

PART III

THE DUAL ECONOMICS OF ADVANCED CAPITALISM

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From De-socialised to Re-socialised Labour

In Part I of this book we have argued that intellectual labour divided from manual labour is ruled by a logic of appropriation. Socialism, however, demands a mode of thinking in accordance with a logic of production. This implies thinking by the direct producers themselves and it would necessitate the unity of head and hand.

It is our purpose now to investigate trends which dominate our present epoch with regard to this contrast. The reasoning involved is, of course, grounded in what has been set out in the preceding chapters. It is bound, however, to be a great deal more speculative since it is concerned with the present and future, and serves, it is hoped, as a basis for further research by others.

We have seen that the abstract intellectual work associated with the system of commodity production is an *a priori* 'socialised' form of thinking, in antithesis to physical labour 'carried on independently and privately by individual producers'¹ since 'only products of mutually independent acts of labour, performed in isolation, can confront each other as commodities'.² The abstract intellect arose because labour lost its primitive collective form of working and became de-socialised in such a way that the cohesion of society grew dependent on exchange instead of production. As the vehicle of the social synthesis, or of socialisation, as we might call it, exchange becomes monetary exchange activated by money being utilised as capital. In the initial epochs of commodity exchange capital figured in the 'antediluvian form', as Marx called it, of monetary and merchant capital, only since then to seize upon the means of production and to operate them by wage-labour.

The logic of appropriation cannot be expected to change into a logic of production so long as labour has not resumed its capacity of carrying the social synthesis. The antithesis between intellectual and physical labour will not vanish before the private and fragmented labour of commodity production has been turned into re-socialised labour. But, as we know only too well, this in itself will not be enough. The re-socialised labour must become the societalising force which must bring about the unity of head and hand that will implement a classless society.

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A Third Stage of the Capitalist Mode of Production?

In the era of flow-production the socialisation of labour has reached a stage higher than ever before, but of course in subordination to capital. The re-socialisation of labour has been a major trend, if not indeed the main one, in capitalist history. Marx distinguishes two stages of the process: the stage of manufacture followed by that of machinery and large-scale industry – 'machinofacture' in short. We feel there may be good reasons for distinguishing a third stage. As Marx says:

In manufacture the transformation of the mode of production takes labour-power as its starting-point. In large-scale industry, on the other hand, the instruments of labour are the starting-point.³

In monopoly capitalism and its flow methods of production, I

would continue, it is labour itself that forms the starting-point. The ground for distinguishing this third stage lies in major structural changes in the labour process occurring in pursuit of intensified valorisation of capital. But the postulate of the automatism of the labour process innate in capital, and its increasing realisation, merits our attention.

In the epoch of manufacture, representing the initial stage of the capitalist mode of production, capital employs the existing artisans of the pre-capitalist period as wage labourers and fits them into a closely knit system of division of labour. Working under extreme pressure of time, a marked increase of labour productivity of each worker is guaranteed, with a correspondingly greater amount of surplus labour to capital. These artisans are transformed from a mass of individual workers doing various jobs in handicraft workshops into an organised collective or compound worker (*Gesamtarbeiter*) though still only using handtools.

The collective worker, who constitutes the living mechanism of manufacture, is made up solely of such one-sidedly specialised workers [who each] performs the same simple operation for the whole of his life [and thereby] converts his body into the automatic, one-sided implement of that operation.⁴

But, as we have quoted before:

since handicraft skill is the foundation of manufacture, and since the mechanism of manufacture as a whole possesses no objective framework which would be independent of the workers themselves, capital is constantly compelled to wrestle with the insubordination of the workers.⁵

In fact the automatism of the labour process upon which capital depends for its control over production is not vested in the human labourer but in conditions which determine the quantity of his expenditure of the labour-power he has sold to the capitalist. The capitalist does not enforce his will by his direct personal action but only indirectly by the action of things and services which he can buy with his money and watch over with his authority.

The answer to the unsolved problem of manufacture was of course the introduction of machinery into the labour process. Of the three parts of the machinery which Marx distinguishes — 'the motor mechanism, the transmitting mechanism and the tool or working machine' — it is this last part of the machinery with which the industrial revolution began'.⁶ For this part of the machinery 'replaces the worker, who handles a single tool, by a mechanism operating with a number of similar tools and set in motion by a single motive power . . .'.⁷

Indeed the exposition of Marx in the opening of the fifteenth chapter is so well known that it might seem redundant to quote further here. However, before arguing my case for distinguishing a third stage of capitalist development I want to throw into relief the very features of Marx's exposition which seem to leave no room for such a stage, because he includes in his second stage the most advanced characteristics of the modern labour process, including the continuous flow method and the automatic character of present-day production.

The collective working machine, which is now an articulated system composed of various kinds of single machine, and of groups of single machines, becomes all the more perfect the more the process as a whole becomes a continuous one, i.e. the less the raw material is interrupted in its passage from the first phase to the last; in other words, the more its passage from one phase to another is effected not by the hand of man, but by the machinery itself. . . . As soon as a machine system executes, without man's help, all the movements required to elaborate the raw material, and needs only supplementary assistance from the worker, we have an automatic system of machinery, capable of constant improvement in its details. . . . An organised system of machines to which motion is communicated by the transmitting mechanism from an automatic centre is the most developed form of production by machinery.⁸

The description given here might stretch to the forms of production of the twentieth century right to the present day. To what extent this is the case is shown by the following quotations from *Grundrisse*:

From the moment . . . when fixed capital has developed to a certain extent — and this extent, as we indicated, is the measure of the development of large industry generally — . . . from this instant on, every interruption of the production process acts as a direct reduction of capital itself, of its initial value. . . . Hence, the greater the scale on which fixed capital develops . . . the more does the continuity of the production process or the constant flow of reproduction become an externally compelling condition for the mode of production founded on capital.⁹

and again:

Hence the continuity of production becomes an external necessity for capital with the development of that portion of it which is determined as fixed capital. For circulating capital, an interruption . . . is only an interruption in the creation of surplus value. But with fixed capital, the interruption . . . is the destruction of its original value itself. Hence the continuity of the production process which corresponds to the concept of capital is posited as *conditio sine qua* for its maintenance only with the development of fixed capital.¹⁰

It seems difficult to find room for a third stage of the capitalist mode of production after reading these passages. But what they do not show are the implications carried by the external necessity of the continuity of the production process. These implications cover the evolution of monopoly capitalism, scientific management and flow production.

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The Turn to Monopoly Capitalism

In line with Lenin we consider these developments as distinctive characteristics of a new stage of the capitalist mode of production. Lenin related the change to the level of the organic composition of capital or the high grade of capital intensity reached in the last quarter of the nineteenth century (in the heavy industries of iron and steel manufacture, synthetic chemistry and electro-industry). This is, in fact, synonymous with the terminology of Marx in *Grundrisse*, which Lenin, of course, did not know. But his theoretical reasoning has been refined and substantiated by certain non-Marxist studies bearing on the same subject. The most pertinent ones are *Studies in the Economics of Overhead Cost* by J. M. Clark¹¹ and the works by Eugen Schmalenbach, the founder and most important representative of modern management sciences in Germany.¹²

The reasoning is simple and incontrovertible. Growing capital intensity and a rising organic composition of capital leads, at a certain point, to a changing costing structure of production, amounting to an increasing dominance of the so-called indirect or fixed element of the cost. This does not vary with output and still remains constant even when production, as in a severe slump, might have to stop temporarily altogether. These invariable overheads are made up of the interest on loaned capital, depreciation, insurance, maintenance, leases, rents and so on. Firms wherein this part of the cost is high in relation to the direct costs, in the main of materials and wages which vary according to the volume of output, cannot easily respond to the market regulatives of social economy controlling the play of the law of value. When demand recedes and prices tend to slump, pro-

duction should be cut down and supplies be diminished. But heavy overheads will cause unit costs to rise with lessened output, and we obtain the contradiction that adaptation of supplies to receding demands forces the cost to rise when prices fall. In other words the rising organic composition of capital makes production increasingly inadaptible to the market regulatives. The reaction to this contradiction on the part of the firms affected can only be to force them, as a matter of life and death, to try to obtain control of the movements of the market. This is how they become 'monopolists'.

Under the impact of this causality some of the features of the labour process described by Marx assume a changed significance.

