Some Preliminary Thoughts On Knowledge-Based Production: 49 Seconds On Mustafar.

Introduction.

Our intention is to demonstrate how Marx’s integrated understanding of capitalism in general, which follows from his theory of the determination of value by labour-time, helps us to understand the particular question of knowledge-based production. We do not believe that Marx’s analysis of capitalism is narrowly historically specific to any ‘stage’ of capitalism, but that it applies to capitalism in general, so the growth of knowledge-based production does not require us to ‘modify’ Marx (as in, for example, Hardt and Negri, 2000). Furthermore, we contend that Marx cannot be meaningfully or adequately applied à-al-carte. Marx’s theory of value implies a certain definition of what is ‘productive’ and ‘unproductive’ labour. Consequently if we specify, for a particular purpose, a different definition of ‘productive’ and ‘unproductive’ labour (like Harvie, 2006), we lose any coherent link to Marx’s theory of value and the inherent tendencies within capitalism that Marx identifies, through employing his theory of value i.e. we lose Marx’s bigger picture. However, since Sweezy (1942) popularised Bortkiewicz’s ‘proof’ of Marx’s ‘errors’, Marxist economists have accepted that Marx’s theory of value is internally inconsistent anyway, and have consequently ‘corrected’ Marx à-al-carte, preserving only differing sub-sets (according to their chosen manner of correction) of Marx’s original conclusions. For the totality of Marx’s vision of capitalism to be taken seriously, Marx must be rescued from allegations of internal inconsistency. The Temporal Single System Interpretation (TSSI) of Marx precisely sets out to achieve this goal. The TSSI explains that if we interpret Marx as having a sequential and non-dualistic method (see below), then Marx is – and always has been – internally consistent, bringing the totality of Marx’s vision back into business. We can thus apply an internally consistent holistic Marx to the question of knowledge-based production.

Our first section further explores the question of the internal consistency of Marx’s theory of value. Section two considers how Marx’s conception of capitalism as the
unity of a valorization process and a labour process shapes our conception of what is productive (and productive of what). Section three explores how Marx’s definition of productive and unproductive labour is relevant to knowledge-based production. Section four focuses on how to understand research and development, a knowledge intensive activity, in the context of Marx’s theory of value. Section five tries to assess questions of training/skills in our knowledge-based society, informed by Marx’s concept of simple and more complex labour-power. Finally we conclude, in the context of what George Lucas considers to be the value of 49 seconds of film (knowledge-based production) on the imaginary planet of Mustafar.

Physical Hang-Ups And Confusion Over Where Profit Comes From.

If a concept of value is to be relevant to our understanding of knowledge-based production, it must be relevant to our understanding of the economy in general. Freeman (1996) explains how Bortkiewicz (1906-7/1952 and 1907/1984), popularised by Sweezy (1942 and 1949), initiated the tradition of interpreting Marx as having employed (or should have employed) a simultaneous approach and, that we should see price and value as dual distinct separate systems to reconcile in simultaneous equilibrium. Bortkiewicz ‘discovered’ that if value was interpreted in a simultaneous and dualistic fashion, then value becomes an inconsistent/externally contradictory concept, as expressed by the failure of ‘Marx’s’ transformation ‘problem’ to add-up. Total value may be equated to total price (Winternitz, 1948) or, total profit may be equated to total surplus-value (as in Bortkiewicz’s ‘solution’) or, the price of wage goods may be equated to their value (Seton, 1957). However, as Desai (1979) explains, as the dual systems must be uniquely reconciled, preservation of only one aggregate equality is possible, and this simply depends on the observer’s own preference. Faced with such difficulties/inconsistencies the position of holding to, at least, the idea that all profit results from exploitation of labour, the fundamental Marxian theorem (FMT), was put forward by Moroshima (1973). However, as Kliman (2001) and Kliman and Freeman (2006) explain, for all simultaneous

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1 Periodically new ‘improved’ simultaneous and dualistic interpretations of the transformation problem appear, such as Loranger (2004), which appear to satisfy all three equalities, but only upon the pain of introducing further assumptions/restrictions to the ‘solution’. Kliman (2007) demonstrates how Loranger’s ‘solution’ cannot always satisfy all three equalities unless prices and money wages are, when required, allowed to be negative!
approaches profit may be positive although surplus labour is negative or, profit may be negative although surplus labour is positive, the FMT falls, surplus labour is not necessary or sufficient for profit. Steedman (1977) decisively stepped into the debate, declaring value a redundant concept, for the compelling reason that in simultaneous and dualistic models, value merely proxies ‘physical’ magnitudes in the ‘real’ economy. With value considered to be a redundant concept the road is open to prioritising ‘physical’ phenomena/things by, for example, imagining such a concept as a natural rate of return on all capital, as is conventionally imagined in mainstream economics. In general, we contend that simultaneous ‘physicalist’ Marxism, with no meaningful concept of value, but rather sharing the same simultaneous ‘physicalist’ tools as the mainstream, is unlikely to challenge/provide more insight than the mainstream itself.

