

## Machine and system. Adam Smith and the Encyclopédistes<sup>1</sup>

**Abstract.** This paper discusses conceptual affinities between Adam Smith and the encyclopédistes concerning the ideas of system and machine. It is my contention that Smith conceives the division of labour as a kind of machine, that also operates as a systematic principle that is at the core of a particular kind of political organization – the so-called ‘commercial society.’ It is a fact that Smith knew the *Encyclopédie* quite well and valued it for its philosophical contents, especially on method and grammar. As we shall see, Smith concurs with Diderot and d’Alembert that systems are kinds of machines, as contrivances that human understanding or imagination devises in order to sort out perceptions in a discursive order that enables one to make sense of them. In dealing with this topic, which, I am aware, is rather unusual, I shall proceed from the idea of the division of labour as stated at the beginning of the *Wealth of Nations* to other less known texts from Smith’ oeuvre, especially the *History of astronomy* and the *Essay on the first formation of languages*. As I hope to show, Smith’s debt to the encyclopédistes is clear enough throughout all of these texts.

**Key Words.** System. Machine. Division of Labour. Experience. Imagination.

According to Ronald Meek<sup>2</sup>, the idea that a system of social or economic relations operates as a kind of machine is an assumption of political economy in its classical period. In Meek’s account, the idea has two different versions. In the first of them, espoused by the Physiocrats, the machine is the product of regulation from government and as such is comparable to human-made artefacts. As such, it must be constantly and carefully adjusted, in order to produce the expected outcomes. Contrary to this conception, Smith thinks that a system of social or economic relations would result from spontaneous interaction between individual agents pursuing their own objectives. In this latter version, the orderly outcome of the machine displays itself in three different effects: “a more or

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<sup>2</sup> See Meek (1977).

less regular sequence of different systems of law and government”, “a rational allocation of resources”, and “overall economic growth”<sup>3</sup>.

Taking this general observation as a point of depart, I would like to show that Smith’s idea of a machine is of a rather complex conceptual device, and one that is far from being simply mechanistic. As I will show, his conception has interesting similarities with some articles from the French *Encyclopédie* of Diderot and D’Alembert, especially ones that treat machines as kinds of systems.

It is a known fact that Adam Smith had direct knowledge of Diderot and d’Alembert’s *Encyclopédie*.<sup>4</sup> There are at least three clear references to that work in Smith’s writings.

The first comes from the *Letter to the Edinburgh Review*, published in 1755, in which Smith comments on the state of the sciences in Britain and in France and on the rivalry between the two nations in intellectual matters. Smith begins his eulogy of the *Encyclopédie* observing ‘with pleasure (...) that the new French Encyclopedia’ absorbs ‘the ideas of Bacon, Boyle, and Newton’, consigning Cartesian science (if not philosophy) to a secondary role (EPS Letter: 245-6; Smith 1982). Smith sees this as a recognition by the French of ‘the superiority of the English philosophy’, to which they add, however, a merit of their own, or, as Smith puts it, ‘that order, perspicuity and good judgment, which distinguish all the eminent writers of that nation’ (EPS Letter: 245). One of the main features of the *Letter to the Edinburgh Review* comes thus from Voltaire’s own *Lettres philosophiques* (1726), in which the philosopher comments on the possible

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<sup>3</sup> Meek (1977: 177).

<sup>4</sup> For a general view on the matter see Kafker and Loveland (2013).

alliance between English genius and French method; a topic to which Smith adds an original turn:

It seems to be the peculiar talent of the French nation, to arrange every subject in that natural and simple order, which carries the attention, without any effort, along with it. The English seem to have employed themselves entirely in inventing, and to have disdained the more inglorious but not less useful labour of arranging and methodizing their discoveries, and of expressing them in the most simple and natural manner. (EPS Letter: 245)

He goes on to describe in some detail the plan of Diderot and d'Alembert's work, and comments on the published volumes and on the criticism directed at them. He also notes the difficulties the editors had to overcome due to religious and political interference. Finally, he adds that the *Encyclopédie*, once published, 'promises indeed to be in every respect worthy of that magnificent eulogy which Mr. Voltaire bestows upon it', when, in the last pages of *Le siècle de Louis XIV* (1751), he refers to it as 'an immense and immortal work, which seems to accuse the shortness of human life' (EPS Letter: 247).

