

On Althusser's *Philosophy of the Encounter*

Paul Cockshott

*School of Computing Science, University of Glasgow and
18 Lilybank Gardens, Glasgow, G12 8QQ, Scotland**

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Abstract

The article reviews Althusser's Philosophy of the Encounter, examining in turn the problem of the Epistemological Break and the idea of matérialisme aléatoire. It looks at Althusser's critique of the concept of commodity fetishism and suggests a possible response. It goes on to situate the matérialisme aléatoire in the context of the history of atomism with particular reference to the work of Boltzmann. It provides a possible technique of both rejecting teleology whilst retaining the arrow of time.

*Electronic address: william.cockshott@glasgow.ac.uk

I. INTRODUCTION

I read with growing enthusiasm Althusser's *Philosophy of the Encounter*[1] with the introduction by Goshgarian. I could not recommend the book more strongly than I do. It is the work of a Marxist philosopher of tremendous intellectual rigour and insight. It really makes you think carefully about things that you may have taken for granted before. The long introduction situates the new book with respect to Althusser's earlier work going back to his book on Montesquieu in the late 50s. The book is collected from notes and unpublished letters that were put together after the death of the noted political philosopher. If a book like this can be said to have an underlying theme it is about what the translator has termed *aleatory materialism*.

For my part I hate Goshgarian's translation of *aleatoire* as *aleatory* which is not a normal English usage. Anyone with a scientific background would translate it as something like random or stochastic, since that is the terminology that the English speaking scientific community uses for the philosophical concept Althusser is discussing. Quibbles about translation aside, and translation of this work was no mean feat since the French philosopher's notes contain numerous quotations from other languages with Althusser's own translations of these into French, the book absolutely fascinating. It struck me would be of great interest to compare Althusser's *matérialisme aléatoire* to the work of 20th century scientists who grappled in their own fields with some of the issues that Althusser concerns himself: the stochastic concept in the work of Heisenberg, the problem of the origins of structure Kauffman's writings, the implicit critique of the Hegelian method provided by the failure of Hilbert and Russell's formalist project.

Goshgarian's introduction has a very provocative analysis of Althusser's theory of the nature of the state and its role in his critique of Euro-communism. It may provide a critique of the approach of the modern Communist Party of Great Britain which, from this theoretical framework, can be seen as a continuation of the theoretical assumptions of Euro-communism. The political conclusions of Althusser's book are of the utmost importance to the current European conjuncture.

More generally in these, his last writings, Althusser was concerned to point out the limits of Marx's thought. Limits that he believed had to be crossed if Marxism was to

escape from the crisis that he saw engulfing it. These limits of Marxist thought were particularly at the level of the theorisation of the state and of ideology, inadequate theories of which were being used to justify the reformist course of the Communist Parties. In 'Marx and His Limits' Althusser touches on the limitations of the theory of commodity fetishism but the philosopher is more generally concerned with how to construct a theory of ideology as it relates to the class struggle. He says that it is easy to see that there is a relation here, but how does it operate - how are class specific ideologies produced, and how do these ideologies control people. In particular he is very critical of attempts to see these ideologies as operating just in the domain of ideas, emphasising the existence of state ideological machinery that ideologises people.

Althusser asks how to theorise the nature of the state machine and its role in the reproduction of bourgeois domination. What he is concerned to point out is not that Marx and Lenin are wrong, but that all they give us is a few terms and ideas which have not been worked into a coherent theory of how the state operates in the class struggle. You have to think of the specific form of self organisation of societies based on exploitation. The question here is how do they reproduce themselves and how does the state function to ensure that reproduction which is the same time a reproduction of relations of domination and subordination. This theoretical inadequacy means that their successors are unable to adequately theorise the conditions of class struggle either in the Soviet Union or in states like France or Italy. He suggests that Lenin and Marx had intuitions about this which went further than they explicitly explained, intuitions that are revealed in the particular choice of metaphors that they insisted on using. He is concerned to tease out why Lenin and Marx were so definite in calling the state a 'machine'. What does this mean in the context of Marx's analysis of what machines are (the analysis of machines presented in *Capital* on modern industrial mechanisation)?

II. WHAT BREAK?

In *The Philosophy of the Encounter*, texts dating from the late 70s and early 80s he somewhat modifies his original position on the epistemological break. He now says

that there were relict Hegelian idealist strands in Marx as late as *Capital*. Commodity fetishism is cited as being a Feurbachian hangover - a very explicit and possibly ironic application of Feurbach's theory of religion to the commodity.

Althusser says that the first break from idealism in Marx was towards Feurbach whose materialism was not yet a causal one, and retained strong idealist themes, in particular the Feurbachian theory of alienation.

Yes, there is plainly something like a 'rupture' or 'break', hence a 'moment' that does not resemble the preceding ones. Marx no doubt believed that he had reached his goal, so self-confident does he seem - if not in the 'Theses on Feuerbach' (yet another text that he did not publish), then at least in *The German Ideology*, which blithely announces the end of philosophy and a return to 'things themselves', or to factual, visible, tangible things, to individuals (but not to persons!), even while confecting a hallucinatory, albeit interesting, materialist philosophy of history. Marx thought that he had reached his goal; who can fail to understand him? Yet his labours were just beginning. (*Philosophy of the Encounter*, page 29)

The shift to seeing the epistemological break as being gradual is realistic. Having looked at Althusser's idea of *matérialisme aléatoire* it occurred to me that instead of relying on old Lucretius's second hand account of Epicurus's now lost works, Althusser would have been better to rely on the modern Atomists. I got out Heisenberg's *Physics and Philosophy*. In the 2nd chapter of this he gives an account of the historical birth of the quantum theory and the long period that elapsed between Planck's initial work on the black body radiation in 1895 through Einstein's introduction of the idea of the photon in 1905 to the matrix and wave mechanics of the mid 20s up to the synthesis of these in the late 20s. We are talking here of a 30 year period for the epistemological break between classical and quantum mechanics during which a half dozen or so of the brightest minds in the world worked on the problem collectively. Heisenberg recounts that in the early 20s they had hybrid ideas mixing a bit of quantum with a bit of the classical continuum, which were still a scientific advance but were far from being fully worked out.