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Imperialism and Scientific Management

These conditions occurred increasingly and over a spreading range of industry during the last quarter of the nineteenth century. They assumed a spectacular manifestation in the long depression following upon the slump of 1873/4 and lasting almost uninterrupted for more than twenty years. The period, remembered as 'the hungry eighties', was a time of mass unemployment comparable to that of the 1930s; a time of hunger marches and mass demonstrations, of strikes and riots and revolutionary class struggle. Socialism for the first time became the catchword of broad political movements resulting in the founding of social mass parties matched by the organisation of the semi-skilled and even the unskilled workers in a new type of trade unionism. The most ominous features of the picture drawn by

Marx of the impending 'expropriation of the expropriators' seemed to menace the bourgeois world.

Foremost in the picture was the paralysing decline of the rate of profit, the root cause of all the trouble as predicted by Marx. It was felt most acutely in the industries with the highest organic composition of capital, the heavy iron and steel manufacture, synthetic chemistry and electro-industry. The period was particularly prolific in technological and organisational innovations attempting to overcome the paralysing overheads but in fact only aggravating the underlying contradiction so long as the market exercised its unhampered rule. Several initiatives were undertaken towards 'regulating production and thereby also prices and profits', as Engels mentions in a well-known footnote in the third volume of *Capital*.¹³ They were effective in producing two hectic booms each of which, however, collapsed within a year. For until the early nineties, the time of Engels's writing, what he adds was still true: that 'these experiments are bound to break down under the pressure of a new economic downturn'. But only a very few years later his remarks ceased to hold true, and it is correct to state that capitalism entered the long depression of the 1870s in the position of a free-market economy and emerged from it in 1895/6 in the shape of consolidated monopoly capitalism.

Two things were above all imperative for the survival of capitalism at that juncture: the first, an expansion of the markets by opening up new territories and resuming colonial expansion on a new scale, a way recommending itself easiest to the rich European creditor countries like Britain, France, Belgium and Holland; the second, a substantial increase in the rate of exploitation of the labour employed in the industries at home, a particular need for the United States, still a debtor country, but rapidly advancing in industry and with the world's highest wage level. In the subsequent course of events both these remedies in conjunction proved necessary to keep capitalism afloat, especially after the First World War when the U.S.A. had turned into the dominant capitalist creditor power. The weakened European countries then followed suit, but with varying time-lags and as reluctant modernisers – with one exception: Germany. Through her defeat and territorial retrenchment as well as loss of foreign capital, Germany had been thrown into the anomalous position of a highly industrialised debtor country.

This left her little choice but to enhance the exploitation of her own labour force by industrial 'rationalisation' on the lines heralded by the American drive for 'scientific management'.

To underline the parallelism of the two lines of development by which capitalism wrenched itself out of the paralysing fetters of the outmoded free-market system and on to the open-ceiling economics of monopoly capitalism, it suffices to repeat from Lenin's 'Imperialism'¹⁴ the conversation he quotes of Cecil Rhodes with *The Times* correspondent Wickham Steed in 1895:

I was in the East End of London yesterday and attended a meeting of the unemployed. I listened to the wild speeches, which were just a cry for 'bread, bread, bread', and on my way home I pondered over the scene and I became more than ever convinced of the importance of imperialism. . . . My cherished idea is a solution for the social problem, i.e. in order to save the 40,000,000 inhabitants of the United Kingdom from a bloody civil war, we colonial statesmen must acquire new lands for settling the surplus population, to provide new markets for the goods produced in the factories and mines. The Empire, as I have always said, is a bread and butter question. If you want to avoid civil war you must become imperialists.

The year 1895 was also that in which Frederick Winslow Taylor introduced his work to the American Society of Mechanical Engineers with a lecture to which he gave the remarkable title *A Piece Rate System, being a step toward a Partial Solution of the Labor Problem*.¹⁵

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The Economy of Time and 'Scientific Management'

The dominance of overhead cost is associated with a specific economy of time relating to the labour process of production. The more highly the production capacity of a given plant is utilised, that is to say, the more products are turned out in a given time and, as a consequence, the quicker the capital can be turned over, then the lower is the unit cost of the output and the greater the competitiveness of the enterprise. The speed of operations in utilising the given plant of a firm is the all-important factor in the competitive struggle for profit under conditions of monopoly capitalism.

If we look back to the beginnings of the search for modern so-called scientific management we can see that it was this economy of time which spurred it on. Harry Braverman points to the vital interconnection:

It will already have been noticed that the crucial developments in the process of production date from precisely the same period as monopoly capitalism. Scientific management and the whole 'movement' for the organisation of production on its modern basis have their beginnings in the last two decades of the last century. And the scientific technical revolution, based on the systematic use of science for the more rapid transformation of labor power into capital, also begins . . . at the same time. . . . Both chronologically and functionally, they are part of the new stage of capitalist development, and they grow out of monopoly capitalism and make it possible.¹⁶

I would say that they grew out of the root cause which gave rise to monopoly capitalism, the dominance of overhead cost, i.e. the

rise in the organic composition of capital. And coupled with the speeding of operations was the question of its control.

From the lecture by F. W. Taylor already mentioned there ensued a discussion with H. R. Towne and F. A. Halsey, his main rivals, who had put their 'Premium Plan' of management before the same Society in 1891. The central issue of the debate concerns the question of control. In the Towne - Halsey plan¹⁷ 'the control of the speed problem is turned over to the men', whereas according to Taylor's scheme it 'lies with the management'. And the main reasoning involved is one of the economics of overhead cost. Indirect expenses equal or exceed the wages paid directly and remain approximately constant whether the output is great or small. Greater output justifies higher wages, the diminution of the indirect portion of the cost per piece being greater than the increase in wages.

The operating economic factor is the effect that the volume of output has on the unit cost. Or, as Taylor later puts it in his *Principles of Scientific Management* (1911)¹⁸ 'it pays the employer to pay higher wages as long as the higher output does not increase overheads'. And there is no doubt that Taylor grasped the implications of this economics of time with greater systematic consistency from the standpoint of monopoly capital than anybody else among the would-be founders of the appropriate sort of management at that time. Taylor was the one to whom the claim to be its founder rightfully belongs. Let us go through some of the salient points of his system.

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The Essentials of Taylorism

Frederick Winslow Taylor's first writing was the lecture of 1895 given to the American Society of Mechanical Engineers, from

which we have already quoted: *A Piece Rate System, being a step towards a Partial Solution of the Labor Problem*. This was the first public intimation of his major work of which the final publication did not appear until 1906 under the title of *On the Art of Cutting Metals*, a very meticulous book indeed, divided into 1198 paragraphs and supplemented by twenty-four folders of charts. It has fallen into undeserved oblivion and much better known are the two more popular books *Shop Management* (1903) and *Principles of Scientific Management* (1911).¹⁹

The cornerstone of scientific management is the time-and-motion study of operations. Of this Taylor says: 'What the writer wishes particularly to emphasize is that this whole system rests upon the accurate and scientific study of unit times which is by far the most important element in scientific management.' (*Shop Management*.) In its original conception, inspired by his undisguised concern for the rate of labour exploitation, Taylorism aroused the opposition and revulsion of the workers to an extent which threatened to defeat its own objectives, and therefore it has since been modified and wrapped around with a medley of 'sciences' - physiology, psychology, sociology and so on. But nothing can conceal the hard core of Taylorism which is in force today as it ever was, though the technicalities may have altered.

His principles are expounded in the following extracts from *On the Art of Cutting Metals*.

In the fall of 1880, the machinists in the small machine shop of the Midvale Steel Company, Philadelphia, most of whom were working on piecework in machining locomotive tires, car axles, and miscellaneous forgings, had combined to do only a certain number of pieces per day on each type of work. The writer, who was the newly appointed foreman of the shop, realised that it was possible for the men to do in all cases much more work per day than they were accomplishing. He found, however, that his efforts to get the men to increase their output were blocked by the fact that his knowledge of just what combination of depth of cut, feed, and cutting speed would in each case do the work in the shortest time, was much less accurate than that of the machinists who were combined against him. His conviction that the men were not doing half as much as they should do, however, was so strong that he

obtained permission of the management to make a series of experiments to investigate the laws of cutting metals with a view to obtaining a knowledge at least equal to that of the combined machinists who were under him. He expected that these experiments would last not longer than six months. [para. 7]

Instead of six months his investigation took him twenty-six years.