The second reference to the *Encyclopédie* occurs amid the discussion on utility and pleasure in *The Theory of Moral Sentiments*. It is then that Smith employs the expression 'spirit of system', which one is tempted to take as a direct translation of the French 'esprit de système', which d'Alembert employs in a very famous passage of his *Discours préliminaire*. However, that is not the case, as we shall see from a close reading of texts. Let us begin by Smith's:

We take pleasure in beholding the perfection of so beautiful and grand a system, and we are uneasy till we remove any obstruction that can in the least disturb or encumber the regularity of its motions. All constitutions of government, however, are valued only in proportion as they tend to promote the happiness of those who live under them. This is their sole use and end. From a certain spirit of system, however, from a certain love of art and contrivance, we sometimes seem to value the means more than the end, and to be eager to promote the happiness of our fellow-creatures, rather from a view to perfect and improve a certain beautiful and orderly system, than from any immediate sense or feeling of what they either suffer or enjoy. (TMS IV.1.11; Smith 1984)

Now compare this with d'Alembert:

Thus, it is not at all by vague and arbitrary hypotheses that we can hope to know nature; it is by thoughtful study of phenomena, by the comparisons we make among them, by the art of reducing, as much as that may be possible, a large number of phenomena to a single one that can be regarded as their principle. Indeed, the more one reduces the number of principles of a science, the more one gives them scope, and since the object of a science is necessarily fixed, the principles applied to that object will be so much the more fertile as they are fewer in number. This reduction, which, moreover, makes them easier to understand, constitutes the true 'systematic spirit.' One must be very careful not to mistake this for the 'spirit of system', with which it does not always agree. (D'Alembert 1995, I, vi)

For d'Alembert, *esprit de système* and *esprit systématique* are not necessarily opposed to each other. There is nothing wrong with a spirit of system that proceeds from principles first established by means of an inquiry conducted in a systematic spirit, that is, one that aims at extracting such principles from a careful analysis of experience. The best example

of this is the application of mathematics to physics. That said, those senses do not apply to the *spirit of system* mentioned by Smith in the passage just quoted from *The Theory of Moral Sentiments*.

It is a delicate point, given that the same expression reappears in an addition to the last edition of the *Theory* as an exact synonym of d'Alembert's *esprit de système*, that is to say, as implying a dogmatic approach to empirical phenomena. The passage in question (TMS VI.ii.2.15) is usually seen as a critique of the French Revolution, whose political motivations, as Smith sees them, are purely abstract and do not take into account political institutions already in place. This is not the same *esprit de système* to which he refers in the discussion on utility and beauty, where the expression means a natural predisposition of the human imagination to organize its perceptions from principles and to fashion them into intricate contrivances. Once in place, these are usually seen as having a value in themselves that surpasses the merit of utility – that, nonetheless, must be regarded, for, if not, the system in question would be merely hypothetical. As Smith says, in accordance with Hume, 'the fitness of any system or machine to produce the end for which it was intended, bestows a certain propriety and beauty upon the whole, and renders the very thought and contemplation of it agreeable, is so very obvious that nobody has overlooked it' (TMS IV.i.1). But if, according to Smith, 'the exact adjustment of the means for attaining any convenience or pleasure' is 'frequently more regarded than that very convenience' in itself (TMS IV.i.1), it is at least in part due to the fact that systems achieve in their own terms the same level of intricacy that humans contemplate in natural phenomena. Art imitates nature, but is not a copy of it. It is rather an ingenious reordering of elements, which makes their relations clear and allows us to make sense of phenomena.

In that sense, we admire a system and bestow value to it in accordance to the difficulties it surmounts in its ordering of phenomena.<sup>5</sup>

As Daniel Diatkine among others has shown (Diatkine 2019: chap. 3), the psychology of system forms a distinctive part of Smith's discussion in the *Theory of Moral Sentiments* relating to utility. There is nothing in the *Encyclopédie* comparable to it. Nonetheless, the *encyclopedistes* partake with Smith of the notion that the value of a system goes beyond its utility and lies ultimately in its intricacy and complexity, qualities that complement the usefulness and convenience to which systems must necessarily answer. For example, the sock-loom is for Diderot a cause of admiration not for the fact that it makes socks or that it does so in a more efficient manner than the previous one, but rather, because it performs this by means of an intricate system produced by human reason. What's more, insofar as such a system has organic features, that is to say, is a whole in which each part relates to all the others, it has a kind of refinement that makes it comparable to that of natural, living productions (Diderot and d'Alembert 1751, 'Bas, Métier à', II: 98a-b).<sup>6</sup> In the same manner, admires Vaucanson's automata for the manner in which they imitate natural actions by means of a system of wholly artificial devices. (Diderot and d'Alembert 1751, 'Automate', I: 896-7). In that sense, machines, as systems devised by the human imagination, are the best illustration of the resources it disposes to organize experience in ways that conform to nature without reproducing it.