In reaction to such developments, among other developments and retrogressions, a new form of value theory emerged, not necessarily claiming to follow Marx (Reuten, 1993), the social paradigm or, the abstract labour approach or, the value form paradigm (Arthur, 2001). Essentially, focus is switched from prioritising the production of value/surplus-value in production to the determination of value/surplus-value through realisation/exchange in circulation (McGlone and Kliman, 2004). We would not wish to suggest that such a concept of value may not be helpful to understanding knowledge-based production, but do agree with McGlone and Kliman (2004) that it is incompatible with Marx’s own concept of value; note Marx (1867/1976), pages 261-262,

‘Hence we see that behind all attempts to represent the circulation of commodities as a source of surplus-value, there lurks an inadvertent substitution, a confusion of use-value and exchange-value. In Condillac, for instance: … Still, Condillac’s argument is frequently repeated by modern economists, especially when the point is to show that the exchange of commodities in its developed form, commerce, is productive of surplus-value. … We might therefore just as well say that the buyer performs what is ‘strictly’ an ‘act of production’ by converting stockings, for example, into money.’

2 Just as economists fetish the physical features of our system over its underlying value essence, in our society we fetish objects over people. Note the paradox of increased ‘personal’ security from developments in communication/technology – you need two mobile phones, so you can ring to say one
But how can we usefully employ Marx’s apparently inconsistent theory of value; or rather, do we really have to? If a hermeneutic interpretation of Marx existed that could reproduce his conclusions from an interpretation of his method, removing any internal inconsistency, then we could turn to Marx’s theory of value for now consistent insight. The TSSI of Marx has risen to this challenge, arguing that Marx’s theory of value is internally consistent if we interpret Marx as following a sequential and non-dualistic method (in particular see Freeman and Carchedi, 1996, and Freeman et al, 2004). Sequential analysis recognises the reality that for a production period, the unit value of inputs may (are likely to through technological change) differ from the unit value of outputs. Simultaneous valuation, through simultaneously equating the unit values of inputs into production with the unit values of the output resulting from that very same period of production, by definition, precisely miss this central basic dynamic point. A dualistic concept of price and value sees prices and values as separate categories/systems. In contrast, a non-dualistic concept of price and value imagines prices and values within the same single system, mutually determining each other in succession through time. At the end of a production period the total produced value of capital is given by the value of constant capital input at the start of that period, plus living labour performed in that period. Price formation/the determination of appropriated values at the end of production may ensure individual commodities’ appropriated values differ from their produced values, but for capital in total, appropriated value must equal the, already established in production, total produced value of capital. The monetary expression of an hour of labour-time at the end of production is given by dividing the monetary expression of total capital by its total produced value. Individual commodities’ appropriated values are simply defined by their price divided by the monetary expression of labour-time. With their value thus defined by their monetary expression, this period’s outputs become next period’s inputs i.e. with their value defined by the price that is actually paid for them.

Kliman (2004) explains how Stigler (1965), in debate with Barkai (1965), applied the criterion of coherence (Hirsch, 1967) to the analytical problem of how, in Ricardo’s work, the demand for corn is affected by its price. Stigler developed the principle of scientific exegesis; if an interpretation of an author can successfully deduce their...
conclusions from their premises, it represents a valid interpretation. Whereas, an interpretation which fails to deduce an author’s central conclusions from their premises, represents an invalid interpretation. Kliman (2004) investigates how many of Marx’s key conclusions, selecting 13, can be deduced by different interpretations of Marx. The TSSI of Marx fulfils all 13, while alternative interpretations of Marx can only fulfil differing sub-sets of Marx’s 13 key conclusions. Kliman concludes by Stigler’s principle of scientific exegesis, that the TSSI of Marx represents the most valid interpretation of Marx. The transformation ‘problem’ is no longer a problem. Appropriately accounting for the value of money, all three of Marx’s aggregate equalities hold, the price of total capital equals the value of total capital, wages equal the value of variable capital and total surplus-value equals total profit (Kliman and McGlone, 1988). Given varying value compositions of capital, the tendency to profit rate equalisation will ensure individual commodities’ appropriated values diverge from their produced values, but for the system as a whole the source of profit is clear, the surplus-value extracted in production. The FMT thus holds for the TSSI (Kliman, 2001, Kliman and Freeman, 2006). Furthermore Marx’s (1981) prediction of a tendency for the profit rate to fall in times of accumulation is reconfirmed, disproving the simultaneous Okishio (1961) theorem (Freeman and Kliman, 2000a and 2000b).