The Bohr atom with electrons in actual orbits, was an advance, but it retained

Newtonian forms of thought - electrons as planets the nucleus as a sun. It could not account for the great stability of atoms under collision. Two solar systems approaching one another would be completely disrupted but atoms bounce off one another unharmed.

It is a mistake to expect Marx, working without the active collaboration of other theorists, to have completely worked out a consistent framework in his own life. What you were bound to get is a gradual process in which things became more and more worked out as time went on. You can see the same thing in Darwin. After the explicit break with the Lamarkian concept of evolution of acquired characteristics in the *Origin of the Species*, one sees the old concept of acquired characteristics resurface from time to time in the *Descent of Man* or in the *Expression of the Emotions*. Without a theory of genetics like that developed by Mendel, the old idea of evolution through acquired characteristics retained its appeal. Dawkin's demonstration of the logical inconsistency of the Lamarkian model[8] is easy to see after DNA but was not originally so evident.

Rejection of the Hegelian content of Marx was a key point of Althusser's writings in the 60s[2]. He continues to reject Hegelianism in the 80s but says that Marx had not completely broken from Hegelian idealism even in writing Capital. Capital retains both Fuerbachian and Hegelian themes. He claims that this still contains both a Hegelian strand and an underground materialist or Epicurean strand. I am a-priori sympathetic to this. The Hegelian elements are quite evident in Capital, and the poverty of the Hegelian presumption was recently summarised by Chaitin's aphorism that you can not get two kilos of theorems from one kilo of axioms. New content requires new information, and new information - if Shannon[27] is right - is random, hence in Althusser's terminology aléatoire.

A. Science and the Hegelian method

There is an interesting discussion of why Marx structured Capital the way he did with an progression from the abstract to the concrete - starting with the the commodity and value and then progressing via surplus value etc. He goes into the the issue of the contrast between the Hegelian mode of exposition of these chapters

and the concrete historical accounts of the process of primitive accumulation.

His basic point is that the actual generation of capitalism is something contingent, something produced by an actual material history described in the chapters on primitive accumulation. This, Althusser says is a rather different approach from that presented in the chapter on the commodity.

Althusser asks why Marx does more than just flirt with Hegelian modes of expression, but presents his entire initial argument with a Hegelian structure. The mere fact that Bakunin had recently given him a copy of Hegel's *Logic* may be relevant but is not an adequate explanation.

The first section (the section containing the 'flirt' with Hegel) was rewritten a good dozen times, because Marx felt the need for a 'scientific' beginning, and had a 'certain' idea as to what such a beginning should look like. It was a rather unhappy idea, unhappily for us, unless we have the courage and also the means to say that this Idea of the beginning is untenable, and even prevents Capital from producing all the effects it might be expected to. ([1], page 31)

the same idealism haunts Capital itself, in an infinitely more subtle form. ... Marx believed that he was duty-bound, as a good 'semi-Hegelian' - that is to say, a Hegelian 'inverted' into the materialist he was - to broach, in a discipline of a scientific nature, the purely philosophical problem of the beginning of a philosophical work. A misconception of this sort is understandable.

It is no accident that Marx rewrote Book I, Section I, the beginning of Capital, a dozen times or more; that he was determined to begin with that which was 'simplest' and with the 'abstract', namely, the commodity, and therefore with value; that he therefore set himself the task of beginning with the abstraction of value, something that lent his demonstrations impressive force, but, at the same time, situated them in the 'framework' of a theoretical field that proved problematic as soon as it was a question of 'deducing' money, capitalist exploitation, and the rest. Not to mention that which is presupposed by the abstraction of value, 'abstract labour',

namely, the existence of a homogeneous field ruled by - because it has already triumphed - the equivalence of socially necessary labour-times in any equation of value whatsoever (x commodity A = y commodity B). For this equivalence is in reality merely tendential, whereas, in order to reason in the rigorous form that he adopted, or had to adopt, Marx sets out from it as if it were a given: not the result of a terribly complicated historical process, but, as it were, the 'simplest' original state. ([1], page 39)

Here we have the same sort of presentation process that occurs in the *Logic*, with its deduction of being from nothingness, and becoming from the contradiction between the two. At the beginning in Hegel this has a certain plausibility but as the argument proceeds, as he gets to the derivation of 'ought'. I for one felt, reading Hegel as an undergraduate, that this was all a conjuring trick. He was sneaking already formed presuppositions and concepts into the argument rather than deriving them. This essentially is what Althusser says of Marx's form of presentation. It only works to the extent that he brings in real historical forms which have their own material history, their own information content, into the argument. Althusser contrasts this form of presentation at the start with the chapters on the working day and primitive accumulation which present the real histories of the forms being discussed.

If we look at the history of mathematics, and if any domain would seem suited to the logical self development of ideas it is maths, we can see how a method analogous to that of Hegel came to grief. The formalist project of Russell and Hilbert came to grief first in set theory[34] and then in Turing's paper[29] on the decision problem. The project had aimed to found mathematics on logic and Hilbert had asked for a mechanical procedure by which the truth or falsity of a mathematical theorem could be determined. If a theorem could be proven true, then you demonstrate that it can be derived from axioms using valid rules of inference. So if you could discover such a mechanical method for checking arbitrary theorems, you would have demonstrated that all of maths could be logically deduced from a collection of founding axioms.

Turing showed that no such proof decision process can exist. He did it by taking the term 'mechanical procedure' and designing a general purpose 'universal' computer that could perform any calculation that a human mathematician could do. He then demonstrated that the assumption that such a mechanical proof procedure could exist

would lead to a contradiction analogous to Russell's paradox. It thus follows that even in mathematics, the project of a complete and logical development of the system falls down[35]. The basic reason is that you can not get more out of an axiomatic system than you put in: Chaitin's aphorism: 'You can not get two kilos of results from one kilo of axioms'.

Advocates of 'dialectical logic' may say that this is just a restriction of formal logic, dialectical logic does allow you to derive more than you start out with. Well the reason why formal logic is different is that it is specified precisely enough to allow machine checking. A human dialectician is free to engage in all sorts of rhetorical slights of hand, importing hidden assumptions without needing to give any justification for them. The great advantage of a mechanisable formalism is that it excludes such verbal conjuring tricks.