A study of the recommendations made throughout this paper will illustrate the fact that we propose to take all the important decisions and planning which vitally affect the output of the shop out of the hands of the workmen, and centralise them in a few men, each of whom is especially trained in the art of making those decisions and in seeing that they are carried out, each man having his own particular function in which he is supreme, and not interfering with the functions of other men. [para. 124]

While his experiments resulted in many valuable discoveries and inventions (e.g. self-hardening steels and new designs of machine-tools)

we regard as by far the greatest value that portion of our experiments and of our mathematical work which has resulted in the development of the slide rules which enable the shop managers, without consulting the workmen to fix a daily task with a definite time allowance for each workman who is running a machine tool, and to pay the men a bonus for rapid work [para. 51]

a slide rule which

serves to make out the effect which each of 12 variables has upon the choice of cutting speed and feed [para. 6]

and again:

The gain from these slide rules is far greater than that of all the other improvements combined, because it accomplishes the

original object for which in 1880 the experiments were started; i.e., that of taking the control of the machine shop out of the hands of the many workmen, and placing it completely in the hands of the management, thus superseding the 'rule of thumb' by scientific control. [para. 52] Under our system the workman is told minutely just what he is to do and how he is to do it; and any improvement which he makes upon the orders given him is fatal to success. [para. 118]

Towards the end of his paper he emphasises that

he did not under-estimate the difficulties of and resistance to using the slide rules. He would add, however, that he looks upon task management as of such great moment, both to the workmen in raising their wages and rendering strikes and labour troubles unnecessary and to the manufacturers in increasing and cheapening output, that he staked the remainder of his days to further assisting in the putting into practice his conception of management. [para. 1197]

The crucial advantage and novelty he claimed for his system of management was that it made the rise of profits for the manufacturer compatible with rising wages for the workers. In his own words: 'High wages and low labour cost are not only compatible, but are, in the majority of cases mutually conditional.' (*Shop Management*, pp. 21-2.) This is why he saw in it a partial solution of the labour problem, and in 1895 he even expressed the hope that it would contribute to the elimination of the trade cycle, thus freeing capitalism of its two major evils. Taylor's examples given in *Shop Management* show increases in workers' output up to 300 per cent and even 400 per cent relative to a wage increase of 60 per cent! Inflexibility of the cost structure being also the main element making for monopolism, it becomes apparent why Taylorism has its roots in monopoly capitalism. Nor does the causality stop there. Taylor's personal history serves to illustrate how Taylorism itself acts on monopolism. After three or four years' work at the Midvale Steel Company he transferred his activity to the Bethlehem Steel Company, where he totally reorganised the system of management; subsequently the latter forged a merger with the former to found the United

Steel Company, the biggest of its kind in the United States. Thus Taylorism, in its turn, helped to increase the stimulus instigating monopolism.

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Critique of Taylorism

An explanation is needed for the quotations in the last chapter dealing with Taylor's much advertised slide rules which hardly reached any practical importance after the introduction of transfer mechanisms and the flow-method of production had rendered them redundant. However I quote them for a number of reasons. In the first place the immense time and trouble which Taylor devoted to them explain why he spent twenty-six years on the completion of his main work. Second, they demonstrated Taylor's singleness of purpose in wanting to transfer the whole skill and experience possessed by the craftsmen of metal trades upon the management. This knowledge in the hands of management was transformed into an intellectual feat transcribed into a set of norms and rules. It thereby became a possession of the managers to deal with in the interests of capital; they could carve it up, mechanise the subdivisions and even automate it as a whole. Taylor refers to this knowledge in its original form as 'all the important decisions and planning which vitally affect the output of the shop'.

The third reason why I regard Taylor's work on his slide rules of such importance is the clarity with which it shows that such knowledge, if left in the possession of the craftsman, must be linked inseparably with his manual labour, representing his productive capacity as an individual worker. But it also enshrines everything which makes possible the link-up of co-operating craftsmen into 'one collective worker'. This socialisation of their

labour, which should, by rights, constitute the power of the workers in production, if not even over production, is removed from them by the Taylorisation of their labour, which instead gives management the means to wield technological coercion upon the workers.

In paragraph 116 of *On the Art of Cutting Metals* Taylor proclaims 'and but little can be accomplished with these laws' (derived from the slide rules) 'unless the old-style foremen and shop-superintendents have been done away with, and functional foremanship has been substituted - consisting of speed bosses, gang bosses, order-of-work men, inspectors, time-study men etc.' In this type of management created by Taylor are concentrated all the powers needed for ensuring the postulate of automatism necessary for the control of capital over production. Monopoly capitalism does indeed represent a third stage of the capitalist mode of production, the one in which it reaches its acme.

As early as 1903, in *Shop Management*, Taylor stresses that 'time study is a success only if it enables you to know exactly how long the studied job *should* take', and not only how long it *does* take in any given case. And he goes on to say: 'The best way to do this, in fact almost the only way in which the timing can be done with certainty, is to divide the men's work into its elements and time each element separately as "unit times"'. It amounts, of course, to nothing more than a mere pretence to proclaim the arbitrarily fixed time rates for a job (in units or no units) as norms of independent validity - as if they were extracted miraculously from the bosom of nature or even represented some prescience of the intellect! But this pretence is common practice in all capitalist countries where 'scientific job analysis' is in use. The pretence is inseparable from the whole intention of Taylorism. Under the German Refa-system, for instance, all kinds of manual operations are broken down into six basic elements of motion, and these are again minutely subdivided until the smallest imaginable common particle of these subdivisions is finally allocated a fractional measure of time counted in hundredths of a second!

It is of the essence of Taylorism that the standards of labour timing are not to be mistaken for the empiricism of the work as the workers themselves do it. Taylor does not learn his time measure from the workers; he imparts the knowledge of it as the laws for their work. The whole claim of 'science' for his functional

task management hinges upon the 'accurate and scientific study of time units, the most important element in scientific management'. *Coerceive timing* would be an appropriate name to give to this element. It corresponds to the treatment of productive human work in accordance with the logic of appropriation. For if we remind ourselves of the analysis of 'abstract time and space' in Part I, it can be seen how the handing over of a coin in payment for a commodity separates the time of the act from all its contents; thereby time is abstractified to a quantifiable dimension into which the scientific intellect can refit carefully selected items of content to make out the mathematics of their laws of behaviour in nature cast in commodity form. Precisely this kind of thing happens in Taylorism, but now applying to the absolute antipode to the logic of appropriation, namely to active human labour in its very labour process. Here the intellect, acting in the service of the capitalist power of appropriation, can assume the mere pretence of its legitimacy in wielding a fictitious norm of labour timing.

It is small wonder, therefore, that we can recognise in the work of Taylor and his followers a tendency to progress from empirical timing to 'synthetic timing' where the time norm for a job is construed without consulting or watching the worker, even for new jobs which have never yet been practised. The first man hired will find himself faced with his technological prerequisites and with the precise time and pay rates for the job. The proper methods of synthetic timing were evolved, not by Taylor himself, but soon after his death by his pupil Frank Gilbreth.²⁰ The principle, although it bears the latter's name, was clearly conceived by Taylor and dates back to 1903 at the very latest. Its present-day application in the systems of the measured day-rate or the MTM presents therefore no departure from Taylorism, but rather its further fulfilment.

In strict keeping with the characteristics of Taylorism is the fact that the concepts of time and motion used in its job analysis are *technological categories* and no true terms of human labour at all. Taylorised labour, therefore, is human labour made into a technological entity, homogeneous with the machinery, directly adaptable and can be inserted or transformed into it without any difficulty of conversion. Here labour is not only subsumed economically to capital (to use Marx's expression), i.e. by the act

of the workmen selling their labour-power to the capitalist, but also physically and technologically. This is a difference which at first sight may seem of small portent. In actual fact, however, it represents the basis and starting-point for the process leading up to the automation of human labour in the precise technical sense of the term. To say this does not minimise the importance nor deny the validity of what Marx states of capitalist production in its machine age generally. As we have partly quoted before:

Every kind of capitalist production, in so far as it is not only a labour process but also capital's process of valorization, has this in common; that it is not the worker who employs the conditions of his work, but rather the reverse, the conditions of work employ the worker. However, it is only with the coming of machinery that this inversion first acquires a technical and palpable reality. Owing to its conversion into an automaton, the instrument of labour confronts the worker during the labour process in the shape of capital, dead labour, which dominates and soaks up living labour-power. The separation of the intellectual faculties of the production process from manual labour, and the transformation of those faculties into powers exercised by capital over labour, is . . . finally completed by large-scale industry erected on the foundation of machinery. The special skill of each individual machine-operator, who has now been deprived of all significance, vanishes as an infinitesimal quantity in the face of the science, the gigantic natural forces, and the mass of social labour embodied in the system of machinery, which, together with those three forces, constitute the power of the 'master'.²¹

This is indeed a far-sighted anticipation of the development of capitalism, foreshadowing even the stages it fully reached only under monopoly capital. The specificities of the third stage, however, such as the wedding together rather than the confrontation of labour and machinery; the conversion of the worker from a machine-operator into a part of the machinery; the new forms and further extension of the division of mental and manual labour to the labour process itself, — these do not find expression in the above passage of Marx. What it does express, however, is that which both the second and third stages have in common. But

the existence of common features does not lessen the immense importance of the distinctive characteristics which occur in the monopolistic stage. The direct analysis and normative measurement of labour already discussed is one of these characteristics, to which we shall return later. The division of head and hand connected with it is equally striking and perhaps of greater implication.