To sum up, we look to Marx’s theory of value to help understand knowledge-based production, understanding Marx to have employed a sequential and non-dualistic method i.e. we look to the input of a potentially internally consistent Marx.

The Labour Process And The Valorization Process.

Marx (1976) emphasises how capitalism should be understood as two processes in one, the labour process and the valorization process. The labour process, the assembly and co-ordination of workers and things, is explained as being obviously essential in itself, but not specific to capitalist production i.e. production must occur in all forms of society. In contrast, the valorization process is identified as being both

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3 Mongiovi and Veneziani are notable critics of the TSSI, see Mongiovi (2002) and Veneziani (2004). The reader may find it illuminating to follow the debate on sequential valuation/the TSSI in Research In Political Economy (Foley 1999, 2000, Freeman and Kliman 2000a, 2000b, and Laibman 1999a, 1999b, 2000a, 2000b) or, in Capital and Class (Kliman 2001, Mohun 2003, Kliman and Freeman 2006). Essentially we contend the TSSI is criticised by Nelson-like observation, for not corresponding to the conventional methodology of other ‘Marxist’ approaches, which cannot find an internally consistent Marx themselves.
historically specific to the capitalist mode of production, and essentially as the underlying purpose/logic of this mode of production. Capitalism as a whole is the unity of these, opposed in character, but each equally necessary sides of capitalism, with the underlying driving essence of the system being the drive to valorize/expand capital. Capitalists simply seek to maximise the difference between M (the money expression of the value of capital they advance to production) and M’ (the money expression of the value of their capital after production). The particular use-values that are produced, and the particular concrete labours and use-values that are necessary for their production, are only relevant in so far as the activity satisfies the valorization process; M – M’ is successfully achieved. Surplus-value, either directly produced by the enterprise or alternatively produced by productive labour elsewhere in the system, must be appropriated to satisfy the valorization process, or that activity/labour process will seek to be undertaken by private business. It is humbling to realise that we live in a system, which so ‘abstractly’ prioritises the valorization process over ‘physical’ needs/apparent realities. It is the nature of the valorization process (the autonomization/independence/leading role of value in action), rather than any particular labour process, which leads Marx to conclude that:

A) Productivity improvements are in themselves unproductive of value (if they increase the organic composition of capital while at the same time increasing productivity i.e. the quantity of use-values produced with a unit of capital), but rather simply cheapen commodities; for example see Marx (1976) page 137.

B) In aggregate, the drive to accumulate creates a tendency for the rate of profit to fall; see Marx (1894/1981) Part Three.

C) Unlike in other societies surplus production is a recipe for crisis rather than a cause for celebration; see Marx (1885/1978) pages 544-545.

Marx seeks to explain how all activities either fit into the process of capitalist production or stand beside it, from the standpoint of recognising the essential nature of the valorization process i.e. by recognising that the source of profit is the unpaid labour of productive workers, no matter how mystifying the actual distribution of this
profit may be. Marx warns us to avoid the folly of over-focusing on the material or 'physical' nature of production; see Marx (1976) page 998 then page 1046, 4

‘The folly of identifying a specific social relationship of production with the thing-like [ding-liche] qualities of certain articles simply because it represents itself in terms of certain articles is what strikes us most forcibly whenever we open any textbook on economics and see on the first page how the elements of the process of production, reduced to their basic form, turn out to be land, capital and labour.’

‘The desire to define productive and unproductive labour in terms of their material content has a threefold source.
(1) The fetishism peculiar to the capitalist mode of production from which it arises. This consists in regarding economic categories, such as being a commodity or productive labour, as qualities inherent in the material incarnations of these formal determinations or categories.
(2) Looking at the labour process as such, labour is held to be productive only if it results in a product (and since we are concerned here with material wealth, it must be a material product).
(3) In the actual process of reproduction – considering only its real moments – there is a vast difference which affects the formation of wealth, between labour which is engaged on articles essential to reproduction and labour concerned purely with luxuries.’

