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## CONTENTS

ABSTRACT ........................................................................................................ iv

INTRODUCTION ................................................................................................. 1

Chapter

I. EXPLANATION, PREDICTION AND THE SCIENTIFIC STATUS OF MARX ........ 7

   Introduction .................................................................................................... 7
   Prediction and Empirical Justification .......................................................... 11
   Marx's Explanatory Paradigm .................................................................... 20
   Causal Complexity and Justification ......................................................... 28
   Conclusion ................................................................................................. 43

II. THE LABOUR PROCESS THEORY IN MARX ........................................... 53

   Introduction .................................................................................................... 53
   Cohen's Account of Marx's Labour Process Theory ...................................... 61
   The Labour Process Theory in Marx ........................................................... 67
   The Development of the Theory ................................................................... 85
   Empirical Commitments of the Theory ....................................................... 106
   Conclusion ................................................................................................. 115

III. BRAVERMAN: PREDICTION AND EVIDENCE .................................... 117

   Introduction .................................................................................................... 117
   Isomorphism of Marx's and Braverman's Core Theories .............................. 123
   Empirical Assessment of the Theory ........................................................... 135
   Generalization from Specific Evidence: The Labour Force Demography Argument .................................................................................................................. 154
   Conclusion ................................................................................................. 167
IV. RIVAL HYPOTHESES: CONTROVERSY AND CONFIRMATION .............................................. 169
  Introduction ......................................................... 169
  Attempts At Falsification .......................................... 175
  Counter-Evidence to the Theory .................................. 195
  Conclusion ............................................................. 225

V. EXPLANATION AND PREDICTION IN CAUSALLY COMPLEX FIELDS ................................. 228
  Introduction .......................................................... 228
  Little's Position .................................................... 232
  Scriven's Position .................................................. 234
  Prediction in Hempel and Popper ................................ 236
  Critique of Scriven's Anti-Symmetry Position .................. 242
  Explanation and Prediction in Darwin ............................ 253
  Discussion ............................................................ 264
  Conclusion ............................................................ 286

SELECTED BIBLIOGRAPHY ............................................. 288
ABSTRACT

The view that large-scale, long-range social theories cannot be predictive other than "in principle" is sufficiently widespread as to be considered the orthodox view. It is widely held that, lacking this predictive quality, social theories are cut off from a crucial form of vindication enjoyed by the experimental sciences. Thus many would agree with Ryan's assessment that while with regard to large-scale social changes "long-range prediction is not in principle impossible," nonetheless as a matter of practical methodology such a goal is of "dubious value."

The reason commonly proffered as to why social theories cannot be predictive is the causal complexity of social life. Because of this feature, it is held, while we may be able to unearth interesting social generalizations, we will not be able to predict the many initial conditions together with which they predict. Alternately, due to this complexity we are able to achieve no better than tendency laws which do not permit predictions of sufficient precision to allow for predictive testing. This has been held to be true for other causally complex fields as well. Thus, Scriven has argued that Darwin was "the paradigm of the explanatory but non-predictive scientist" due to the constraints imposed on his methodology by the causal complexity of the biosphere.

As a result of both an uncritical acceptance of the orthodox view and an
inadequate analysis of Marx's methodology, Daniel Little has argued that Marxian
theory is non-predictive. However, a thorough analysis of Marx's labour process
theory shows it to be both clearly predictive and subject to justification by predictive
assessment. Moreover, a formalization of the theory indicates that available data
confirm it as regards both its central hypothesis and the matrix of social causation it
exhibits.

Little's position in regard to Marxian theory is strongly similar to Scriven's in
regard to Darwinian theory. In both cases, faulty theoretical presuppositions combine
with inadequate analysis to buttress false conclusions as to the asymmetry of
explanation and prediction. Adequate analysis dispels Little's and Scriven's
conclusions and exhibits important methodological parallels between Marx and
Darwin.
We have much studied and perfected, of late, the great civilized invention of the division of labour; only we give it a false name. It is not, truly speaking, the labour that is divided; but the men: divided into mere segments of men - broken into small fragments and crumbs of life; so that all the little piece of intelligence that is left in a man is not enough to make a pin, or a nail, but exhausts itself in making the point of a pin, or the head of a nail. Now it is a good and desirable thing, truly, to make many pins in a day; but if we could see with what crystal sand their points were polished - the sand of human soul, much to be magnified before it can be discerned for what it is - we should think there might be some loss in it also. And the great cry that rises from all our manufacturing cities, louder than the furnace blast, is all in very deed for this -that we manufacture everything there except men.

John Ruskin
INTRODUCTION

Marx considered the economic analysis in Capital to be a work of science, and not in any casual sense of the term. This was more than shrewd empirical commentary. Here were the capitalist mode of production’s laws of motion exhibited, the inner physiology of the system exposed to view. It is natural then that his work there and more generally has been analyzed with an eye to discerning its essential methodology. Is its widespread intellectual influence rooted in a unique social scientific method?

Daniel Little’s recent The Scientific Marx is part of this enterprise, and it is his conclusions in that regard I undermine in the work that follows. By beginning from the wrong units of analysis, by attempting to efface what he perceives as predictive failures, and by misunderstanding the role of prediction in complex subjects, he presents a picture of a Marx so frail as to be uninteresting as a scientist. The reader who turns to Little with the question "What did the scientific Marx get right?" and who demands something substantial will be disappointed. There is an evident tension in Little’s approach inasmuch as he seeks at once to install Marx more firmly in the role of scientist while at the same time trying to cut Marx’s theories free from any need for vindication in the light of ongoing events. He argues that new

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1Daniel Little, The Scientific Marx, (Minneapolis: University of Minnesota Press, 1986)
philosophical conceptions of scientific justification allow Marx to escape this common requirement and that, further, to apply such a criterion to Marx is to set a benchmark social theories cannot fulfill.

Little’s position has, it must be conceded, a certain superficial plausibility. In *Capital*, he claims, Marx offers explanations that are genuine works of social science in the sense of being assessable against a range of relevant empirical evidence but, like all comparable social theory, these are non-predictive and hence beyond the pale of justification by predictive testing. In this latter regard, Little’s view is hardly radical. When the financial advice column in the daily newspaper warns us not to take current predictions of a coming rise in interest rates too seriously because those rates depend upon government policy which responds to changes in the world economy which, in turn, can be affected by unpredictable events like a major drought or political upheavals in Eastern Europe, we see spread before us a problem that haunts the common perception of all social science. The complexity of causation which undergirds social affairs is such as to deny us access to the sorts of stable causal matrices that allow for reliable predictions and, thus, for predictive testing. If Marxian theories are denied this testability are they not

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Among philosophers of science, this is also a common explanation for the failure of social scientists to predict large-scale social changes. See for example Ryan’s discussion in which he argues that a combination of our inability to find reliable causal generalizations and to be able, even given such generalizations, to predict the occurrence of relevant initial conditions means that while "long-range prediction is not in principle impossible," in practical terms such a goal is of "dubious value." Alan Ryan, *The Philosophy of the Social Sciences*, (New York: Random House, 1970), 197-218.
denied that which is at the heart of science? Denied, that is, access to that dialectic of conception and practical application which is a hallmark of science? In the experimental sciences, there is an evident ready passage from the study to the laboratory and back again. Is it not in large measure the prevailing sense that social theories cannot avail themselves of this dialectic that grounds doubts about the scientificity of social theory?

Little's position is that while predictive justification is not available to Marxian theories, they can nonetheless enjoy primary scientific justification insofar as they can be seen to be supported by an appropriate array of empirical evidence. To raise the question of justification in regard to them we can ask, first, if the descriptive generalizations from which they begin are accurate and, second, if the material economic inferences they employ are reliable. Thus, in Little's view, Marxian theories exhibit an asymmetry: they can be vindicated against affairs contemporary to, or historical data available to, Marx, but not against future occurrences. This, Little claims, is why Marx was not concerned with the assessment of the predictive consequences of his view.

Little's argument, he realizes, sets him at odds with Marx himself. So he proposes to extract Marxian methodology not from Marx's own methodological writings but rather from "evidence taken from Marx's actual practice as a social scientist." I follow a similar path, but to opposite conclusions. Marx, I argue against Little, did expose significant portions of the inner physiology of capitalism and, based
on his explanation of those deep-seated processes, predicted labour process transformations that can be tested by contemporary social scientists. The labour process theory stands or falls according to the results of such testing.

In chapter I, I set out Little’s argument in this regard and discuss its merits. There I argue that his view originates in part from a failure to analyze any robust, well-articulated theory in Marx, and I suggest that the asymmetry between explanation and prediction he proposes is theoretically implausible. In chapter II, I turn to the analysis of the labour process theory. After sketching a prima facie case that here Marx predicted salient features of modern work, I analyze the Capital Volume I version of the theory and explain its genesis in Marx’s early Hegelian attitudes. Cohen is right, I propose, to see Marx’s views on the evolution of work as founded on Hegelian concepts, but to rest with that perception is to lose the very real satisfactions of the subsequent theoretical elaboration in which Marx provided a thorough empirical foundation for his early intuitions. I conclude with a discussion of the empirical commitments of the Capital Volume I version of the theory. While my approach is similar to Little’s in that I too draw lessons from Marx’s actual work, in other regards there is a marked dissimilarity. As opposed to the fragments of Marxian explanation that populate the pages of Little’s book, I base my conclusions on an extended analysis of a single, major theory, one whose articulation occupies chapters 7-16 of Capital Volume I. As opposed to Little’s approach which regularly invokes philosophical theories as to what is and is not possible by way of social science and social scientific prediction, I stay close to the actual theory, to the
methods and results of the relevant practitioners, and use the resulting analysis as a basis for evaluation of the related philosophical positions.

In chapter III, I argue that Braverman's 1974 *Labor and Monopoly Capital* represents an empirical application of the *Capital* theory to twentieth century affairs. I derive a relatively formal characterization of the theory, presenting it as a structure of related hypotheses which exhibit a causal matrix linking capitalist relations of production to changes in the nature of work. The formalization allows a relatively thorough assessment of the evidence for the theory and the chapter's implicit claim is that this puts Little's conception to rout, both as regards universal claims about an explanatory but non-predictive Marx, and as a view of social scientific methodology. In chapter IV, the formal clarity achieved through the analysis in chapter III allows me to discuss the work of a wide range of contemporary sociologists as normal science that constitutes testing relative to an original paradigm. Within the formalization we can understand the justificatory impact of varied forms of contemporary investigation even where controversy and ideological disputes undermine any sense of shared paradigm. I argue in detail that the evidence made available by current sociology constitutes at least an empirical trial of predictions original to Marx, and that, within relevant limits, that trial provides predictive confirmation.

In chapter V, I return to theoretical issues posed by the analysis presented in my central chapters. I argue that the central analysis must be seen as part and parcel
of a wider revision necessary to correct plausible but nonetheless false views about the availability of predictive testing to theories in causally complex fields. I undermine the main theoretical pillar for Little's position: Scriven's views on explanatory/predictive asymmetry and their application to the paradigm of science in causally complex subjects, Darwinian evolution. The results of my analysis have an impact beyond Marxian studies. They dispel a certain skepticism abroad not only among philosophers of science - like Scriven - but also among social theorists - like Rueschemeyer - about the ability of substantial social theories of wide scope to be stated in a form such that they can be tested predictively.
CHAPTER I
EXPLANATION, PREDICTION AND THE
SCIENTIFIC STATUS OF MARX

1. Introduction

Philosophy and Science in Marx

In the past decade the scientific stature of Marx’s work has received growing attention. G.A. Cohen’s Karl Marx’s Theory of History argued that Marx’s central theory, the theory of history, showed a certain kinship to scientific explanation.¹ The upshot of Marx’s revision of his Hegelian roots, Cohen suggested, was the historical materialist theory of history in the 1859 Preface, a theory generated through the exercise of functional explanation, an explanatory form conditioned by and natural to Hegelian thought. Far from undermining confidence in the scientific virtues of Marx’s theory, Cohen argued, the materialized Hegelianism evident in historical materialism could be given a rigorous formulation. Moreover, the theory’s central explanatory method could be seen to be of the same form as that evident in Darwin’s account of phyletic adaptation.

While Cohen's work increased Marxian theory's currency in the Anglo-American mainstream, his unique reading became the subject of considerable controversy. A number of commentators countered that functional explanation is scientifically inadequate unless underwritten by more fundamental mechanisms and, further, that Marx does not practice it, save in holiday pronouncements. In his main explanatory endeavors, the critics maintained, Marx provides "microfoundational accounts." Such accounts do not, pace Cohen, explain macrophenomena - rapid technological innovation, for example - by showing their functional utility within an economic system. Rather, important macrophenomena are shown to flow from microphenomena, most typically the motives of rational agents.

In The Scientific Marx, Daniel Little discusses science in Marxian theory within the microfoundational perspective. Focusing on the economic theory in Capital, Little supports his view of the scientific Marx by elucidating how Marx explains features of capitalist economy and the justification Marx provides for his explanations, holding with Elster and Roemer that Marx offers microfoundational accounts properly supported by empirical evidence.

Remarkably, Little does this while allowing Marx's work to evade the standards of a common model of science Little refers to as predictive-theory

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3Daniel Little, The Scientific Marx (Minneapolis: University of Minnesota Press, 1986).
naturalism, or P-T naturalism. More specifically, he credits Marx with a science to which predictive test is irrelevant. I will argue that Little achieves this end by both misunderstanding the methodology of the social sciences and injudicious selection from among Marx's explanations for his units of analysis. While Little is right about the explanations he analyzes as far as he goes, he distorts Marx's work by effacing central features of the explanatory enterprise in *Capital*. Along these lines I argue that Marx cannot be reduced to an economist and that to read him as such is to avoid his central ambitions and theoretical objectives. Marx, of course, did become preoccupied with economics, so much so that there is some merit in E.P. Thompson's charge that he became engulfed in its narrow conceptual gear. Nonetheless, there is good reason to see his work as a dialogue between a philosophic model and a sustained, empirically well-grounded meditation on the themes of the intellectually thriving political-economy of his day. Within that dialogue, it is Marx's distinctive philosophic commitments which predominate.

It would certainly be wrong to claim that Marx's work is a wholesale evasion of standards we commonly think crucial to science. He had a clear respect for what Thompson calls the "dialectic of making and breaking," for the vital abrasion of "models and particulars." Little retains some of this sense of the creative tension between theory and fact but his standards in that regard are uneven and confused. In his preparedness to excuse Marx from the criterion of predictive test, he comes

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5Ibid., 64.
uncomfortably close to those Marxists among whom, as Ruben puts it, "disregard for fact has become cavalier." 

Marx produced a body of economic theory into which he imported, better interleaved, his historical materialist philosophy. It is clear that he found in his economic research good reason to reaffirm that a sort of teleological progression, Hegelian in its origins, could be discerned in human affairs and that certain of its end points could be forecast. Marx clearly intended to be taken as showing the progression of capitalist society and economy. In so doing, he took on empirical commitments that demand by their very nature to be scrutinized against the ongoing history of capitalist development. Of course, Marx’s intentions are not the primary issue. Morgenbesser’s distinction between "pragmatic prediction" or explicit forecasting, and predictive entailment or the empirical commitments which flow logically from a theory, is pertinent here. It is the susceptibility of Marx’s work to testing via these latter predictive entailments, not his own visionary ambitions or lack thereof, that is to the point.

In the remainder of this chapter, I want to examine Little’s two main claims: (1) that Marx’s explanatory paradigm is microfoundational; that is to say, that a special sort of causal explanation in which human ambitions figure as root social

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forces is the heart of Marx's method; and (2) that these explanations are non-naturalistic inasmuch as they exhibit no essential reliance on predictive confirmation. In section 2, I begin with Little's arguments for the latter claim. In section 3, I argue that Little misinterprets Capital and show how this misinterpretation aids Little in his denial of empirical commitments which would allow Marx to be tested against the historical record. In section 4, I gather accumulated materials together to show that in sparing Marx's work any ongoing tension with historic facts, Little has excused Marx from a creative discipline.

2. Prediction and Empirical Justification

The Scientific Marx is cast in the post-Kuhnian, history of science mold. At its outset, Little informs his reader that he intends to trace the footsteps of those recent philosophers of science who "have held that careful study of particular cases in the history of science is a fruitful way of coming to new insights into the nature of scientific reasoning." However, this straightforward intention is vexed somewhat by the case Little has chosen, Marx's Capital. Many will have prima facie reservations about gleaning lessons about science from a study of Marx. Both opponents and some friends have turned thumbs down on the scientificity of Marx's work. Popper argued that Marx and his epigones were prime exemplars of the "soothsaying" that

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8 Throughout the text, I use "naturalism" in a way that follows Little's usage: a theory is naturalistic if it conforms to the methodology of the natural sciences, under a construal Little refers to as "predictive-theory naturalism" (see p. 16, herein). I focus on one aspect of predictive-theory naturalism; namely that theories achieve empirical corroboration through predictive testing.

9 Little, Scientific Marx, 4.
typified historicism. Even admirers like E.P. Thompson reject Marx's frequent claims to naturalistic methods as scientism. So Little finds it necessary to do two tasks simultaneously. Alongside his study of Marx's methods he presents a sustained defence of his conviction that *Capital* is "a classic and substantial work of social science," informing his reader in his introduction:

> I will argue that many common objections against the scientific standing of Marx's analysis are invalid. In particular, I will rebut the charges that Marx's research depends on suspect methodological ideas (e.g., Hegelian dialectical reasoning), and I will argue that failed predictions in general do not falsify Marx's account (because of the general problems of using predictions to evaluate theories in the social sciences)."\(^{10}\)

In this attempted rebuttal of the seriousness of what he sees as Marx's "failed predictions," Little's work is decidedly unsatisfactory. He takes comfort in the recognition by both philosophers of science and practitioners like Weber that social affairs exhibit a causal complexity which vexes prediction:

> It is unreasonable to expect precise long-term predictions from social science. Social phenomena are too complex, with too many interrelated forms of causation and agency at work, to permit confident prediction. The metaphor of the motions of the stars - attractive as it is to Marx - is not useful in social science, since the determinacy of mechanics is precisely what is impossible in social science."\(^{11}\)

But he slides from the difficulty of predictive testing to its methodological irrelevance and this seems unfortunately partial. Certainly the causal complexity of social affairs makes prediction hard in social science and Marx works at a level of grand theory where this problem is no doubt great. But it seems likely that Little intends in all this

\(^{10}\)Ibid., 9, parenthetical remark is original.

\(^{11}\)Ibid., 170.
simply to rationalize the empirical difficulties he perceives to have befallen Marx's work and thus save the project from legitimate discontents which might motivate reform.

As Ruben suggests, Popper's attack may have led many who would salvage the scientific in Marx to adopt "cavalier" attitudes toward predictive testing, even going so far as Hindess and Hirst who declare Marxian theory beyond the reach of "the supposed 'facts' of history." Little exhibits this attitude. On the one hand, he accepts far too uncritically familiar charges of Marx's failed predictions regarding such matters as permanency of class conflict under capitalism, the polarization of labour and capital, and the system's growing economic instability. On the other, in a voice that seems to rationalize failure, he both accepts that Marx was concerned with forecast, yet denies any substantive role to justification by predictive consequences.

Little's general strategy is to appropriate recent trends in the philosophy of science. The early positivists' models, he argues, have been eclipsed by richer conceptions. Even what Little refers to as Hempel's "enlightened positivism" has been supplanted by Lakatos's more sociologically sensitive theory of "research programs" where, pace Popper, it is legitimate in the face of contrary results to reformulate theories, providing the repairs meet well-defined criteria of

"progressiveness."

New theories of science, that is to say, accept that science has a richer logical structure than that proposed by early theories. The new structures make room for a wide range of background assumptions, popular metaphors, the trappings of contemporary intellectual life, etc., as part of the working equipment of the theorist. As a result, it is both possible and desirable, faced with anomaly, to defend a core of theorems by making suitable alterations in the penumbra of background assumptions which condition the theory. The details of this strategy are not of concern; it is the central message that is important: the membership rules for science are now both more sophisticated and more inclusive. Consequently, social science, Marx within it, need no longer be asked to pass muster before the old rigidities that characterized the fledgling logics of the Vienna Circle and their twentieth century inheritors.

Little accepts as accurate of the physical sciences, five theses which summarize what he calls "predictive-theory naturalism." These represent both key aspects of "the enlightened empiricist philosophy of science of late logical positivism" and a residuum that has been retained by "postpositivist" models:

1. Scientific knowledge takes the form of organized theories which possess a unified deductive structure.

2. Such theories typically describe unobservable mechanisms in order to explain observable conditions.

3. Such theories attempt to formulate laws of nature.

\[^{13}\text{Little, Scientific Marx, 184-85.}\]

\[^{14}\text{Ibid., 14.}\]
4. These theories make relatively precise predictions.

5. These theories achieve empirical corroboration through their deductive consequences for experience.\(^{15}\)

Marx's work, he argues, does not accord with these theses. Because of the varied evidence on which he is forced to rely, Marx must eschew a more or less axiomatic framework in favour of a "pluralistic" explanatory structure. Marx does not posit occult forces and entities, but rather begins from observables like individual motives and constraining institutions. For the naturalist's exceptionless laws Marx must substitute "tendency laws."\(^{16}\) Finally, as we have seen, Little denies prediction any important role in Marx's theories.