The third mention of the *Encyclopédie* in Smith's pages comes from a letter written to George Baird in 1763 in which he recommends the articles on Grammar, which he found

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<sup>5</sup> See Deleule (1997: 30-32).

<sup>6</sup> All translations from the "Encyclopédie" are my own.

‘very interesting’ (Corr. Letter 69: 87-8, Smith 1987). This could refer not only to the many articles written by Dumarsais (A-G) and Beauzée (H-Z) but also to others that comment on questions of philosophical grammar, such as ‘Dictionnaire’ by d’Alembert (1754, IV: 958-69), ‘Encyclopédie’ by Diderot (1755, V: 635-62) and ‘Étymologie’ by Turgot (1756, VI: 98-125). However different they may be in other aspects, all these partake of the idea that languages are the means by which knowledge as such is organized and in which it evolves.<sup>7</sup> The point is important to Smith, as is clear from the criticism, also published in the *Edinburgh Review*, of Johnson’s *Dictionary of the English Language*:

Those defects [of Johnson’s Dictionary] consist chiefly in the plan, which appears to us not to be sufficiently grammatical. The different significations of a word are indeed collected; but they are seldom digested into general classes, or ranged under the meaning which the word principally expresses. And sufficient care has not been taken to distinguish the words apparently synonymous. (EPS Letter: 232-3)

The logical criteria that Smith stipulates in this passage for the structuring of a canon of the English language follow closely those established by d’Alembert in the section ‘Dictionnaire de langues’ of d’Alembert’s article ‘Dictionnaire’ (1754, IV: 958-60), published almost a year before Smith’s criticism of Johnson. The point for both Smith and d’Alembert is that languages have their own logical rules and one must attend to them if one hopes to attain to a rigorous exposition of any science whatsoever.

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<sup>7</sup> See Diderot and d’Alembert, ‘Encyclopédie’, V: 636-; and also Auroux 1979.

This gives a new perspective on the interest Smith shows for language and grammar. Far from being a marginal topic to which he gave passing attention, language is for Smith the first theoretical system devised spontaneously by the human imagination and as such offers the best example of the principles by means of which a system comes to be and develops itself. This point has not escaped the attention of Andrew Skinner (1996), whose *A System of Social Science* remains one of the best accounts of the evolution and principal features of Smith's philosophical thought.<sup>8</sup> As Skinner shows, languages are for Smith kinds of machines, made of signs, that is to say, of sensible perceptions of hearing whose analogy to perceptions of other senses are the first step in the systematizing of experience. This is not according to a plan, but rather to a natural bent.<sup>9</sup> By virtue of analogy, language not only organizes and forms perceptions but also allows humans to analyse these and rearrange them according to their own needs and wants. As will be seen in what follows, this is the very principle beyond the idea of the division of labour in *The Wealth of Nations*. Thus, Smith gives to the idea of system as machine a reach and an importance that go way beyond what it has in the *Encyclopédie*. For that reason, our exposition begins and ends with reference to the opening pages of *The Wealth of Nations* on the division of labour.

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In speaking of division of labour in Chapter 1 of the *Wealth of Nations* Smith invites us

To take an example from a very trifling manufacture; but one in which the division of labour has been very often taken notice of, the trade of the pin-maker; a workman not educated to this business (which the division of labour has rendered a distinct trade), nor acquainted with the use of the machinery employed in it (to the invention of which the

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<sup>8</sup> See also, more recently, Planck (1992) and Berry (1998: chap. 2).