We shall consider in the next section how association with production or circulation informs Marx’s concept of productive and unproductive labour. To sum up, we stress that knowledge-based production must not be assessed as productive or unproductive according to the particular nature of its labour process or, the use-value/materiality of its output; see Marx (1976) page 1044,

‘From the foregoing it is evident that for labour to be designated productive, qualities are required which are utterly unconnected with the specific content of the labour, with its particular utility or the use-value in which it is objectified. Hence labour with the same content can be either productive or unproductive. … A singer who sings like a bird is an unproductive worker. If she sells her song for money, she is to that extent a wage-labourer or merchant. But if the same singer is engaged by an entrepreneur who makes her sing to make money, then she becomes a productive worker, since she produces capital directly. A schoolmaster who instructs others is not a productive worker. But a schoolmaster who works for wages in an institution along with others, using his own labour to increase the money of the

4 We suggest that Marx’s avoidance of ‘physical’ hang-ups follows precisely from the fact that he was not seeking to simply build a ‘neat’ ‘complete’ mathematical model. Once abstractly modelling – and we are no exception – economists can control ‘physicality’, ultimately assuming a single identical commodity, and thus if they wish give undue significance to ‘physical’ ‘notions’ or ‘results’.
entrepreneur who owns the knowledge-mongering institution, is a productive worker.’

Productive And Unproductive Labour.

We must avoid making the naive mistake of thinking that if an activity is unproductive then it is of less importance to our investigation. By reserving the category of productive labour, to labour that is directly productive of surplus-value in production, Marx intends to help our understanding of the phenomenon/necessary role of unproductive labour in capitalism. Whether knowledge-based production is important to capitalism does not rest on whether it, as an output or as an input, is primarily productive or unproductive in nature, but rather the productive or unproductive nature of activities helps us to understand how these activities are important to/fit into the operation of the capitalist system as a whole. Marx (1978, Chapter 6) argues that all activities purely associated with circulation, the change of form of commodity and money capital, are unproductive, and that all labour in the productive sphere which is not necessary for the labour process, but only necessary for the valorization process, is also unproductive. Furthermore, the matter does not depend on the scale in which unproductive labour is performed; see Marx (1978) page 225-226 and 209,

‘The general law is that all circulation costs that arise simply from a change in form of the commodity cannot add any value to it. They are simply costs involved in realizing the value or transferring it from one form into another. The capital expended in these costs (including the labour it commands) belongs to the faux frais of capitalist production. The replacement of these costs must come from the surplus product, and from the standpoint of the capitalist class as a whole it forms a deduction of surplus-value or surplus product, in just the same way as the time that a worker needs to buy his means of subsistence is lost time for him.’

‘if we have a function which, although in and for itself unproductive, is nevertheless a necessary moment of reproduction, then when this is transformed, through the division of labour, from the secondary activity of many into the exclusive activity of a few, into their special business, this does not change the character of the function itself.’

So, if knowledge-based production enables unproductive activities to be conducted on a greater scale (through helping concentration and centralisation), it cannot change
their unproductive nature. Acts of buying and selling, in productive firms or outside
e.g. the entire retail sector, including advertising and marketing, are necessary but
unproductive, so represent a deduction of surplus-value. The banking/financial
system, whether it is facilitating circulation, lending and attracting deposits, or trading
titles/fictitious capital, is necessary but unproductive, again a deduction of surplus-
value. Bookkeeping, or rather the recording of the valorization process, is strictly
unproductive, a deduction of surplus-value; note Marx (1978) page 211,

‘By way of book-keeping, which also includes the determination or reckoning
of commodity prices (price calculation), the movement of capital is registered
and controlled. The movement of production, and particularly of valorization –
in which commodities figure only as bearers of value, as the name of things
whose ideal value-existence is set down in money of account – thus receives a
symbolic reflection in the imagination.’

Expenditures of labour necessary to the supervision/co-ordination of the labour
process, no matter in which society it may be performed, are productive. But
additional supervision aimed at simply maximising the self-expansion of capital in the
valorization process i.e. working all as hard as possible, is not productive. If we
imagine a supervising machine, a reality made increasingly possible by knowledge-
based production, if it is co-ordinating you, it is acting as constant capital, which will
enter the commodities’ value. But if it is simply checking up on you/speeding you up,
it is acting as unproductive constant capital, a deduction from surplus-value.

Knowledge-based production may improve the ‘efficiency’ of all these unproductive
activities, reducing the proportion of surplus-value they consume. It is no wonder that
firms are keen to use the internet to sell direct, as if they can reduce their circulation
costs/time their profit rates will be boosted in just as real sense than if they had
exploited their productive workers more. Interestingly Marx defines transport, the
movement of commodities to their point of sale, as productive, the continuation of the
production process in circulation.

For simplicity we shall use the term unproductive labour for all categories of labour, which do not
produce value. Carchedi (2005) explains how Marx imagined different categories of labour, which do
not produce value. Labour applied to the supervision of the valorization process is termed non-labour.
Carchedi (1977) explains how supervisory non-labour forms a hierarchy leading up to the actual
owners of capital, which ‘collectively’ supervises the valorization process, with capitals’ need for such
non-labour providing the basis for new middle classes.