In what follows, I concentrate attention on the last three theses, particularly 5. My argument will be that Marx's work cannot evade the criterion of predictive justification. Little's reminder that exceptionless laws of nature are foreign both to social science and Marx is worthwhile, and this places obvious restriction on predictive evaluation. Nonetheless, the epistemic constraints which impose tendency laws on the social sciences do not give a privileged status to any one form of empirical corroboration. The intellectual difficulties thrown up by causal complexity undermine easy appeal to evidence in any temporal direction. The symmetry of explanation and prediction assures that whatever problems beset predictive justification will similarly trouble all empirical justification.

\(^{15}\)Ibid.

\(^{16}\)Ibid., 26.
Theories of justification, Little observes, commonly appeal to two sorts of criteria. Some stress primary criteria - i.e., direct empirical support - while others stress secondary criteria such as simplicity, explanatory scope, generality, support from other areas of science, and ontological parsimony. But this diversity belies a common theme: to count as scientific, a theory must be supported by "an appropriate array of empirical evidence."¹⁷ The most common model of such justification is the hypothetico-deductive (H-D) model:

A theory (in conjunction with other parts of scientific knowledge) entails infinitely many consequences, some of which are experimentally testable. Scientists use their ingenuity to derive some consequences that are testable; they then perform the experiments. If the experiments turn out as theory predicts, the theory is corroborated. And if the theory has been rigorously tested in this way, in a variety of different areas, the theory is justified. That is, the justification of a scientific theory is a matter of working out its observational consequences and testing them directly; the truth of these consequences lends indirect (inductive) support to the theory that gives rise to them.¹⁸

Of course, the strict logical positivist observation/theory distinction on which this model of justification seems to rely is now in disrepute, Little remarks. We are left with "a more reasonable epistemological stance" which employs the distinction in a softer form, one which "seeks to identify a body of belief that is provisionally fixed relative to current theory, with the result that the theory can be assessed in terms of it."¹⁹ Under this stance, a theory can be empirically assessed because the body of belief to which it gives rise can be compared to states of affairs; not the absolute facts

¹⁷Ibid., 154.

¹⁸Ibid., 155.

¹⁹Ibid., 156.
borne by positivists' pure observational sentences, but rather the evidence represented by "relatively observational" sentences:

I will consequently presuppose a more moderate posture based on these assumptions. First, there is no such thing as theory-independent observation and therefore no such thing as a purely empirical foundation for scientific knowledge. Secondly, however, there is a real distinction between observation and theory in terms of the applicability of observational and experimental procedures in testing the proposition. Sentences that are relatively observational on this criterion constitute the basis of justification of scientific beliefs.20

On Little's view, then, "empirical evidence retains primacy in assessing scientific belief." This is no less true of Marx, but he does not conform to the H-D model:

Marx makes careful and detailed use of empirical data in evaluating his construction, but I will also hold that evidence is not relevant to his analysis in the way the H-D model requires.21

Instead, Marx's theory is justified on two grounds: (1) descriptive premises that are empirically accurate and (2) "the rigor of his reasoning."22 In effect, the criterion of theoretical adequacy in Marx's case comes down to logical soundness: true premises and valid inference. Empirically respectable, empirically defensible premises whose force is carried to conclusions by rigorous reasoning is the dominant pattern of Marx's justificatory logic.

Since Little's model of justification here is superficially similar to establishing conclusions by modus ponens, I refer to it in what follows as modus ponens.

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20 Ibid.

21 Ibid., 157.

22 Ibid.
justification. It is important to note that this represents a clear restriction on the relevant evidence to which Marx can appeal. It must be "descriptive" by which Little means evidence that characterizes history and contemporary affairs.\(^23\) It is Marx's descriptive adequacy along with his inferential rigour that lends support to his convictions, including, as we shall see, his future-regarding convictions. Extending this justificatory core, Little says, "Marx's analysis also gives rise to predictions about the behavior of capitalism."\(^24\) However, since this is social science, "the truth or falsity of Marx's predictions provides only the weakest possible test of the correctness of his treatment of capitalism."

Little goes on to demonstrate the wide range of evidence Marx employs to support "his description of the defining features of the capitalist mode of production."\(^25\) Marx combines these descriptive premises with the "logic of the defining institutions of capitalism," or economic reasoning, to derive his major theoretical commitments. This, Little claims, is parallel to Mill's "deductive method," a procedure that Mill offered as an appropriate alternative to inductive and hypothetical methods in fields like economics "where predictions are almost always heavily qualified by background assumptions."\(^26\) This form of justification is non H-D:

\(^23\)Ibid. See "Marx's Epistemological Practice" and "Varieties of Evidence," 158-65.

\(^24\)Ibid., 158.

\(^25\)Ibid., 164.

\(^26\)Ibid., 166.
It is a pattern of inference that transmits empirical weight to conclusions through fairly esoteric chains of reasoning rather than through any direct or indirect test of the conclusions themselves.\footnote{Ibid.}

Through all this Little does recognize that Marx "believes that capitalism will show a definite pattern of development"\footnote{Ibid., 167.} and that Marx sees himself providing "strong reason to expect that these predictions will be borne out."\footnote{Ibid., 168.} Nonetheless, Little argues that the "epistemic role of prediction in Marx's system is the reverse of its role in the natural sciences."\footnote{Ibid.}

In what follows, I will argue that Little's position in this regard is inadequate, succeeding in part by misrepresenting Marx and in part by illogic. He urges his reader to infer from the lack of predictive strictness in social science that predictive testing is therefore largely irrelevant. What Little should be arguing is that predictive test is both 1) \textbf{central} to the evaluation of Marx's work and 2) to be applied in a manner appropriate to the causally complex nature of the subject matter. By contrast, as we shall see, he argues that because predictive test in social science must be imprecise, it is at best \textbf{marginal}, at worst irrelevant to social theory and Marx's work.
I will also argue that Little succeeds in shifting attention away from predictive test, in part by mischaracterizing what it is that Marx is trying to explain in *Capital*. Little’s choice of explicanda puts in eclipse Marx’s larger purposes, purposes which are inherently future-regarding. It is to this misreading that we turn our attention first.

3. Marx’s Explanatory Paradigm

Little claims that Marx’s goal in *Capital* was to provide explanations for commonplace economic phenomena like rapid technological innovation within capitalism. In line with this view, he proposes what seems at first common sense: to derive an account of Marx’s explanatory paradigm from an examination of particular explanations. This succeeds as far as it goes, but it does so by effacing Marx’s larger purposes. Though Little gets his account of Marx’s explanations in *Capital* right to a degree, he misses the nature and force of Marx’s explanation and this aids Little in his desire to efface the predictive entailments of Marx’s work.

Little argues his position through the examination of cases of Marxian explanation. He shows effectively, for example, that Marx explains the capitalist mania for technological change, for "constantly revolutionizing the instruments of production," on the basis that there is in a competitive economy, where price advantage can be achieved through productivity engineering, "a motive for each individual capitalist to cheapen his commodities by increasing the productivity of

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This is both accurate and an essential distortion. It is accurate insofar as it captures the fuller account that typically stands behind passages of functionalist short-hand in *Capital*. It distorts by focusing on parts at the expense of the whole, by examining component explanations at the cost of the explanation.

It is important to recognize that there are at least two sources of the functionalism which is regularly available in the text of *Capital*. It serves there, as it often does in social explanation at a certain level of panorama as convenient, short-hand expression. But it also derives from Marx's Hegelian roots and from his attempt to translate Hegelian cosmology into material terms. Marx had an evident proclivity to see in the flux and detail of history the progression of a system toward certain ends. Just exactly what Marx saw in this regard is a vexed question. His debt to Hegel is the subject of controversy. What is not controversial is that he has such a debt and that he regularly makes installments throughout *Capital*. Given this, it is apparent that Little's focus on the explanations behind the functionalism serves to nudge the Hegelian residue, along with the panorama, whatever its detailed nature, to the sidelines, in fact right out of the picture. This is wholly in keeping with other sections of *The Scientific Marx*. Little devotes a chapter to the irrelevance of historical

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33Throughout the text, I use "functionalism" to refer to providing explanation by showing how explananda function within a larger pattern, process, or system. Where I associate what I identify as Marxian functionalism in this sense with Marx's Hegelian heritage, I indicate simply that a) Marx adopted Hegel's approach of explaining historical phenomena by setting them within a putative pattern of historical processes, and b) Marx appropriated certain Hegelian terms for historical functions, like "alienation," for example, and turned them to his own explanatory purposes.
materialism, Marx's explicit account of his materialization of Hegel. He devotes another section to the dismissal of dialectical method.

The effect of this otherwise illuminating focus on specific explanations is to put the overall explanatory purpose in Capital into eclipse. In Capital, Marx set out to develop a critique of political-economy, to explain what was wrong with it as it was practiced by its leading authorities, to show what it does not see, and to explain capitalist economy by setting it in the context of a reality that fell outside the political-economists' narrow theoretical categories. In Marx's day, political-economy was a long-standing and well developed theoretical tradition. "By the time Marx confronted it," Thompson claims, it had become "a very sophisticated structure indeed, rigorous in its procedures and inclusive in its claims." Marx, Thompson argues, was not simply concerned to refute political-economy in its technical details; rather he "identified this structure as his major antagonist, and he bent the whole energies of his mind to confounding it. For nearly twenty years this was his major preoccupation." So whole-heartedly did Marx devote himself to the overthrow of political-economy, Thompson claims, that he became lost "within its same premises." There is much to Thompson's position here. Marx clearly assimilated the language of laws and the concern for mathematical rigour of his antagonist.

36Thompson, Poverty of Theory, 251.
35Ibid.
36Ibid., 252.
Nonetheless, Marx consciously gave to *Capital* a structure which in his view would set it apart from classical political-economy.

In *Capital* Marx appropriates all the tools and procedures of economics and turns them to the explanation of how a capitalist economy works. But he has a larger purpose than the mere exploration of the inner workings of economy. He tells us in the postface to the second edition that he has brought the Hegelian dialectic, its rational kernel, to bear on capitalist economy. He agrees with a reviewer that in doing so he has placed capitalist economy within a historic progression, has provided "illumination of the special laws that regulate the origin, existence, development and death of a given social organism and its replacement by another, higher one." This reviewer’s remarks, with their implicit comparison of his work to Darwin’s, Marx found flattering, "generous," and accurate. Moreover, it was just this that set *Capital* apart in his view. *Capital’s* method of hinting the rational kernel of Hegel to scientific purposes, he says, is just what makes the work "a scandal and abomination" to mainstream thought because it sets capitalist economy in an explanatory context which shows it "like every historically developed form as being in a fluid state, in motion" toward "its negation, its inevitable destruction."

The larger purpose, then, omitted by Little’s reading, is Marx’s attempt to show his reader the "inevitable" by eliciting what Marx repeatedly calls "the laws of

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38Ibid., 103.
motion" of the system. While Marx does, as Thompson says, appropriate the concepts of economics, he puts them to a distinctive use. Take constant and variable capital. These are, for Marx, momentary capitalist expressions of general historic categories: man and his tools, Homo sapiens and its exoskeleton of productive means. As such, these economic categories are temporary, alien expressions of natural categories that are coextensive with history. Here we see, Marx urges his reader, the quintessential human dialectic trapped as but two terms in capitalist investment ledgers. The historic dialogue between object and mind, between artifact and need, between conception and application, between the intellect, the great constructions of theory, and the proving ground of labour in the practical arts, this discourse may now only proceed provided the necessary investments in plant and labour are made. The human project, the human condition has become a moment, albeit a transient one, in the accountancy of capital. And this, above all the other particular objections to capitalist economy, is what constitutes the heart of Marx's critique: the human drama, its essential dialogue, has become for the moment an object, capital, in the hands of a party within society. Fundamentally, the critique is a democratic one. But it can also be seen as an account of perturbations imposed on natural tendencies by the historically transient forces proper to capitalist society.

Not only does the coordinating concept of Capital, surplus-value, make this clear, the general structure of the work also affirms it. Marx opens with "The Process of Production of Capital," discusses how exchange economy and money are essential ingredients in the process, shows how money is transformed into capital. Then he
passes on to the work's central chapters which deal with the fundamental economic mechanism: the production of surplus-value. Here the reader is enjoined to see surplus-value as more than an economic construct. True, surplus-value is the goal of individual capitalists, one the pursuit of which becomes a law unto them, prescribing the prudential details of every-day innovation and investment. But this surplus is also has historic significance. It resonates with Hegel's world spirit. It is the blindly growing heritage of future generations of free people in the process of being born.

Thus surplus-value has two aspects: one immediate and specific to its capitalist setting, and one historical and able to be grasped from a broader perspective as the human progression toward freedom. As we have seen, it is the virtue of the Hegelian perspective in all this, in Marx's view, that it allows us to see this latter dimension. It is this that allows us to see phenomena we would otherwise be blind to, Marx claims. There are two sorts of "drives" evident in the economy. There are the drives which arise unbidden from the collective action of rational agents acting within institutional constraints: the growth of unemployment, human under-utilization, the explosion of new technology, the growing ratio of equipment to labour, the expansion of general social surplus. As well, there are subterranean drives of a more historic, fundamental sort.

An example of this can be seen in Marx's account of the conflicts which attend the historical drive toward what he calls "variation of labour," the creation of flexible labour, able to work equally well in varied forms of productive enterprise. This is at
once the fulfillment of general historical ambitions and specific demands of capitalist economy. At its most evident level, it arises due to the mechanization and the labour division inherent in the laws of capitalist economy. Marx says that since mechanical innovation demands the creation of a science of production, of principles underlying all productive effort, at the same time that it obviates workers' lifelong submersion in detail skills, it is tending to build the foundations for abstract, generalist, scientific workers. Thus the process can also be seen from its historic perspective: the creation of the free-because-knowledgeable generalists of the future. But within a capitalist perspective the process appears as the growing redundancy of workers and their abilities:

This is the negative side [this redundancy and insecurity]. But if, at present variation of labour imposes itself after the manner of an overpowering natural law, and with the blindly destructive action of a natural law that meets with obstacles [capitalist economic laws, like the division of labour] everywhere, large-scale industry, through its very catastrophes, makes the recognition of variation of labour and hence the fitness of the worker for the maximum number of different kinds of labour into a question of life and death.\(^{39}\)

This is a contradiction between immanent realities and capitalist realities, Marx says, is one which "bursts forth without restraint in the ceaseless human sacrifices required from the working class, in the reckless squandering of labour-powers."\(^{40}\)

My argument here is quite straightforward. Marx is up to much more than Little's analysis can recognize, given the fragments he has chosen to treat. Marx is not just providing explanations within political-economy - no matter how different in

\(^{39}\)Ibid., 618.

\(^{40}\)Ibid.
content from those of mainstream economics - of such phenomena as rapid technological change, the tendency of profit rates to fall, or the conditions that regulate economic reproduction. There is an overarching explanation evident in these pages, one that concerns a historical drama temporarily playing in an alien theater where the full richness of its discourse is cramped and censored.

Little recognizes that he is performing a reduction of sorts on Marx, casting his work in *Capital* as a set of explanations rather than a single coherent project. Having laid out, in his chapter on justification, the eclipse of predictive test behind modus ponens justification, Little states:

And this is true because Marx is offering not a general theory but an explanatory analysis of capitalism based on a variety of independent premises. There are various explanations to be evaluated on the evidence and the strengths of Marx's evidence.

But this eclipse of "general theory" behind "various explanations" is as suspicious as it is opaque. Without supporting examples it is hard to differentiate between "general theory" and "explanatory analysis." Into which camp would Darwin's *Origins* fall? He wanted to explain the Linnaen taxonomy, the vast diversity of forms that struck the naturalist. The explanation rested on an analysis of the forces that gave rise to evolutionary motion, as evident, for example, in species radiation. Yet this is clearly a general theory.

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42 Ibid., 172, emphasis added.
Beyond this quibble, however, it is in this larger explanatory endeavor that the language of "immanent laws" and inner "drives," and the general theoretical ambitions and empirical commitments regarding capitalist development are most evident in Marx. Like most social theorists, he does not cast his work in an explicitly predictive form. But he does, as Little recognizes, have clear commitments about the path of capitalism. Capitalism is not the terminus of history. Rather, it is a moment of contradiction deepening toward an explosive resolution, an aufhebung, which will set humanity at history’s end, and true freedom’s beginning. Reading Marx as a dismal scientist, Little reads these commitments out of the account, places them in brackets where "it is a serious question whether these predictions have justificatory weight at all."\(^43\)

We have seen, then, that Little downplays the practical relevance of prediction to justification in Marx. At the same time, he draws his reader’s attention away from Marx’s larger purposes in which the essentially future-regarding nature of the work is registered most strongly. With that in mind, let us turn back to Little’s account of the empirical justification for Marx’s work.

4. Causal Complexity and Justification

Little’s position is that because of predictive problems associated with the complexity of social objects, predictive testing of Marx’s work is at best a peripheral matter. The indeterminacy of social causation allows Marx only "tendential

\(^{43}\)Ibid., 170.
predictions." As a result, "it is a serious question whether these predictions have justificatory weight at all." The question is apparently serious enough that Little cannot quite decide on his own answer. He states, on the one hand, that predictive testing is only of "weak use" in evaluating Marx's work. On the other hand, he claims aid from the work of Bhaskar and Sayer who, he says approvingly, "support the basic notion that Marx's system cannot be evaluated through the truth or falsity of its predictive consequences."

On the surface, then, Little appears ambivalent. However, we must consider the fact that Little's is a project directed toward drawing important parallels between Marx's work and acknowledged science. In this light, the fact that he provides not even a brief discussion of the positive use of predictive test suggests that he does not wish to countenance even weak predictive evaluation. Inasmuch as this is a work devoted to exhuming whatever is scientific in Marx, the fact that Little provides only dismissive argument regarding predictive test indicates that in the final analysis he is comfortable with the position of Bhaskar and Sayer.

Little defends his thesis in this regard by a two-pronged strategy, offering on the one hand arguments that undermine the value of predictive test in social science, and on the other arguing that Marx uses modus ponens justification. The logical outlines of his task are thus clear. He must, at a minimum, argue (1) that social

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44 Ibid.
indeterminacy undermines predictive testing, leaving it a weak form of evaluation, and (2) that social indeterminacy does not thus undermine modus ponens justification, which is in his view the strong form of evaluation. I turn to the first branch of the argument now.

Little deploys two versions of what is essentially the same argument for the irrelevance of predictive testing. I place beyond serious discussion Little's appeal to Marx's own unconcern "about establishing the truth of his predictions as a test of his analysis." This is beside the point. The first version is framed in terms of countervailing tendencies: Marx's predictions are "deliberately loose" because "Marx also specifies reasons for their failing to emerge, in the form of countervailing tendencies and competing causal factors." Marx seems committed to the efficacy of certain causes, but he also sees other forces at work which can impede them. As a result, "Marx's position is consistent with the occurrence or nonoccurrence of the predicted outcome." Thus is predictive test of questionable value.

The second version is but a generalized form of the first: The very complexity and indeterminacy of social affairs makes it "unreasonable to expect precise long-term

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46 Here indeterminacy refers to an epistemological, not ontological, problem. Little explicitly accepts Ruben's argument that Marx's recourse to tendency laws marks no ontological commitment. Ibid., 148-49.

47 Ibid., 169.

48 Ibid.

49 Ibid., 170.
predictions from social science.\textsuperscript{50} Social science predictions, including Marx's, are conditionals. They take the form: "If other factors do not intrude, then these tendencies will emerge." Unfortunately, "other factors generally will intrude, so naturalistic testing is not of much use in social science."\textsuperscript{51} This is only to replace the causal competition on offer in the first version above with causal complexity.

Now, that social indeterminacy undermines strict prediction appeals to common sense. It seems intuitively plausible that good generalizations would be harder to come by in, say, ecology than in mechanics. Most of the experimental gear necessary to the demonstration of at least the classical portions of mechanics can be placed in a small room; not so the observational referents of ecology. Similarly for basic physics relative to the vicissitudes of social phenomena. In the case of social phenomena, however, there appears to be an added complication: the mutation rate, so to speak, of ideas, hence motivations, is much faster than the origination of either new entities in physics or the ontological nodes of ecosystems. Beyond this, the principal means for scientific analysis, determination of cause by selective control of independent variables, is more difficult to achieve in the social sciences both because of the complexity of variables and because of restrictions on experimental intervention. In the light of the uncertainty posed by this changeable complexity, it seems reasonable to read Little's arguments as a plea for some form of non-strict predictive testing. Instead, Little urges a more radical conclusion; namely, that Marx

\textsuperscript{50}Ibid.

\textsuperscript{51}Ibid.
"turns the H-D model on its head" by justifying predictions in advance of the evidence.\textsuperscript{52}

Before proceeding with Little's argument to that end, it is worthwhile pausing to get our bearings relative to the literature. As Little indicates, in excusing Marx from predictive test on the grounds of causal complexity he is simply appealing to orthodoxy, both within philosophy and among practitioners like Weber and Durkheim. But he takes that premise to conclusions that are far from orthodox.

There is a substantial literature which seeks to establish that prediction is not in principle available to social science, much of it of a highly theoretical nature. For example, it is argued that since predicting the future of social affairs entails reliance on the prediction of original ideas (which play a central role in social life), the predictive project leads swiftly to paradox because the prediction of original ideas would constitute origination.\textsuperscript{53} Again, it is held that since theoretical claims about the future can influence it, by leading to avoidance of untoward occurrences or to self-fulfilling actions, social predictions are necessarily precarious.\textsuperscript{54} This literature may well merit further discussion, but here I am primarily concerned with analyses that have a specifically methodological focus. A more common, and more long-

\textsuperscript{52}Ibid., 170.


standing objection to social prediction entails appeal to free will: the ubiquity of human choice robs social processes of the sorts of invariant regularity on which the concept of causation, hence prediction, relies.55 But this is only a problem vis-a-vis the availability of prediction on a libertarian, or contra-causal, account of free will.