<sup>9</sup> That Smith sometimes calls 'instinct'; see for example EPS External Senses 50: 151.

same division of labour has probably given occasion), could scarce, perhaps, with his utmost industry, make one pin in a day, and certainly could not make twenty. But in the way in which this business is now carried on, not only the whole work is a peculiar trade, but it is divided into a number of branches, of which the greater part are likewise peculiar trades. One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on, is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations, which, in some manufactories, are all performed by distinct hands, though in others the same man will sometimes perform two or three of them. I have seen a small manufactory of this kind where ten men only were employed, and where some of them consequently performed two or three distinct operations. But though they were very poor, and therefore but indifferently accommodated with the necessary machinery, they could, when they exerted themselves, make among them about twelve pounds of pins in a day. There are in a pound upwards of four thousand pins of a middling size. Those ten persons, therefore, could make among them upwards of forty-eight thousand pins in a day. Each person, therefore, making a tenth part of forty-eight thousand pins, might be considered as making four thousand eight hundred pins in a day. But if they had all wrought separately and independently, and without any of them having been educated to this peculiar business, they certainly could not each of them have made twenty, perhaps not one pin in a day; that is, certainly, not the two hundred and fortieth, perhaps not the four thousand eight hundredth part of what they are at present capable of performing, in consequence of a proper division and combination of their different operations. (WN, I.1; Smith 1981)

The idea is clear enough: division of labour enhances productivity; that is, it allows the production of a greater number of pieces of a determined commodity in less time than

one person would take, were they to produce the whole artefact by themselves. It is a general effect, of which pin making offers but an instance, albeit perhaps the clearest, that extends to 'other trades and employments.' Before the advent of commercial society, division of labour occurred mainly within the different members of society that applied themselves to the production of so many different conveniences of life. Smith also has that sense in view, but in chapter 1 he is thinking mainly about something new, a phenomenon that occurs within the framework of the production of one single object, such as a pin. Before the division of labour, the same person had to learn and perform all the stages in the production of a pin. They had to combine them into a process that equated to a set of successive multiple activities, performed as extensions of the physiological functions of their own body. The consummation of this process came in the form of the object produced. With the introduction of the division of labour, multiple workers come to task, each of them with a particular knowledge of one stage only and performing a particular operation that reduces the physiology of their movements to a continued repetition of the same task. Their operations are neatly divided, they employ tools of varied complexity, and the sole person who has a notion of the process in general is the supervisor responsible for the production of the finished object. But even this person has no more than an abstract idea of the process as a whole, and certainly they do not have all the required skills to manufacture a piece in each stage of its fabrication. The difference between the two processes is clear. Division of labour makes things more complex in principle – since each worker has a particular task, the production becomes rather complicated – but simpler in the composition, resulting in an enormous increase in efficiency in the multiple production of objects that look and effectively are rather identical to each other.

The division of labour is part of an argument that comprises the whole of chapter 1 of the *Wealth of Nations* and is a central element in the analysis that Smith sets forth in Book I. As such, it has been the object of many studies.<sup>10</sup> In addition, there are many important precedents to Smith's discussion, but it is fair to say that he had in view the detailed discussion of the topic by Mandeville in his *Fable of the Bees*, where the production of manufactures by means of the division of labour is seen as one of the main features of modern, European political societies. As such, it becomes worthy of philosophical consideration by moralists as well as by political theorists. Our main interest, however, is to enquiry into some conceptual precedents to Smith's text.

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As Edwin Cannan has pointed out, the passage in question seems to be referring to an article in Diderot and d'Alembert's *Encyclopédie*, 'Pin' (*Épingle*) by Delaire (Diderot and d'Alembert 1755, V: 804a; WN, I.1: 5), a descriptive text that offers Smith the basic

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<sup>10</sup> See more recently Diatkine (2019: chap 6).

<sup>11</sup> For a recent overview, see Berry (2013: chap. 6).

scheme to which he alludes in his own text. There is ample evidence that this is the case. First, Smith derives from Delaire the peculiar notion, which is not to be found in other sources (such as Réaumur's *Art de l'épinglier*, first published in France in 1761 but read years before in a séance at the Académie Royale des Sciences), that the manufacturing of pins takes 'about 18 operations.' In the second paragraph of Delaire's article, we also find the idea that pin making is 'a very trifling manufacture', in the sense that it is a feature of common, domestic experience, which nonetheless requires a very complex and organized system of production:

Among mechanically manufactured objects, the pin is the smallest, the most common, the less precious and, nonetheless, perhaps one of those that demand the most extensive number of combinations. It is thus that art as well as nature is most prodigious in smaller things, and industry, when constrained in this way, exhibits its most admirable resources; for the manufacturing of the pin goes through eighteen steps before it is ready to be put up for sale. (Diderot and d'Alembert 1755, V: 804)

As Delaire makes it clear, the art and combinations required in the production of pins is a kind of *logical answer* to a particular problem: how to obtain, in the most efficient possible manner, an object such as a pin in its most perfect possible form, that is to say, the most efficient and standardized one. The conceptual vocabulary that Delaire deploys in this passage (arts, combinations, resources, operations etc.) is a strong indication that he is following Diderot's and d'Alembert's hints, as they appear in some articles in the *Encyclopédie* concerning the manner on which a philosophical dictionary should address machines – not only as objects but also as concepts. For as we shall see, Delaire's manufactory, as seen through Smith's lenses, is nothing but a machine-like system.

Let us start with Diderot's article 'Bas, Métier à', that deals with the sock-loom, a very complex machine, 'perhaps the most interesting and complicated that we have', as he puts it (Diderot and d'Alembert 1751, II: 98a-b).<sup>12</sup> In it, the *encyclopédiste* shows the manner in which interconnected multiple engines perform tasks previously assigned to one single person, allowing for the production of numerous objects in the interval of time that one worker would take to produce only one object. The complex interconnection between the many parts of the machine finds an exact compensation in the simplicity with which it is operated by a person, not an artisan, but a manual worker of a different kind, a substitution that allows for the production of many identical objects that answer to the same end. Division of labour improves on that principle, in taking machines devised for particular tasks as so many different links in a long and complex chain of manufacturing. If you allow me the expression, the sock loom is a simultaneous machine, or, to employ Diderot's terms as they appear elsewhere, it is an ideogram; whereas the pin-factory is a successive one, such as the art of writing as it reproduces verbal discourse (See his *Lettres sur les sourds-mouets*). The underlying principle, however, is the same.

Returning to the sock-loom, Diderot says that 'it can be seen as a sole and unique reasoning, whose conclusion is the manufacturing of the product. Likewise, there is such a close interdependence among its parts, that subtracting one we judge less important, or altering its form, would be damaging to the entire mechanism' (Diderot and d'Alembert 1751, II: 98a). Or, to put it in other terms, when we look at the product as the result of a process performed by multiple parts, we understand that it is the consequence of a series of propositions, put together in an order that accords with the role they play in the process as a whole. A machine, then, is a reasoning on the very precise sense that it is a system

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<sup>12</sup> See Delon (2017).

that answers to a logical imperative that gives it coherence and renders it effective in view of a certain set of ends or even for one single end. The same can be said of the production that takes place in the pin-manufacturing process which Smith refers to. It is a kind of reasoning, in the sense that each of its parts has its due place and the object that results from it is the conclusion of a determined, necessary sequence. This sequence is in accordance to rules and proves to be effective, for the very existence of a useful product means that the reasoning behind it is good. In that sense, a machine or a workshop is like an empirical, experimental system that organizes certain material elements in order to produce certain results. It renders the experience of manufacturing more regular and foreseeable than it would otherwise be.

In order to understand this organizing principle that answers for the increase in the effects of manufacturing from handiwork to mechanized manufacturing, we should look no further than to the definition of machines as objects offered by d'Alembert, for he shows that it is a simple mechanical question:

In a general sense, the word *machine* means something that increases and regulates the moving forces, or any instrument designed to produce such movement in a way that saves either the time in the execution of this effect or the force in the cause. This word comes from the Greek μηχανή, machine, invention, art. Therefore, a machine depends much more on the art and the invention than on the force and the solidity of the materials used in its construction. (Diderot and d'Alembert 1765, IX: 794a)

The word has a particular, concrete meaning, but also points to a more general, conceptual sense that connects the idea of machines to art and invention, that is, to certain powers of human imagination or understanding. In that sense, machines are to be understood as

contrivances devised in order to *spare time and force*, and to facilitate the task of organizing experience as humans find it. Machines devised to lift heavy objects perform the task ascribed them by mechanics by means of the same conceptual principle that allows for the production of socks or for philosophers to solve their problems by means of intricate arrangements of ideas.