In *Shop Management* Taylor states that his system 'is aimed at establishing a clearcut and novel division of mental and manual labour throughout the workshops. It is based upon the precise time and motion study of each workman's job in isolation and relegates the entire mental parts of the tasks in hand to the managerial staff . . . working out minutely detailed job-cards which the workmen are left to follow out in the prescribed speed.'²² This latter detail was drastically changed when flow methods came to be introduced somewhat later, causing, however, no mitigation but only further accentuation of the schism made by Taylor between the mind and the body of the industrial workman. The workman has, as it were, handed over his mind to a new institution which has come into existence — the modern management in charge of the economy of time peculiar to monopoly capital.

This new division of mental and manual labour must not be confused nor assumed identical with the fundamental one, dating from classical antiquity, now mainly rooted in the intellectual nature of science, although there are of course links and changes in the practice of science which reinforce these links. But the division directly involved in the managerial authority over the monopolistic labour process is the one between the technical and organisational intelligentsia and the manual work-force. As this division springs from the foundations from which monopoly capitalism itself arises, the stability of monopoly capitalism vitally depends on the relations between these two forces, the mental and manual, remaining safely divided. Should the division be changed into an alliance the authority of the management would be in jeopardy. Acting in unison the direct producers could dispose of the capitalist management and take production into their own control.

The cultivation of the specific fetishism of the modern monopolistic management is, therefore, one of the particular

ideological concerns, not only of the capitalists themselves, but of the State. The fetishism has a twofold root. The intellectual tasks vested in this management are not seen as representing the workers' mind but as deriving directly or indirectly from science and scientific technology. The mysticism of the 'scientific-technical revolution' is its mainstay. Above and beyond that, science itself is the principal issue of our autonomous intellect. This assumption about the intellect is made almost unassailable by modern positivism which places the origins of science outside the range of questions which can be asked; asking such questions is declared metaphysical and nonsensical. Never has idealism led a more unharassed existence!

The second root of the managerial fetishism rests in the individualism of the worker's wage. We have already quoted the important passage from Marx from his chapter on 'Co-operation' where he shows how the 'productive power developed by the worker socially . . . appears as a power which capital possesses by its nature . . . a productive power inherent in capital'.²³ This 'crucial inversion' of the productive power of collective labour into the power of capital is magnified in monopoly capitalism because in the size of the modern system the workers are more powerless than they have ever been since slavery, owing to the minuteness of each individual contribution. However, this aspect of monopoly capital can be fully discussed only on the basis of the all-important sequence to Taylorism — flow production, which made its very earliest beginnings by Swift in Chicago²⁴ and Henry Ford in Detroit two years before Taylor's death.²⁵ As far as I can see, Taylor's writings themselves contain no intimation of flow methods of production.

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The Foundation of Flow Production

In keeping with Marxian thinking we have interpreted the increase in labour productivity as occurring concurrently with increased association of labour. But it is clearly not the time-and-motion study as instituted by Taylor which socialises labour. The most striking and best-known examples of Taylor's work, famous from his own writings, refer to operations of building workers and to simple loading tasks in a yard of the Bethlehem Steel Co.; not only were these loading operations done by hand with shovels, but they had been done collectively as gang labour before Taylor individualised them. Indeed, one of the essentials in his instructions on time-and-motion study reads that each analysis must be applied to the operation concerned 'in strict isolation'.²⁶ This ruling would make it quite immaterial whether the operation studied was done singly or as part of co-ordinated labour. The relevance of Taylorism to highly socialised production is not that the specific norm of labour it imposes either causes the socialisation nor presumes its previous existence. It lies in the fact that Taylorism serves to implement the specific economy of time inherent in monopoly capitalism; and the economy of time ensues from high overhead costs and the need for continuous production.

The classical example best suited for illustrating this relationship is Ford's foundation of his motor works on the basis of flow production from 1913 onwards. In the building up of the operation Taylorism played no part. The stop watch need hardly have been invented, it seems, from the description Henry Ford himself gives in *My Life and Work*. The decisive element was the organisation of mass-production of a uniform product. He left

much room for the inventiveness of his workers, and the scheme did not develop at one stroke but evolved piecemeal, always following the logic of continuous mass-production. Ford's idea was to concentrate on one model car, his 'model T', designed by him personally for simplicity of operation, ease of repair, lightness of weight and multiplicity of use. He was the first to anticipate that the market for cars was unlimited, providing that the price could be kept at a lower level than anyone at the time thought possible. Other manufacturers were designing individual cars with a variety of models at high prices aimed at a restricted market for use as a privilege by the rich. Ford's famous remark illustrates his way of thinking. 'Any customer can have a car painted any colour that he wants so long as it is black.'²⁷ Incidentally he was also the first to realise the value of the uniformity of a product acting as its own advertisement.

In the building up of his production process overhead cost was not a compelling factor. The relation was the reverse: the overheads and their increasing dominance resulted from the flow methods applied in creating this new and revolutionary type of mechanised mass-production. The application of Taylorism became a necessity, apparently even to Ford's personal dislike, but indispensable if he was to maintain his profits and his competitiveness.

Thus it is not sufficient to look from the viewpoint of the engineer only at the history of flow production in capitalism since the industrial revolution and the growth of large-scale industry. True, seen from a purely technological angle no more than a replacement of multi-purpose by single-purpose machine-tools is needed for introducing some measure of flow production. There is no reason why this should not have happened as far back as the beginning of the nineteenth century or still earlier if the product was simple enough and the demand for it sufficiently large and pressing. Emergencies arising from war were the most likely occasions, such as the sudden mass requirements for small arms in the American Civil War. Mass-production on a flow-method basis appeared as the only device which could supply demands quickly. The need for munitions in the First World War created similar conditions on a much larger scale. But does the technological similarity place these instances on the same level with the Ford works of Detroit? The difference should be easy to

recognise. The instances prior to the emergence of monopoly capitalism were motivated by reasons of use-value and the urgency of war-time need, whereas twentieth-century flow production follows the logic of exchange-value and the time economy enforced by heavy overheads. Thus the serial small-arms manufacture of the 1860s went out of existence and was forgotten as soon as the Civil War was over, while Henry Ford's initiative introduced a new epoch of the capitalist mode of production.

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The Unity of Measurement of Man and Machine

The flow method of manufacture is the mode of production most perfectly adapted to the demands of the economy of time in monopoly capital. The entirety of a workshop or factory is integrated into one continuous process in the service of the rule of speed. We remember Marx saying: 'The collective working machine . . . becomes all the more perfect the more the process as a whole becomes a continuous one. . . .'²⁸ This continuity is now implemented by a machine, a conveyor belt or other transfer mechanism subjecting to the set speed the action of all the productive machinery and the human labour serving it. The identical rhythm of time of the transfer mechanism and the unity of measurement it imposes between the men and machines constitute the distinguishing principle of the flow method of modern mass-production. Compound machinery with compound labour works under this unity of measurement. Linked by the action of a transfer mechanism the workers operate like one comprehensive functional labourer using perhaps 400, 800 or

2000 hands and feet of individuals doing minutely fragmented jobs of work. This mechanised form of mass-production is a system in which human labour is coerced into complete technological combination.

Clearly, industrial plants organised on principles of continuous flow must follow their own rules of development. Strict synchronisation of all part-processes is essential. Any section slower than the others acts as a bottleneck condemning the capital invested in the plant to wasteful utilisation. Further capital must be invested until the plant satisfies the rule of even flow. The result will be the growth of the actual volume of output and of the permanent capacity of the plant. This result may or may not be intended nor called for in terms of market demands. If not, the firm stands to lose in the market what it gains by observing the laws of internal plant economy.

Here we notice the gap which opens up, in monopoly capitalism, between market economy and plant economy. For the laws determining the structure and evolution of the production process of monopoly capital are rooted in its intrinsic time economy and relate directly to the labour process of production. But these laws exist, of course, side by side with, and in the framework of, market economy; otherwise the enormous advance in labour productivity and surplus production springing from the new methods would not transmit themselves into private profits.