The worthwhile literature on social prediction in my view develops from an intersection between philosophical concerns and the actual methodology of theories in sociology, and fields of similar causal complexity. Here the cause of predictive problems is linked to epistemological indeterminacy. Thus Hayek has argued that outside a narrow area of physics, most sciences, not just social sciences, are vexed with producing theories involving a multiplicity of variables, hence a plurality of hypotheses. In these, he argues, predictive testing entails not so much proving the truth of a single hypothesis as the demonstration of the explanatory efficacy of a particular way of ordering a manifold of hypotheses, no one of which is likely to be empirically disconfirmed. As a result, the relevant predictions take complex forms: lengthy disjunctions; the prohibition of co-occurrences; or simple prohibitions that leave a wide latitude to what will, in fact, occur. From this Hayek argues that we must recognize that explanation and prediction comes in degrees according to the

55Winch's objection that meanings or concepts get in the way of causal explanation in the social sciences is a variant. According to Winch, the regularities which figure in causal explanation are replaced in social explanation by the regularities which, after Wittgenstein, establish the social meanings in terms of which life is lived. Consequently, the neutral observation of regularities which found natural science must give way in social science to immersion in the rules which structure social meanings. Since such meanings are beyond the pale of cause and effect, explanation of social life must entail empathy, not causal analysis.
complexity of the variable structure of its object.\textsuperscript{56} But this is not to say, he points out, that typical theories' lesser commitments are of less certainty:

The limited character of the predictions which these theories enable us to make should not be confused with the question whether they are more or less uncertain than the theories which lead to more specific predictions. They are more uncertain only in the sense that they leave more uncertain because they say less about the phenomena, not in the sense that what they say is less certain.\textsuperscript{57}

Ryan takes a similar view. He accepts that any adequate explanation must conform to the hypothetico-deductive model. Given the complexity of social causation, however, social explanations will often rely on generalizations that are "immensely long and filled with hedges and qualifications."\textsuperscript{58} He also insists on the symmetry of explanation and prediction.\textsuperscript{59} From these premises it follows that social prediction, though difficult, is in principle possible\textsuperscript{60} and that "successful explanation must entail an increased ability to predict future events."\textsuperscript{61}

\textsuperscript{56}F.A. Hayek, "Degrees of Explanation." \textit{British Journal for the Philosophy of Science} 6 (1955-56).

\textsuperscript{57}\textit{Ibid.}, 224.

\textsuperscript{58}Ryan, \textit{Philosophy of the Social Sciences}, 54.

\textsuperscript{59}\textit{Ibid.}, 198.

\textsuperscript{60}\textit{Ibid.}, 209.

\textsuperscript{61}\textit{Ibid.}, 198.
Hempel saw no reason why his conception of scientific explanation and prediction should not apply to social theories.\textsuperscript{62} Popper, while he argued that theories of the "historicist" type could not meet the standard of scientific testability, declined to generalize:

The argument does not, of course, refute the possibility of every kind of social prediction; on the contrary, it is perfectly compatible with the possibility of testing social theories - for example, economic theories - by way of predicting that certain developments will take place under certain conditions.\textsuperscript{63}

Orthodoxy, that is to say, affirms that prediction, though difficult, is at least \textit{in principle} available as a justificatory procedure in the social sciences. As was indicated, however, Little claims a more radical position vis-a-vis prediction in Marx. Marx is not merely reduced to caution, he manages to "reverse" the logic of predictive test:

What I will argue, however, is that the epistemic role of prediction in Marx's system is the \textit{reverse} of its role in the natural sciences. Rather than predictions being the basis of justification of the full analysis of capitalism, Marx's forecasts in Capital are themselves justified by the independent warrant available for the basic account. Therefore the success or failure of predictions is only the weakest form of test for the basic analysis. This suggests that Popper's charge of unfalsifiability misses Marx in the most fundamental way: It misconstrues the epistemic role of long-term predictions in Marx's analysis.\textsuperscript{64}


\textsuperscript{64}Little, \textit{Scientific Marx}, 168, emphasis added.
So Popper thinks Marxian theories should stand up under future tests, not realizing that in creating the theory Marx has already justified his predictions. They have an "independent warrant" that Popper misses:

Marx's analysis of capitalism acquires epistemic warrant through (1) the independent confirmation available for his basic premises, and (2) the rigor of his reasoning from these premises to the institutional logic to which they give rise.65

Little is right, of course, that Marx's forecasts are justified by his theories to the extent of their soundness. This is true of any theory whatsoever and beside the point. The question is not whether any given prediction is justified but rather whether evidence conforms to predictions thereby buttressing the theory. The issue is not justification of prediction, but justification by prediction. Little's position is hollow in this regard. There is no new "epistemic role" on offer here. Any theory entails predictions whose reliability will depend on the empirical adequacy and logic of the theory in other regards (ie., as a summation of and inference from prior experience). The purported new epistemic role is not the reverse of normal predictive justification. Indeed, it is hard to say what "reversal" could mean in this context. Under the standard conception of predictive confirmation, support flows from future evidence (ie., evidence available downstream from theory formation) to a theory via its logical consequences. This flow of support cannot be reversed, theory buttressing evidence, because evidence cannot be supported in the relevant sense.

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65Ibid., 158.
Thus it is as misleading as it is emptily self-congratulatory for Little to advertise discovery of a new "epistemology for social science that turns the H-D model on its head." He is right to claim that his own version of Marxian epistemology makes "the justification of Marx's work [appear] simpler than it might seem." But this simplification, as it turns out, consists not in supplementing modus ponens justification with any radically renovated predictive warrant but rather in obviating the need for predictive support entirely. In fact, Little's justificatory schema quite simply short-circuits our normal view that historical theories stand in creative tension with an ongoing body of normal science in which improved data, methods of investigation, the creation of infrastructural theories bridging between observables and core theorems, etc., are gradually made available to those who would reform or refute them. Little's is not an argument for a new epistemic role for Marxian predictions; it is simply a perverse way of saying that they play no justificatory role.

Beyond this, it is important to recognize that both Little's account of Marx's explanatory paradigm and of his justificatory procedures suggest strongly the centrality of predictive testing. Microfoundational explanation is a type of causal explanation, one that derives economic tendencies from forces which originate with individual motivations conditioned and constrained in certain ways. If Marx's explanations are right, this can only mean that they depict the essential, reliable motives cum causes at work, that they present the dominant forces characteristic of a

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66Ibid., 172.
67Ibid.
capitalist economy. But if he gets that right, the persistence of capitalist economy should be accompanied by the tendencies thus explained.

This argument has an exact parallel in Little's justificatory schema: to evaluate Marx's theory we ask (1) are the defining features of capitalism as he argues and (2) are the economic inference licenses he uses to pass from basic data to tendency laws reliable and rigorously applied? To the extent that each justificatory aspect passes scrutiny, we are again necessarily persuaded of the truth of a large conditional of the form: If these defining features and these economic principles, then these tendencies. Again the form is predictive.

None of this need gloss over the real problems associated with causal complexity, countervailing tendencies, conflicting motivations, and the like. To the extent that social phenomena are thus vexed, the issue becomes one of statistical or appropriately hedged explanation, of disjunctive or conditional prediction. We are confronted with the problem of determining, as it were, the vector resultant of a manifold of causes.

So, having disposed of Little's high-profile claims about the role of prediction in Marx, we are left with a more generous reading of his purposes under which he merely asks us to regard predictive test as a weak form of evaluation. Having taken this charitable stance, however, we are still left with the second branch of his
argument; namely the view that modus ponens justification is not similarly weakened by social complexity.

Modus ponens justification is, as Little says, a simple matter. First, Marx gathers "a great deal of factual and statistical data" which confirms his major explanatory points. For example, that capitalist economy "tends to introduce technologies that increase the productivity of labor at the expense of workers." In this way Marx gains a basis for "evaluating his description of the defining features" of capitalism, its "structural and functional characteristics" such as, presumably, the motivations and constraints, the institutional logic we have seen to figure in his explanations. Then, to this descriptive foundation, Marx adds rigorous inference to provide the "second aspect" of his justificatory practice. This is a matter of elaborating on basic descriptions using the tools of economic theory. So to evaluate Marx's work, we must query his work as an economist:

First, are the economist's inferences sufficiently precise and careful? This form of evaluation is similar to checking a proof in mathematics; it treats the analysis as something like a derivation and assesses the reasoning. Second, are the premises of the analyses - the hypotheses with which the economist begins - reasonable and empirically defensible? And third, is the overall thrust of the analysis consistent with the features of the economy we already "know"?

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68 Ibid., 159.

69 Ibid.

70 Ibid., 164.

71 Ibid., 165-66.
In short, the second aspect is a matter of providing what are normally called material inference licenses, the empirically reliable generalizations which allow us to pass from one claim to another. In this case, the inference licenses are of an economic nature and we evaluate the reasoning by questioning the reliability of the economics.

It is troubling that a hard look at these two aspects of Marx's justificatory practice seems to dissolve their putative distinctness. For, the sorts of propositions which figure in an exemplary way in the descriptive "aspect," propositions such as that (1) productive technology tends to be introduced at the expense of workers, also appear in the inferential aspect. The inference license for Marx's conclusion that capitalism necessarily seeks external markets, for example, is the economic hypothesis that (2) capitalism tends toward accumulation. Both (1) and (2) can be seen to have approximately the same observational status. That is to say, both are generalizations available in the historical and statistical record without a great deal of analytic work. At the same time, however, both can be used to license inferences, such as that the growth of investment in an industry will be accompanied by changes in the composition of the workforce, or that capitalism will be marked by periodic crises as accumulation undermines consumption.

But this apparent lack of distinctness is not the crucial defect here. Perhaps it only indicates the real difficulties involved in attempting to separate observational and theoretical statements. What is crucial is the fact that both (1) and (2) look like

\[^{72}\text{Ibid.},~166.\]
the sort of tendency formulations Little claims are forced on Marx by the complexity of social causation. In both cases we can readily think of countervailing causes: demand for skilled workers in machine-tool industries and demand for skilled maintenance workers in the first, workers' wage demands and the necessity to disperse value to means of consumption in the second. At this point Little's reader is right to ask just how such formulations escape the looseness which on his view condemns the formulation of predictions.

In the absence of arguments as to why causal complexity should be any kinder to the work of deriving such descriptive propositions or such inference licenses, and Little provides none, we must conclude that modus ponens justification is neither more nor less reliable than predictive justification. Little, in his effort to place predictive test in eclipse, is simply appealing from frailty to frailty.

Little provides no account of how description escapes the ravages of complex causality because he cannot consistent with his own claims vis-a-vis prediction. The explanatory enterprise he attributes to Marx relies root and branch on the derivation of useful generalizations which come, by Little's own testimony, necessarily in the form of tendencies.

The symmetry of scientific explanation and prediction is a matter of controversy. Anti-symmetry arguments provide the most substantial theoretical support that could be brought to the aid of Little's view of prediction in Marx and so
the debate over symmetry will be taken up in chapter V. In the meantime, it is to be noted that the symmetry thesis suggests that modus ponens justification, which Little presents as a function of sorts on paradigm Marxian explanation, must be as frail or robust as any recourse Marx might have to predictive justification. For, like prediction, explanation must rely on a set of generalizations which allow passage from certain conditions to certain events and it is these generalizations which come hard in social science. As Hempel and others have argued, in both explanation and prediction the logical fulcrum is a set of laws or, more weakly, generalizations. In explanation one begins with a problematic event and searches for the laws and conditions (the causal structure) which generate it. In prediction one begins with received generalizations and expected conditions and derives events entailed thereby. In either case, the logical form is an argument rotating around generalizations or laws. As Ryan summarizes:

That the generalization, whether stated or not, is logically necessary to the explanation can be seen [in the fact that] we explain an event causally by pointing to its causal antecedents, to what Popper terms the 'initial conditions' of the event [but] this only makes sense because we appeal implicitly to a general law which states that these causal antecedents are sufficient to bring about this event. Thus a fully spelled out explanation takes the form of adducing a general law or laws, some set of initial conditions, and deducing from these the statements describing the event to be explained. The logical relationship is thus Laws (L1....Ln), Conditions (C1....Cn), so Event(s) (E1....En); and as in any valid deductive argument the explanans must entail the explanandum.73

Marx's commitment to a "family of predictions," predictions which grow naturally out of the historical nature of his theory, predictions urged on him by his

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73Ryan, Philosophy of the Social Sciences, 49.
Hegelian heuristic, moves the business of predictive testing into a central justificatory position. Of course, this is social theory, vexed with complexity, and as such should not be burdened with naturalist standards of precision. But this is to indicate something about the nature of the predictive testing which is central to the work. That such testing must be judiciously tempered according to the observational possibilities inherent in the object of inquiry, the state of investigative technique, the extent of social resources committed to the field, etc., is no argument for its marginality.

5. Conclusion

I have argued that Little is wrong to suggest that prediction plays a radically different role in Marx than in natural science. Further, I have suggested that the truth of the symmetry thesis would assure that frail predictions must come paired with frail explanations. To suggest that Marx is radically non-predictive is to suggest that he is not in the business of presenting causal explanations. I have further suggested that the logical drift of Little’s premises (but not his argument) is toward the conclusion that Marx’s predictions are not so much weak but, in keeping with other social science prediction, unique. That is to say, the peculiarities that force tendency laws on social science should only qualify, not damage, the predictive function. Moreover, given the nature of Marx’s project, which was in one way or another to plumb the laws of motion of capitalism, it is wholly reasonable to ask of his various theories just what their future empirical commitments are.
Little's argument begins from solid premises. It is true that society presents a unique object for investigation. Some aspects of this uniqueness can readily be seen. History is fast. It generates ontological novelty at a pace that leaves the creation of elements in the stars, and species in the biosphere at a relative standstill. This is of great importance for the progress of human understanding of social affairs. For it means that the object studied by one generation is not that of their predecessors. For example, Copernicus and Galileo were concerned with the same object, had the same ontological referent, in a way that Smith and Ricardo did not. To give but one example, in Smith's day the role of machinery was still marginal, the way to productivity was consequently paved with success in labour division. 100 years later, Ricardo found himself in the middle of an explosion of mechanical experimentation and was forced to wrestle with the causes and effects of machinery. The ideas and motives of the principal contending groups within the nineteenth century economy, the corresponding patterns of social investment, had a new character. Insofar as motives and conditions are fundamental causes in social science explanations, it must be said that Ricardo confronted an ontology, a set of empirical forces and entities, that differed from those of Smith's time.

This perception of ontological mutation has been expressed in the idea that whereas natural scientists do not intervene in the reality they study, social scientists do. Concepts, it is argued, are part of social ontology. So, when we study society

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we are studying not simply its exoskeleton of hard artifact, its social geography and architecture, but rather its institutions and practices. But institutions and practices are living, growing stuff of which the ideas that inform and organize are a part. Since, therefore, social scientists can produce, qua social scientists, concepts which become organic components of social practices, they can actually generate, can enter into, the ontology of what they study. Thus, to the extent that Freud's unconscious, Marx's alienation, and Durkheim's anomie enter into social practices, they become part of what downstream investigators analyze.

I think this observation is a trivial expression of a more ubiquitous truth. It is not the intervention of the social scientist in social ontology that is problematic in social science, but rather the general principle of social ontological flux, of which social science contributes but a part. The conceptual production of the social theorist is but one aspect, likely a minor one, of a more general process in which ideas, motivations, practices and institutions constantly mutate to produce new social genera and species.

This changeability in social ontology is not to be confused with its complexity. That is yet another factor which distinguishes mechanics from social theory. We need only think of the various ways in which individual choices and attitudes become expressed in institutions, and the multiplicity of factors to which a choosing, attitude-forming individual can advert, to recognize the nuance and detail which is summarized in the large social phenomena of which social theory treats.
It is from such premises as these, as we have seen, that Little draws the conclusion, first, that social science must content itself, on grounds of epistemic unmanageability, with tendency laws in place of the exceptionless laws featured in, say, celestial mechanics, and, second, that prediction, resting as it does on the interplay of tendency laws, is unavailable to the justificatory logic of social theory. But either Marx's explanatory endeavors are successful in a sense that merits the ascription "science" or they are not. If they are, their rightness can only consist in their showing that certain tendencies are durable due to their causal relation to major and characteristic capitalist phenomena. Such an assertion is meaningless unless it indicates at least a statistical prohibition of certain events or processes.

The flaw in Little's case can be brought out in another way. He argues that what Marx passes to later practitioners within his paradigm is not a heritage of canonical predictions but a loose set of explanatory concepts. Consequently, the task of Marxist normal science would not be to determine the extent to which Marx had theoretically fixed the necessary causal relations of capitalism, but rather to explore the loose utility of central concepts. Thus, Marx did not bequeath "a canonical work that establishes the necessary properties of all capitalist systems." Rather, Marx provided "a fund of central concepts ... and a loose set of shared hypotheses about what sorts of factors are explanatorily fundamental within capitalist society."75

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75Little, Scientific Marx, 38-39.
Again, however, this is not so much an argument for the practical irrelevance of prediction as for a particular form of it. The conceptual keys Marx passed on are only useful in explanation to the extent that they designate entities and forces which drive social life. Concepts cannot live in the ether; their proof and affirmation lies in the durability of the influences they depict. Marx’s concept of worker alienation, for example, is not disembodied explanatory gossamer. It bears testimony to a cause, or better a structure of causation: given that the engineering of their daily fate lies beyond their own grasp, workers are alienated, caused to have certain feelings and motivations. Alienated as they are, workers respond to their situation in characteristic ways. Their alienation has causes and is, in turn, a cause of their work practices, the work rules enforced by their unions, of their strikes and their politics.

We can see, then, that a conceptual framework is a set of empirical commitments. The assertion that certain concepts are efficacious is the assertion that certain forces are influential; in such claims does the predictive force of theory consist. Thus, the opposition Little suggests between hypotheses concerning necessary relations of capitalism and concepts useful for its analysis is a false dichotomy. The issue is not either/or, it is the nature of the essentials to which Marx’s theory is committed and the type of prognosis that they provide.

Without some such analysis, we are left with social theory locked within the confines of its own time and place, without the temporal reach which bodes to prove the worth of its conceptual gear. This is just what science is supposed to get us over.
The point of theory is not to simply reflect the flux of the social manifold, but to be the basis for controlled endeavor, for informed expectation. Of course, only small portions of social causation can be caught in the net of social theory, and as a result only very specific or highly conditional expectations will be provided for. To identify worker alienation as a necessary feature of capitalism does not allow us to predict the next strike, spanner in the works, or unionization drive. But if the theory designated by the concept of alienation is true, if economic alienation of society's productive facility necessitates certain definable worker motivations, then it constrains what can happen within a useful set of reference points. It explains that in a typical industrial setting certain forces will be at work. These can be intelligibly appealed to by a participant, a union organizer for example. Capitalist industry will durably provide the soil of workplace antagonism which lends a reasonableness to concerted worker action. The organizer will find, reliably, a well-spring of resentment on which to premise his or her work.

My intention here is not to offer the de facto empirical commitments of alienation but rather to show that it must take on commitments on pain of unintelligibility. Of course, the commitment must be appropriately specified. Suppose, for example, we take it to entail, along with other causes, the durability of unionism. What sense could such a theory make of the fact that unionization in the largest capitalist economy, the US, has plummeted in recent years? Obviously, part of the answer is that what the theory actually predicts is a pattern of motivation
which can be expressed in a variety of ways, unionism being one of them. But some circumstances may make unionism impossible or unattractive.

This suggests a hierarchy in explanation and prediction. For example, we explain X’s striking Y by the fact that Y insulted X, under the rule that insults lead to blows. Now, that rule is too far up the hierarchy to survive: many insults meet only reproof, some only resentment, still others are beneath response. A safer rule, of both explanation and prediction is that insult will lead to antagonistic response, though even this is not completely safe. What seems clear is that at lower levels of prediction fewer conditions which select between responses, blows being one species, must be spelled out to appropriately hedge the prediction. The same will be true about either explaining or predicting unionism. To predict unionism from alienation is to make a forecast which is unstable in the absence of conditions which select for the relevant specific.

Analysis of what is actually predicted by alienation is not to my purposes. In subsequent chapters, I take a specific set of social science concepts and carry through the sort of analysis merely alluded to here. The point against Little is this: a conceptual inheritance, if it is of any worth, is an inheritance of empirical commitments. Alienation, like numerous other intelligible concepts of social science, comes replete with implications. These implications allow ongoing experience to be arrayed against the theory implicit in any concept and so allow for theoretical assessment.
Finally, I observe that the only examples Little offers to demonstrate how Marx's predictive impotence arises are the famous tendency for the rate of profit to fall\textsuperscript{76} and the tendency of capitalist economy to crisis.\textsuperscript{77} In the case of the former tendency, Little says, it seems clear that Marx so thoroughly hedged the tendency as to put in question whether there is any theoretical commitment to it. In regard to the latter, he simply states that Marx identified a range of offsetting factors. Now, in this regard, it makes a great deal of difference which examples in Marx we choose. It is quite wrong to proceed as though the tendency for the rate of profit to fall is standard fare. Marx argues a capitalist tendency to generate unemployment, to polarize classes, and to engender class-conflict, and these trends do not come so systematically hedged as the falling rate of profit appears to be.\textsuperscript{78} To proceed as Little does is to suggest that Marx sees capitalism not as a coherent system with a net historical direction due to the institutionally constrained interplay of typical motivations of individuals and classes, but rather as a self-cancelling entity, continuously exhausting itself in cross purposes, fixated in an aimless eternal present. Such a suggestion is a reductio of the position.