D'Alembert himself expands that conception to matters philosophical, when discussing the conceptual problems implied in the framing of a philosophical dictionary such as the *Encyclopédie*:

In order to have an idea of a complex machine we should begin by dismantling and showing all its pieces separately and distinctly, and then explaining the relation that each one of them bears to the others. This would allow us to see clearly how the machine operates as a whole even without reassembling it. In likely manner, the authors of an encyclopaedic dictionary must begin by making a general tableau of the main objects of human knowledge in order to give us the main parts of the dismantled machine. Then they must proceed to the minute parts of the machine, dismantling the main ones in the same manner as they did with the machine as a whole and offering a detailed tableau of our knowledge. (D'Alembert 1995, IV: 968)

The philosophical dictionary is a kind of machine for the dismantling and reordering of so many machines given in experience; or, to speak with Diderot, it takes hieroglyphs and turns them into discursive language. Of course, given that the *Encyclopédie* has both a methodical and an alphabetical order, to say nothing of a figurative presentation of the

system of human knowledge, things are not quite as simple as I am making them appear.<sup>13</sup> Nevertheless, the general principle stands its own.

In going beyond the usual, concrete signification of the word machine as a mechanical object made by human intelligence, d'Alembert is able to show, 1<sup>st</sup>. That the phenomena that present themselves to human imagination can be taken as machines in the sense of things to be analysed in order to be understood; and 2<sup>nd</sup>. That in order to do so, the understanding creates another kind of machine, one in which parts previously connected in a given manner are rearranged so as to produce another, entirely different order that relates in the strictest manner to the one it modifies. In this 2<sup>nd</sup> sense, machines are indeed kinds of systems; an idea that is illustrated in the *Encyclopédie* by reference to astronomical systems, which are, in a manner, so to speak, systems by excellence, inasmuch as they describe to the understanding something that is already seen, but not comprehended, by the senses.<sup>14</sup>

That is exactly what Smith expects from a system, irrespective of its peculiar features and particular ends. In the *History of astronomy*, published posthumously in 1795, he defines philosophy as 'the science of connecting principles in nature.' The role of philosophy is to bind 'discordant appearances', for they are, as such, an encumbrance to the 'easy movements of imagination'; it suppresses the 'uneasiness' by 'representing invisible chains' that are not given to perception and that must be thus introduced by human understanding (EPS Astronomy II.12). Philosophy is the 'art' – in Diderot's sense: the technique – that allows human imagination to retrieve its own natural tenor or 'tone' (EPS

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<sup>13</sup> See Leca-Tsiomis (2019).

<sup>14</sup> See Martine (2006: 194-6).

Astronomy II.12). Taken as such, systems are the products of a certain kind of art, or, as Smith puts it, ‘inventions of the imagination’ (EPS Astronomy IV.76). It is on this basis that Smith establishes the analogy between systems and machines:

Systems in many respects resemble machines. A machine is a little system, created to perform, as well as to connect together, in reality, those different movements and effects which the artist has occasion for. A system is an imaginary machine invented to connect together in the fancy those different movements and effects which are already in reality performed. (EPS Astronomy IV.19)

When Smith says that a system is an ‘imaginary machine’, he does not mean it is some kind of chimera. On the contrary, a machine devised by imagination to ‘connect together’, in a new order, things that are already connected in nature, is a product of what d’Alembert calls the ‘systematic spirit’, *esprit systématique* (Diderot and d’Alembert 1751, I: 31). As Smith shows, systems themselves, as ‘imaginary machines’, function according to a precise logic, through which mechanisms of complex structures account – with various degrees of elegance and parsimony – for a very complex array of movements and effects. Smith sees in systems of astronomy the best illustration of how this happens (EPS Astronomy IV.19; and Biziou 2003: chap. 2).

There are, however, some important structural differences between the kinds of systems so far alluded. For while some of them (imaginary machines, systems, objects of art) are the products of a plan, design or intention, and allow one to reorganize, through peculiar principles, things that present themselves as ordered to the observation, the same cannot be said of a system such as the manufacture. For it answers to a convenience, is the product of an original invention, but is not the product of a design or intention as such.