The unity of measurement of machinery and labour introduces a new setting for the class struggle in the labour process. The unity of measurement can either be one of the subordination of labour to the machinery or it can take the shape of the subordination of the machinery to labour. It must be one of the two; it cannot remain indifferent to this alternative. Under capitalist management, of course, the first is taken for granted, the assumption being that the workers, while working as a combined force with their hands, in their minds remain divided in conformity with their pay-packets. For the contrary case to become possible, the minds of the workers should be set in conformity with the compound character of their combined labour. An example of this rare possibility was shown by the workers at the Pirelli strike in Italy in 1968, when they did their own timing by 'counter-norms' and succeeded in taking the

assembly lines out of the hands of the management into their own, and reduced the flow to as low as 30 per cent of the rated speed.

This and many strikes of a similar kind, as well as numerous factory occupations in Italy, France, England and elsewhere, illustrate the fact that the fetishism, observed by Marx, involving the 'inversion' of the relationship between labour and capital has worn thin in a type of production where both labour and machinery assume compound structure.

Capital continuously faces the necessity for restructuring its production process, not only to reduce unit costs and to elude recessions, but even more compellingly to retain its hold over the class struggle. Thus the present drive towards group-work to replace the rigid linear pattern of assembly work may be apparent concessions to the workers, but in fact are nearly always aimed at breaking the bargaining power which the working class have learned to exert from line work. Another response of capital to industrial strife is continuous 'rationalisation' of production by having less and less workers and more and more automation regardless of the long-term perils of this trend.

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The Dual Economics of Monopoly Capitalism

The system of monopoly capitalism is marked by a duality of economics, the one located in the market and going back to roots as old as commodity production itself, the other peculiar to the most recent form of production and pointing to the latest, if not the last, stage of capitalism. But the rules of the market are no longer the same as in free-market capitalism. In the free-market system production was, as a rule, tied to the manufacture of

reproductive values – that is, to values serving the reproduction process of society – and these values were represented by marketable goods. The reproduction of capital thus ran, by and large, parallel to that of society, although submitting it to the wasteful vicissitudes of the trade cycle. By the manipulation of the market characteristic of monopolism this functional tie-up between production and circulation has been increasingly weakened. Monopolistic production is no longer bound to the manufacture of reproductive values, and the consolidation of monopolism in the middle 90s of the last century was marked by the beginning of an arms race leading up to the First World War. Obviously, an ever-growing part of the gross national product consisted of non-marketable goods for which the State devolved the cost upon the shoulders of the population while the private profits went to the manufacturers. Right from the start the State enabled the capitalists to satisfy the exigencies of limitless production on the part of the time economy by providing extensions to the limited markets. With the creation of the flow methods of mechanised mass-production during the First World War, and with its post-war integration into the capitalist system on a world-wide scale, the duality of market and plant economy became a permanent feature of world monopoly capitalism. It led to the big slump of the 1930s when both economies broke apart to such an extent that the capitalist system itself was threatened. Only Hitler-Germany's whole-hearted adoption of production of non-marketable goods and rearming for the Second World War helped world capitalism off the rock by the international arms race. After the Second World War there was greater awareness on the part of big business of the contradictions bound up with this form of mass-production and threatening a relapse into pre-war conditions. The large corporations evolved a 'planning' strategy centred on a 'break-even-point' as a guidance for balancing the centrifugal tendencies of production against the centripetal tentacles of the market limitations. Still, without the Korean War in the 50s and the Vietnam War of the 60s and 70s, underpinned by the secular inflation, it is more than doubtful that the recurrence of world-wide economic crisis could have been put off until the later 70s.

This brief outline of events serves to emphasise the ever-deepening contradictions of the dual economics which are basic

to the nature of monopoly capitalism and which help to explain the increasingly damaging effects of capitalism on society. While the regulatives of the market economy are weakened by manipulation, the growing pressures for continuous production and the time economy of capacity utilisation become the overall leading forces of capitalist development. Market economy, fundamental to commodity production, must be retained if capitalism is to survive, and production economy must be made to exist within the market economy. But these limitations which capitalism must impose upon plant economy for its own continuance should not stop us from analysing the formal structure of production and of Taylorism. So far we have viewed this new economy only as a part of capitalism in its third stage, yet it might harbour potentialities which could assume a vital significance if society were no longer subservient to capitalism. This in no way implies a belief that capitalism is already in a state of transition towards such a future nor that there is any innate necessity for a final breakdown, other than by its revolutionary overthrow. Nevertheless we might remember Marx's remarks in *Grundrisse*

But within bourgeois society, the society that rests on *exchange value*, there arise relations of circulation as well as of production which are so many mines to explode it. (A mass of antithetic forms of the social unity, whose antithetic character can never be abolished through quiet metamorphosis. On the other hand, if we did not find concealed in society as it is the material conditions of production and the corresponding relations of exchange prerequisite for a classless society, then all attempts to explode it would be quixotic.)²⁹

We have retraced the basic roots of commodity production to the separation between labour and socialisation (social synthesis) which occurred under the impact of the developing technology of the Iron Age. Capitalism is at the same time the result and the promoter of a re-socialisation of labour. In our belief, monopoly capitalism marks the highest stage of re-socialisation of labour in its state of dependency upon capital.

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The Necessity for a Commensuration of Labour

We must now turn to the fundamentals of man's historical existence as a social being. These fundamentals are nowhere stated more convincingly nor more concisely than in a famous letter of Marx to Kugelmann dated 11 July 1868, shortly after the first appearance of volume 1 of *Capital*, when Marx was irked by the lack of comprehension of one of its reviewers.

The unfortunate fellow does not see that, even if there were no chapter on value in my book, the analysis of the real relationships which I give would contain the proof and demonstration of the real value relation. The nonsense about the necessity of proving the concept of value arises from complete ignorance both of the subject dealt with and of the method of science. Every child knows that a country which ceased to work, I will not say for a year, but for a few weeks, would die. Every child knows too that the mass of products corresponding to the different needs require different and quantitatively determined masses of the total labour of society. That this necessity of *distributing* social labour in definite proportions cannot be done away with by the *particular form* of social production, but can only change the *form it assumes*, is self-evident. No natural laws can be done away with. What can change, in changing historical circumstances, is the *form* in which these laws operate. And the form in which this proportional division of labour operates, in a state of society where the interconnection of social labour is manifested in the *private exchange* of the individual products of labour, is precisely the *exchange value* of these products.³⁰

The natural law that animals are subjected to is comprised in the ecology and the biology of the species and for them involves no historical change. In application to human existence the same necessity is converted to economic law owing to the labour by which man provided for his livelihood, thereby achieving his assimilation to nature by his own doing. Human labour is subjected to changing historical circumstance through the changing scope of his productive forces in this struggle for assimilation. To him the observance of the economy of this struggle is his law of nature, and the apportioning of his labour power to his different needs is its precondition. But this apportioning in societies which have outgrown the primitive stage where labour takes place within everybody's sight demands some formal commensuration of the socially necessary varieties of labour. Some sort of commensuration of labour then becomes a necessity for every kind of society, societies of appropriation and societies of production alike. Marx makes this very clear in *Grundrisse*, with obvious forethought of socialism:

On the basis of communal production, the determination of time remains, of course, essential. The less time the society requires to produce wheat, cattle, etc., the more time it wins for other production, material or mental. Just as in the case of an individual, the multiplicity of its development, its enjoyment and its activity depends on economization of time. Economy of time, to this all economy ultimately reduces itself. Society likewise has to distribute its time in a purposeful way, in order to achieve a production adequate to its overall needs. . . . Thus economy of time, along with the planned distribution of labour time among the various branches of production, remains the first economic law on the basis of communal production. It becomes law, there, to an even higher degree. However, this is essentially different from the measurement of exchange values (labour or products) by labour time. The labour of individuals in the same *branch of work*, and the various kinds of work, are different from one another not only quantitatively but also qualitatively. What does a solely quantitative difference between things presuppose? The identity of their *qualities*. Hence the quantitative

measure of labour presupposes the equivalence,* the identity of their quality.³¹

Thus the commensuration of labour, demanded by way of 'a law of nature' for any human society, presupposes a quantification of labour of different kinds or by different individuals. And the fact is that labour, as it occurs in society, is not of itself quantifiable. It is not directly quantifiable in terms of needs, nor needs in terms of labour; neither is labour quantifiable in terms of labour time unless the labour were identical in kind or the actual differences, material or personal were disregarded. Therefore to satisfy the 'law of nature' stated by Marx thereby making human society possible, systems of social economy are needed to operate a commensuration of labour based on a quantification of labour. As Marx suggests, both the commensuration and the quantification of labour can be brought about in different ways, and these differences should be taken into account in distinguishing social formations and their economic systems.