Although the dot-com bubble primarily serves to remind us of the excitable nature of fictitious
capital, the dot-com companies practice of seemingly adding operating costs to their capital, waiting
In addition to the effect knowledge-based production may have on actual transport, we must recognise that knowledge-based production is frequently concerned with the transport of information. It would seem that this form of transport is cost less, a minute expenditure of electricity, however, even more than railways relatively, it requires the investment of large sums of capital in communications infrastructure. For all the capital to complete its circuit i.e. for fixed capital to fully pass its value bit by bit to the product, a commercially non-viable length of time may have to elapse. To solve this ‘timber problem’ (Marx, 1978, page 321-322) we would expect to see the appearance of this problem of the ‘reality of value’ manifest in state provision/funding of communications networks or, granting of some form of monopoly status to a private capital.

Before we consider research and development and training, let us briefly consider the self-employed. Given the nature of knowledge-based production many opportunities have, and will continue to, occur for self-employed specialists (‘virtual plumbers’) to operate successfully. To capitalists, the services of the self-employed, or rather their cost represents if employed productively, an equal addition to the value of their commodity or, if employed unproductively, a deduction of surplus-value equal to the value/cost of that service. The ‘wages’ of such self-employed labour-powers ultimately seems to rest on supply and demand. Specialists in excess demand may receive a high reward, but specialists which are amply supplied will see their ‘wages’ reduced to, or even below, its bare minimum (for that level of skill). Furthermore such knowledge-based specialists should beware (Marx, 1976, Chapter 15); the more essential a particular skill may be, the greater will be the capitalists’ drive to circumvent it through technological advance e.g. what became of TV repair men?

**Research And Development.**

The fact that knowledge-based production is important to, and is made possible by, research and development is self-evident. The question is rather, how does a high level of research and development, supported by and creating new branches of 

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for the profit to roll in, has a echo of Marx’s (1978) recording of how railway firms manipulated charges to capital and current expenditure to ‘manage’ their dividends.
knowledge-based production, fit into the operation of capitalism as a whole? Research and development is aimed at creating new use-values, whether as commodities for final consumption or as inputs into, potentially radically changing, productive and unproductive labour processes. Although research and development can change the nature of production it is not an act of ‘immediate’ production itself of any value or surplus-value, in the same way as advertising cannot be seen as productive, an ‘immediate’ act of production. So if research and development is unproductive, then why does it make any sense to do it? We contend that the three ‘answers’ we put forward to this problem do not negate Marx’s theory of value; rather, they illuminate it in action:

A) Research and development is conducted to support capitalists’ search for relative surplus-value.
B) Granting of monopoly status through patent, the creation of ‘intellectual’ land, is a manifestation of the essentially unproductive nature of research and development.
C) State provision or support for research and development is a further manifestation of the essentially unproductive nature of research and development.

As we have already noted (Marx, 1976, page 137), productivity improvements – the creation of more use-values by labour performed for the same length of time – are unproductive of value in themselves. However, Marx (1976) Chapter 12 explains how, for capitalism as a whole, the production of relative surplus-value rests on

7 This is not to say that the knowledge research and development produces cannot take part in value producing processes, so research and development can indirectly lead to the production of value. New products/techniques may require that new skills must be learnt, increasing the value of specific labour-powers and in the same proportion increasing the value produced by an hour of such labour-powers (see our training section). However, as new techniques are likely in aggregate to be labour-saving/deskilling, they are likely to reduce the production of value and surplus-value. Knowledge may be taught as a business, which produces value and surplus-value, but its input is as a use-value, with the source of surplus-value being the unpaid labour of the ‘collective-teacher’. Knowledge may be sold as a book or as software. However, we contend such products’ produced value is their cost of reproduction not including the labour of those who actually produced the knowledge/text/software. Such unproductive labour simply produces a use-value, which once produced is not reproduced (even if we did imagine that this labour had value, its form as an input would be as an ever lasting use-value, which could not transfer/pass its value to a product bit by bit as it does not physically depreciate in any way). For a book/software to have a higher price/appropriated value than its produced value there must be a matching opposite deviation of appropriated value from produced value elsewhere in the system.
productivity improvements reducing the value of labour-power and consequently the value of wages, assuming the price of labour-power adjusts to its value; see Marx (1976) pages 436-437,

‘Capital therefore has an immanent drive, and a constant tendency, towards increasing the productivity of labour, in order to cheapen commodities and, by cheapening commodities, to cheapen the worker himself.’