In subsequent chapters, I propose to take up these and related issues in a more satisfactory way, turning away from the sort of aphoristic accounts of Marx's

\textsuperscript{76}Ibid., 170.

\textsuperscript{77}Ibid., 172.

\textsuperscript{78}For an account of Marx's complex explanation of the falling rate of profit, see Paul Sweezy, \textit{The Theory of Capitalist Development} (New York: Monthly Review Press, 1942), 147-55.
theoretical work, empirical commitments, and justificatory practice Little provides. There is a theory in Marx which proves fertile both as a vehicle for examining the predictive justifiability of Marx’s work and for raising the general question of prediction in social theory. Unlike the terse pronouncements on which Little’s account of Marx relies, the labour process theory receives a prolonged and detailed treatment in the Marxian corpus. In *Capital* Volume I, Marx devotes several hundred pages of the central chapters to the analysis of the labour process under capitalist economy.

In 1974, Braverman’s *Labor and Monopoly Capital* applied Marx’s labour process theory to the structure of contemporary work with striking results. Braverman’s work was the immediate centre of controversy, controversy which fuelled widespread debate and research in sociology, economics, and history. As a result, we have in the modern labour process literature a vast amount of evidence bearing on the soundness of the empirical commitments Marx took on over 125 years ago. In the chapters that follow, I explore the issue of prediction in Marx in detail with reference to the labour process theory. I show that Marx’s economics and general historical model led him to appropriately clear conclusions about the causal processes that shape work. Subsequently, I turn to an assessment of the theory’s fortunes in the light of the contemporary literature. My overall argument is that Braverman’s work constitutes a complex application of Marx’s original theory to twentieth century conditions. As such, *Labor and Monopoly Capital* and the related
empirical debate must be viewed as an elaborate predictive test of Marx's theory, one which, in fact, provides confirmation within relevant standards of adequacy.
CHAPTER II
THE LABOUR PROCESS THEORY IN MARX

1. Introduction

Technology and Labour

Telephone operators constitute an occupational group toward the low end of the wage-scale; their quarter million North American jobs are an employment of a familiar and common sort.

Telephone operators are part of the clerical work force, the steadily growing and largest occupational group constructed by the statisticians. They are one of the growing number of occupational groups whose working lives are under renovation due to that quintessential technology, the computer. Among clerical workers we find, as the most typical occupation, the data-entry and retrieval workers, workers who form the human link between the real world of productive affairs, to one side, and the ordered, binary universe of the machine, to the other. These jobs are known for their narrowness, their uni-dimensional monotony, electronic overseeing, and the enforcement of work-rate via what is called "machine-pacing." Here we find the telephone operator.

The general nature of the operator's job is not hard to imagine, but its details will be unfamiliar. The job requires the worker to meet verbal requests for service
from customers. Nowadays, these tasks are accomplished via a keyboard which accesses a computer. There are really two occupations here: long distance operators, and directory assistance operators. They could be called 24 second and 17 second operators, for what characterizes their jobs is a performance which is watched and driven by the computer so as to maintain an average task cycle of 24 and 17 seconds respectively.

For the directory assistance, or 17 second, operator, the cycle begins with an incoming call which the computer begins to clock. Having clarified the name and locale of the target party, the operator keys in the information, verifies the item registered by the computer on her terminal screen, and passes the correct phone number off to the caller. Computer-synthesized-voice technology, currently being introduced across North America, allows the computer to pass the retrieved number directly to the caller, and thus cuts a second from the average task cycle, allowing for a "superior," 16 second standard of operator performance.

Now the operator's objective during the cycle is to meet the caller's request and then strike a key which tells the computer that the task is done. But the engineers have not been kind. The instant that key is pressed, the computer immediately puts another call into the operator's ear. By a stroke of technical ingenuity, the key which terminates one cycle begins another. The operator has no control in this matter; in this crucial regard, the machine runs her, not the reverse. Thus the engineers have endowed that key with two differing and conflicting
significances. On the one hand, the operator feels impelled to strike it in order to tell the computer that the work is up to speed. On the other hand, striking the key is a request for more work, for a new cycle, for a renewal of the only ambition the job offers: to strike the key once more. At the end of each cycle, an identical task looms in view. For eight hours a day, five days a week, for in many cases a working lifetime, the repetitions will go on, their endless progression unmarred by any inefficient novelty.

Work of this sort torments and damages the people on whom it is visited. A Canadian study of jobs such as this, recently reported in the *Journal of Occupational Medicine*, concluded:

The mental health of the data entry clerks in our study is affected by certain restrictions typical of a style of work organization based on the fragmentation of tasks and the imposition of high output norms.\(^1\)

Computerized clerical occupations characterized by work overload, routine and monotony, and a lack of personal autonomy, the study's authors reported, were found to measurably increase the risk of a variety of psychosomatic and mental disturbances. In related work, Swedish researchers found confirmation of a widely hypothesized link between fragmented and low-control work, on the one hand, and stress and cardiovascular disease, on the other. Men whose jobs were "mentally demanding and pressing (undue demands) and at the same time monotonous and calling for little knowledge (little scope for decision-making)" were found at higher

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risk of various cardiovascular conditions and "death from the associated disease" than those whose jobs offered variety and autonomy.²

We might be forgiven, in the light of this research, for supposing that in our own day we are coming to replace the obvious philosophical and moral objection to such jobs with sterner stuff, for supposing that our moral objections and the conceptions of human nature on which they are based have a recently clarified empirical content. What might have appeared a century ago as a violation of an ideal, we might conclude, can now be perceived as a palpable violation of tissue and nerve, of life itself. Such a supposition would be premature. This does not appear to be a perception for which credit is due to recent science at all. At least a prima facie case can be made that everything we have just reviewed was understood and predicted well over a century ago.

The Prima Facie Case

When, in the early 1840s, Marx began to take French sociology and English political economy, as opposed to German philosophy, seriously, he was already convinced that the heart of capitalism, its central drive or prime mover, was a series of intransigent antagonisms. Principal among these was the clash between the human needs of workers and capitalist technological imperatives. Over the next 25

years, Marx strove to flesh out that intuition empirically. The upshot was the labour process theory.

Therein Marx argued that the demands of capitalist competition enforced upon entrepreneurs a set of characteristic motivations without which they must succumb in the struggle for market survival. Principal among these was the compulsion to reduce production costs ("the dominant motive for the capitalist's actions"), particularly labour costs. This motive had taken many forms over the history of capitalism. In the early manufacturing phase, where the forces of production consisted primarily of workers' abilities, the preferred method was to wrest productivity gains from the fine division and organic re-arrangement of labour. Formerly robust craft wholes were dismembered, their fragments dispersed over a labour collectivity so that each individual was asked to perform lifelong monotony. Later, in Marx's own day, competition was based on technological prowess, was founded on mechanization and the effective employment of natural, as opposed to human, productive forces. Here too a number of key injunctions, rooted in the system's causal matrix, ground woe for workers.

To one side, workers as a factor in production had become terms in a developed labour market. Hence, the labour-cost economizing which had always been the system's hallmark was given an new edge as capitalists began to seek means to draw on the increasingly available, low-skill, cheap labour force strata. At the

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same time, the application of science to production and the embedding of science and competence in machines spelled a growing irrelevance for skilled labour.

The result was a tendency to produce a growing mass of under-developed labour; that is to say, a growing proportion of jobs which demanded little by way of knowledge or initiative from their incumbents:

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.4

As for the actual work process, the detailed activities of these operatives, the cog-in-the-wheel nature of the job, compelled them "to work with the regularity of a machine."5

Under mechanization, as in earlier phases of the progression, this sort of work went against the grain, abraded against the human nature of the worker:

Constant labour of one uniform kind disturbs the intensity and flow of a man's vital forces, which find recreation and delight in the change of activity itself.6

Resistance to this capitalist-imposed, counter-natural expenditure of life meant that the workplace became a field of antagonism such that any potential advance toward

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4Ibid., 549.

5Ibid., 469.

6Ibid., 460.
democratic or cooperative management was displaced in favour of a growing "labour of superintendence," and the autocratic power of "private [managerial] legislation."\(^7\)

Beyond this inevitable resistance, and the thoroughgoing antagonism to which it gave rise, the alienating work was registered in the sapped health of workers:

[Since the division of labour] attacks the individual at the very roots of his life, it is the first system to provide the materials and the impetus for industrial pathology.\(^8\)

Factory work exhausts the nervous system to the uttermost; at the same time it does away with the many-sided play of the muscles, and confiscates every atom of freedom, both in bodily and in intellectual activity.\(^9\)

This narrowness, this assault on the human nature of workers, Marx said, was not a natural inevitability but rather system-specific. Actually, the advance of scientific productive automata laid the technical foundation for broadly educated, flexible and mobile workers, did away with the necessity of life-long immersion in detail work. But, Marx argued, such a situation is forbidden by the nature of capitalism:

Those revolutionary ferments [the robust labour potential in new technology] whose goal is the abolition of the old division of labour stand in diametrical contradiction with the capitalist form of production, and the economic situation of workers which corresponds to that form.\(^10\)

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\(^7\)Ibid., 549-50.

\(^8\)Ibid., 484.

\(^9\)Ibid., 548.

\(^10\)Ibid., 619, emphasis added.
It would appear, then, that Marx has reached out over the intervening span of 125 years to put his finger down on the occupation of the telephone operator and her kind. The minute competencies, the machine-driven routines, the wasted health, the lack of autonomy, all this was assigned the status of an inevitability given the nature and laws of the system. Marx appears to have predicted contemporary events. Moreover, on at least in his own account, science was involved. His prognosis was based on a grasp of the causal processes and principles which undergird the surface phenomena of capitalist production. Mechanisms generally hidden from view, only available as theoretical entities, engendered certain characteristic and typical motivations in the mind of those who guide investment, engineering, and the shape of productive technology:

While it is not our intention here to consider the way in which the immanent laws of capitalist production manifest themselves in the external movement of the individual capitals, assert themselves as the coercive laws of competition, and therefore enter into the consciousness of the individual capitalist as the motives which drive him forward, this much is clear: a scientific analysis of competition is possible only if we can grasp the inner nature of capital, just as the apparent motions of the heavenly bodies are intelligible only to someone who is acquainted with their real motions, which are not perceptible to the senses.¹¹

I submit that a prima facie case exists. But does this case rest on judicious selection within the Marxian corpus? Does a closer review of the full text show less clarity? Does the theory therein show such a systematic flexibility that with a little cutting and pasting it can be made to square with virtually any body of contemporary fact? These are some of the queries to the side of the theory. Others

¹¹Ibid., 433.
must be posed to the side of the contemporary evidence: Is the telephone operator group representative?

It is to questions of the first sort that we turn our attention in the remainder of this chapter, leaving the question of contemporary evidence for later chapters. In what follows, in section 2 of this chapter, I first summarize G.A. Cohen’s valuable account of the labour process theory and indicate some weaknesses in it. Then, in section 3, I set before the reader a concise statement of the theory as we find it exegetically available in *Capital* Volume I. In section 4, I accumulate materials necessary to a full understanding of the theory’s nature. Finally, in section 5, I present what may reasonably be regarded as the theory’s empirical commitments. Little is at least right that, at a minimum, Marx’s work provides later social scientists with a bank of concepts, tendencies and processes which comprise the starting point of empirical research. But if we are to raise the question of a more precise heritage, we will have to go beyond simply listing such insights and that entails the exegesis which will occupy us over the remainder of this chapter.

### 2. Cohen’s Account of Marx’s Labour Process Theory

Marx’s work contains a number of relatively distinct theories. The theories of history, freedom, and human nature have all become the subject of specialist discussions within philosophy. By contrast, the labour process theory, which is the

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focus of a vast empirical literature, has received scant attention from philosophers. This is a glaring omission. Marx used labour as the coordinating concept of his analysis of history, freedom and human nature. History, in his view, was a resultant born of the dialogue between human needs and the natural world. This dialogue took place in the workplace and through it were articulated all the intellectual and practical arts which comprise the human sphere. To participate in this discourse, he said, was of our nature; without the proper play of its inner rhythms we could not find our essential affirmation. The real freedom of a person or a people could be gauged by the extent to which they were denizens of both the world of conception and of the practical arts.

An important exception to this scanting of the labour process is G.A. Cohen's "Marx's Dialectic of Labor." Cohen's work was the first attempt to explicate not only the general progression of the labour process as Marx conceived it, but as well to expose the model on which the account was based. Cohen showed that Marx's views are substantially indebted to certain forms of Hegel's dialectic.

According to Cohen, the dialectic is characterized by three successive stages. These are described variously as "unity, separated opposites, re-union" or, slightly more elaborately, "undifferentiated unity, differentiated disunity, differentiated unity." This three-phased progression, Cohen argues, provides a typical Hegelian explanatory

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structure. Thus, for example, in his theory of knowledge Hegel proposed an epistemological ascent from a sensuous unity with the object, to a critically established separation, to a more discerning reunification with the object. Love relationships, the true ones at least, showed the same pattern, passing through an initial sense of undifferentiated oneness, to critical awareness of different individual needs, to a unity based on mutual respect for the partners' distinctness.

Marx appropriated this logic, Cohen showed, or rather Marx devised a "materialist elaboration" of it. Hegel thus provided the core of Marx's model of history, for example. The progression begins with pre-capitalist community that suppressed the individual (undifferentiated unity), then advances to the class divisions of capitalism wherein an egoistic, competitive individuality is born (differentiated disunity), and eventually develops into the communist society of the future in which people enjoy both individuality and community (differentiated unity).

It was under such a logic, Cohen rightly observed, that Marx subsumed his conception of the labour process. The pre-capitalist craft worker is at one with his/her work and can enjoy it as a whole, sensuous activity. But a price must be paid for this primitive unity. The worker is "engulfed" in his/her occupation, is bound to it lifelong and has a social identity and self-concept stamped with the parochial mentality and dwarfish skills of the occupation. The proletarian, on the other hand, stands alienated from the occupational fragments generated by the
division of labour; he "does not care about the job he performs, or what kind of job it is. The wage worker's indifference manifests his alienation. But it also betokens a birth of freedom." Freedom from craft engulfment, from the lifelong preoccupation with the narrow details of a mere branch of production.

However, obeying another dialectical canon, this freedom is as yet only "abstract," as opposed to "concrete." Real, immediate workers are not its beneficiaries, only the human species, an abstraction, makes an advance:

The Promethean virtues listed in Marx's characterization of specifically human labour are realized as properties of the factory or industry as a whole. But under capitalism these values make only an alienated appearance. The power of the species is not suffused through its members. It confronts them as something foreign, as the possession of the capitalist, who monopolizes intention and knowledge.\(^{15}\)

These seeds of freedom, consequently, will not bear fruit for workers until after the fated, revolutionary rupture when socialism "will provide for \textit{men} the creative existence achieved under capitalism by \textit{man}."\(^{16}\)

Meanwhile, under capitalism labour becomes abstract both in the sense that it comes to be performed less for its intrinsic qualities or its utility to workers' needs than as a means to wages and in the more important sense that work divisions become ever less differentiated according to specialty, ever more "homogenized."

\(^{14}\)Ibid., 242.

\(^{15}\)Ibid., 245.

\(^{16}\)Ibid., 246.
Thus, Cohen concluded, "Marx's contrast between medieval and modern labour moves in an Hegelian orbit."\(^{17}\) \(^{18}\)

Cohen is certainly correct in this account of typical Marxian explanation. A review of the texts in which Marx touches on the labour process shows a consistent recourse to Hegelian expression as the basis for explanatory forays into the changing nature of work. In the main account, in *Capital* Volume I, the model of history that Cohen retrieves is, if not the backbone, at least a major skeletal element of the narrative.

While Cohen is right to have pointed out the Hegelian roots of Marx's views on the labour progression, there is good evidence that this only captures part of what Marx is up to. If we look at the actual intellectual path Marx took between his youthful Hegelianism and his mature work in *Capital*, we see not just a constant recourse to dialectic expression but as well the steady implementation of the original

\(^{17}\)Ibid., 248.

\(^{18}\)It is worth noting that this model provides at least a partial account of the mechanism within the larger historical progression. Not only was the engulfment of the craft worker a form of individual enslavement, but the tight relationship between productivity and basic producers' needs characteristic of pre-capitalist production was a curse economically: producers who worked more or less directly for themselves tended to quit when they had fulfilled whatever custom taught them was enough. The special contribution of capitalism was the severing of this natural relation of work to personal needs and the imposition of artificial needs on production. The enforced substitution of capitalist acquisitiveness for less ambitious workers' needs gave the system a motivational thrust, subsuming productive activity under the sway of increased profit. Thus an inner drive which led labour by the nose, forcing it to go beyond satisfied need to surplus, became the invisible hand of economy. Moreover, the competitive nature of the system enforced rapid re-investment of surplus in new technology and thus impelled a dizzying spiral of industrial innovation.
views in an empirical form. By tracing this path we are enabled to answer the question as to whether, at the end of the day, Marx is still using dialectics as one among other modes of expression or is, as Cohen suggests, elaborating a dialectical theory.

The weakness in Cohen's account is that it sidesteps the issue of the explanatory value of the model. He did not want to subscribe to the view that describing a dialectic process involved discerning the inner causation or laws of the process:

I do not affirm any dialectical laws. Processes displaying the required structure count as dialectical whether or not their stages generate one another: it is enough that they follow one another, for whatever reason. In seeing the dialectic in a process, we discern its contour in an intellectually satisfying manner, but the explanation of why it unfolds as it does is not thereby disclosed to us.¹⁹

This sets standards of what is "intellectually satisfying" too low, I think. We generally do require that accounts of a process such as this provide insight into "why it unfolds as it does." Moreover, as Cohen recognizes, Marx was concerned with causation. He explained the progression as one necessary in accord with "economic reasoning."²⁰ In thus leaving the theory as merely an interesting intellectual shadow cast by Hegel, Cohen fails to bring out the real empirical dimensions and satisfactions of the theory.

¹⁹Ibid., 237.

²⁰Ibid., 251.
I propose to remedy this weakness by showing that the dialectical conception was an early philosophical model which was steadily implemented as a sociological cum economic account through Marx's empirical endeavors over a 25 year period. In doing so I want to retain Cohen's sense of the importance of the philosophical model. I do not mean to argue simply that the model acted as a stimulant which, once empiricized, was left to the sidelines; on the contrary, the evidence is against it. Nor do I want to suggest that the model was merely an expressive device. Rather, I want to show how it was important practical equipment at the same time as I displace it from the center of attention. This is the burden of the next two sections.

As well, Cohen's emphasis here on the labour process theory's Hegelian elements is related to his work in *Marx's Theory of History* where he argued that Marx, in effect true to his Hegelian roots, had a functionalist theory of history in which an immanent drive for efficiency is the central explanans. As we saw in the first chapter, Little, Elster, Roemer and others have counter-argued that Marx provides microfoundational explanations, explanations in which macro-processes, such as labour process trends, are determined by individual and social ambitions. This debate can be assessed on the evidence provided by the labour process theory. I turn to that in section 4.

3. The Labour Process Theory in Marx

In this section, I present the labour process theory as it is found in *Capital*, excerpting to give the flavour of the work and providing detailed citations that will
allow my exposition to be readily checked by the interested reader. With that account in hand, we will turn, in section 4, to the matter of the theory's Hegelian origins and the issue of whether or not it should be considered a dialectical theory.

The Theory in *Capital*

Capitalist transformation of the labour process begins, naturally, with the methods of work antecedent to it. The first fledgling capitalists, that is to say, take as their starting point the givens of craft-based industry laid down by prior history. Here they find a great diversity of small productive technology, widely dispersed in the hands of isolated producers who run production by dint of their mastery and ownership of traditional craft knowledge.

What characterizes early labour processes is above all that the forces of production - developed equipment and productive intelligence - are dispersed, not centralized; are democratized, roughly speaking, in that they are resident with independently functioning, direct producers. Capitalists enter the picture and hire labour to serve their own ends. They thus set in motion the germinal beginnings of their own era, initiate the growth of a productive environment which will eventually mature into a system of both opportunities and constraints upon those ends. The transformation thus initiated is marked by a number of discernable phases.
Before Marx enters into this matter, he sets before his reader the essentials of the labour process.\textsuperscript{21} The labour process he says, has three premises: labour, tools and raw material. Its defining purpose is to transform the givens of nature and thus bring them into alignment with the needs of those who labour. Of necessity, it is always a compound of conceptions and practices:

We presuppose labour in a form in which it is an exclusively human characteristic. A spider conducts operations which resemble those of a weaver, and a bee would put many a human architect to shame by the construction of its honeycomb cells. But what distinguishes the worst architect from the best of bees is that the architect builds the cell in his mind before he constructs it in wax. At the end of every labour process, a result emerges which had already been conceived by the worker at the beginning, hence already existed ideally. Man ... realizes his own purpose in those materials.\textsuperscript{22}

However, Marx urges, the labour process should not be seen merely as toil, which is really only one, partial aspect. Rather it should be seen first of all as a self-affirming activity in which the material realization of human ends confirms the conceptions from which they stem. Moreover, the ongoing critical dialogue between product and need is the nexus of human self-development:

Labour is, first of all, a process between man and nature, a process by which man, through his own actions, mediates, regulates and controls the metabolism between himself and nature. He confronts the materials of nature as a force of nature. He sets in motion the natural forces which belong to his own body, ... in order to appropriate the materials of nature in a form adapted to his own needs. Through this movement he acts upon external nature and changes it, and in this way he simultaneously changes his own nature. He develops the

\textsuperscript{21}Marx, \textit{Capital} Volume I, 283.