B. Example commodity fetishism

Althusser critiques the theory of commodity fetishism as being inadequate to its assigned task of explaining the illusions of the economists. These Althusser says must be sought in the ideological class struggle and can not be understood on the basis that Marx has so far introduced into the book when he mentions commodity fetishism.

the relation of the producers to the sum total of their own labour is presented to them as a social relation, existing not between themselves, but between the products of their labour. This is the reason why the products of labour become commodities, social things whose qualities are at the same time perceptible and imperceptible by the senses. In the same way the light from an object is perceived by us not as the subjective excitation of our optic nerve, but as the objective form of something outside the eye itself. But, in the act of seeing, there is at all events, an actual passage of light from one thing to another, from the external object to the eye. There is a physical relation between physical things. But it is different with commodities. There, the existence of the things qua commodities, and the value relation between the products of labour which stamps them as com-

modities, have absolutely no connection with their physical properties and with the material relations arising therefrom. There it is a definite social relation between men, that assumes, in their eyes, the fantastic form of a relation between things. In order, therefore, to find an analogy, we must have recourse to the mist-enveloped regions of the religious world. In that world the productions of the human brain appear as independent beings endowed with life, and entering into relation both with one another and the human race. So it is in the world of commodities with the products of men's hands. This I call the Fetishism which attaches itself to the products of labour, so soon as they are produced as commodities, and which is therefore inseparable from the production of commodities.

This Fetishism of commodities has its origin, as the foregoing analysis has already shown, in the peculiar social character of the labour that produces them.(chapter 4, [21])

The 'foregoing analysis' mentioned by Marx is the analysis of the commodity, it is not specifically an analysis of capitalist production. Up until then he is using ideas that apply to all forms of commodity production and the examples of types of labour he chooses are as much artisanal as industrial. As such it does not touch on the issues that he tried to analyse some years earlier in his working notes in terms of alienation. But note that the *Grundrisse* and the *Economic and Philosophical Manuscripts* are just that: unpublished manuscripts. Unpublished because Marx knew their analysis was not adequate. They were part of his thought process as he struggled towards science. They are much more marked by idealism than his later work. As such they have a particular appeal to some modern readers who recognise in these works a certain 'obviousness' that speaks to a shared set of idealist modes of thought.

In these the labourer alienates his product in the sense spoke of by Smith - ie the idea deriving from commercial law to refer to the sale of property. But this sense is rather different from the meaning that *Entfremdung* has by the time it arrives in the *Grundrisse*. There it has gone from being a Scots commercial law term used by Adam Smith, to being given an idealist philosophical gloss in Hegel after his reading of Smith, and then becoming used by Feurbach in his theory of religion, to being

applied by Marx in his first attempt to understand capitalist exploitation.

By the time *Capital* is written he has a scientific theory of exploitation - the theory of surplus labour time and does not rely on the concept of alienation since this is open to confusion between exploitative and non exploitative relations. An independent shoemaker alienates the shoes he sews in return for silver, but this is an equivalent exchange in which there is no exploitation. The fact that the value of shoes in terms of silver is indirectly caused by the relative quantities of labour in the two commodities is hidden from the participants in the exchange. The worth of the two commodities now seems something inherent in them rather than being a projection onto them of the division of social labour. This is what Marx labels fetishism. The social relation that gives rise to it is the existence of a multiplicity of independent units of production engaged in a social division of labour. The same obscurity exists whether these units of production are slave latifundia in Brazil, the private peasant farms of Massachusetts, or Manchester cotton factories. These are three different economic forms with quite different class relations.

So when Marx talks of the “relation of the producers to the sum total of their own labour” what kind of producer is he referring to?

If it is a private farmer or artisan who sells their own product, then the idea makes some kind of sense. But a slave under the lash was never confronted with the product of her labour as a commodity. Only her owner knew the sugarcane as a commodity, and to him, slave and sugar were both commodities. A similar argument could be applied to the wretched operatives in Manchester mills. At this stage of the argument in *Capital*, before the examination of any relations of production and exploitation Marx can only deploy the ‘producers’ as a philosophical abstraction, a placeholder for the subject of idealist philosophy. The antimony between relations between men and relations between things on which the theory is based is just a dressed up way of counter-posing inter-subjective relations to relations between objects. It is not surprising that the theory is as impoverished as this because all he has are philosophical categories not historically constituted agents within definite class relations.

The idea that the use of the theory of commodity fetishism was an ironic use of the theory of alienation is an interesting one. Of course it could not have been intended as an ironic reference to what Marx himself had deployed as a theory of alienation in

what were posthumously published as the *Economic and Philosophical Manuscripts*, because he had regarded these as early explorations not worth publishing. So if it was an ironic reference to his own theory of alienation, nobody would have got the irony until, long after his death these documents were published. We must remember that Marx did not publish any theory of alienation.

If it was an ironic reference, it was an ironic reference to Feurbachs theory of religion in which man's real activity gets an alienated expression in the life of the gods and saints up in the clouds. Feurbach's theory was very well known and the reference to it would have been picked up by educated German readers - hence the explicit use of a term from the critical analysis of religion - fetish, and the explicit statement: " In order, therefore, to find an analogy, we must have recourse to the mist-enveloped regions of the religious world." So he is being pretty explicit that he is ironically applying Feurbachs theory of religion here.

Now the problem according to Althusser, is that this theory of fetishism, which is derived from Feurbach is not up to the job that Marx wants to use it for : explaining the illusions of the political economists.

If for example a mercantilist economist sees gold as the innate substance of value then at first sight this will pass as an example of commodity fetishism. But the weakness of this is that the illusions of the mercantilists did not arise from the economic relations that Marx has so far analysed in Chapter 1 of *Capital*. To understand the mercantilists this is far from enough. You have to approach these ideas as class ideologies expressing definite class interests arising from a definite mode of appropriation of a surplus product - via international trade. All of these are much more complex relations than are being presented in Chapter 1. They are indeed, relations even more complex than anything analysed in the whole of *Capital* - since the book has no theory of international trade. In the logic of the development of *Capital*, it comes in the section on commodities before the very possibility of exploitation has been discussed. Althusser's point is that this is the wrong point at which to try to introduce a theory of economic ideology since the material basis for the ideology - in class conflict has yet to be introduced. The really detailed examination of bourgeois economic ideology is not the few remarks on commodity fetishism but the 3 volumes of the *Theories of Surplus Value*. In this Marx is pretty explicit that the post Ricardo

Political Economists are carrying out crude propaganda for vested interests, and are rejecting the insights of Smith and Ricardo because they are afraid of the class implications of this. He attributes the difference to Smith writing at a time when the class struggle of the proletariat was not yet a threat to the propertied classes.