A most significant difference in the modes of commensuration of labour rests upon whether it is brought about indirectly by the exchange process, or directly by the labour process. The exchange process, here, stands for the particular form of socialisation on the basis of commodity production. The whole secret and difficulty of Marx's analysis of the commodity and of exchange in the opening chapters of *Capital* lies in the task he sets himself of explaining how the exchange process brings about a social commensuration of labour in the guise of commodity value and of money. The abstraction of labour making for its quantification as the hidden determinant of the exchange proportions of the commodities he declares to be the crucial point (the 'pivotal point') for an understanding of political economy. '... by equating their different products to each other in exchange as values, they equate their different kinds of labour as human labour. They do this without being aware of it.'³²

To sum up we can enumerate five characteristics of the

* The German word is *Ebenbürtigkeit*, meaning 'equality' by birth, rank or dignity. If Marx had meant 'equivalence' he would have used this term. But he makes an explicit distinction between the commensuration by way of exchange value and the commensuration needed in communal production. I deem the use of the word 'equivalence', reminiscent as it is of exchange, therefore out of place here.

commensuration of labour underlying commodity production in accordance with Marxian teaching:

- (1) It takes place in exchange and by the valorisation of money and capital.
- (2) It takes place indirectly.
- (3) It takes place in an unconscious manner.
- (4) It takes place as an outcome of the whole circuit of the social exchange process, and
- (5) Above all it applies to the labour 'stored or embodied' in the commodities, or as Marx calls it, to 'dead labour'.

The fourth of these characteristics emphasises that, in effecting the commensuration of labour, commodity exchange provides the social nexus, and that the social nexus operates the commensuration of labour. Marx stresses this, but only as the economic implication of the law of value. My analysis widens the implication to embrace the formation of the abstract intellect. This extension does not, of course, in the least invalidate the Marxian analysis but merely complements it. While Marx exposes the economics of the capitalist class antagonism which is unaltered if the private property rights of capital are abolished, I focus on the division of mental and manual labour, which is another aspect of the same class antagonism. However this aspect of the antagonism does not disappear by the abolition of private capital but will have to be consciously liquidated in the progress of socialist construction as a measuring-rod of its success. This has never been taken into account in the Soviet Union except in words, whereas it forms a central issue in the construction of socialism in China since the victory of the proletarian cultural revolution.

workshop or of a section of it as it is in the measured day-rate system of management.

Our interest lies in the fact that here operations of different qualitative description are being expressed as different multiples of each other in quantitative terms of labour time. We have, in other words, a systematic quantification on standards of uniform time measures and thus a commensuration of labour in the literal meaning of it, over a range of operations. Since Taylor's time these operations have expanded to one industry after another and even to agriculture, mining, transportation and many of the service industries as well as to administration, to clerical work and design.³³ If we compare this mode of commensurating labour with the one effected by the social exchange process as analysed by Marx, it becomes obvious at a glance that both are diametrical opposites to each other in every vital characteristic. The mode initiated by Taylor is:

- (1) Rooted in the labour process of production.
- (2) It is a direct form of quantification.
- (3) It is carried out consciously with the aim of quantification in mind.
- (4) It is performed for single particular jobs, each analysed in 'strict isolation', building up in stages to sectional parts and to the entirety of existing or even of projected labour processes, and
- (5) Most important of all, it applies to labour in action in contrast to 'dead labour' stored in commodities.

However, an essential reservation must be made in speaking of a system of commensuration of labour of any kind. It must have a character of causal reality in practice and not be merely a calculation existing somewhere on paper. The commensuration of dead labour is given causal reality by the actual performance of acts of exchange. Only by the reality of these acts is it actually carried out and takes shape as the economic laws governing a social system of commodity production, whether capitalist or pre-capitalist. Thus the element of reality in time and space is an indispensable attribute to labour commensuration. In the case of labour in action the step from its mere existence on paper to its existence for society rests in putting the calculation into reality in

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The Commensuration of Labour in Action

We must now return to Frederick Winslow Taylor and focus upon his method of 'accurate and scientific study of unit times' declared to be 'by far the most important element in scientific management'. His analysis was done in the service of capital and therefore as a method for speeding labour. Under our viewpoint, however, the method need not serve this objective, nor be wielded by capital as a means of enforcing its control over labour. It could even be a method operated by the workers themselves, although then it would certainly differ substantially from Taylorism. But in order to have a firm base for our own considerations we take as a starting-point the way in which it is practised in monopoly capitalist mass-production.

Taylor's aims in analysing manual operations were, in the first place, to find out how the studied operation can be done with least waste of time and minimal effort and fatigue; then to norm the operation as a composite of strictly repetitive and standard parts; to reduce these parts to the smallest particles or 'units' of motion, assumed to be homogeneous in all manual operations; to time these units with the precision of fractions of a second; finally to use these 'unit times' as a foundation of the job evaluation for fixing correct wage and bonus rates. Some of these features have undergone more or less considerable modifications since the days of Taylor; modifications, however, which mainly serve to make Taylorism more acceptable to the workers – to sell it to them. These are of lesser importance from our point of view. It still is a method of direct time-and-motion study, or, better, of job analysis allowing for the possibility that the 'job' in question could be a collective performance of a highly automated

an actual process of flow production. Only by a conveyor belt in motion does the calculated proportion of labour which it enforces on the workers assume the functional reality of social labour commensuration. Remembering Ford's first installation of flow production, when no preliminary time studies had been made, a commensuration of these jobs nevertheless entered into force with no previous calculations.

We must, of course, remember that the time standards of labour commensuration vary from factory to factory, corresponding to their degree of competitiveness, and even vary within the same factory where the speed of operations is changed at frequent intervals. These different standards set the framework for the production process among monopoly capitalists who, on the one hand, associate to manipulate the markets, and, on the other, work in fierce competition. They must therefore operate the dynamics of their monopolistic economy of production within a framework of market economy to make it fit into a system of social synthesis.

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The Way to Automation

We have seen how the economy of time not only forces every firm to aim at the uninterrupted continuity of its production process but also to apply the highest possible speed and the greatest economy in the use of constant capital. Competitiveness demands the quickest capital turnover, and this again adds to the pressure for speed of operations. As a result there is a shortening cycle of renewal of plant at a rising level of technology and increased cost. Thereby the proportion of the circulating part of the capital relative to the fixed part tends continuously to rise. Since it is only the circulating part of the productive capital

which carries surplus value (cf. *Grundrisse*³⁴) the tendency helps to countervail the trend toward a falling rate of profit.

In short, the cumulative pressures of the monopolistic economy of time devolve upon the work force by an ever-increasing speed of operations. Even before the Second World War this speeding had in some cases reached the degree where it surpassed the limits of human capability, and technological agencies were introduced to obtain the required results. One of the first of these, to my knowledge, was the photo-electric cell, or 'electric eye' whose action replaces and exceeds the attention possible by a human person. There is hardly any need to remind ourselves of the stress Marx lays upon this element of human work. 'Apart from the exertion of the working bodily organs, a purposeful will is required for the entire duration of the work. This means close attention.'³⁵

To give an example, in the early 1930s the manufacture of razor blades was transformed in Germany from the operations of small-scale cutlers to automated mass-production by large-scale mechanisms relying on photo-electric cells for retaining the flawless blades and rejecting failures at a rate and reliability completely unattainable by a human operator. The Hollerith machine – also based on an electric eye – was in use for office work very much earlier. High speed and mass-production was only made possible by the introduction of such technological agencies in place of human labour power. From the 1950s onwards their use has been enormously extended, tending to make for complete automation of an increasing range of manufacturing processes.

I believe that the essential aspect of this type of automation is ultimately the total replacement of the subjectivity of a human labour-power. By this I mean the entirety of the human person's mental and sensorial activities in the particular jobs of work involved. Details of this replacement have been so frequently and lavishly described that we can spare ourselves the tedium of renewed repetition. It serves our purpose better to quote a very apt, though ironical, passage by Robert Boguslaw:

Our immediate concern, let us remember, is the explication of the operating unit approach to system design, no matter *what* materials are used. We must take care to prevent this

discussion from degenerating into a single-sided analysis of the complex characteristics of one type of system material: namely, human beings.

What we need is an inventory of the ways in which human behaviour can be controlled, and a description of some instruments that will help us achieve control. If this provides us sufficient 'handles' on human materials so that we can think of them as one thinks of metal parts, electric power or chemical reactions, then we have succeeded in placing human materials on the same footing as any other materials and can proceed with our problems of system design. Once we have equated all possible materials, one simply checks the catalogue for the price, operating characteristics, and reliability of this material and plugs it in where indicated. . . . There are, however, many disadvantages in the use of human operating units. They are somewhat fragile; they are subject to fatigue, obsolescence, disease and death; they are frequently stupid, unreliable, and limited in memory capacity. But beyond all this, they sometimes seek to design their own system circuitry. This, in a material, is unforgiveable. Any system utilizing them must devise appropriate safeguards.³⁶

What is here described, by way of a persiflage, but not far wrong from the true reality, denotes the whole line of monopolistic development of the labour process leading up to automation.