For the individual capitalist who introduces a successful new commodity or a more productive method of production first, as the result of their unproductive expenditure on research and development, their reward and motivation extends beyond helping to cheapen labour-power; see Marx (1976) page 434 then page 436,

‘Now let some one capitalist contrive to double the productivity of labour, … The real value of a commodity, however, is not its individual, but its social value; that is to say, its value is not measured by the labour-time that the article costs the producer in each individual case, but by the labour-time socially required for its production. … Other things being equal, the capitalist’s commodities can only command a more extensive market if their prices are reduced. He will therefore sell them above their individual value but below their social value, … This augmentation of surplus-value is pocketed by the capitalist himself,’

‘On the other hand, however, this extra surplus-value vanishes as soon as the new method of production is generalised, for then the difference between the individual value of the cheapened commodity and its social value vanishes. The law of the determination of value by labour time makes itself felt to the individual capitalist who applies the new method of production by compelling him to sell his goods under their social value; this same law, acting as a coercive law of competition, forces his competitors to adopt the new method.’

So, pocketing additional surplus-value/realising above average profit, or desperately trying to keep up with those who do, is a powerful impetus for unproductive expenditure on research and development. Clearly, those in front – if they wish to stay in front – will ‘invest’ much of their ‘surplus’ profits in research and development, and thus hope to stay in front. The law of the determination of value by labour-time is reflected by capitals’ attempts to break free of its consequences through attaining a legal right to stay ahead i.e. a monopoly by patent. Competitors will seek to circumvent patents, if they are in any position to do so, to avoid being on the wrong

Software is worth more than the box, but only through a redistribution of value, rather than knowledge in itself as a use-value creating value.
side of the socially necessary/average level of productivity in their branch, or in order to operate in that branch at all. We can see how new medical drugs, patented products in general, as new branches with entry prevented by patent, attract additional surplus-value from elsewhere in the system, if they have the demand combined with their monopoly status to charge above their commodities’ value. So, whether patents are necessary to facilitate research and development or not, desire for them to circumvent the law of the determination of value by labour-time, and the desire of competitors to stop this, can be seen as manifestations of this very law in action.

If a research and development activity will only be conducted if a patent is granted or if it is publicly funded, then we are back to Marx’s ‘timber’ problem in a new form. State intervention must circumvent the operation of the law of the determination of value by labour-time for that activity to proceed. Given that the rewards of being on the right ‘side’ in the search for relative surplus-value are so significant, it should be of no surprise that the state in ‘developed’ countries, acting as a collective capitalist, should subsidise research and development to stay ahead of ‘underdeveloped’ countries. Putting it crudely, ‘developed’ countries ‘waste’ labour on much, in itself unproductive, research and development, so as to capture a greater quantity of labour from ‘underdeveloped’ countries, which cannot ‘afford’ to ‘waste’ their labour so ‘unproductively’ on research and development. To the extent that knowledge-based production is contributing to the ‘developed’ world’s ability to stay ahead, it is helping the ‘developed’ world to pocket additional surplus-value at the expense of the average/below average producers i.e. the rest of the world. Knowledge-based production is consequently contributing to the, at least relative, impoverishment of the majority of the world’s population.8

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8 We could perhaps suggest that the conditions for the rise in globalisation were partially created by advances in knowledge-based production, but not as is conventionally imagined by merely speeding communications. Soviet fears of falling behind the knowledge-based production high-tech revolutionary information-system based, unproductive, US weapon systems is considered key to the Soviet elite’s gamble on Gorbachev’s reforms. Reaction by the elite to the very box they opened led to the rapid disintegration of the USSR, as if destroyed in a video game virtually by the very weapons it feared.
The Tricky Question Of Training.

We do not dispute that the education system may be seen as a grand social sorting system reflecting/reinforcing immobility between classes rather than opening it up. Neither do we dispute the view that much ‘training’ by firms e.g. team building, is simply an extension/part of the supervision of the valorization process. We shall however leave these important issues behind to focus on what direct effect education and training may have on various labour-powers’ contribution to the valorization process. Clearly knowledge-based production, in common with all activities conducted in the economy, requires, in addition to simple labour, the input of a skilled labour component; see Marx (1976) page 135,

‘the value of a commodity represents human labour pure and simple, the expenditure of human labour in general. And just as, in civil society, a general or a banker plays a great part but man as such plays a very mean part, so, here too, the same is true of human labour. It is the expenditure of simple labour-power, i.e. of the labour-power possessed in his bodily organism by every ordinary man, on the average, without being developed in any special way. Simple average labour, it is true, varies in character in different countries and at different cultural epochs, but in a particular society it is given. More complex labour counts only as intensified, or rather multiplied simple labour, so that a smaller quantity of complex labour is considered equal to a larger quantity of simple labour.’