\textsuperscript{22}Ibid., 284.
potentialities slumbering within nature, and subjects the play of its forces to his own sovereign power.\textsuperscript{23}

These remarks have both a practical and logical function. Their practical function is to rescue labour from its mid-nineteenth century connotations and to set it before the reader in its fullest significance and portent. Labour, the dialogue between needs and the world of human artifact, is the ground of history, of human progress itself. In labouring, the worker establishes concrete manifestations which confirm the ethereal inner abstractions of self-identity. The dialectic partners, need and object, conception and realization can only develop through their mutual dialogue. In raising up the artificial world, humanity is generating the world of theory.

Production and science are inseparable twins. The logical function is to enter a premise implicit in all the subsequent explanation and argument: a fact, a causally efficacious fact about ourselves as workers, is the tenacity of our drive for social or individual autonomy in work. While on the one hand this is a piece of historical cum anthropological synthesis, on the other it clearly has a prescriptive force for Marx. Through this description of essence, Marx is claiming that natural labour is work where the motive forces are the needs and conceptions of the worker. Is yields ought; work should conform to what we are.

Cohen has shown, however, that Marx views craft labour as a form of "engulfment" the remedy for which is the breaking of craft ties and the re-assertion of

\textsuperscript{23}Ibid., 283.
conceptual relations at the social, as opposed to individual, level. So no simple conception in which good work is work directly for one's own appetites can be sufficient. To derive Marx's real position we must broaden the concept of natural labour. For Marx, good work is only possible where there exists a close relationship between an individual's needs and his or her productive activities, such as is exemplified, but only exemplified, in craft labour. The heart of the matter is that natural work involves an intimate relationship between human purposes and labour. This relationship may be established directly, as in craft, or mediated democratically, as in organized social production, so long as the relation between individual purpose and labour practice is such that it is proper to classify the subordination of action to conception as self-subordination. For the natural worker, "a purpose he is conscious of ... determines the mode of his activity ...," but the purpose may be constructed democratically, in concert with others.

All work is subordinated to one or another conception, but it makes a difference whether the conception is imposed or adopted freely:

The less [the worker] is attracted by the nature of the work and the way in which it has to be accomplished, and the less, therefore, he enjoys it as the free play of his own physical and mental powers, the closer his attention is forced to be.24

24Ibid., 284.
Toil, grinding work marked by a self-sacrificial mentality, is not of the nature of work but rather is a second nature which characterizes work under certain historical conditions.

Capitalism is a form of this dialectic even as it cuts across it, establishing a dialogue between purely private and narrow conceptions and the world of production. Under the spur of its urgent competitive and acquisitive motivations, the dialectic surges forward. Rational production, to one side, and rational conception, to the other, develop explosively. But the growing science and the growing practical control develop characteristics peculiar to the structure of vested interest within which they are embedded. Consequently to workers, whose economic hence political clout is minimal, there falls but the role of a factor in the process.

In *Capital* Volume I, the labour process theory is presented as an historical progression. In chapters 12 to 15, Marx sets out a number of technical phases and their related labour regimes. These mount up from early, ineffective uses of labour to later, more effective uses, to the eventual technical (but not actual) eclipse of labour within production. The progression covers two major phases. The first of these, which Marx terms *manufacture*, is characterized principally by a reliance on human ability in the form of workers' knowledge and physical strength. This phase Marx divides into an early and late period; an early period of *co-operation*, by which Marx denotes capitalist-inspired workshops where handicraftsmen work side by side but with no organic connection or interdependence, and a later period of *manufacture*
proper wherein the craft specialists have been organically connected via the division of labour. The second phase Marx terms modern industry (sometimes "machineofacture" or "large scale industry") a term he uses to refer to the mechanized industry of mid-nineteenth century England.

Co-operation and Manufacturing

What marks the earliest specifically capitalist phase is its reliance on workers as opposed to machinery, or more generally, scientific technology. Since there is a reliance on workers and their knowledge, the labour process, especially at the beginning of the period, remains largely unchanged:

[The capitalist] must begin by taking the labour-power as he finds it in the market, and consequently he must be satisfied with the kind of labour which arose in a period when there were as yet no capitalists. The transformation of the mode of production itself which results from the subordination of labour to capital can only occur later on ...

While the labour process is thus stable in the early period, important changes of a more or less contextual sort obtain. The production process has already taken on two of its defining features: juridical capitalist control over labour and capitalist ownership of the product. Workers now labour within a framework of nominally free legal contracts which assign to capitalists the right to specify the work process. At first, the capitalist does not have enough industrial knowledge to prosecute this right in detail; technical skill, hence technical control remains with the hands-on producers. Early capitalists do exercise some workplace control, but this is minimal, only enough to assure that equipment is not abused nor materials wasted. Capitalist

25Ibid., 291.
ownership of the product, of course, is the leaven in the loaf. Because of it, any 
productivity gain the capitalist can devise, by extending working hours at given 
contracted wages, by upping the intensity of work, or by amplifying the powers of 
workers will necessarily result in an expanded product at his/her disposal. 
Accordingly, the motivational roots of a nagging interventionism on the part of the 
capitalist or his/her minions is laid down.

Thus even though the technical features of production are relatively stable 
through this early phase, the social relationships change markedly. Managers are 
introduced and these, Marx cautions, are not simply a neutral directing authority 
such as all combined, large-scale human action requires; rather they and their sub-
ranks of foremen and overseers fulfill a specifically capitalist function:

As the number of cooperating workers increases, so too does their resistance to 
the domination of capital, and, necessarily, the pressure put on by capital to 
overcome this resistance. The control exercised by the capitalist is not only a 
special function arising from the nature of the social labour process, and 
peculiar to that process, but it is at the same time a function of the exploitation 
of the social labour process, and is consequently conditioned by the 
unavoidable antagonism between the exploiter and the raw material of his 
exploitation ... Moreover, the cooperation of the wage-labourers is entirely 
brought about by the capital that employs them. Their unification into a single 
productive body, and the establishment of a connection between their 
individual functions, lies outside their competence.26

Toward the end of the co-operation phase, in the period of manufacture 
proper, the labour process is renovated more substantially. The original tailor, for 
example, formerly competent in all aspects of his/her trade, becomes the narrow

26Ibid., 449.
specialist who can do only the upholstery work demanded by a coach-work factory. But though the working science is thus more finely divided, it is still divided among the workers in the main. Though the factory tends toward "... a productive mechanism whose organs are human beings," it is nonetheless the human element that stands out as the primary motive force of production:

The collective worker, formed out of the combination of a number of individual specialized workers, is the item of machinery specifically characteristic of the manufacturing period.\(^{27}\)

This organization of the "collective worker" as a meshing of numerous finely graded talents gives rise to the phenomenon described by Babbage: the creation of detailed labour hierarchies and the matching of wages to competence and training:

Manufacture therefore develops a hierarchy of labour-powers, to which there corresponds a scale of wages. The individual workers are appropriated and annexed for life by a limited function; while the various operations of the hierarchy are parcelled out to workers according to both their natural and their acquired capacities.\(^{28}\)

Alongside this life-long annexation of individual to narrow specialty there arises a phenomenon even more sinister, the pushing of specialty to the point where it becomes the absence of specialty. Every production process, Marx says, requires certain unskilled activities, activities "which every man is capable of doing." The number of workers whose jobs are confined to such activities grows steadily. As the division of labour characteristic of manufacturing comes of age:

\(^{27}\)Ibid., 468.

\(^{28}\)Ibid., 469-70.
... it also begins to make a specialty of the absence of all development. Alongside the gradations of the hierarchy, there appears the simple separation of the workers into skilled and unskilled.\textsuperscript{29}

As a result of these processes, the beginning and the end of the co-operation phase have markedly different labour process characteristics:

While simple co-operation leaves the mode of the individual's labour for the most part unchanged, manufacture thoroughly revolutionizes it, and seizes labour-power by its roots. It converts the worker into a crippled monstrosity by furthering his particular skill as in a forcing-house, through the suppression of a whole world of productive drives ...\textsuperscript{30}

But through all this stage of production the power of the collective labourer has been advancing with the result that now, in the culmination, the forces resident with individuals stand in starker contrast to the social forces of production than they did at the beginning:

The possibility of an intelligent direction of production expands in one direction, because it vanishes in many others. What is lost by the specialized workers is concentrated in the capital that confronts them. It is a result of the division of labour in manufacture that the worker is brought face to face with the intellectual potentialities of the material process of production as the property of another and as a power that rules over him.\textsuperscript{31}

Notice before we move on that there is quite evident here a intermixing of both microfoundational, or economic explanation with Hegelian explanation.

\textsuperscript{29}Ibid., 470.

\textsuperscript{30}Ibid., 481.

\textsuperscript{31}Ibid., 482.
Capitalists act because they seek the advantages of prolonged, intense labour, co-operative production and the division and organic systematization of labour. At the same time the "contours" of the process, as Cohen would put it, obey the dialectic. Something lost by specialized workers is concentrated at the antagonistic pole opposite and alien to them. As their own intellectual force within production shrivels, a proportionate expansion of privately owned science in production looms over their heads.

Machinery and Large-Scale Industry

With the arrival of the machinery phase, Marx says, the focus shifts from human powers systematized as a sort of incarnate machine wielding the "dwarf-like" tools characteristic of manufacture, to the mechanical systems of large-scale industrialism which wield the workers as so many appendages.

This is both positive and negative, Marx notes. From the positive perspective, machinery advances that embryonic socialism which is nurtured within capitalism. Already, under manufacturing, labour had been socialized inasmuch as isolated, individual labour was generally replaced by collective labour. But still this seemed to be a mere accident, Marx says, a matter of choice and convention. Under the subsequent phase, however, things are different:

Machinery ... operates only by means of associated labour, or labour in common. Hence the co-operative character of the labour process is in this case a technical necessity dictated by the very nature of the instrument of labour.\(^{32}\)

\(^{32}\)Ibid., 508.
Ironically, capitalist technological innovation is laying the groundwork for its successor social system. This is positive. But this advance is merely abstract from a worker’s perspective; it falls due only to society in general, and only as a potential. For individual workers, the process grinds negation.

What are the labour process characteristics under machinery? As we have seen, Marx sees certain general characteristics as coextensive with capitalism itself, whatever the phase of development. Conflicting interests of capitalist and labour, authoritarianism in the work place, hence antagonism, fragmentation and simplification. These continue. Under manufacturing, capitalists had begun to intervene in the design of work, if only minimally; managers had made their first appearance. The thin edge of the mental versus manual labour distinction had been insinuated as modest, fledgling productive science under the control of capital had been sponsored. These patterns continue and come of age in the next phase but they are joined by new labour process characteristics.

Marx makes it clear that machinery undermines technically the basis of the older division of labour characteristic of manufacture, eulogized by Smith and analyzed by Babbage. The skill hierarchy with its finely divided pay-scales is supplanted technically: it is no longer technically necessary to make human flesh and its graded abilities into an organic social mechanism. Now, the mechanical systems are becoming relatively autonomous while the human personnel have become so many appendages whose competencies are increasingly irrelevant.
Still, while the old manufacturing hierarchy is now outmoded, and while hierarchy itself is no longer technically necessary, capitalism, for its own special motives (principally competitive cost-cutting), reproduces the division of labour in a new, more destructive, form. The effect has two components. First of all, the old division of labour, formerly wrought in flesh, is now simply replicated in the divisions among detail machines:

Here we have again the co-operation by division of labour which is peculiar to manufacture, but now it appears as a combination of machines with specific functions. The tools peculiar to the various specialized workers ... are now transformed into the tools of specialized machines, each machine forming a special organ, with a special function in the combined mechanism. 33

Secondly, workers become "appendages" 34 to this independent, lifeless mechanism. But while workers are as minutely classified as before, there are only a few real distinctions among them:

The essential division is that between workers who are actually employed on the machines [operatives] ... and those who merely attend them [helpers](almost exclusively children). In addition to these two principal classes, there is a numerically unimportant group whose occupation it is to look after the whole of the machinery and repair it ... engineers, mechanics, joiners etc. This is a superior class of workers, in part scientifically educated, in part trained in a handicraft; they stand outside the realm of the factory workers, and are added to them only to make up an aggregate. 35

Entailed in this development is a decline in training and apprenticeship and a related interchangeability of workers. Both of these elements are economically

33Ibid., 501.

34Ibid., 548.

35Ibid., 545-6.
motivated. Less trained workers are less expensive just because they are interchangeable with an expanded pool of technologically redundant labour. Lowering training requirements increases the supply of appropriate labour, thus lowering its average price. Thus, while the new technology obviates the technical need for the sort of engulfment characteristic of prior specialist labour, the old division of labour is nonetheless "systematically reproduced and fixed in a more hideous form" as the machinery with its socially beneficial potential is "misused in order to transform the worker, from his very childhood, into a part of a specialized machine." The result is an expansion of routine work, work which even though it may be lighter is so repetitive and intense as to constitute an endless Sisyphean "torture":

Factory work exhausts the nervous system to the uttermost; at the same time, it does away with the many-sided play of the muscles, and confiscates every atom of freedom, both in bodily and in intellectual activity.

The new technology is thus the bearer of promise and punishment for workers. On the one hand, it holds the prospect of liberation from what Cohen calls "engulfment" in the narrow intellectual and performative confines of craft; holds out a vision of generalists, broadly competent in the scientific principles which animate all production, enjoying a varied, refreshing occupational mobility. However, instead of this re-unification of worker and productive intelligence at a higher level, the separation of mental and manual functions reaches its zenith:

36Ibid., 547.

37Ibid., 548.
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.\textsuperscript{38}

We have seen that in presenting the historical course of the labour process Marx does more than draw out the Hegelian "contours", as Cohen would have it. Marx clearly mixes Hegelian explanation with the economic motivational explanation available to him via his reading of the political economists (the likes of Smith, Say, de Tracy, Quesnay, James and J.S. Mill, Bentham, Ferguson, Urquhart, Petty and numerous others) and he imbues this account with a special empirical content of his own, a content derived from his reading of factory inspectors' reports, volumes on occupational medicine, testimony before industrial commissions, the declarations of relevant parties to industrial conflicts, and so on.

Three Residual Aspects of the Theory

Before I leave this expository section, I wish to draw attention to three distinctive features of the theory. The first concerns the issue of relative and absolute degradation. Marx makes extensive use of the absolute/relative distinction. \textit{Capital} Volume I, for example, is largely structured in terms of a progression from absolute to relative surplus-value extraction, from surplus extracted by simply enforcing more hours of labour to surplus extracted by reducing the share of product returned to labour. For another example, workers' wealth, Marx frequently observes, may

\textsuperscript{38}\textit{Ibid.}
increase absolutely yet decrease relatively. The question arises somewhat naturally then, and later we will see that it has a practical empirical significance, as to whether Marx is empirically committed to absolute or merely relative degradation of the labour process.

He clearly means at least relative degradation. Knowledge in the hands of workers contrasts badly with the productive science of industrialism in the hands of capital, so to speak. Narrow, fragmentary performance of workers contrasts badly with the sophisticated actions of machines. This conforms readily to Hegelian expression. Contradictions deepen; what is lost by workers by way of productive potency accumulates at the pole of capital.

He also has much to say that indicates an advance of absolute degradation, degradation relative to former workers' position. The modern worker is a "fragment of himself," a fragment, that is to say, of what the historical worker was previously. Confirming this reading, Marx favorably cites the opinion of Ferguson that "Manufactures ... prosper most where the mind [of the worker] is least consulted ..."39 Intelligence, Ferguson says, and Marx agrees, just gets in the way. Smith is cited in a similar vein.40

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39 Ibid., 483.
40 Ibid.
Second, Marx is quite clear that the degradation he is portraying is not to be confused with naturally occurring contrasts between competencies of parts and those of the whole, between individual performances and the overall social repertoire, as society increasingly grows and diversifies its product range. He devotes a 10 page section of chapter 14 to it. What happens naturally in society and what happens in the capitalist workshop have distinct characteristics because they have distinct premises.

This distinction can be grasped quite simply by considering a progression I shall call an academic model. Imagine that the philosophy department of a small college has five professors who among themselves cover the major areas of the discipline. One teaches political-social philosophy, another history of philosophy, another epistemology and metaphysics, etc. In a larger department, the history of philosophy, as with other major areas, may be divided. Three professors may divide teaching the history of ancient, medieval, and modern philosophy among themselves. In a still larger department, we may suppose, each such sub-division may be again sub-divided with someone just teaching Plato, perhaps just Plato’s politics. Notice, however, that in all this no polarization such as the theory is committed to is evident. The specialized Plato scholar, though less all-encompassing than the college history of philosophy professor, may exercise the same range of pedagogical skills. He/she may make the same range of decisions regarding texts, testing methods, timing of reading breaks, etc. He/she may, as much as the generalist, bring the full weight of
years of graduate training and acquired knowledge to bear on teaching-related research, lecturing, and in-class dialogue.

Were the academic progression to follow an industrial model, the large department would be polarized. A group of directors and an intellectual elite would direct a work force of detail instructors. These instructors would have only college diplomas (with an introductory philosophy course being, perhaps, an asset) and would interface with students by showing them how to use text data-bases, by running computer-based, menu-driven socratic routines on various topics, or by supervising pre-taped lectures.

The difference between the academic and industrial model, the theory claims, is due to the fact that academia does not seek financial return by selling students into a market. The motivational structures of the two enterprises are distinct. The former, strictly speaking, is not an enterprise at all.

Third, just as the lamentable tendencies in the labour process are not the result of sheer growth in range of production, neither are they mere reflexes of technological advance. As we have seen, Marx holds that from a purely technical standpoint mechanization lends itself "naturally" to developed technical workers who are flexible generalists.41 Since, he claims, mechanization is merely the outward face of scientific production in which the diversity of productive processes is analyzed so

41Ibid., 618.
as to abstract a parsimonious set of fundamental principles - he draws an analogy with the progress of mechanics - eventually workers will not be limited to the specifics of their allotted branch but rather will wield general, universally applicable truths.

I want now to deepen the sense already achieved of the distinct forms of explanation as we find them in the primary document, *Capital*, by tracing briefly the course of development of Marx's thought between the first germinal statements of the theory and its ultimate exposition.

4. The Development of the Theory

The Early Days

Marx did not first stumble on a body of information about work and then seek to theorize it. Quite the contrary, he began with a body of theory. As Popper would have it, he came to his subject matter replete with hypotheses.

Marx and other students he associated with in the Berlin pubs in the 1830s liked to style themselves after various figures in the French Revolution, to which they looked for a model of social transformation in Germany. They had been steeped in Hegel, and while many, Marx at least, had rejected the spiritual elements of his
thought, they remained committed to much of the form and content of his philosophy, the historic importance of critical opposition, for example.\footnote{Apart from works cited in the text, the account of Marx's intellectual development offered here relies on two major sources: David McLellan, The Young Hegelians and Karl Marx (London: MacMillan, 1969) and Loyd D. Easton, and Kurt H. Guddat, Writings of the Young Marx on Philosophy and Society (New York: Anchor, 1967).}

Writing for the Rheinische Zeitung, Marx had come to see private property as a hindrance to community welfare. During long walks with his fiancée's socialist father he had been exposed to the idea that the future would be based on social, not private property. These ideas and a youthful idealism and zeal were among the baggage with which Marx disembarked in Paris in the early 1840s.

Before him was a large question. How could a young intellectual like himself put into play the critical faculties Hegel said were historically efficacious while jettisoning the outmoded spiritual elements in which the Hegelian dialectic came wrapped? Given that, as Feuerbach had shown, the Hegelian ontology was simply an inscription of material processes, how could its logical charm be re-expressed in realistic terms?

In Paris, Marx made the acquaintance of the city's anarchist and workers' organizations, entered their deliberations on the evils of industrialism, and became familiar with the French vogue of analyzing history as the interplay of social classes. In all this, Marx found an answer. The Hegelian historical model with its immanent
spiritual entities and dialectical and teleological logic could be reinterpreted as a system of social forces congealed around the objective economic interests of classes. Hegel's dialectic with its contradiction-driven motions could be replaced by the revolutionary tendencies inherent in the growing gulf and conflict between workers and capitalists. Hegel's teleology, too, could be reformed: the progress of world spirit through its historical labours toward its final freedom could be re-written as the striving of a characteristically labouring species toward its ultimate liberation from toil. In the end, it was the working class, that contemporary expression of human labouring essence, that would be liberated, liberated from its pas de deux with its opposite, capital, liberated from its struggle to externalize its needs in property, liberated from the tyrannical subordination of its working life to the mass of private property wrought by its own labours.

So, we begin with the 25 year old Marx, steeped in the lore of the French Revolution, seeking a way to transcend what he regards as the sterile-because-purely-intellectual posturings of the Young Hegelians. Philosophy, he believes, can only be a real historic force when it is taken up by powerful historical agents; for Marx, the fated and growing working classes. To Marx, as he sees it, falls the task of devising the theory of this emergent agency, this class which because it is bound by "radical chains" is being driven to revolt in the name of the end: a socially rich, personally fulfilling, cooperative future where property's current dominance over humanity (as seen in its essential expression, the workers) is reversed; where the historical category property, represented by and made an historical end by the emergent class of
capitalists, re-appears in its higher, truly social form, as a means to personal and social enrichment, as an expression of social, not sectoral, values.