A great deal more automation could be introduced in the capitalist world than is, in fact, carried out. The reason for holding back is not only the excessive cost and rise of overheads attending automation in many cases, but the fact that the extension of automation beyond certain limits is bound to defeat the very end of the whole process, which is to maximise profits. It is easier and safer for monopoly capital to scan the world for cheap and willing labour still available for exploitation. To develop the full potentialities of automation will probably be a task remaining for socialism.

34 The Curse of the Second-Nature

With the achievement of automation the postulate of the automatism which we described in Part II of this book has reached its final stage. In automation the second nature reigns supreme. Ruled as it is by the logic of appropriation, the second nature cannot enrich itself out of any other source than real nature, and labour is the channel through which it does so. Capital grew fat and mighty by sucking the surplus out of labour. Can it continue to grow fat out of its own products? Capital faces the ultimate contradiction. The labour process has to function for capital as automatism to enable capital to exploit labour. But now the automatism alone remains and labour is discarded. Obviously, labour is fully discarded only in the rarest of cases; as a rule, automation only covers part-processes. And although its scope and its range are increasing, in the great mass of industries the global size of the human work-force still grows, both in the advanced and in the developing countries, even with unemployment forming stagnant pools.

An automated labour process is still a labour process, but a labour process of a completely social scope, social in the terms of a science and a technology resting on the logic of appropriation peculiar to commodity value. The subjectivity of the individual labour-power, the mental, sensorial and nervous functions of an individual while at work, has been replaced by the electronics of automation. Technological devices, in substituting for the workers' personal attributes, emancipate the subjectivity of labour from the organic limitations of the individual and transform it into a social power of machinery. Thus the electronics of an automated labour process act, not for the

subjectivity of one worker only, but for all the workers employed in its previous manual stage. Automation amounts to the socialisation of the human labour-power which, in certain aspects, it surpasses in its scope of capability, range of action, its speed, reliability and precision, though only in a restricted and set specialisation.

As Marx traces the evolution of the capitalist mode of production throughout its history he never fails to point to its emancipating effect as well as its evils. Even prior to the employment of machinery, in the period of manufacture: 'When the worker co-operates in a planned way with others, he strips off the fetters of his individuality, and develops the capabilities of his species.'³⁷ Then when the machine enters the picture: 'The number of tools that a machine-tool can bring into play simultaneously is from the outset independent of the organic limitations that confine the tools of the handicraftsmen.'³⁸ Similarly as to the gain in power: 'As soon as tools had been converted from being manual implements of a man into the parts . . . of a machine, the motive mechanism also acquired an independent form, entirely emancipated from the restraints of human strength.'³⁹ Taking into consideration the factory as a whole: 'Along with the tool, the skill of the worker in handling it passes over to the machine. The capabilities of the tool are emancipated from the restraints inseparable from human labour-power.'⁴⁰

Many other indications of this aspect of the capitalist development could be gathered from Marx's writings. The talk of 'emancipation' should of course not evoke illusions. It is not the worker who could ever reap emancipatory benefits under capitalism. The worker is not freed from labour by the machine, but his labour is emptied of its content, as Marx remarks. It is capital that is emancipated from certain barriers which hitherto set limits to the range of the exploitation of labour. As long as science and technology serve the development of the means of production of capital their advance can but be for the enhancement of profits at the expense of the workers:

all means for the development of production undergo a dialectical inversion so that they become means of domination and exploitation of the producers.⁴¹

Nevertheless, to associate this process with the term 'emancipation' carries an important pointer for the working class. The achievement of socialism does not necessitate scrapping the means of capitalist production to replace them by socialist means. To recognise, with Marx, the potentialities of emancipation in the capitalist machinery means, however much this machinery incorporates the rule of capital over labour,⁴² it can be transformed into means of production for socialism once the revolutionary power of the working class has broken the power of capital.

Each step of emancipation is due to the directly social capacity of capital, to its nature as social power in private hands. Automation, however, marks a step of emancipation more significant and far-reaching than any before. Here the worker has not only his work alleviated, he is dismissed from the work himself. Automation, seen by itself, is a creation by the powers of appropriation, those of capital and those of the intellect. This creation must be put into a new relationship with man just as man needs a new relationship to the automating machinery.

We thus have the result that now man would, in principle, have at his disposal production forces which in themselves embrace in their physical reality the socialisation which in the ages of commodity production has grown up in the intellectual work of the human mind – that is, in science. This is a reversal in the relationship between man and his tool. The tools are the repositories of his social potentialities and man can remain an individual using these tools to satisfy his needs and wishes with as yet unforeseeable horizons. It is clear that this assumes socialism in the place of capitalism.

It must, however, be remarked that abolition of private capital by the abrogation of its property rights does not automatically dispose of the antithesis of intellectual and manual labour. If this antithesis remains in being it makes for the continuation of an antagonistic society. Only conscious political action by the revolutionary forces can overcome this obstacle to socialism and make the direct producers the power that masters, handles and develops the means of production. Otherwise the development and disposal of the forces of social production remain the privilege of scientists and technologists, of experts and specialists

who, enmeshed with a vast bureaucracy of administrators, carry on a reign of technocracy.

This marks the chief dividing-line between the People's Republic of China and Soviet Russia as the main protagonists of socialism in the world today. The Russians justify their regime as a socialist one on the ground that it guarantees the speediest way to automation, but even this is contended by China where it is argued that the workers must build the automation themselves to suit their own purposes.

The interest of capital to maintain the gap between the advanced and opulent countries and the developing and poverty-stricken is as deep and as permanent as ever. And it will keep a world in being in which that which is possible is hidden by that which is existing. Capital will exert any means at its command to maintain the rule of a logic of appropriation and prevent a rule of the logic of production from restoring man's proper relation to nature on earth. And yet it is the very dialectic of capitalism which creates the conditions for a society of production to arise.

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The Epoch of Transition

As Marxists we were brought up to think that of all the contradictions inherent in capitalism the one between the ever-increasing social dimension of production and private appropriation is the most fundamental. It expresses the historical trend of the capitalist mode of production and asserts its transient character. This teaching has gained enhanced relevance in monopoly capitalism. With the introduction of flow production the social dimension assumed a specific structural form of its own and henceforth increased in a conclusive manner reaching in our

days the size of the giant multi-national corporations. This provides convincing evidence of the importance of the new commensuration of labour in making the development of production and the development of the markets proceed at variance. Their discrepancy creates problems which tend to exceed the controlling power of private capital and demands supplementation by the social resources and power of the State. The epoch in which we live is the epoch of transition which must either lead to socialism or to social disaster.

Science and technology have developed to new forms. But while classical physics is securely based on its mathematical and experimental method, the relativity theory and quantum physics have thrown science into methodological uncertainty. Classical physics in its unchallenged reign shared the lifespan of modern capitalism up to the end of its classical free-market period. Although now relegated to second place, it still has an important role to play and remains an adequate scientific method for a great mass of the technological tasks in the present world, not excluding the socialist parts. Were we then entitled to speak of classical science as 'bourgeois science' as we did in Chapter 20?

Let us be quite clear: methodologically, classical physics has nothing to do with the exploitation of labour by capital. Its findings are valid irrespective of any particular production relations. Inasmuch as it is based on the mathematical and experimental method science is one and one only. Exact science carries objectivity because the elements of the exchange abstraction, which in themselves are entirely of the second nature, have substantial identity with the corresponding elements of real nature owing to the fact that the separation of exchange from use and hence the creation of the exchange abstraction itself happens as an event in time and space in every occurrence of exchange.

On the other hand, looking at nature under the categories of the commodity form, science affords precisely the technology on which hinges the controlling power of capital over production. It cuts up nature piecemeal by isolating its objects of study from the context in which they occur, ignoring nature in its importance as the habitat of society. The environmental conditions are treated as a mass of interfering circumstances which must at all cost be kept out of the experiments. In this way the phenomena are severed from the human world and cut down to recurrent events;

these are defined by mathematical equations signifying the description of immutable 'laws of nature' providing the automatism demanded by capital. True, this deterministic and orthodox concept of natural law has in more recent times been increasingly supplemented by statistical laws and therewith strict necessity by probability. However, the pattern of exact science is still fundamentally that of classical physics.