Let us for the moment leave aside complex/skilled labour to focus on simple/unskilled labour. It is evident Marx thought that the concrete nature of simple labour is not set, but is historically/level of development specific. Given that the nature of simple labour varies, we would expect its reproduction cost to vary. The lengthening of compulsory education in advanced capitalist countries in the twentieth century may thus reflect state funded (as the collective capitalist) reproduction of concretely more use-full simple labour.

Marx (1976, pages 617 to 619) explains how continual revolutions in the nature of the labour process (through machines/science i.e. such as revolutions made possible by knowledge-based production) are likely to constantly make specialist workers redundant. By specialist, we interpret Marx as meaning not specifically skilled but just simple labour conditioned to its specialist task. Such ‘structurally’ unemployed now have to enter the worst paid/longest hours/most over-supplied segments of the
labour market (coal miners becoming taxi drivers). In defence against such a fate, Marx imagines that education may have a role in making workers many-sided i.e. able to transfer from one specialist occupation to another. We are unclear as to whether Marx sees education of many-sided workers as a necessary development for capitalism, or simply as a necessary development for the working class to strengthen its resistance to, and eventual ability to overthrow capitalism. Assuming the latter allows us to see education as a progressive activity, to the extent it actually produces many-sided workers. Compulsory education may thus improve the concrete quality of simple labour to the advantage of capitalists (matching developments in labour processes) and the many-sided nature of simple labour to the advantage of the working class. We should also note how Marx reports that factory-owners think workers must be conditioned by factory work at a very young age (Marx, 1976, page 549) and should not be short-sightedly allowed to emigrate if unemployed (Marx, 1976, page 722), thus wasting their long-learned conditioning to their labour. Marx (1976) page 546,

‘All work at a machine requires the worker to be taught from childhood upwards, in order that he may learn to adapt his own movements to the uniform and unceasing motion of an automation.’

It is in this context that we should judge the introduction of computers in primary schools, and parents’ desire to make their children computer literate – there is some advantage to be had from learning to press those buttons fast – but only to capital if most can do it i.e. if it is a feature of simple labour. Moving on to skilled labour; Marx (1976) pages 304 to 305,

‘in the valorization process it does not in the least matter whether the labour appropriated by the capitalist is simple labour of average social quality, or more complex labour, labour with a higher specific gravity as it were. All labour of a higher, or more complicated, character than average labour is expenditure of labour-power of a more costly kind, labour-power whose production has cost more time and labour than unskilled or simple labour-power, and which therefore has a higher value. This power being of higher value, it expresses itself in labour of a higher sort, and therefore becomes objectified, during an equal amount of time, in proportionally higher values.’

9 Through increasing the productivity of simple labour, capital as a whole potentially benefits from the production of relative surplus-value, the cheapening of the worker.
Let us assume over a working lifetime that it takes 100,000 hours of labour-time (measured in average/simple labour) to reproduce a simple labour-power, and that it requires an additional 20,000 hours of labour-time (measured in average/simple labour) to train/reproduce a particular skilled labour-power. The value of that skilled labour-power, as expressed in money (by multiplying the total hours of simple labour-time necessary for its reproduction by the monetary expression of labour-time), will thus be 20% higher than the value of simple labour-power over its lifetime, and consequently 20% higher for any given period of time. Let \( a^s \) represents the monetary expression of the value of this particular skilled labour-power for one working day and \( a^\xi \) represents the monetary expression of the value of simple labour-power for one working day. Therefore \( a^\xi = \Phi a^\xi \), with \( \Phi \) representing the proportionally higher reproduction cost of this particular skilled labour-power \( (\Phi = 1.2) \). Let us assume that simple labour and this particular form of skilled labour have an equal length of working day, \( l_s = l \). We must now be clear that the monetary expression of labour-time does not represent the monetary expression of the value of one hour of simple labour-power, but rather the monetary expression of the result, in terms of the value added, of one hour of simple labour-power being employed productively under average social conditions of production. One hour of simple labour may add £10 to the value of a commodity (the monetary expression of labour-time = £10), whereas its value as labour-power, the commodity the worker sells, may be, say, £5. Let \( x \) represent the monetary expression of labour-time, then \( xl_s = \Phi xl_s \), in an equal working day our particular form of skilled labour will add 20% more value as expressed in money to the value of what is produced, than an hour of simple labour. If \( l_s = l = 8 \) hours of labour-time and \( x = £10 \), our particular form of skilled labour would add, in a day, £96 to the value of what is produced, while simple labour would add £80 in a day. If we assume \( a^\xi = £40 \) then \( a^\xi_s = £48 \), but this does not mean our particular skilled worker will be paid a wage of £48 for that day, equal to the value of their labour-power. When Marx introduces the concept of simple and complex labour, he notes (Marx, 1976, page 135, footnote 15),