For as Diderot says in the article ‘Art’, machines are inventions of men, and these inventors should be lauded, in his opinion (and following Bacon’s recommendation) as the true heroes of modern times (Diderot and d’Alembert 1751, I: 714a). Another set of heroes celebrated by Smith on the essay on astronomy are astronomers and physicists from Aristotle to Newton, for their successive, and, in their own terms, successful attempts at substituting ‘wonderment’ and ‘superstition’ for a calm and regular apprehension of the most diverse natural phenomena (See for instance EPS Astronomy IV.6; IV.9; IV.27; IV.44-5). Workshops and manufactures, on the other hand, stem from necessities that arise once men find themselves in a peculiar stage of social organization (as Mandeville noticed).

Now, if one turns to the *Encyclopédie* it is clear that ‘manufactures’ as places where division of labour takes place are, together with the improvements resulting from them, the effects of the search for the satisfaction of necessities that arise from man living in a state of society regulated by laws and customs, that is to say, ‘policé.’<sup>15</sup> In other words, manufacture arises from circumstances in which a certain set of laws and institutions combine to make it possible and even, in due time, necessary for the satisfaction of needs (*besoins*) proper to the state of society. Once manufactures are in place, practice improves them, and it is by means of this that rudimentary production slowly but steadily gives place to the division of labour. As Smith says in chapter 1 of the *Wealth of Nations*,

The division of labour, so far as it can be introduced, occasions, in every art, a proportionable increase of the productive powers of labour. The separation of different

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<sup>15</sup> See for instance the anonymous article ‘Manufacture de Laine’, Diderot and d’Alembert 1765, IX, 184b: ‘The manufacture of wool, however superfluous it might be to mankind in a state of nature, is most important to mankind living in a polity – policé’.

trades and employments from one another, seems to have taken place, in consequence of this advantage. This separation too is generally carried furthest in those countries which enjoy the highest degree of industry and improvement; what is the work of one man in a rude state of society, being generally that of several in an improved one. (WN I.i.4; Smith 1981)

The same principle that operates inside the workshop soon imposes itself on all branches of economic activity; and all commercial transactions, as a whole, tend to be determined by this very same principle (not to mention public administration). Division of labour as a technical device becomes the principles of division of labour as a social feature. A small machine becomes a whole system, which shows that Smith goes beyond anything the *Encyclopédie* says concerning the division of labour, which is for Delaire a purely technical and commercial, but not social phenomenon. For Smith, the division of labour possesses in its technical or mechanical dimension a systematic virtue, insofar as it actuates altering the very features of political or social organization. In order to understand this difference in relation to the *Encyclopédie*, we must bear in mind that labour is for Smith the productive principle of the commercial system, whereas the *Encyclopédie* assigns that role rather to land.<sup>16</sup> Arguably, this *doctrinal* difference derives from a methodological affinity, for it is by applying the very idea of system as a machine, that increases effects by means of a decreased application of force, that Smith arrives at the idea of the division of labour as a model for the whole of society.

The similarities here pointed to would be tentative, were it not for the fact that Smith himself elsewhere offers, in his *Essay on the first formation of languages* (1762), an

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<sup>16</sup> See especially Quesnay, 'Fermiers', VI: 528-40, 'Grains', VII: 812-31; but also Diderot, 'Agriculture', I: 183-90, and Anonymous, 'Manufacture réunie, dispersée', X: 58-60.

account of languages as machines, that emerge and evolve in the same manner as manufacture, when it goes from individual *métiers* to the division of labour.

Language becomes more simple in its rudiments and principles, just in proportion as it grows more complex in its composition, and the same thing has happened in it, which commonly happens with regard to mechanical engines. All machines are generally, when first invented, extremely complex in their principles, and there is often a particular principle of motion for every particular movement which it is intended they should perform. Succeeding improvers observe, that one principle may be so applied as to produce several of those movements; and thus the machine becomes gradually more and more simple, and produces its effects with fewer wheels and fewer principles of motion. In language, in the same manner, every case of every noun, and every tense of every verb, was originally expressed by a particular distinct word, which served for this purpose and for no other. But succeeding observation discovered, that one set of words was capable of supplying the place of all that infinite number, and that four or five prepositions, and half a dozen auxiliary verbs, were capable of answering the end of all the declensions, and of all the conjugations in the ancient languages. (Languages 41; Smith 1985)

As it should now be clear, languages are systems very like philosophical dictionaries, sock-looms or modern manufactures. Rather like these, it organizes experience and renders it regular and foreseeable. There is a relevant aspect, however, that only now comes to the fore in this whole discussion. For languages (or at least, for Smith, the Greek and the Latin languages), have the advantage, over other kinds of system, of showing, in the very manner of their operation, the elementary parts of the analysis of sensation through signs. That kind of analysis, favoured by the *encyclopédistes*, proceeds as to rearrange a number of phenomena given in experience and showing what is the necessary connection between them. The result of this procedure is to present a kind of history –

conjectural history – in which events succeed one another not in the order they actually occurred, but rather in that which *they should have occurred*, were human experience organized according to a teleological principle.