Althusser's point is that the theory of commodity fetishism is far too slender a basis to support a theory about bourgeois economic ideology. It only says things about what is confusing about all commodity production in general - the difficulty of discerning the real cause of exchange value. The occult nature of the source of value was like the occult nature of heat until the kinetic theory. It was not until Ibn Khaldun in the 14th century that labour was identified as the source of value. But by the early stages of industrial capitalism the labour theory of value was well known and started to be used by advocates of the workers movement. At this point the bourgeois economists took fright and abandoned their previous scientific insights.

C. Something else to fill the space

Althusser says that the theory of fetishism comes too early in Capital. But if we now approach the place which the theory of commodity fetishism stands, approach it from the position we arrived at after reading all of Capital, and indeed after all of the development of Marxian economic thought since then, we can say something. We can say something that is rather more than an allusion to Fuerbach's theory of religion.

Consider the reproduction schemes in the 2nd volume of Capital which relate to the reproduction process of the aggregate social capital.

The total product, and therefore the total production, of society may be divided into two major departments:

I. Means of Production, commodities having a form in which they must, or at least may, pass into productive consumption.

II. Articles of Consumption, commodities having a form in which they pass into the individual consumption of the capitalist and the working-class.(Chapter XX.I The Two Departments of Social Production,[20])

From this categorisation he goes on to form a pair of equations that are what would

now be considered a form of national accounting. The figures are, he says, millions of marks, francs, or pounds sterling.

I. $4,000c + 1,000v + 1,000s = 6,000$ means of production

II. $2,000c + 500v + 500s = 3,000$ articles of consumption.

So the second equation says that the money price of the output of articles of consumption is £3,000,000,000. This is probably an order of magnitude too high for the UK GNP at the time[9], but it is the structure not the figures that are important. Consider these £3 billion of consumer goods. That total price hides what stands behind it. It hides the fact that the value is comprised of three parts corresponding to value passed on from the means of production, value created by the necessary labour time and value created by the surplus labour time. In the price of these commodities:

1. The fact that the value originates in labour at all is effaced.
2. The fact that this labour occurred under exploitative conditions is effaced. The buyers of consumer goods can not tell from the price they pay how the working day was divided, by how much the producers of the goods were exploited.
3. The fact that part of the value is passed on from means of production. This passing-on signifies both the overall structure of social reproduction (the $2,000c$ is the net output of department I), and that the production is carried out under capitalist conditions since it is the ownership of this £2,000,000,000 of means of production by the capitalist class that enables them to enforce production under exploitative conditions.

In addition, in the formation of a sum, the parts that make it are mixed up and hidden. So in the prices, the actual social conditions of production the actual material conditions of production are hidden.

If we go from the simple division into two departments for national accounts then the obfuscation becomes much worse. Inspired by Marx's reproduction schemes and by the practical exigencies of economic planning economists like Leontief realised that such reproduction schemes could be split up into much more detailed tables splitting the component **c** in Marx's tables into dozens or hundreds of components :

the inputs from dozens of different industries - electricity, steel, road transport, rail transport etc. From this standpoint we see that commodity prices hide an enormous amount of information. In the price of a commodity the value of the dozens of different types of raw material and production equipment that are required to make it are obscured.

This structure of flows of means of production between industries is what the coherence of the entire system of social reproduction depends. Within each means of production price again, there are components representing surplus and necessary labour time, and components representing yet more indirect inputs. The network of interconnections ramifies until, as Sraffa showed[28], every commodity in department I (his basic sector) depends on the labour expended to produce every other commodity in department I. Then every consumer good also depends on every sub-branch of the division of labour in department I.

All of this is hidden in the price of shoes, microwave ovens, and washing-up liquid. All the purchaser is aware of is the monetary cost. Since every commodity can be bought by money, it appears to the purchaser that access to money is the key to everything, and that the real cost of things is money. But the whole notion of cost, so inextricably linked with commodities and their monetary purchase effaces and dramatically over-simplifies the reality of social reproduction. Money is a scalar, it has only extension no structure. The social division of labour in contrast is a network, highly structured and interdependent. The social division of labour receives representation in money prices, but that form of representation is a radically degraded one. It is in literal mathematical terms a projection, an image of a higher higher dimensional space represented on a sub-manifold. And as the engravings of Escher[15] and Figure 1 show us, when you project a higher dimensional space onto a lower dimensional one, there are limitless possibilities for illusion.

The economists claim that the price system is a signaling system, that it transmits the information necessary to coordinate the economy and creates, in its self-adjustment, the best of all possible worlds. This illusion is sustained by the fact that changes are normally small slight and gradual. Within the context of gradual change, the fluidity of and metamorphosis of human labour, supports, for a while the illusion that money is the universal equivalent. But the information that is lost in money

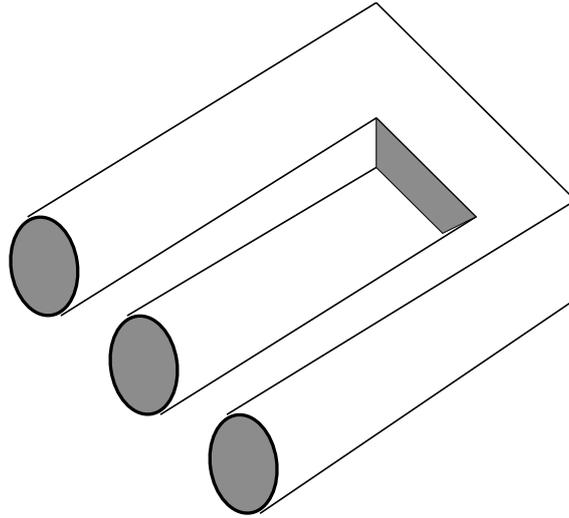


Figure 1: When an image of a higher dimensional space is projected into a lower dimensional space, the impossible can seem possible. The illusions of money come from the projection of the higher dimensional space of social reproduction relations onto the lower dimensional space of prices.

prices, the interdependencies between branches of the division of labour that are obscured in them, eventually make themselves felt in economic crises. Since no scalar measure can ever be 'equivalent' to, or describe a network, monetary illusions must periodically break down.