‘The reader should note that we are not speaking here of the wages or value the worker receives for (e.g.) a day’s labour, but of the value of the commodities in which his day of labour is objectified. At this stage of our presentation, the category of wages does not exist at all.’
Although Marx usually assumes, for analytical convenience, that the price of labour-power, its wage, equals its value, when Marx does consider wages and the process of accumulation as a whole (Marx, 1976, Parts 6 and 7), he imagines that the phenomenon of the price of labour-power not equalling its value is a very real possibility. Assuming the price of different labour-powers always equals/reflects their values, as is conventionally assumed e.g. Roberts (2004), ignores this real possibility. Furthermore, it may distort our view of exploitation, depending on whether the government, the firm or the worker has funded the training. In our example, if the worker had funded their own training then paying them less than £48 a day would clearly represent additional exploitation through depressing the price of their labour-power below its value, restricting their ability to reproduce. Wages for now self-funded graduates must reflect their student debt or their ability to reproduce will be restricted. In contrast, if the firm had in the firm’s time incurred the training cost, then the now skilled worker need only be paid as simple labour, at £40 a day, to successfully reproduce. Full state funding of training would likewise leave the worker’s reproduction cost at £40 a day, while saving the firm the cost of training. Competition between capitalists for already firm or government trained workers is likely to ensure such skilled workers’ wages rise above their daily reproduction cost of £40. So, although who pays the training cost does not affect the monetary expression of the value objectified in commodities by employment of a particular skilled labour-power (Φx an hour), it does affect how that labour-power’s wage relates to its actual reproduction cost (that faced by the worker). We could perhaps identify in skilled labour a form of human capital, but we should remember to who/what the worker acts as capital; see Marx (1978) page 516,

‘In point of fact, labour-power is his capacity (ever renewing and reproducing itself), not his capital. It is the only commodity that he can constantly sell, and he has to sell it in order to live, but it operates as capital (variable capital) only in the hands of the buyer, the capitalist. If a man is perpetually forced to sell his labour-power over and over again, i.e. to sell himself, to someone else, this proves, according to these economists, that he is a capitalist, because he always has a ‘commodity’ (himself) for sale. In this sense even a slave would be a capitalist.’

\[10\] We would like to thank Andrew Kliman for bringing this interpretation to our attention, and only hope that we have not misrepresented it.
Given that labour-powers vary in ‘specific gravity’, wage differentials between skilled and unskilled labour-powers should be seen as a consequence/manifestation of the determination of value by labour-time. To the extent that capitalism requires particular skilled labour-powers, it provides the material foundation for different ‘classes’ of workers. If knowledge-based production were to increase the proportion of skilled labour required in a particular country, then it would provide the material basis for a matching change in the class composition of that country. However, even if knowledge-based production itself requires a high skilled labour input (like early machine building, Marx, 1976, Chapter 15), its ‘products’ are likely to make many existing skilled workers unnecessary/redundant, as with the introduction of any new ‘machinery’. In aggregate, knowledge-based production may thus increase the proportion of simple labour in the economy rather than reduce it.

49 Seconds On Mustafar.

When summarising what goes into the complex process of modern film-making, an act of knowledge-based production, George Lucas speaks of all the various types of concrete labour that lie behind producing 49 seconds of action on the imaginary planet of Mustafar in the last of his Star Wars films. He expresses the total value of these 49 seconds of film as representing 70,441 ‘man’ hours of labour, not $70,441 or 70,441 units of a physical commodity. Obviously he does not differentiate between productive and unproductive labour or provide a formula for his calculations (presumably reduction to some sort of average or simple labour), but we think George is on the right track. We believe that it is impossible to analyse our ‘human’ society in physical or nominal money terms; in a ‘human’ society it is the human effort that counts. However, under capitalism, human effort is assessed in a very peculiar way, with Marx’s enduring achievement being his understanding of the peculiar nature of capitalism’s assessment of human effort, as expressed in his theory of the determination of value by labour-time. In the spirit of modern Hollywood choose your preferred ending:

(A) Knowledge-based production may change labour processes but cannot ‘buck’ the, universal in the capitalist mode, underlying dominance of the valorization process. So let us understand the underlying valorization process in order to
understand how knowledge-based production fits into the development of the capitalist mode of production i.e. Marx’s theory of the determination of value by labour-time is alive and well and rides off into the sunset.

(B) Knowledge-based production marks a completely new mode of production, providing yet another reason to see Marx’s theory of the determination of value by labour-time as redundant i.e. as nothing more than another tedious and irrelevant nineteenth century costume drama.

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