However, what begins as philosophy is immediately immersed in empirical reality: the conditions of the French workers seen through the prism of the Parisian workers' organizations, the theory and description of the developing discipline of political economy. Out of a dialogue between these elements, to one side a model, a logic, to the other a body of direct and indirect evidence, Marx extrudes an empirically rich yet visionary and committed account of the progression of work under capitalism.

But though the effort is given a measure of respectability by its dedicated empirical immersion, the whole project remains drenched in the original intentionality: the world must be changed, philosophy must be made a real force, the workers must rise up and negate capitalism, preserving its universalist advances while re-appropriating the vast array of scientific-technical facility that has been appropriated from the community through the value-extractive processes of capitalist economy.

Early in 1844, Marx settled down to a concerted reading of the political economists, whose empirical evidence he used to explain the causal matrix which underlay class antagonism which had become part of his thinking in the past year. And it is at this point that something odd happens, or rather fails to happen. Having
got to the bottom of things, as it were, having put himself in a position to drop the Hegelian conception in favour of an economic theory, Marx proceeds instead to Hegelianize the economics.

What had been a moment earlier but the descriptively evident social-political opposition, the subject of the Parisian workers' organizations' discussions, is now supplied with an explanatory foundation. Marx discovers in the writings of the political economists the real economic processes which undergird the evident political tension, but he rewrites the deliverances of the political economists in Hegelian terminology, so that it appears as though the economists are describing superficial appearances covertly undergirded by Hegelian ontology.

It is not just the case, for example, that capitalist legal entitlement to means of production allows them an economic and social leverage which gives them control over the social product and its re-investment. Workers "objectify" and "alienate" their inner being and thus come to confront in capital their own potencies turned hostile. For another example, the constant generation of new branches of production and the development within each of an indefinite number of fine specialties is "universalization": the multiplication and exploration of every nook and cranny of the repertoire potential to the species.

It is important to see that this was not simply a frivolous penchant for poetic expression toward which Marx's literary German training would have inclined him.
While the political economists were presenting Marx with the grist for a wholly empirical theory, one which could have supplanted his however materialized Hegelianism, he had good reason to reject their views as incomplete expressions of reality. They were, after all, the advisors of capitalists. Their standpoint was not a general social one, but rather that of capitalists. Their essential problematic was the derivation of profit from production. In their prescriptions they summarized and extended the empirical lessons of practicing entrepreneurs. Thus they tended to praise the labour-fragmenting mentality which led to productivity advances. So it was natural and important that Marx maintain a critical distance from the empirical deliverances which were nonetheless his best window on the world of the workplace. To himself, he formulated this critical distance as his awareness of an immanent reality to which he, by virtue of his German theoretical background, was party and of which the political economists were ignorant. They present us with laws, he says over and over, which merely rationalize appearances.

Beyond this, Marx also took his Hegelian vision to place him in a superior epistemological position to other critics of capitalism. He criticized Proudhon, for example, for wanting to distribute the total product of labour to all who worked, under the banner "Property is theft." This Marx scoffed at. All this would mean, he said, would be a stagnation of social productive powers at a mean level; a stopping of the historic progression toward greater productive powers and the human freedom they permitted. No, he insisted, the capitalist process must inevitably run its course, squeezing out every last drop of living from the workers, building up the wealth
which would be appropriated at the end of the day as the foundation for the
liberated world of tomorrow. Not only was Proudhon wrong to recommend this, he
was unconsciously bucking the laws of history, laws to which Marx was attuned by
dint of his immersion in the superior theoretical mentality prevalent in Germany,
Hegel to be precise.

Marx, thus, took his own political superiority to reside in the fact that he
recognized certain laws, that he was scientific in a way that various levellers and
utopian socialists were not. They would be left in history's wake. As for his own
personal vision, it comprehended and built upon the large-scale, industrial
technology, the abstract monetary liquidity, the credit system, the internationalization
of trade, and the international division of labour. His was a politics of industrialism,
a politics attuned to and supportive of progress toward that grand **aufhebung** which
would set humanity at last, at some point in the post-capitalist future, on the
threshold of the epoch of true human freedom, freedom based on industrialism.
Fourier's espousal of the pastoralism of agriculturally-based society (such as was just
at that moment in history being eclipsed by urban capitalism) as an antidote to the
evils of industrialism, was in Marx's view romanticism based on ignorance, based on
an utter lack of scientific perspective.

So rather than the natural displacement of youthful philosophic themes in
favour of the much admired economic mode of analysis, this intertwining of Hegelian
and economic analysis becomes a permanent feature of Marx's thought. In the **1844**
Manuscripts, for example, Marx discusses the way workers, as a force of production, as a factor of production, have become a commodity alongside others purchased and consumed in the production process. As such, they are found to obey the laws of supply and demand; their wages, hence their economic vitality, hence their human vitality, rise and fall according to economic, not moral, principles. To this he adds a characteristic Hegelian flourish: the worker has really ceased to be a human being with a moral stature, has become an "abstraction."

The same is true for Marx's own version of the classical economists' labour theory of value, their recognition that market value follows labour time necessary for production. He castigates them for moral flinching, for not having the courage to follow their insight to its logical conclusion, for failing to expose the fact that it condemns profit as unjust retention of workers' product. He also presents the problem as a theoretical failure; the economists fail to see the inner workings, the underlying causal mechanism, of the economic principles they espouse:

All these consequences [the expansion of capital and the poverty of workers] result from the fact that the worker is related to the product of labor as to an alien object. For on this premise it is clear that the more the worker spends himself, the more powerful becomes the alien world of objects which he creates over against himself, the poorer he himself - his inner world - becomes, the less belongs to him as his own ... The worker puts his life into the object; but now his life no longer belongs to him but to the object ... Whatever the product of his labor, he is not. Therefore the greater this product, the less is he himself.43

The product of labor is labor which has been embodied in an object, which has become material: it is the objectification of labor.\textsuperscript{44}

And so it goes throughout the early work.

How thoroughly Marx had empiricized his views can be seen in *Wage Labour and Capital* (1849). It is here that we find the first coherent statement of the labour process theory. This work is important because it was intended for publication and actually saw the light of day with Marx's approval, unlike all earlier sources with the exception of the *Manifesto*. Moreover, the work is important inasmuch as it shows that when Marx produced popular work, and consequently put a premium on clarity of expression, he was capable of dropping the Hegelianisms entirely.

Productivity gain, Marx says here, premising his whole explanatory endeavor with economic concepts, is the bedrock of competition, and this presupposes advances in the division of labour and the employment of machinery:

The one capitalist can drive the other from the field and carry off his capital only by selling more cheaply. In order to sell more cheaply without ruining himself, he must produce more cheaply, i.e., increase the productive force of labour as much as possible.

But the productive power of labour is increased above all by a greater division of labour and by a more general introduction and constant improvement of machinery ... And so there arises among the capitalists a universal rivalry for the increase of the division of labour and of machinery and for their exploitation upon the greatest possible scale.\textsuperscript{45}

\textsuperscript{44}Ibid.

Turning to the effect of this on the nature of work, Marx states:

Furthermore, to the same degree in which the division of labour increases, is the labour simplified. The special skill of the labourer becomes worthless. He becomes transformed into a simple monotonous force of production, with neither physical nor mental elasticity. His work becomes accessible to all ... [and] it must be remembered that the more simple, the more easily learned the work is, so much the less is its cost of production, the expense of its acquisition, and so much the lower must the wages sink -for, like the price of any other commodity, they are determined by the cost of production. Therefore, in the same measure in which labour becomes more unsatisfactory, more repulsive, do competition increase and wages decrease.\(^{46}\)

Here, then, we have a succinct statement of the theory. Capitalists seek a market advantage through cost reduction or, what is the same, through advancing the productivity of workers. The means to this productivity advance are two: division of labour and mechanization. Both have the effect of generating repulsive work. A counter-trend to this would, Marx says, be in contradiction to all the laws of political economy, particularly that "...modern industry always tends to the substitution of the simpler and more subordinate employments for the higher and more complex ones."\(^{47}\)

The Mature Work

We have seen, then, a very clear progression in the development of the theory. Marx begins with a sketch which is almost entirely Hegelian in character. The only empirical concession is a cursory knowledge derived from his brief exposure to Parisian politics and French social theory. Then over a seven year period the theory

\(^{46}\)Ibid., 44-45, original emphasis.

\(^{47}\)Ibid., 46.
is deepened empirically until in *Wage Labour and Capital* Marx is able to present the theory in wholly economic terms.

This does not mean, however, that Marx now abandons the core philosophical model. In *Capital* itself, as we have seen, Marx employs both forms of explanation, the Hegelian and the economic. Moreover, given the poetic vividness that accompanies the Hegelian expression, and its frequency, it would be quite a simple matter to conclude that this was the primary model.

In the *Resultate* (early 1860s), he offers an extended discussion of the results for workers of the technical shifts presented in *Capital* Volume I. This is an account wholly in the shadow of Hegel. The main theme is the suppression of the worker in line with the dialectic thesis of deepening contradiction between a world of wealth and science and a world of poverty and ignorance. Thus, the "result" is a shift from formal subsumption of labour (formal-legal control over the worker) to real subsumption (detailed direction of the work process).

In our day, we read the account in *Capital*, given Cohen's scholarship, in the shadow of the 1859 *Preface* formulation of historical materialism. In typically Hegelian fashion, the *Preface* asserts that history is a matter of economic determination: an immanent impulse to ever greater productivity is the enduring historical force, social systems come and go according to their compatibility with the inner impulse. A social structure which "fetters" the expansion of productivity will be
shrugged off by history. Cohen has elaborated this short sketch into a full theory of history, defending Marx as a functionalist thinker.

However, it is a simple matter to suppose that what is in the Preface presented as historical determinism, as a model of history based on Hegelian immanences, is a shorthand for what could just as easily be presented as a causal account where the relevant causes are human ambitions. This would replace the Hegelian immanences with a natural drive based on human discontent with prevailing levels of productivity. What each generation achieves by way of productivity becomes, in effect, the object of criticism by the next generation who set new goals and benchmarks. What makes this drive for productivity especially evident on the surface of capitalism, as opposed to earlier societies, is the fact that it is a social system that has broken the link between production and direct producers' needs, has imposed the needs of a class embedded in a struggle for productivity, needs that supplant the lethargic ambitions of direct producers. That is to say, the drive of the capitalist system is the capitalists, constrained as they are by the "coercive laws of competition" and the natural contrariness of autonomy loving workers. It is they who devise technologies, legal structures, and labour disciplines which supercharge productivity.

On a straightforward reading, however, the weight of textual evidence seems to go against such a re-writing. Discussing the drive to extend the working day, during the early, manufacturing phase, for example, Marx writes:

The capitalist has his own views of this point of no return, the necessary limit of the working day. As a capitalist, he is only capital personified. His soul is
the soul of capital. But capital has one sole driving force, the drive to valorize [expand, roughly] itself, to create surplus-value, to make its constant part, the means of production, absorb the greatest amount of surplus labour. Capital is dead labour which, vampire-like, lives only by sucking living labour, and lives the more, the more labour it sucks.\textsuperscript{48}

There can be no doubt that this functionalist type of account, in which social changes, changes in social relations of production, are explained by their effects - meeting the needs of capital - is what falls most readily to hand throughout the text. Over and over, it is \textit{capital} that acts in history, that has "boundless thirsts\textsuperscript{49} that exhibits a "blind and measureless drive ... [an] insatiable appetite for surplus labour."\textsuperscript{50} To take another example, concern about personal morality is generally irrelevant because agents are driven by the system. When, for example, the extended working day robs workers of their health:

\begin{quote}
Capital ... takes no account of the health and length of life of the worker ... [because] Under free competition, the immanent laws of capitalist production confront the individual capitalist as a coercive force external to him.\textsuperscript{51}
\end{quote}

This general attitude seems to receive its quintessential expression in a formulation we reviewed at the outset:

\begin{quote}
While it is not our intention here to consider the way in which the immanent laws of capitalist production manifest themselves in the external movement of the individual capitals, assert themselves as the coercive laws of competition, and therefore enter into the consciousness of the individual capitalist as the motives which drive him forward, this much is clear: a scientific analysis of
\end{quote}

\textsuperscript{48}Marx, \textit{Capital} Volume I, 342.

\textsuperscript{49}Ibid., 345.

\textsuperscript{50}Ibid., 375.

\textsuperscript{51}Ibid., 381.
competition is possible only if we can grasp the inner nature of capital, just as the apparent motions of the heavenly bodies are intelligible only to someone who is acquainted with their real motions, which are not perceptible to the senses.\textsuperscript{52}

Here the direction of the arrow of causation, or at least the theoretical hierarchy, appears eminently clear: a certain immanent force, an inner nature, "asserts" the phenomenal world. This repeats the explanatory form of the Preface, and the technological determinism of The Poverty of Philosophy: capital has needs which give you social relations, investment patterns, competition, the mentality of the capitalist.

However, I think a close look at Marx's analysis of the inner workings of this immanent force in Capital can illuminate the nature of his understanding. The following material derives from the point in Capital Volume I where Marx introduces the crucial concept of relative surplus-value.

By way of preliminary, it may be observed that the explanation we are about to examine is not just one among many, nor even one major explanation among other pillars of his analysis. Rather, this is the core account of the most general and important process within what Marx regards as real or "specifically capitalist" economy. That this is a process of real-because-mature capitalism he makes clear in the Resultate. There he breaks capitalism into two phases according to the status of workers in production in each. In the early phase, as we have seen, control is merely juridical. This Marx calls the "formal subsumption of labour." Later, under what is termed the "real subsumption of labour," capitalists intervene deeply in the technical aspects of production and engineer work practices in detail. The early phase stands,
Marx says, "... in striking contrast to the [later] development of a specifically capitalist mode of production (large-scale industry, etc.)..." Real subsumption, he says, is synonymous with "capitalist production proper."

Surplus accumulation is the essence, the historical contribution of capitalism, relative-surplus methods being the most developed form of accumulation. At the same time, this is the theoretical entity Marx introduces to distinguish himself from mainstream political economy. This immanence is just what vulgar, apologetic economics cannot see because it lacks the theoretical equipment necessary to penetrate the merely apparent. What I wish to show is just how Marx understands the inner drive within this immanence to be comprised of human ambitions, and thus show the Hegelian entities in their true perspective.

I now explicate what is in Marx a clear microfoundational account of the motives and mechanisms which give rise to relative-surplus. Bear in mind that there are two methods for producing surplus-value, the portion of production which remains when the cost of labour is deducted. The first, or absolute method, involves simply extending the workday at given wages. The second, or relative method, involves reducing the wage-replacing share of the workday by either increasing

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53 Ibid., 1021, original emphasis.
54 Ibid., 1027.
55 Ibid., 645.
productivity or cheapening the value of labour. Relative surplus-value, then, is produced whenever productivity gains lead to reduced prices for wage goods.\(^{56}\)

Having laid out the basic notion that an increase in surplus may be achieved by reducing the proportion of the workday needed to replenish wages,\(^{57}\) and that given a fixed work day this "curtailment of the necessary labour time" is impossible "without an increase in the productivity of labour,"\(^{58}\) Marx concludes that there is a general injunction (given the surplus productive essence of the system) to revolutionize "the labour process itself," because:

Then, with the increase in the productivity of labour, the value of labour-power will fall, and the portion of the working day necessary for the production of that value will be shortened.\(^{59}\)

The reason this works is because increased productivity, when it occurs in the wage goods sector, or sectors which contribute materials or equipment to wage goods producers, lowers the prices of workers' necessaries. That is to say, the cost of producing and maintaining workers falls and, since the price of labour will, like the price of all commodities, tend toward its costs of production, such increased

\(^{56}\)I ignore as not to my purposes throughout the labour/labour-power distinction about which Marx took such care.

\(^{57}\)Ibid., 429-30.

\(^{58}\)Ibid., 431.

\(^{59}\)Ibid., 432.
productivity lowers the price of labour and generally extends the portion of the work day devoted to surplus, as opposed to necessary (i.e., wage-replenishing) labour.

Now while this process is a general or economy-wide phenomenon, unintended by the individual entrepreneur, it is rooted in the pursuit of an advantage he can see and desire. The individual entrepreneur, Marx says, can take momentary advantage of this relative-surplus equation. By increasing labour productivity, by engineering a productivity gain, the entrepreneur may lower the production cost, hence the potential price, of his/her goods. This is desirable because it allows for price competition and an increased market share against competitors who lag. By splitting the difference between the generally prevailing price and the newly lowered, cost-related price, the capitalist can clear his product and pocket a surplus. As a result, Marx says, "... there is a motive for each individual capitalist to cheapen his commodities by increasing the productivity of labour." However, this advantage will be temporary because "this extra surplus-value vanishes as soon as the new method of production is generalized" as indeed it must be in a framework of free competition.

All this being the case, the law which stipulates that prices must follow necessary labour time "makes itself felt to the individual capitalist" as a compulsion
"to sell his goods under their social value" and to his competitors as a coercion "to adopt the new method." Summarizing all this, Marx concludes:

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

Thus, having followed economic reasoning from individual motivational premises, we have generated the original immanences. This general resultant, this immanence, is not the goal of the individual capitalist who "by no means aims to reduce the value of labour-power and shorten necessary labour-time in proportion to this." This system-wide tendency is merely the unintended upshot of individual motives played out in a specific environment.

The explanatory duality we have just examined is not an isolated one. Rather, it is characteristic of the whole of Capital Volume I. Certainly it is a steady feature of the labour process theory. As he chronicles and explains each phase of the labour process (co-operation, manufacture and large-scale industry), Marx moves freely, without evident pattern, from Hegelian, dialectical or functional explanation to microfoundational accounts framed in terms of basic economic motives.

However, while there seems no way to predict when Marx will slide into Hegelian expression or back into economic reasoning, there are good reasons for

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63Ibid., emphasis added.

64Ibid., 436-37,

65Ibid., 433.
accepting the microfoundational explanations as Marx’s paradigm. This is too complex a matter to enter into fully here. It will suffice to observe that Marx’s prime complaint against Hegel was his spiritualism. Marx clearly sought a materialist elaboration, as Cohen puts it. His empirical work in political economy during what he himself regarded as the most fruitful decades of his intellectual life confirms this commitment. Arriving in Paris in search of an adequate materialization of Hegel, he declares that “philosophy finds its material weapons in the proletariat.”66 Looking for social agency, he finds it. To suppose that, given this general intellectual tenor; he erected Capital on a foundation of Hegelian immanences, except insofar as these could stand as convenient representatives of real material forces, of the agents and classes with whom Marx’s name is synonymous, is at least implausible.

Having determined all of this, it would be a simple matter to consign the dialectics to the theory’s genetic phase, to the context of discovery as opposed to verification and leave the matter there. We have seen that Marx developed a philosophical model into an empirical account of the labour process. We have seen some of the motivations which likely led him to retain the original philosophical baggage, albeit in a materialized form. I have argued that this retention occurred in spite of the fact that the Hegelianism had become redundant as an expressive device. However it would be wrong to leave the matter there, giving the appearance that the virtues of the dialectic were merely expressive, a matter only of rhetoric.

66Easton and Guddat, Writings, 263, original emphasis.
To see that this is not so, consider the object of investigation, the labour process as it evolved from the fifteenth to the nineteenth century. Beyond the formidable task of gathering empirical materials and producing a synthesis on this scale, the nature of the object is vexed with cognitive problems.

Obviously social explanation in this area requires drawing relationships between social objects: forms of technology, human organization, legislation, interests, moral and religious standards, etc. But each of the relata has its own unique progression and it is generally difficult to demarcate evolutionary phases. Take the advance from technological modes of production in which human forces are basic to modes in which mechanical forces predominate. This, as we have seen (pp. 16-17), is a shift which lacks discreteness and observability. Marx can see its earliest term in, say, Smith's pin factory: a system of workers and rudimentary tools, the main productive force being the organization of the shop's fleshy components. He can see the latest term in mid-nineteenth century automata like Arkwright's mule. He can surmise that early on the pin factory form predominated and that now or soon the mule and its kind will predominate. However, the transition between the two has been long and complex, and most of the empirical detail has been erased by time. Yet he wishes to understand its causes and to assess the causal role it plays. Consequently, he must inferentially locate and reconstruct the centre of gravity of the relevant phenomena and construct explanatory relations among these essentials.
Marx shows repeatedly the instincts of the practitioner, offering his reader insight into the working rules of thumb of his craft:

We are concerned here only with broad and general characteristics, for epochs in the history of society are no more separated from each other by strict and abstract lines of demarcation than are geological epochs.\textsuperscript{67}

Similarly, with regard to the transition from handicraft to early capitalism. The capitalist form will not really arrive and function properly until many of its presuppositions have been met: developed markets, labour pools, currency systems, work contracts backed by a wide array of legal sanctions, etc. In between the time when production proceeds with none of these and later, relatively developed forms will be found numerous "hybrid forms."\textsuperscript{68} Marx is here exposing real empirical nuances and hence vexations for the empirical investigator, as we shall see in later chapters.

Historical phenomena do not arise sharply. They gather their characteristics about them slowly. Design of technology to take advantage of the Babbage principle - hiring skills in their lowest technical grades - is not possible prior to a certain level of development of labour markets, for example. Only when prevailing social structures make readily available a pool of labour, hierarchically organized according to aptitude can the general strategy Babbage espoused be fully effective. Again, an economy based on exchange rather than use presupposes a developed

\textsuperscript{67}Marx, \textit{Capital} Volume I, 492.