When change must be rapid, for example in war, the whole illusion of a self regulating autonomous monetary economy becomes impossible. The state has to substitute an economy in kind, has to grapple with the real flows of use-values and the real division of labour upon which the structure of production depends. This was pointed out by Neurath[22] who saw in this 'natural economy' an alternative to commodity production.

His insight brought a furious response from Mises and other advocates of the market economy[16, 30]. One needs no great insight to see the motivation for this response. The idea that there was an alternative to monetary economy was politically dangerous in the post World War I period when there seemed to be a real threat that Communist or Social Democrat governments might try to replace the market system with a planned 'in kind' economy. The ideology of Hayek and Mises is politically motivated but complex and sophisticated. Probably only a few of the political leaders

who now follow their doctrines have read them in the original, but the ideology is propagated in popularised form by front groups like the Mont Pelerin Society, the Institute for Economic Affairs, the Adam Smith institute. The illusions about monetary calculation being an appropriate way of thinking through the problems of national or continental economies take hold on politicians both as a result of this propaganda, and because the position of an individual non-state agent in the economy constantly reinforces these illusions. As individuals we are all constrained by money so it is easy to transfer this learned pattern onto the situation of the state or society as a whole.

III. EPICURUS AND THE CRITIQUE OF TELEOLOGY

We wish thee also well aware of this:

The atoms, as their own weight bears them down
Plumb through the void, at scarce determined times,
In scarce determined places, from their course
Decline a little- call it, so to speak,
Mere changed trend. For were it not their wont
Thuswise to swerve, down would they fall, each one,
Like drops of rain, through the unbottomed void;
And then collisions ne'er could be nor blows
Among the primal elements; and thus
Nature would never have created aught (Book II, [3])

Althusser's critical position towards teleology was long standing. In *Philosophy of the Encounter* he develops it further by advancing an alternative view of history, the stochastic materialism, that emphasises the radical contingency of events and the impossibility of understanding the past in a 'future anterior' tense. This turn on his part takes him into some very deep questions that have been intensively discussed by scientists and philosophers of science since the late 19th century. We all approach questions in a manner shaped by our prior intellectual context, and as a philosopher

Althusser traces this matérialisme aléatoire down through the history of philosophy from the Greek atomist Epicurus through Machiavelli, Spinoza and Hobbes to Marx. He starts with Epicurus, the atoms falling in the void, and the 'swerve'.

In the beginning were the atoms falling in the void and then ever so slightly they swerve, jostle, collide and stick together and from these chance *encounters* comes the world. No aim, no purpose just the play of chance and fortune produce the world we know.

This ancient view seems familiar. The modern view of atoms flying out from a big bang, with symmetry broken by quantum fluctuations and the subsequent seeding of the galaxies from these slight variations in density and velocity is not so different. Again contingency, randomness in the initial conditions, produces the vastest of effects, our whole Earth a side effect of the throw of the cosmic dice.

A. Opposition to Atomism

It is easy now to forget how recently science returned to this atomist view. Although atomism was accepted in Maxwell and Boltzmann's theories of heat, a large part of the scientific community remained sceptical about the existence of atoms. Positivist philosophers like Mach denied that atoms really existed:

In his period any attempt at all to account macroscopic phenomena in terms of underlying microscopic process was regarded as suspicious. Some physicists and chemists began in search of atomic explanations, while theologically oriented philosophers and positivists dug into preserve their concepts of that atoms were not really real . Those advocating the concept of atoms were labeled materialists by classical philosophers[36]. By introducing and obtaining the expression for the Boltzmann factor, Boltzmann became a strong supporter of the reality of atoms. Opposition to his ideas was formidable. Many scientists misunderstood Boltzmann's ideas without grasping the nature of his reasoning. In his lectures on kinetic theory of gases he told his students how much difficulty and opposition he had encountered and how he had been attacked from the philosophical side.([25])

It was not until Einstein's paper on Brownian motion[11], that the existence of atoms was finally accepted. He revealed the cause of Brownian motion to be the random bombardment of particles by their surrounding atoms.

The religious may still decry the aimlessness and lack of purpose implied by the atomic philosophy but read Lucretius and you see its liberating potential.

Whilst human kind
Throughout the lands lay miserably crushed
Before all eyes beneath Religion- who
Would show her head along the region skies,
Glowing on mortals with her hideous face-
A Greek it was who first opposing dared[37]
Raise mortal eyes that terror to withstand,
Whom nor the fame of Gods nor lightning's stroke
Nor threatening thunder of the ominous sky
Abashed; but rather chafed to angry zest
His dauntless heart to be the first to rend
The crossbars at the gates of Nature old.
And thus his will and hardy wisdom won;
And forward thus he fared afar, beyond
The flaming ramparts of the world, until
He wandered the unmeasurable All.
Whence he to us, a conqueror, reports
What things can rise to being, what cannot,
And by what law to each its scope prescribed,
Its boundary stone that clings so deep in Time.
Wherefore Religion now is under foot,
And us his victory now exalts to heaven. (Book I, [3])

There is no atomism without the stochastic. It was the great virtue of Boltzmann that he, for the first time, stood natural philosophy on the foundation of probability not determinism. The shift to a physics based on probability and randomness that started with Boltzmann, continues with the quantum theory of the atom : a probabilistic rather than deterministic mechanics. The idea of randomness has become so fundamental to the scientific world view that it is worth going into several different scientific conceptions of it. We will then examine how these ideas of randomness impinge on ideas of time and of evolutionary and historical progress: the core concern of Althusser.

B. Notion of randomness in Boltzmann - degrees of freedom

Boltzmann examined the behaviour of gases made up of huge numbers of individual molecules or atoms. Since the atoms are so small and numerous we can not detect them individually or know their positions and momenta but, he showed, it is possible to reason about properties of the ensemble of molecules. The unknown positions and momenta of the gas were its *degrees of freedom*. He assumed each atom was a small perfectly elastic sphere, and that in their individual motions and collisions these atoms followed conventional Newtonian mechanics with conservation of momentum and energy. Although their collisions were random and their individual positions unknowable, he could draw conclusions about the probabilities that atoms would have particular energies, and derive formulae for the probability distribution of the aggregate distribution of the molecules. From this reasoning he was able to arrive at a purely mechanical derivation of the notion of entropy[38]. He could show that the entropy of a gas would tend to increase over time until an equilibrium value was reached.