That Smith was a master of this kind of analysis is clear not only from his history of languages from which we have just quoted, but also in book 3 of the *Wealth of Nations*. Its title, ‘Of the different progress of opulence in different nations’, might seem at first quite ordinary. But when we turn to chapter 1, ‘Of the natural progress of opulence’, we learn that ‘this order has been in many respects inverted’, and that

Though this natural order of things must have taken place in some degree in every such society, it has, in all the modern states of Europe, been, in many respects, entirely inverted. The foreign commerce of some of their cities has introduced all their finer manufactures, or such as were fit for distant sale; and manufactures and foreign commerce together, have given birth to the principal improvements of agriculture. The manners and customs which the nature of their original government introduced, and which remained after that government was greatly altered, necessarily forced them into this unnatural and retrograde order. (WN, III.i.9)

A case, then, of what grammarians of the enlightenment called inversion,<sup>17</sup> but also, and more importantly, a straight application of a principle outlined by Diderot in the article on ‘Art’ already quoted. In the passage that interests us, Diderot devises a ‘project for a general treatise of mechanical arts’ that would deal with the history of such arts – whose origins, as he observes, are frequently more obscure than those of the liberal arts. In order

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<sup>17</sup> See Ricken (1994: chap. 4).

to supply for that lack of knowledge, the philosopher is free to make ‘suppositions’ extracted from experiments concerning that art with which he is dealing. Then he adds:

By this procedure the progress of an art would be presented in a clearer and more instructive manner than by its true history, if that were known. The difficulties that had to be overcome to improve the art would occur in an entirely natural order, the synthetic explanation of its successive steps would render it comprehensible even for very average minds, and this would divert artists onto the path leading to perfection. (Diderot and d’Alembert 1965, I: 715)

Diderot shows that it is necessary to reverse the actual, empirical order of succession, so that it makes sense. The philosopher is thus able to apprehend it, and to show in a clear manner the logical connections that binds its parts with each other. Conjectural history, then, is a powerful conceptual device that gives sense to phenomena that otherwise would remain beyond the realm of human comprehension and intervention.

To this, Smith adds a nice touch of his own. Given that the machine that is the object of *The Wealth of Nations* – commercial society – is the result of multiple, varied historical processes, it is necessary not only to explain it as such but also to point out to the changes that have produced it in the first place. That is why, when it comes to the conjectural history of commercial society, Smith takes language as the model for thinking about machines. For societies as well as languages have for Smith their very own morphology; and I think it proper to say that commercial society offers Smith the idea of the best possible society within the frame of human nature, in the same manner that Greek and Latin offer the idea of the best possible language within the frame of human

imagination.<sup>18</sup> In that sense, the *Wealth of Nations* is a kind of (very ingenious) grammar for the science of political economy. It seems fair to say of that the science contained in the book operates as a kind of machine that offers a systematic overview of modern European states. A system based on a set of multiple, complicated passions, whose interactions, governed by a human tendency to make systems, result in the division of labour, which, in turn, actuates as a systematic device that gives modern society its distinctive features.

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In view of this, it would certainly be far-fetched to say that Smith himself was a kind of *encyclopediste*. At the same time, it seems undeniable that he profits from Diderot and d’Alembert in ways that make clear the extent of his erudition as a writer but also, and more importantly, his sophistication as a philosopher. For if, the division of labour, as defined and analysed in Smith’s pages, is the main feature of commercial society, it is because it is a system that offers a ‘new kind of analysis’ comparable to the philosophical decomposition of ideas and their arrangement in new ways favoured by the *encyclopedistes* and their ink.<sup>19</sup> Which is another way of saying that political economy, in its inception as a science, is a branch of philosophical analysis.

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<sup>18</sup> For Smith as the pioneer of morphological analysis see Land (1974: chap. 3).

<sup>19</sup> See Séris (1994: 53).

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