\textsuperscript{68}Ibid., 645.
currency system which, in turn, presupposes a developed legal system. Marx repeatedly reminds his reader that historical phenomena are born in this way, various components being assembled, stochastically or by design, with the essentials of explanatory relata being describable only as typical or average forms. Given that the object is of this sort, a model of change generally, and of history specifically, in which such phenomena are highlighted, in which, for example, phenomena which only reach fruition in one era are always found germinally present in an earlier era, is an asset. This sort of asset Marx's Hegelian roots apparently provided him.

5. Empirical Commitments of the Theory

By now the general drift of the theory's empirical commitments will be clear to the reader. It remains to summarize these at an appropriate level of precision, and to underscore certain features. As well, we can now consider whether the theory is in such a form that, as Popper would have it, no modern labour force structure or work processes could falsify the hypothesis.

It is clear that, on the theory, workers lose and that the loss is due to the productive role they play in an economic structure. It is clear that the losses involved are intellectual, in part. Workers lose status as repositories of the working knowledge necessary to run industry, and they do so both relatively and absolutely. Workers lose autonomy as well. They make fewer decisions; running the enterprise is
increasingly lodged with special functionaries. Work tends toward the repetitious, the routine, the miniscule. At first glance, then, the theory's empirical commitments will find confirmation just in case labour force trends are of this sort. But this simple formulation masks a number of problematic details.

As we have seen, there are certain, as it were, natural changes which are easily confounded with the processes to which the theory is committed. For example, the theory does not simply project those naturally growing part-to-whole ratios which necessarily accompany any division of labour. As we saw in the schematic academic division of labour (above, pp. 91-93), the theory goes beyond, projects more than, what we might term natural, relative degradation. The theory recognizes such changes, but they are not themselves evidence for its distinctive commitments. It posits a special change in which knowledge and control are placed in the hands of elites as a counterpart to the decline in worker knowledge and autonomy.

Nor is the theory committed simply to chronicling the loss of individual craft knowledge and autonomy. Rather, it is committed to both the loss of that historical form of knowledge and autonomy and the failure of any satisfactory replacement. Individual knowledge and autonomy is not supplanted by cooperative or social competence; instead, the knowledge and autonomy formerly dispersed over the population of individual artisans is now arrogated to a special group of functionaries: managers and technical-scientific specialists.
Again, the theory is not simply committed to such work evolution as necessarily occurs as a corollary to advances in mechanical aptitude or large-scale, systematic technology. It is a given that the relationship of worker-held knowledge and control must change with certain technological advances. The use of complex, automated mechanisms must sever the craft unity of conception and execution, must cut across the direct pathway that runs from the mind and will of the worker, through his/her tools, to the raw materials. In a mechanized system, knowledge necessarily takes a different shape, as does control. The question is a democratic one, a question of whether the transformation will allow the displaced worker to play a new role, participating in the new intellectual processes, exercising productive will in a new social and systematic manner. This, on the theory, does not occur. Knowledge and control is polarized, not democratized.

The theory is committed to these trends because of its commitments as regards the capitalist motivational hierarchy. Given the defining features of capitalist economy - private property in the means of production, surplus extraction by exploitation - certain characteristic operational motivations are enforced on entrepreneurs or enterprises. These militate against worker competence in specific ways.

For capitalists, the pursuit of surplus in a competitive environment is the most general motive-constraint configuration Marx presents. This is diffracted through the prism of each historical phase, and divided into sub-motives which, via the prevailing
social and technical structures, constitute means to the general end. Labour productivity via the division of labour and mechanization and labour cost reduction by the same means represent specifications of the general motive.

Workers' motives enter in two ways. First, they form part of an antagonistic work-related politics. Workers bargain and strike, resist technical renovation of their occupations, refuse to give whole-hearted dedication to their allotted fragments. Capitalists respond with an extra increment of labour division or mechanization which lowers their dependency on workers, increases labour force interchangeability, and thereby undercuts their political strength. Second, workers engage in extramural politics. For example, they agitate for shorter work days and this eventually leads to legislative protection. This legislation, in turn rebounds upon the technical progression, putting a premium on relative-surplus methods in general and mechanization in particular. Within this pattern of capitalist motivation and constraint, it is the capitalists who have the strong positions; their drive for cost-reduction, productivity gain, and workplace political control is generally effective.

The putative trends, then, are the results of certain causes. Arguably essential motivations, embedded within a system of institutions and constraints, give rise to historical trends or tendencies. Private enterprises, pursuing the financial efficiency of productive endeavors which incorporate human beings as factors are constrained to devise labour processes with specific characteristics. However, these trends can be counteracted, indeed on the theory they must be counteracted, by other processes
thrown up by the motivation-constraint matrix. We can discuss three countervailing processes here.

First, there is worker resistance. This is not a countervailing force discussed in any detail by Marx, but he does at several points recognize its efficacy. Second, there is state action. As we have seen, Marx allows that either a public outcry against glaring evils in the factories or organized worker militancy may lead to legislation that constrains the urges of capital, as when the work day is standardized. However, he alludes to no instances of state intervention in the innovatory function which is at the heart of the theory. Moreover, as is well known, the general Marxian rubric covering such events is that economic interests are trumps.

Third, there is the tendency of the theory's central processes to give rise to skilled labour necessary for the development and care of new technology. This is the process which is in the modern literature called "re-skilling." It is a counter-tendency of which Marx is aware at an early stage. The notion makes its first appearance in *Wage Labour and Capital*:

An exception to the law [of labour simplification] has been adduced, namely, the workers who are employed in the manufacture of machinery itself ... it is said that ... the workers employed in this branch of industry are skilled, even educated workers.\(^69\)

However, Marx argues, this counter-trend does not bode to seriously offset the main tendency. Mechanization, he says, has been applied to machine tools production

itself since 1840 and has begun to show its simplifying effects. Instances of re-skilling are soon overtaken by the main trend. Simplification, that is to say, is the trend enjoined by the system's most basic forces. When counter-trends, also rooted in the system's causal matrix, assert themselves, they sooner or later fall prey to the more fundamental tendency. Other brief references to re-skilling are found in Capital Volume I, but the phenomenon is never considered a serious countervail to general degradation.

Two of these offsetting factors are mandated by the theory: the effects of worker resistance and re-skilling. That is to say, they arise out of the causal matrix defended by the theory. As such, they at least superficially pose some comfort for Popper's general charge that Marxian theory systematically hedges its bets and thus places itself beyond the pale of falsification. However, this appearance is superficial: Marx gives no credence to these countervails as factors capable of offsetting the main trends. Accordingly, were they later found to play a decisive role, the theory would have to be considered to that degree disconfirmed.

The theory's empirical commitments are sufficiently specific that we can see labour process developments which are forbidden by the theory. Developed, industrially educated or trained workers, at least generally, are forbidden. Jobs which allow workers substantial autonomy, again in general, are forbidden. This is obvious, given what we have reviewed. However, we must be careful. The terms "general" and "workers" are significant in the above formulations. It is workers jobs that are at
issue and here only in general. Not any developed labour is forbidden. Marx recognizes the necessity of a growing hierarchy of managers who, given the causal mechanism posited by the theory, are to be the repositories of directive, decision-making functions which were formerly the prerogative of workers or work groups. These he groups at the pole of capital, opposed to workers. He also recognizes the growing role of technical elites, although he offers no sustained discussion of their role or future dimensions, except to say that "they stand outside the realm of the factory workers, and are added to them only to make up an aggregate."; that is to say the super-competencies of these "numerically unimportant" scientific and highly trained personnel together with the performative minutiae of the workers comprise a polarized but functional whole.70

Again, then, the specter of bet-hedging and Popper's accusation appears. Could it be that these elite groups, recognized and mandated by the theory, might form a convenient dumping ground where theoretically untoward occurrences of labour up-grading could be hidden? Again, the answer is no. The theory is committed to a clear scenario. In line with general Marxian commitments, the advancing class structure of capitalism must tend to a growing working class recruited out of dwindling middle classes, standing opposite capital. Strictness here is not appropriate. What is important, from a justificatory standpoint, is that the evolving structure approximate the scenario to which the theory is committed. Thus, for example, were the managerial and scientific-technical elites to come to clearly

70 Marx, Capital Volume I, 545-46.
predominate, to push low-skill labour to the margins of the work force, then even if the latter was to remain a substantial minority, the theory would have to be considered falsified. It is, in short, possible to specify, within the limits appropriate to historical theoretical work, developments which could occur and which would undermine the theory.

We can perhaps finally consolidate our understanding of the logic of the theory's linkage between motive, circumstance and trend by posing some challenges.

Why, for example, can there not occur technical facilities whose productivity is sufficient to allow for financially efficient operation with developed, autonomous labour? The logic of the theory's central explanation seems to allow for this. The over-arching goal is surplus and the most general means are cost reduction and productivity gain. Why cannot systems be devised that are so productive as to allow for financial needs to be met with the use of developed, expensive labour?

The answer is complex, but not overly so. First, any such productivity gain which, in an originating enterprise, allowed for employment of developed labour would tend, according to the terms of an available economic principle, to be generalized under conditions of competition. After generalization, competing firms' relative competitive edges would tend to be decided once again on the basis of labour costs, and Babbage would once again come to the fore: hierarchical organization, employing a few engineers and many labourers, is more cost-efficient. Second,
workers of higher technical grade, employed by enterprises reliant upon them for
t heir developed competence, will be tougher adversaries just because of that reliance.
Within a framework of exploitation, work place politics are necessarily adversarial.
So even though it is theoretically possible that productivity advance might be
sufficient to allow for the employment of developed labour, such a shift would be
contrary to other basic motivations telescoped within the desire for financial
efficiency. Third, the very productivity gains via technological change on which this
challenge is premised entail the embedding of competence in mechanisms, hence a
growing technical irrelevance of labour. Increasingly, what is required, beyond
scientific and technical elites, is "appendage" labour. If higher grades of labour are to
be employed, they must be so uselessly. This would be the analogue within labour
market practice of buying anthracite coal where bituminous would do.

Another challenge might be put as follows. Why could not processes
exogenous to the productive system redress the putative technical trend and enforce
upon the whole field a general up-grade of labour? Why cannot government, for
example, use its taxation powers to sponsor worker development out of general social
revenues by instituting a universal educational system (such as did not exist in
Marx's day)? This would leave the competitive playing field level and violate none
of the premises of the theory at least none of the central premises. Given such a
general up-grade, could not the endogenous technical progression be shifted upwards
as regards the use of developed labour?
Nothing in the theory prevents this, insofar as it is concerned with relative degradation. Such generalized education, to the extent that it produced competencies relevant to the work place, would simply form a new labour force base line; whatever might be achieved by way of industrially useful literacy, numeracy, etc., would simply raise the socially prevailing lowest skill ranks. The industrial system would still seek, following the lights of its own endogenous logic, technology requiring the lowest, hence cheapest grades of labour. This scenario obviously describes, at least roughly, processes at work between Marx's time and our own. What actually occurred in this regard will occupy our attention in subsequent chapters. However, education of this sort would undermine the theory insofar as it is committed to absolute degradation, even though the counter-trend derives from exogenous forces. Such an occurrence would show that the theory is based on an overly narrow set of putative causal essentials. In assigning omnipotence to factors endogenous to industry, the theory would have mis-analyzed the causal structure at work in labour process transformation.

6. Conclusion

With the general explanation and the empirical commitments of the labour process theory in Marx thus clarified, we are in a position to assess how well it has survived the empirical trials conducted by the modern researchers. We can turn to that work in subsequent chapters with a genuine curiosity. For, if Marx was in fact able to chart the labour process over the manufacturing and mechanization phases, there have been many further developments, relevant on the theory's premises, since
Marx's day. Technical and managerial elites, in their infancy in Marx's time, have become at least prominent features of modern industrialism. Universal schooling, unknown to Marx, is now a long established fact. The interventionist state, consciously regulating the economy, providing a wide range of services to the industrial sector, enforcing technical and safety standards, and regulating many aspects of social development, has developed almost in its entirety since Marx wrote. The technology in which Marx could see a "universalizing" potential was trivial by comparison with the truly universal machine competence of computers.
CHAPTER 3
BRAVERMAN: PREDICTION AND EVIDENCE

1. Introduction

The Continuity of the Marxian Paradigm

When Braverman set out to assess the composition and nature of the modern U.S. working class in the early 1970s, he was confronted by a contradictory literature. The industrial sociology of the period and journalistic accounts of contemporary work proposed both that typical occupations were becoming more routine and mindless and that they were demanding more skill and education. The result of Braverman's attempt to settle which view was right was Labor and Monopoly Capital.\(^1\)

Braverman saw himself doing science\(^2\) and it was reflected in his methodological stance. As his research proceeded he realized that to reach meaningful conclusions on the evolution of work he had to chart both "the evolution of the labor process within occupations as well as the shifts of labor among occupations."\(^3\) The data were both very broad, encompassing the history of labour


\(^2\)Ibid., 8.

\(^3\)Ibid., 4.
force structure, and very detailed, incorporating information on changes in specific work performances. "As both of these varieties of change became gradually clear in my mind," Braverman relates, "I was led into the search for causes, the dynamic underlying the incessant transformation of work in the modern era." The unruly diversity of empirical evidence could be domesticated through causal explanation, through the careful and selective use of otherwise unmanageable data to assess a set of causal hypotheses.

The search for the dynamic underlying the evolution of work led Braverman to Marx's original theory and he announces in his introduction that the "very same dynamic" Marx put his finger on is the basis of contemporary transformations. In fact, he conjectures, the dormancy of labour process studies among Marxists may have been due to the predictive power of the original theory:

So well did [Marx] understand the tendencies of the capitalist mode of production, and so accurately did he generalize from the as yet meager instances of his own time, that in the decades immediately after he completed his work Marx's analysis seemed adequate to each special problem of the labor process ... thus ... the very prophetic strength of Marx's analysis [may have] contributed to the dormancy of this subject among Marxists. The development of the factory system seemed to bear out Marx in every particular, and to render superfluous any attempt to repeat what he had already accomplished.

Thus Braverman's task was two-fold: to reproduce the original theory in a contemporary idiom and to elaborate and test its empirical commitments in the

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4Ibid.
5Ibid., 8-9.
6Ibid., 9-10.
twentieth century context. This updating naturally required attention to new phenomena. Marx, as we have seen, had produced an account in which the central causes were capitalists' motivations as they arose from the injunctions bearing on them due to their economic location. Since managers were as yet in their infancy in Marx's day, and their numbers were small, he had left them to the margins of the theory. Braverman inverts this relation. While all the basic economic motivations relating capital to labour are reproduced and deemed effective, they receive only cursory treatment; it is their expression in the mentality of modern managers that takes the centre stage. But this, as will be seen, represents only a shift in evidential sources: where Marx turned directly to entrepreneurs and their political-economist advisors for testimony about the basic ambitions which, from the capitalist side, enliven the unfolding scenario, Braverman turns to the statements of managers, particularly members of the scientific management movement, like Taylor.

A great deal has changed, of course, since the mid-nineteenth century, and Braverman must extend the theory into terrain uncharted by Marx. But he reproduces and confirms the essential Marxian account of the causal matrix which drives the labour process. So much is this the case that, as we shall see in what follows, the work must be considered contrary to Little's account of the theoretical model justifying Marx's theories. It will be the task of the present chapter to show that for one of the most highly articulated theories in the Marxian corpus, Little's argument is wasted effort. We have seen in the prior chapter that the labour process theory was, for Marx, a matter of longstanding preoccupation, one given elaborate
and central treatment in *Capital* Volume I. If Braverman is right, the predictive strength of that theory is such that it needs a straightforward up-date in order to make it readily applicable to twentieth century conditions.

What I wish to show, accordingly, is Braverman’s implicit practice of pairing central hypotheses of the original labour process theory with downstream historical evidence. The most natural and unstrained interpretation of Braverman’s work is that it is an elaborate test of the original theory as it proves out through the emergent novelty of the century-plus which followed Marx’s construction.

**Soviet Labour Processes**

One historic development which threatens to undermine the whole theory is sufficiently important that Braverman deals with it in his introduction. Marx’s theory claimed to explain a certain shape of work out of motivations proper to capitalist economy; yet it would appear that work in the Soviet Union is relevantly similar. This strongly suggests that labour process evolution responds to forces more ubiquitous than those proper to capitalism and gives some credence to technological determinism, to the thesis that work degradation is a reflex of large-scale technology irrespective of the social relations which form its context.

Braverman abstains from a full length review of the path of the Soviet labour process, but he presents a wholly plausible argument regarding the similarity of Soviet and capitalist work. He readily agrees with French sociologist Georges
Friedmann's account of the similarity labour processes in Eastern Europe, the Soviet Union, and the West. But he argues, in effect, that Eastern Bloc labour practices are capitalist, both in fundamental motive and design.

Both systems, he claims, have the same central ambition; namely, to rapidly accumulate capital. Soviet leaders have given priority to one aspect of the Marxian legacy: the necessity to lay down the economic foundations of human liberation. In doing so, they have put Marx's political and social agenda in second place, behind vulgar material objectives. As a result, the Soviet program, and that of its Eastern European epigones, shows a deep-seated economism in its overarching commitments. Moreover, the architects of Soviet society have adopted Western means to that end. Braverman accepts with Marglin that:

In according first priority to the accumulation of capital, the Soviet Union repeated the history of capitalism at least as regards the relationship of men and women to their work ... [and] consciously and deliberately embraced the capitalist mode of production ...

It is telling, he argues, that Soviet officialdom has never claimed an interest in fundamentally altering work relationships in the current, early phase of their program. Having seized the "catch-up-with-and-surpass-the-U.S.A. tiger by the tail," as Marglin puts it, they naturally have been led to imitate American production

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7Ibid., 14-15.

methods as well. This conformity to the Western labour ethos is not a piece of late-in-the-day revisionism. Recalling that Lenin had repeatedly urged the study and adoption of Taylorist work methods, Braverman concludes that:

In practice, Soviet industrialization imitated the capitalist model; and as industrialization advanced the structure lost its provisional character and the Soviet Union settled down to an organization of labor differing only in details from that of the capitalist countries, so that the Soviet working population bears all the stigmata of the Western working classes.⁹

This argument, though not intended to forestall a thorough comparison of the economic/labour relations of Soviet and Western societies, is logically adequate to the challenge it confronts. As we have seen, the original theory is readily characterized as a causal account, one detailing how labour process trends flow from distinctive motivations. Consequently, an argument on Braverman’s part rendering plausible the claim that the labour processes of both Soviet and Western societies are founded on similar motivations undermines the argument from Soviet practice, the argument that degraded Soviet labour proves that it is technology, not social relations, that produces labour alienation. The counter-argument to the labour process theory, to the effect that the similarity of the labour processes of a nominally non-capitalist society and those characteristic of capitalist society disproves the causal relevance of factors putatively efficacious on Marx’s theory, is rebutted by evidence of the motivational similarity of the two societal forms.

⁹Braverman, Labor, 12.
Rival Hypotheses

While early responses to *Labor and Monopoly Capital* were favorable, the tide soon shifted, as we shall see in the next chapter. It was not merely sociologists from competing paradigms who voted against Braverman; many Marxists also came to deny the soundness of the work. Among these latter critics, it is frequently argued that Braverman lacked fidelity to the original, Marxian theory. So it is important to assess the accuracy of Braverman's work in that regard. As well, since the thesis on offer is that Marx's original theory survives its extension to the twentieth century, it is important to clarify the points of theoretical identity and difference between Marx and Braverman.

In section 2, I argue the fundamental fidelity of Braverman's theory to Marx's. In section 3, I formalize the hypothetical structure of the theory and set out Braverman's evidence as it bears on that structure, arguing that within the epistemological limits imposed by the social object under investigation, the data are confirmatory. In section 4, I discuss briefly the nature of the shifts that take place from Marx to Braverman. Here I take cases where the theory apparently explains historical occurrences beyond the predictive ability of Marx and pose the question of explanatory and predictive symmetry in a preliminary manner.

2. Isomorphism of Marx's and Braverman's Core Theories

Between the mid-nineteenth century and the late twentieth century many of the reference points of the labour process theory have shifted. Basic economic
structures have been altered drastically. The size and integration of corporations, the
importance of the marketing function, the role of finance, and the reliance of firms on
state services, all have increased dramatically. The scale and competence of
machinery and the infrastructure of basic and technological science which produces it
has expanded rapidly. At the same time, the occupational structure has been
transformed. Wholly new occupations, like computer programmers and technicians,
have appeared, while formerly miniscule groups like clerical workers have become
dominant labour force categories. Managers, still an embryonic class in mid-
nineteenth century England, have become one of the dozen or so largest occupations.
Where wage-earning employees were, in Marx’s day, a minority of the labour force,
today virtually all workers are wage-earners.

It is natural, then, that Braverman’s findings would add a great deal to Marx’s
theory and that they would contain, as Little says, much that cannot be deduced from
the original theory. But Little is wrong to argue that the substantial non-deductive
elements of Braverman’s theory support Little’s view that the original theory is non-
predictive. The issue is not the prediction of the overall unfolding scenario, the new
shape of economy and labour force structure. The issue is the accuracy of theoretical
essentials, the durability of the entities and processes claimed central by the original
theory, and, hence, the availability of predictive testing. In assessing Darwin’s
Origins the issue is not whether it projects in accurate detail the future taxonomy of

the biosphere, nor should Marx's theory be assessed on its ability to foretell the genera and species of modern labour. What is at stake in both cases is the stability of central hypotheses and general trends.

What is of interest is Braverman's claim to find the "very same dynamic" at work in the modern period that Marx claimed to be necessitated by capitalist economy. Braverman argues that the original theory does not provide a "ready-made formula which enables us to "deduce" from a given state of technology a given mode of social organization." Nonetheless, he can discern a pattern of cause and effect, a dynamic, underlying modern work transformations and occupational structure, one first explicated by Marx. What gives the theory its ongoing vigour, then, is the fact that the motives it claims are essential to capitalism, are durable forces within capitalist economy, forces evidently productive of prevailing labour process trends.