Note that two key concepts with which Althusser concerns himself are already being dealt with by Boltzmann:

- Randomness
- Temporal direction

I will go on to examine each of these in more detail lower down, but first I want

to make a digression on how Boltzmann's form of reasoning in his kinetic theory of gases, has proven to be directly useful to Marxist economic theory.

1. *From Boltzmann to Farjoun and Machover*

The notes from which the *Philosophy of the Encounter* is drawn were written between the late 70s and mid 80s. Around the same time two mathematicians Emanuel Farjoun and Moshe Machover were working on a new foundation for the analysis of capitalist economies, one that used Boltzmann's methods[13]. They reason that a capitalist economy shares much in common with a gas. It has a large number of agents, whose detailed behaviour is, from the theorist's standpoint unknown and thus random. There are millions of individual economic transactions, sales of commodities for money, every day. It is as unrealistic to attempt to predict 'the' price at which these take place as it is to say anything definite about 'the' velocity of atoms in a gas. Instead one has to use Boltzmann style reasoning to arrive at predictions about the probability distribution of prices, profits etc. Their seminal publication founded an entire new field, econophysics, which applies the methods of statistical physics to the analysis of the economy. The surprising thing about this endeavour was that this approach essentially validates the analysis that Marx gave in volume I of *Capital*.

Farjoun and Machover were able to show that the price of commodities will closely correlate with their labour content. What is most important is that they gave an explanation for why the labour theory of value is empirically correct. Up until they wrote, the labour theory of value was seen as a sort of rough empirical rule of thumb without any theoretical support. Indeed by the late 70s of the last century even many marxian economists were embarrassed by it. In this sense it was like classical thermodynamics, an empirical generalisation with no causal mechanism. The stochastic materialist approach of Farjoun and Machover showed that it must necessarily arise from the nature of the probabilistic interaction between economic agents in a capitalist economy. Subsequent work[5, 32, 33] has demonstrated that similar arguments can explain how the observed distribution of wealth in a capitalist economy arises as a consequence of the sale of labour power as a commodity. By this means matérialisme aléatoire has rescued theory from the impasse that Althusser signalled :

Better: what are we to think of a theory which sets itself the goal of demonstrating the production of the prices of production starting out from value, and succeeds only at the price of a mistake, by leaving something out of the calculation? Sraffa, Gramsci's old friend, who emigrated to England - Sraffa and his school must be given credit for closely checking Marx's demonstration of this point, and discovering, to their amazement, that the demonstration was erroneous. The error has deep roots: it is rooted, precisely, in the principle that it is necessary to begin with the simplest element, the first, namely, the commodity or value, whereas this simple form is in fact neither simple nor the simplest. The mistake is also rooted in the principle that it is necessary to begin in an 'analytical' mode, the mission of analysis being to discover, in the simple form, its essence and the effects of this essence, effects such that we ultimately again find, by synthetic deduction, the concrete itself.(Page 40, [1])

C. Notion of randomness in Quantum mechanics

In one sense Boltzmann had set the stage for the next incursion of the random into theory, quantum mechanic, with his suggestion that energy might be quantised[14], but its real birth came with another of Einstein's 1905 papers[39] on the photo-electric effect, where he introduced the idea of that 'atom' of light: the photon.

With the quantum mechanics randomness is no longer a matter of our subjective ignorance. It is not just that we *do not* know the position and momentum of the atoms, instead we *can not* know their positions and momenta because the atoms do not simultaneously have both a definite position and a definite momentum. Quantum mechanics assigns to each possible state of a system what it terms an *amplitude*. These amplitudes are numbers[40] which, when squared, give us the probability of the system being in that state. By expressing things in terms of the square roots of probabilities rather than probabilities themselves, the quantum physicists were able to construct a linear mathematical system, a matrix mechanics, that conserves probability[41]. Quantum mechanics revealed that randomness was built into the very nature of atomic phenomena, not just to our knowledge of it.

Initially there was a reassuring distinction between the nano-world where quantum randomness ruled and a deterministic macro-world. But in recent years it has become increasingly apparent that quantum phenomena can be exhibited by macroscopic objects[23, 31]. A key idea here is the notion of *superposition* the idea that a system can be simultaneously in more than one state, with the states superposed on one another. The textbook example is the photon or electron simultaneously going through two slits in a mask to interfere with itself[10]. Photons are tiny, but We can place visible objects into superposed states.

Classically reality had been seen as single threaded, but according to the influential Many Worlds interpretation of the quantum mechanics reality is multi-threaded. This is often expressed as saying that reality branches into two threads every time a quantum event occurs. Another way of looking at it is to say that the whole of reality is simultaneously in a superposition of a vast - possibly infinite - set of configurations all evolving under the laws of quantum mechanics.

We are bombarded with radiation from space. A single high energy particle, a single quantum event, can induce a fatal mutation in an egg cell meaning that a particular child is not born. A different man in the same place makes different decisions. Under another admiral the 1st Cruiser Squadron intercepts the Goeben before it reaches Constantinople. Turkey stays neutral. Russia supplied via the Dardanelles wins victories in the East. There is no 1917, Russian and Turkish empires survive.

If history is radically contingent what becomes of historical materialism?

Let us return now to Althusser and his concerns about contingency in history. He is arguing against a simple deterministic view that slavery inevitably leads to feudalism which inevitably leads to capitalism. Instead, he says, it was a contingency that gave rise to capitalism in England but not in Italy.

What matters about this conception is less the elaboration of laws, hence of an essence, than *the aleatory character of the 'taking-hold' of this encounter, which gives rise to an accomplished fact* whose laws it is possible to state. This can be put differently: the whole that results from the 'taking-hold' of the 'encounter' does not precede the 'taking-hold' of its elements, but follows it; for this reason, it might not have 'taken hold', and, *a fortiori*, 'the encounter might not have taken place'. All this is said - in

veiled terms, to be sure, but it is said - in the formula that Marx uses in his frequent discussions of the 'encounter' [*das Vorgefundene*] between raw labour-power and the owners of money. We can go even further, and suppose *that this encounter occurred several times in history before taking hold in the West*, but, for lack of an element or a suitable arrangement of the elements, failed to 'take'. Witness the thirteenth-century and fourteenth-century Italian states of the Po valley, where there were certainly men who owned money, technology and energy (machines driven by the hydraulic power of the river) as well as manpower (unemployed artisans), but where the phenomenon nevertheless failed to 'take hold'. What was lacking here was doubtless (perhaps - this is a hypothesis) that which Machiavelli was desperately seeking in the form of his appeal for a national state: a domestic market capable of absorbing what might have been produced. (Page 198,[1])

What conclusion should we draw from Althusser's emphasis on the contingent?

