, coll. Tel, 1993, pp. 345, 367-368, 382, 451 and 458.

understand its function we can ascribe functional roles to its parts and understand its mechanism in a finalistic way.

It is of course the former kind of mechanistic explanation which belongs to the natural sciences. In these sciences one merely deals with the causal mechanisms of the clock in itself, without any reference to purposes or finality. Correspondingly, what differentiates the functional viewpoint is essentially the fact that finalistic mechanism (Pichot's "machinism") implies an external finality and purpose. It explains by contextualizing the object in the framework of human needs and practices. There is nothing problematic in such explanations in so far as they are used in explaining tools and machines. This makes one see the naturalness of the metaphor of organism as a machine. Since machines are nothing more than artificial organs, machines and organs are analogous. Machines and organs, as well as parts of machines and organs, are best explained when we understand their functional role. There could be parts which move and the movements of which we could explain mechanically in the proper sense, but if we cannot see how the part contributes to the function or functions of the machine or the organism, we have not actually explained it mechanically in the finalistic sense of the word. This kind of mechanism seems to be appropriate at least as far as the parts of organisms are concerned (keeping, of course, in mind that they may serve a number of functions at the same time).

However, the machine metaphor becomes problematic, when it is applied to the whole organism. Thus organism ends up as a machine, that is, an artificial organ. Then we are naturally forced to ask "whose organ?". But of course: the soul's. Thus instead of annihilating souls machines as metaphors of the human body give rise to (Cartesian) souls.

This is a problem of which Diderot was aware of and which he avoids by the vitalistic elements of his materialism. In the *Rêve de d'Alembert* d'Alembert remarks that in presenting his harpsichord analogy, Diderot is separating the thinking philosopher and the instrument. Diderot answers by postulating the identity of the musician and the instrument, which means that the *instrument* is given the properties of sensibility and memory.⁵² Likewise in the *Éléments de physiologie*, Diderot presents the traditional Platonic metaphor of wax as a model for memory, but he adds

⁵² Denis DIDEROT, AT II, p. 114.

that the wax must be "*sentient and living*". He is obliged to do this in order to make the metaphor of memory traces consistent in a materialistic context. "*Here's the book*", he writes, "*but where is the reader? The reader is the book itself*".⁵³ The idea that the brain is full of signs and traces does not simply work outside the dualistic presupposition of a separate reader, unless the book and the reader are supposed identical, that is if the medium in which traces are engraved is not formed of dead and insentient matter but of sentient matter. But, of course, in this case the whole metaphor collapses.

⁵³ "*Voilà le livre. Mais où est le lecteur? Le lecteur est le livre même.*", Denis DIDEROT, *Éléments de physiologie*, *op. cit.*, p. 423.

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