It is a pattern of science closely connected with the division of intellectual and manual labour. In fact, it forms the hard core of this division since the intellect is the very creation of the exchange abstraction circulating as money and again as capital. The practice of science in the service of capital pays allegiance to an idea of the intellect which is a fetish concept of the human mind seen as the spontaneous source of the non-empirical concepts basic to science. In the framework of this fetishism the science of the mathematical and experimental method is indeed bourgeois science, the scientists pursuing their vital social tasks while being steeped in false consciousness about their function and the nature of science itself. Our attempt to retrace the intellectual powers of conceptual reasoning to the real historical roots in the social systems of commodity production serves the critical liquidation of this fetishism and its epistemological doctrine.

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Logic of Appropriation and Logic of Production

The basic difference of socialism from capitalism, as seen from our viewpoint, is in the relationship of society to nature. Whereas in capitalism the existing technology serves as machinery for the

exploitation of one class of society by another, in socialism it must be made the instrument of the relationship of society to nature. If present advanced technology does not allow for such a change then it must be transformed and freed from the adverse elements and the power structure ingrained in it. To speak with Ernst Bloch, the science and technology of our age rule over nature like 'an occupying army in enemy country', whereas in socialism we must aim to establish 'an alliance of society with nature'.⁴³ This cannot be done by dispensing with science, but demands the aid of a science backed by the unity of mental and manual work.

Contemporary history offers examples which can be drawn upon to illustrate some features of this fundamental change. It cannot be our intention here to give more than the barest hints of the tenets involved; a detailed examination must be reserved for a separate study. The examples I choose are three: (1) the remarkable enterprise of the Tennessee Valley Authority (T.V.A.) in the U.S.A., (2) a special aspect of the development of socialism in the People's Republic of China, and (3) a negative lesson to be derived from Stalin's 'Plan for the Remaking of Nature' of 1948.

Of the work of the T.V.A. David E. Lilienthal, its first chairman, has given an inspiring report covering the first decade under the significant subtitle *Democracy on the March*.⁴⁴ His book is a mine of information deserving scrutiny by present-day students for the positive and the negative features of the project as seen from a socialist viewpoint. The T.V.A. was created in April 1933, at the crest of the wave of Roosevelt's New Deal – the nearest the U.S.A. has ever been to a social revolution.

The catchment basin of the Tennessee River, an area almost the size of England and Scotland combined, utterly eroded and devastated by capitalist exploitation, was, like a patient revived from the brink of death, restored to health and prosperity. Waters once wasted and destructive were controlled for irrigation, electricity, transport, fishing, and pleasure; planned conservation of the soil re-created the fertility of the land; agriculture, industry, forestry, mining, village and town communities flourished. This was a task of combined action upon a region in its entirety, which could not be performed by the isolating strategy of bourgeois science in the service of capital. The fundamental aspects of the project are formulated by Lilienthal right at the

beginning of his report as the two governing tenets of the enterprise:

'First, that resource development must be governed by the unity of nature itself.

'Second, that the people must participate actively in that development.

'But if, in the doing, the unity of nature's resources is disregarded, the price will be paid in exhausted land, butchered forests, polluted streams, and industrial ugliness. And if the people are denied an active part in this great task, then they may be poor or they may be prosperous but they will not be free.' We would say they would be the slaves of capitalist exploitation.

Our second example, revolutionary China, of course offers inexhaustible illustrations of society coping with nature as the human habitat and on the basis of socialist democracy. The instance I choose accentuates the unification of mental and manual labour.

Jack Westoby, a former forestry specialist of the International Food and Agricultural Organization (F.A.O.), surveys the progress of afforestation made in China since 1949 'after two millennia of forest depletion'.⁴⁵ He heads his article 'Whose Trees?' and analyses the problems involved - embracing not merely the planting of trees but the entire ecology - from the viewpoint: 'To whom does science belong?' The necessity is not to alter the methodological constitution of science to change its character from a bourgeois to a socialist one, but the need is for 'the daily revolution which is making science everybody's business. This is the most important aspect of the evolution of Chinese science.' 'Why have plantings since the mid-sixties been very much more effective than the ones preceding? The heart of the answer . . . has to do with the Cultural Revolution, with the struggle of the masses making science their property. . . . It radiated the available expertise into the countryside, making the special knowledge of forestry science more directly the property of the masses. And it encouraged and helped the peasants to analyse their own experience: to become forestry scientists themselves. New forests are created by the people, not by professional foresters.' Here, in accordance with the teaching of

Mao Tse-tung, science is not discarded; it is, on the contrary, utilised in all its specialised and isolating practices but in a socialist framework and integrated into the context of nature as the human habitat. The use and significance of science changes in this process of transfer to the direct producers. However, it is not a change resulting from a prior decision about the class nature of science, but from the effects of the socialist practice it is made to serve.

In Stalin's famous or notorious 'Plan for the Remaking of Nature'⁴⁶ science, and the special science of biology and plant-breeding, was discarded because the isolating method of genetic selection was judged to be bourgeois in essence and incompatible with the alleged Marxian truth of 'dialectical materialism'.⁴⁷ Here a science is discarded, not in the light of new research of superior scientific validity, but simply on the strength of a philosophical belief in 'dialectical materialism' regarded as an *a priori* truth. It is well known that the substitute for the orthodox biological science was provided by T. D. Lysenko and that with Stalin's connivance all the geneticists opposing Lysenko were ousted from the Lenin Academy of Agricultural Science of the U.S.S.R. in the Session of July - August 1948. The course of action advocated by Lysenko and adopted by Stalin and the Party proved bogus and condemned the much-boasted plan to failure, entailing considerable damage to Russian agriculture.

Here a project had been conceived for tackling nature as a whole, like the project of the T.V.A. though on a vastly more grandiose scale and by a government professing to be socialist. But while the T.V.A. made the greatest possible use of science and advanced technology, Stalin relied on the doctrine of reflection and the associated materialist metaphysics. There was emphasis on basic democracy in the execution of the plan but the masses did not benefit and the attempt at breaching the division of intellectual and manual labour remained unavailing.

What emerges from these examples is, first, that the science indispensable for socialism is methodologically the same as the science in capitalism; second, that socialism has the means to counteract the properties which, in capitalism, constitute the bourgeois character of this science. These properties are: that the basic categories of science are of the second nature and totally alienated from the qualitative realities of the first nature; that

science is compelled to single out its objects as isolates; and that it must be carried out as an intellectual exploit.

All these properties are capable of remedy by the feature, the essential one of socialism, that the people as direct producers must be the controlling masters of both the material and intellectual means of production, and that they act in concert to establish their prosperity within nature in its global unity. For this feature signifies that the material practice of the people in their social exploits commands the need for scientific findings to be integrated into the relationship of society to nature. In the service of capital the findings of science are each of them items in commodity form presented to capital for its exploitation. This position does not alter when a number of such findings are combined to be exploited in their association; whereas in the practice of a socialist project, as evidenced also by the work of the T.V.A., the findings of science never remain single, but are always combined under the logic of production regulating any collective interaction with nature.

The difference then between the status of science in capitalism and in socialism is not in that the logic of science will change from a logic of appropriation to one of production. It is rather that the relationship between them differs. In capitalism the logic of appropriation reigning in the economics of profit-making and in science dominates the logic of production in the manual activities of the wage-labourers, whereas in socialism the relationship is the opposite: that the logic of production animating any socialist project dominates the logic of appropriation of a science belonging to the producers. It cannot, of course, be ruled out that in the long run the logic and method of science will alter as a result of socialist developments. But what is certain to change is the technology taken over from capitalism. And this change will not only be one of the machinery itself but also a change in the manner of producing it. Its construction will increasingly become the work of the direct producers rather than that of professional experts. We can see many examples of this change in China, particularly since the Cultural Revolution. Given a new, qualitatively different technology a new theoretical conception of its mode of working may emerge deepening its understanding and giving it the universality needed for its general social utilisation.⁴⁸

Our considerations in this chapter are based on the assumption of future socialism, transforming the giant social dimensions of present capitalist corporations to collective projects by the people as masters of their destiny. It is not our place here to predict how socialism is to come about in the advanced parts of the world. It is certain, however, that a change of the social system can no longer be spearheaded by an armed uprising of the workers as in the past, since the distribution of armed power is one-sided beyond dispute. On the other hand, what the ruling class is piling up in material arms it is losing morally by its mounting disrepute. It fails increasingly to serve society by providing gainful employment for the people and actively endangers their life by the technological perversions in military and industrial use. Therefore, it ought to be only a question of time until the workers can defeat the ruling system, armed with the political support and the ideological backing of the overwhelming mass of the people. The purpose of a study like the present must be seen against such a background.