One would be to say that there are no laws governing historical transitions, only particularities, that when we throw out teleology we throw out grand narratives altogether. Grand narratives may be suspect, since as Althusser says the story is told from the standpoint of an already accomplished fact - history as it has turned out. It is worth noting that some physicists have argued that the time symmetry of the laws of both Newtonian and quantum mechanics implies that the idea of the past causing the future is an illusion. The future must also constrain the set of possible pasts Price [24]. But it may still be possible to construct a non deterministic theory of historical change by borrowing the modes of thought that other sciences use. I think the relevant tool is the Markov chain.

Markov chains are a way of modeling systems that have a certain number of states and which undergo probabilistic transitions between the states. Markov himself used the technique to model the formation of text[19] on the assumption that the person writing the text can be in two states : writing a vowel and writing a consonant(Figure 2). He then made a model of the probability that you will next write a vowel or next write a consonant if you have just written down a vowel, and vice versa if you have just written down a consonant. Shannon performed similar analyses of text, English

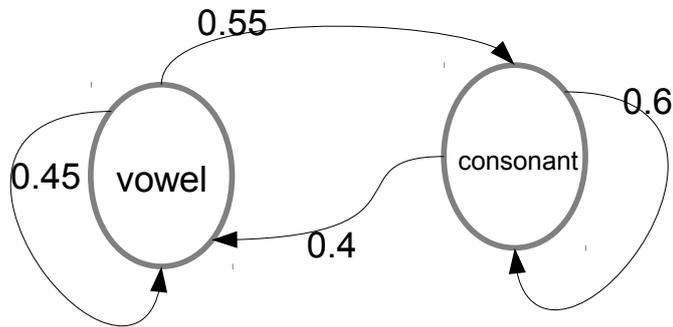


Figure 2: A Markov process modelling the creation of text subdivided into vowels and consonants. The actual probabilities given are made up.

this time, and showed that such probabilistic models could generate sequences that have a strange likeness to normal text[27]. Here, as the saying goes, is one that I prepared earlier:

The angel who talked with me an everlasting covenant,
 ordered in all things, so will we do, if God permits.
 For concerning those who were with me.
 Jacob served seven years for Rachel.
 They seemed to him and they wept.
 He said to the woman, You won't surely die,
 and we also will serve Yahweh
 for I am as you swore to her.[42]

Markov parodies hover on the edge of meaning, with a narrative that constantly eludes us. But since their original application to textual analysis they have become a tool for analysing a plethora of systems. My suggestion is that we could conceptualise the transitions that social formations undergo in terms of Markov models. Figure 3 shows a hypothetical Markov model to deal with Althusser's Po Valley objection.

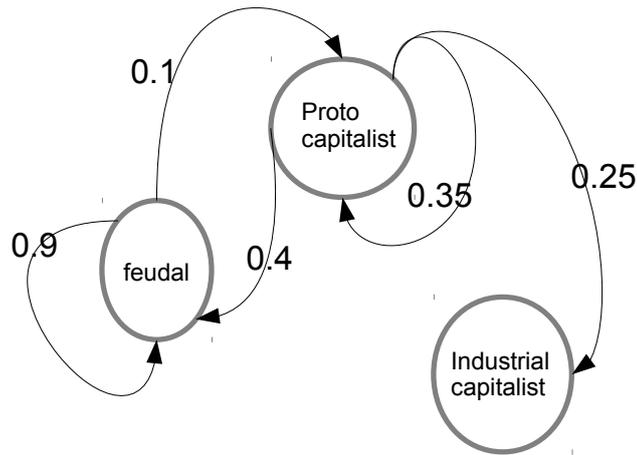


Figure 3: A hypothetical Markov chain model of the transitions between feudalism and capitalism. The state marked proto-capitalist stands for examples like the Po Valley cited by Althusser. The transition probabilities might be rated in terms of transitions per century.

Note that in a model like that in Figure has a direction to history. As time goes on the probability that the society is feudal falls, and the probability that it will be capitalist rises. This overall shift in the probability distribution is compatible with individual social formations going from feudal to proto-capitalist and back.

What would be the object of a historical materialism posed in Markovian terms be?

It could not be a theory of particular histories, we have to take Althusser's objection seriously, such histories are simply accomplished facts. Instead its objects are *ensembles* and their *possible* histories. The circles labeled Feudalism and Industrial capitalism are not particular instances of feudal or capitalist social formations, not Feudal France on the 3rd of April 1217AD or Industrial Japan on the 26 of February 1969 - no they are what statistical mechanics terms macro states, bundles of huge numbers of possible states, ones that have existed, and ones that potentially could exist. Such ensembles are necessary for the idea of probability to have any meaning.

If we were to do historical materialist research this way, by the construction of parameterisable Markov models, we would need to identify a plausible set of macro-states and estimate the transition probabilities between them. The model in Figure

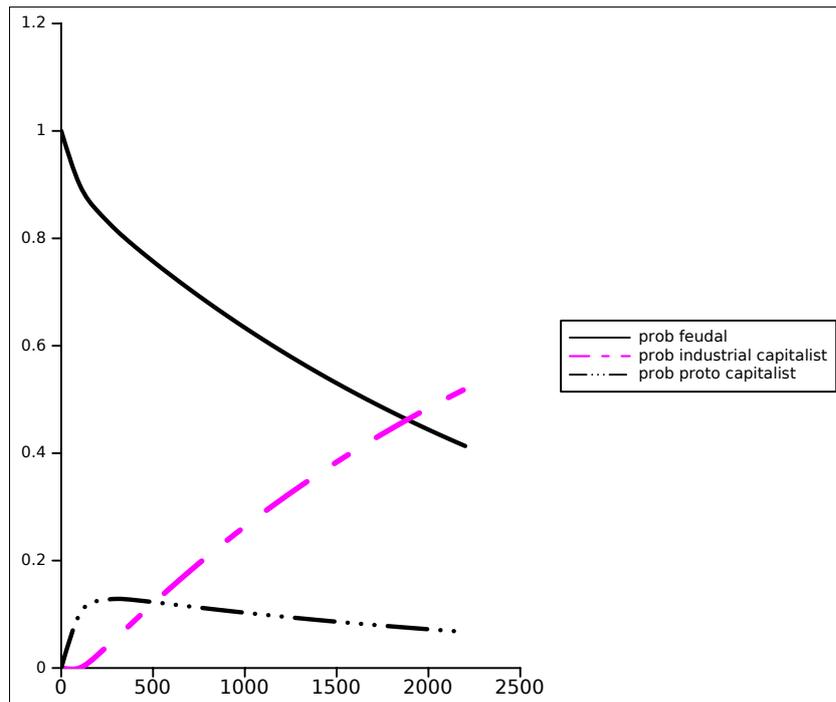


Figure 4: Probability on the y axis versus time in years along the x axis, for the evolution of the model shown in Figure 3.

3 had probabilities that I just picked out of the air as seeming roughly right. When I evaluated their time evolution (Figure 4), I found that by dates 1800 and 1900 it became more probable that the social formation would be an industrial capitalist one than a feudal one. This suggests that the parameters may be roughly the right order of magnitude for this very simple model. To get a realistic parameterisation of Markov models you need a lot of instances. Although we only have one world history, but we there are many instances of social formations in it, so some sort empirical parameterisation might be attempted.

There is often a temptation for us to generalise from narrow data. Before the discovery of extra-solar planets it was assumed that other solar systems would be like ours, rocky planets on the inside with gas giants orbiting further out. Observation of real extra-solar planets revealed lots of gas giants in close orbits to their suns. Analogously, after the 1917 revolution, Marxists assumed that future revolutions would be similar, they had after all only one example to go on. That was better than the zero examples that Marx had to go on in the 19th century but it led to what, in

machine learning, we call over-fitting. A theory of revolution that fitted Russia 1917 perfectly, but had little predictive value elsewhere.

In the last couple of centuries there have been lots of revolutionary or potentially revolutionary conjunctures. There are probably enough of these to make a reasonable attempt at constructing a Markov model of revolutionary conjunctures or to apply techniques like support vector machines or linear discriminant analysis to understand when conjunctures are likely to be revolutionary and when they are not.

D. The distinction between reproduction and origin

we are clearly dealing with all the elements mentioned above, but so thought and ordered as to suggest that they were from all eternity destined to enter into combination, harmonize with one another, and reciprocally produce each other as their own ends, conditions and/or complements. On this hypothesis, Marx deliberately leaves the aleatory nature of the 'encounter' and its 'taking-hold' to one side in order to think solely in terms of the accomplished fact of the 'take' and, consequently, its predestination. On this hypothesis, each element has, not an independent history, but a history that pursues an end - that of adapting to the other histories, history constituting a whole which endlessly reproduces its own [*propre*] elements, so made as to [*propre a*] mesh. This explains why Marx and Engels conceive of the proletariat as a 'product of big industry', 'a product of capitalist exploitation', corifUsing the production of the proletariat with its capitalist reproduction on an extended scale, as if the capitalist mode of production pre-existed one of its essential elements, an expropriated labour-force. Here the specific histories no longer float in history, like so many atoms in the void, at the mercy of an 'encounter' that might not take place. Everything is accomplished in advance; the structure precedes its elements and reproduces them in order to reproduce the structure. What holds for primitive accumulation also holds for the owners of money. Where do they come from in Marx? We cannot tell, exactly. From mercantile capitalism, as he says? (This is a very mysterious expres-

sion that has spawned many an absurdity about 'the mercantile mode of production.'[43]) From usury? From primitive accumulation? From colonial pillage? Ultimately, this is of small importance for our purposes, even if it is of special importance to Marx. What is essential is the result: the fact that they exist.

I have already said a lot, perhaps I have said too much, but I can not resist touching on another point. I have drawn attention to the possible relevance of Boltzmann models and Markov models to a stochastic approach to historical materialism. Another thinker who is worth examining in this context is Kauffman.

It is because Kauffman and Althusser are both dealing with the same problem - the origin of ordered systems or ordered structures[17]. Kauffman is concerned with auto-catalytic nets and the process of creating cells for the first time as a result of pre-biotic evolution. Althusser is concerned with the process of formation of modes of production - another structured self reproducing system. There is the same problem - once the system exists it self reproduces but the components that constitute part of the self reproducing system - the new mode of production, have to arise as a contingent effect of prior history where the self reproducing mechanism is not there.

The great thing about Kauffman, and of course Darwin before him is that teleological explanations are ruled out. Unfortunately for too many Marxists that is not the case. They as Althusser puts it see the past in the 'future anterior' tense. So they see the mercantile bourgeoisie of the 16th century as a nascent modern bourgeoisie with a historical 'role' to play. One only has to see how often this terminology of 'roles' is used by some Marxist writers. But that mode of thought only makes sense within the Hegelian / theist conceptual structure, for who but the immortal gods can have scripted such 'roles'. I suspect that Kauffman's ideas of 'auto-catalytic nets' and 'rough fitness landscapes' may provide fertile metaphors for historical materialists to think through their own problems.

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- [35] For a clear and readable explanationa of these issues you can do worse than consult [4].

- [36] When you grasp the contemporary scepticism towards atomism it is easier to make sense of Lenin's foray into philosophy [18]. Lenin showed considerable foresight in coming down firmly against Mach's then fashionable views.
- [37] He means Epicurus.
- [38] The idea of entropy already existed in classical thermodynamics but the latter had no causal explanation for it.
- [39] An English translation is available as [12].
- [40] Technically they are complex numbers which means that different states can interfere with one another.
- [41] A matrix mechanics expressed directly in probabilities could not do this.
- [42] I created the text using a Markov model of the World English Bible. The transition probabilities to print a new word are determined by states made up of the last 3 words printed. The probabilities are obtained from a computer generated Bible concordance using the algorithms described in [7].
- [43] I can not resist the chance to say here that Allin Cottrell and I provide a theoretical explanation for mercantile surplus value in the chapter on foreign trade of [6].