The Theory in Marx and Braverman: A Comparison

I now proceed to compare the core theories of Marx and Braverman along 5 key dimensions, arguing that they are for all practical purposes identical. I use the term "dimensions" to differentiate the comparison I am about to make from a comparison of both theories' hypotheses, or hypothetical structure. I reserve the term "hypothesis" for propositions which can be more or less directly assayed against evidence. When we turn, in section 3, to the empirical assessment of Braverman's theory, I set out 6 such evidence-relevant claims, which I claim capture the empirical

11Braverman, Labor, 22.
commitments of Marx's theory. Here, I am concerned with comparing the theories both as regards central hypotheses and as regards what might be termed axioms or higher order commitments. Thus, for example, that a theory is committed to causal explanations is a matter of a different order than the specific causes it holds to be efficacious. In what immediately follows, I am comparing the theories at both levels.

1. The labour process derives from social relations.

As we have seen, in Marx the central explanation takes the form of adducing causes which are putatively essential to capitalism and showing how they lead to a certain pattern of labour process evolution. Primary among these are the motivations bearing on and evidenced in the practices of major social groupings, principally entrepreneurs and workers. Entrepreneurial desires for financial stability lead to motives for cost-cutting, particularly labour cost-cutting, and for both social and technical control in the work place. These ambitions collide with workers' natural desire for expressive, autonomous work. The consequence of these motives as they are put into play in a competitive context is a secular trend to simplified labour.

Braverman's case follows this general logic. He explicitly rejects a technological determinist reading of Marx:

It will be argued here that the "mode of production" we see around us, the manner in which labour processes are organized and carried out, is the "product" of the social relations we know as capitalist.\footnote{Ibid., 21.}
2. The labour process is explained as the result of motivational causes.

Marx, as we have seen, depicted the transformation of the labour process as a derivative of the cost-cutting, productivity seeking, relative surplus-value accumulating ambitions of the entrepreneurial classes. To buttress his case, he drew substantially on the writings of the political economists. While he sought to overthrow their theories, he relied on them to provide a window on the mentality of typical capitalists to whom they provided consultation.

Where Marx attended to the testimony of contemporary entrepreneurs and the practical counsel they sought from the likes of Smith, Babbage and Ure for evidence of the motives at work in capitalist production, Braverman shifts attention to later terms in the sequence of economic advisors. Accepting the ongoing relevance of the testimony of Smith and Babbage, he devotes a chapter to the thought and work of Frederick Winslow Taylor and other members of the "scientific management" school.

3. The labour process trend toward reduced worker competence corresponds most directly to capitalist motivations.

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13Ibid., 76-87.

14Ibid., 85-138.
Marx argued that though decisions in the workplace were made in a context of struggling interest groups, nonetheless capitalists' economic clout, political position, and juridically assured right to management of their own facilities gave them a clear edge in prosecuting their own interests in the face of workers' resistance. Consequently, their own technological designs prevailed. For Marx, the central ambition was the generation of surplus-value, the drive to reduce the portion of product value returned to labour and, as a practical specification of that general economic motive, the day-to-day motive toward either increased labour productivity or reduced labour costs. Both these demands, he argued, could be met through technological innovations which undermined the need for highly trained, broadly competent labour.

Braverman follows this same argument. Because functioning entrepreneurs must have a freedom to innovate based on ownership of basic productive knowledge and effective authority in the workplace, control must be brought into their hands. Given this need, he says, a corresponding transition takes place:

It thus becomes essential for the capitalist that control over the labor process pass from the hands of the worker into his own. [And it does:] This transition presents itself in history as the progressive alienation of the process of production from the worker; to the capitalist, it presents itself as the problem of management.

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This general efficacy of capitalist motives proves out in the historically durable relationship between cost reduction and declining worker competence. Following the cost-cutting injunction Braverman terms "the Babbage principle":

Every step in the labor process is divorced, so far as possible, from special knowledge and training and reduced to simple labor ... In this way, a structure is given to all labor processes that at its extremes polarizes those whose time is infinitely valuable and those whose time is worth almost nothing. This might even be called the general law of the capitalist division of labor ... it creates that mass of simple labor which is the primary feature of populations in developed capitalist countries.17

Now it is important to see that neither Marx nor Braverman exclude worker motives from an efficacious role in the unfolding scenario. Both place the workplace and its evolution within the context of a fundamental antagonism which the simple historical act of devising wage-labour-based production generates. For both, this means that technology is designed with an eye to controlling workers, with an eye to overcoming workers' natural reluctance by harnessing their actions to the unvarying and intense motions of machinery, with an eye to creating the labour redundancy and insecurity which undermines the will to strike.

Thus, for both it is the tension between contrary motivations which explains the technological progression, and thus in both what is called "the dialectic of capital and labour" is central to the theory. But neither theorist discusses the progression as though the ambitions of capital and labour are in any effectuating equipoise: it is capital whose ambitions and needs, whose class "for itself," dominates the era; it is

17Ibid., 82-83.
labour's but to resist within a pattern of growing negation and to grow in its resistance toward the aufhebung which will terminate the era.

We will deal with this issue at greater length in the next chapter. However, we can pause here to anticipate one frequent criticism put forth by Marxist critics of Braverman; namely that he depicts capitalists as winning the struggle to develop new labour processes and thus eliminates the "dialectic," the class conflict Marx said was the motor of history. If this criticism is correct, we should expect to find Marx depicting capital and labour as co-producers of the technological progression. We should expect the technological scenario to be a story of equally efficacious though conflicting demands. Such is not the case.

Marx recognizes that (1) the course of events is determined by struggle, as a resultant of antagonistic urges, and that (2) this is not generally a struggle in which capitalists' and workers' economic and political locations place them in equipoise. As to (1), Marx clearly sees a dialectic of sorts at work, affirming quite generally that with the advance of the capitalist labour process worker resistance grows, imposing on the entrepreneur a need to create counter-pressure "to overcome this resistance."\(^\text{18}\) Consequently, this motivation enters into the innovatory process both in the design of particular technologies and in the general progression to mechanized industry.

\(^{18}\text{Marx, Capital Volume I, 449.}\)
The capitalist tendency evident in Marx's day, for example, to employ cheaper, untrained child and female labour was, Marx claimed, "largely defeated by the habits and resistance of the [skilled] male workers." Thus, he said, "capital is constantly compelled to wrestle" with this contrariness. But this struggle could not be won in the early manufacturing phase; that had to wait for the later mechanization phase where "the barriers placed in the way of the domination of capital" by "the role of the handicrafts as the regulating principle of production" could at last be "abolished."^{19}

Mechanization was also used to undermine workers' will to resist through strikes by decreasing skill and thus the reliance of owners on workers. As evidence, Marx cites the 1854 statement of the Master Spinners' and Manufacturers' Defence Fund which urged workers to:

Keep in wholesome remembrance that theirs is really a low species of skilled labour; and that there is none which is more easily acquired ... by a short training of the least expert ...^{20}

This is not an isolated case. Commenting on Naysmith's testimony that he had introduced skill-reducing technology to undermine strikes, Marx claims:

It would be possible to write a whole history of the inventions made since 1830 for the sole purpose of providing capital with weapons against working-class revolt.^{21}

^{19}Ibid., 491.

^{20}Ibid., 549.

^{21}Ibid., 563.
As to (2), Marx clearly saw capital holding most, if not all the trump cards. Take the struggle over wages, for example. Wages, in Marx's view, were fixed in part by economic factors (the costs of labour subsistence, the supply-demand ratio for labour) and in part by political struggle, organized workers versus employers. In this latter regard, however, it is the capitalists who have the upper hand due to their economic position and the powers of political solidarity afforded by their class position:

Wages are determined through the antagonistic struggle between capitalist and worker. Victory goes necessarily to the capitalist. The capitalist can live longer without the worker than can the worker without the capitalist. Combination among the capitalists is customary and effective; workers' combination is prohibited and painful in its consequences for them.\(^\text{22}\)

This is the early, relatively untutored, 1844 view of the matter. However, later discussions of the value of strikes, while more discerning, follow the same general path.\(^\text{23}\)

As a result of this conviction as to the general strength of capital, Marx regularly talks of the capitalist desires as though they were fait accompli, even when they are clearly not. For example, having discussed at length the capitalist motivation to separate and polarize conception and execution, a motive that can only be incompletely exercised during the early, manufacturing phase, he proposes that mechanization allows this tendency to be "completed":


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, as we have already shown, finally completed by large-scale industry erected on the foundation of machinery. The special skill of each individual machine operator ... vanishes as an infinitesimal quantity in the face of the science ... embodied in the system ...

Now Marx is clearly here adopting a broad historic viewpoint, attempting to extract the essentials and speculatively summarize the effects of a process - mechanization, large-scale industry - in which he is located. Thus his remark about "completion" should be taken to be an extrapolation, a matter of carrying to its logical extreme a process evident before his gaze. The point, however, is that Marx has no qualms about supposing the thoroughgoing effectiveness of capitalist power, leading up to "finally completed" drives. Consequently, there is good reason to doubt that Braverman's general supposition of the efficacy of capitalist motives sets him at odds with Marx.

4. The labour process trend toward separation of conception and execution reflects the capitalist motive for control of production.

Marx saw capitalism as a distinctively innovatory system, one that tied the economic security of individual capitalists to success in securing 'relative surplus-value' through ceaseless mechanization. But this feature of capitalist economy, he argued was incompatible with pre-scientific, craft forms of productive wisdom and labour control. Consequently, the life of capitalists, as individuals or across the

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24Marx, Capital Volume I, 548-49, emphasis added.
generations, was a ceaseless drive to devise forms of production in which effectuating knowledge, and the control it implied, was increasingly vested with themselves. Carried to its logical extreme, this drive deprived workers of any substantial personal or collective autonomy in work.

Braverman reproduces this tenet, albeit with his own distinctive emphasis on the role of managers:

The capitalist strives, through management, to control. And control is indeed the central concept of all management systems, as has been recognized explicitly or implicitly by all theoreticians of management.\(^{25}\)

This striving brought the management project inevitably into conflict with workers’ sense of "purpose"\(^{26}\) and desire to exercise their own "conceptual powers."\(^{27}\) Nonetheless, the upshot was a steady "separation of conception and execution."\(^{28}\)

5. The labour process characteristics essential to capitalism are contrary to the needs of workers.

As we have seen, Marx erects an anthropological theory of human nature and natural labour in which the unity of conception and execution, either social or individual, is necessary to human development and self-affirmation. This is both a matter of the retention of control by cooperating individuals over the historic

\(^{25}\)Braverman, Labor, 68.

\(^{26}\)Ibid., 46.

\(^{27}\)Ibid., 47.

\(^{28}\)Ibid., 124.
mainsprings of evolving human identity and a matter of the preservation of the conditions necessary for personal well-being. Given this, Marx argues in effect, the counter-democratic nature of privately owned and managed production motivates a permanent resistance on the part of workers.

Braverman follows Marx explicitly in this regard, devoting his first chapter to a review of the naturally "intelligent and purposive" character of human labour, citing contemporary anthropology on the labour origins of humanity, and pointing to the "antagonistic relations of production" which arise out of alienated labour.

The worker resistance Taylor confronted at Midvale Steel was, he claimed, a "classic instance" of the permanent workplace antagonism between conflicting needs for control, an instance of the "hostility of workers" which "renews itself in new generations ... comes to the fore repeatedly as a social issue demanding solution."

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29 Ibid., 56.
30 Ibid., 47-50.
31 Ibid., 57.
32 Ibid., 92.
33 Ibid., 151.
3. Empirical Assessment of the Theory

Reproduction of the Hypothetical Structure of the Capital Theory

Braverman's work reproduces the Capital version of the theory. Since the object of investigation is complex, the theory is complex and cannot be reduced to a single hypothesis against which evidence can be arrayed. Rather, since it asserts a matrix of causes and effects, asserts the necessity and historical durability of certain motivations and their effectiveness in producing certain trends or tendencies in the workplace, it must be assessed as a set of hypotheses, among which one is key. That key hypothesis is, of course, the degradation hypothesis, the hypothesis that capitalist relations of production lead to a general lowering of the working knowledge demanded by, and the labour control allowed by, typical occupations. Consequently, I now propose a hypothetical structure sufficient to capture the theory's empirical commitments and then set out the evidence for each element of that structure, including the key hypothesis. I begin by setting forth the explanation provided by the theory in a highly compressed form and then extract the hypotheses which are, as it were, skeletal to it.

The Explanation in the Labour Process Theory

Capitalist producers confront one another in a socially regulated matrix of competition and can only appropriate surplus by maintaining themselves in a race for productivity gain and labour cost reduction. This is not a freely chosen ambition; in a setting of capitalist institutions, its pursuit is a matter of do or die. An enterprise that fails to meet this injunction must eventually be underpriced and driven from the
market wherein alone the process a surplus appropriation can be completed in the form of a cash return on investment.

In order to maintain their enterprises in a state of market viability, capitalists must gain control over innovation, the disposition of labour, and production costs by delegating authority for innovation and control to managers and by creating a body of productive wisdom controlled by them. Again, this is not a freely chosen ambition, not one option among many. Given the value-transferring nature of the productive mechanism, given its inherent attribution of wealth to capital, the motivational force that might be derived from workers' self-interest in production is not available to the firm. Alienated workers cannot be relied on for the sort of restless innovation and stern labour discipline which alone can keep the firm ahead of its rivals. The innovatory function has to be gathered unto the capitalist and labour discipline has to be motivated artificially. Both entail managers.

Because managers must motivate, by whatever means, work that is foreign in the sense of designed apart from the interests of workers, and because the criterion of managerial effectiveness is in large measure reduction of costs, labour costs among them, managers put a premium on innovation which decreases dependency on knowledgeable, autonomous workers. This is not a matter of aesthetic preference. In fact, the prevalence of low-skill, routine jobs may personally disgust the manager. Nonetheless, those are the kinds of jobs easily measured and, hence, easily paced through supervisory pressure; those are the jobs readily filled out of the pool of
common and inexpensive labour. Again, this is a matter of necessity (tendential social necessity, of course), not free choice.

The goal of corporate appropriation of productive knowledge (so as to be able to control the innovatory function and so as to reduce reliance on worker competence) is achieved through expansion of research and development, through corporate science. This, along with the urge to obviate labour in production (its costs, its unpredictable and resistant nature) puts a premium on mechanization and the embedding of productive wisdom in machinery. The causes of capitalist mechanization, then, are injunctions determined by a specific institutional setting. Machines can undermine strikes by reducing the need for experienced labour, by threatening strikers with ready replacement from the ranks of the unskilled. Machines can cut labour costs by substituting common for trained labour. Such virtues set the design criteria for new technologies.

The upshot of the above drives, motives, and institutional constraints is a general lowering of the working knowledge demanded by, and the labour control allowed by, typical occupations.

The Major Hypotheses

From the foregoing account, we can extract a skeleton of hypotheses which makes evident the essential relationships asserted by the explanation, which shows
how the degradation hypothesis is related to other social generalizations, and which allows for a thorough assessment of the empirical grounds of the theory.

1. A basic and durable economic drive in labour process transformation is the capitalist need for productivity gain and labour-cost reduction.

2. Enterprises show a tendency to instal increasing numbers of managers to fulfill conceptual and control functions.

3. The motivations of managers, reflecting those of their entrepreneurial sponsors, are to innovate toward fragmentary, low control and low working knowledge jobs.

4. Firms show a tendency to renovate the conceptual foundations of production through exogenous productive science (exogenous in the sense of arising outside the inductive empirical wisdom of workers) which eclipses worker-held knowledge.

5. Mechanization, which is but the embedding of competence in machines and systems of them, proceeds at the expense of worker competence.

6. The upshot of the above drives, motives, and tendencies is a general lowering of the working knowledge demanded by, and the labour control allowed by, typical occupations.
These are major components of the theory at issue, components unified by the logical connections the theory imposes upon them. Within the theory they exhibit a unified causal mechanism through which a range of phenomena are given an explanatory coherence. 3, for example, is true because 1 is true and the fragmentation of work is productive (within a narrow, economic, reference frame, of course) and low competence workers are cheaper. 2 is true, in part at least, because 3 is true and workers must be induced (through superintendency as well as other inducements) to do such work as 3 depicts. 4 is true because the "eclipse" aids control over workers and control over the innovation necessary to productivity and survival (1). 5 is true because 4 is true, and because 3 is true under 1. 6 is true because 1-5 are true.

I will not, at this point, enter into a detailed exposition of the logical relationships between hypotheses 1-6. Rather, I will turn to the evidence and examine logical relationships only where required to clarify the evidence.

Evidence for the Major Hypotheses

1. A basic and durable economic drive in labour process transformation is the capitalist need for productivity gain and labour-cost reduction.

Braverman makes no attempt to produce systematic evidence for this hypothesis, but, obviously, this is not because such evidence would not be ready to hand. Rather, it is the very ubiquity of such evidence that renders empirical buttressing otiose. Nonetheless, at least cursory evidence is adduced in aid of this
Braverman reviews statistics for 13 major industries for the period 1947-64 to show that they all moved rapidly ahead in productivity:

Output of the textile industries grew by 40 percent but employment was cut by one third ... iron and steel foundries, lumber and wood products, malt liquors, and footwear, showed production increases from 15 percent to 40 percent in the same period, accompanied by employment drops of 10 percent to 25 percent ... the petroleum industry poured out five sixths more product ... but its employment was one fourth lower.[etc., etc.]

As to the issue of labour cost reduction, he provides little direct evidence other than explaining in detail how Taylor’s work, one of the central phenomena studied in Labor and Monopoly Capital, was carried on in the name of getting more output at given wages. Beyond this, he contents himself with citing a twentieth century illustration of the Babbage principle at work and showing that the occupational groupings he has independently argued are lowest in knowledge and control are also on the bottom rungs of the pay scale.

While this is sparse evidence, it is to be evaluated against a background of common knowledge, against, that is, the general intellectual context of the theory and the consequent background assumptions on which it can rely.

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36 Ibid., 81.
37 Ibid., 296-8, 367-9, 394-5, 396-7.
2. Enterprises show a tendency to increase the role of technical elites and managers to fulfill conceptual and control functions.

For what Braverman calls "the grouping created by the new industrial revolution to bear responsibility for the conceptualization and planning of production," the technical engineers and natural scientists, statistics show that these occupations grew from 80,000 in 1900 to 2.5 million in 1970. However, even though their absolute numbers have experienced this 30-fold increase, these conceptual workers still constitute only a small elite group, about 3 percent of the 1970 workforce. While both engineers and natural scientists play a conceptual role, that of the natural scientists is more indirect (see 4, below). Among the 1.2 million engineers, it is significant that the sub-group in industrial engineering, "the aspect of engineering concerned most directly with the design of production process," has grown most rapidly.\textsuperscript{38}

Management functions expand rapidly in the monopoly period. Along with their growth comes a movement to systematize their practice and develop management theory and this provides evidence of their role in production (see 3, below). Census data on managers is of little service because it includes the likes of convenience store managers, themselves more or less indistinct from supermarket clerks, in the category. Deleting these, Braverman concludes, something less than half of the 80 million managers and administrators counted by the 1970 US Census are

\textsuperscript{38}Ibid., 242
"true operating executives," a group which comprises less than 4 percent of the workforce. But, he argues, even this small stratum must be considerably larger than in the pre-monopoly phase when, according to Chandler, "very few American businesses needed the services of a full-time administrator..." Pollard supports this conclusion: the Arkwrights employed only three clerks, managers of the day, to administer an enterprise of 1,063 workers.

As with 1, above, the evidence here is not especially strong or thoroughly mustered. However it is equally the case here that no member of the relevant theoretical community will find it implausible that the role of managers and technical elites has expanded, nor will anyone expect that the predictive test of the theory will overturn the hypothesis. Looking ahead to 3, no one will find it specially implausible that the expansion of such functions represents the expansion of specialization in industrial conception and control. However, that this represents the flourishing of expertise and humanly essential conceptual ability at one extreme of a growing polarization is an empirical proposal of considerably higher profile.

3. The motivations of managers, reflecting those of their entrepreneurial sponsors, are to innovate toward fragmentary, low control and low working knowledge jobs.

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39Ibid., 260.

40Ibid.
What motivates the newly expanded managerial groupings? What, from their own point of view, is their essential problematic? Braverman cites management historians and management consultants to show that control and appropriation of productive knowledge control are their prime ambitions.

W.H. Leffingwell, whose 1925 *Office Management: Principles and Practice* was part of the monopoly era explosion of management theory, states clearly that the pursuit of control is the organizing concept of the managerial project.\textsuperscript{41} F.W. Taylor's activities and writings show a similar preoccupation with control of labour practices and more generally with the separation of conceptual from executional tasks and the allocation of the former to the corporate bureaus.

Urwick and Brech, whose three volume *The Making of Scientific Management* chronicled the rise of the new theoretical turn which sought to give order to the practice of the rapidly growing managers, argue that Taylor, though in some regards a pioneer, was symptomatic of a larger and longer tendency:

What Taylor did was not invent something quite new but to synthesize and present as a reasonably coherent whole ideas which had been germinating and gathering force in Great Britain and the United States throughout the nineteenth century.\textsuperscript{42}

It is this, in Braverman's view that makes Taylor worth a full chapter. In his compulsive concern to chart and direct work in its most minute details, Taylor is,

\textsuperscript{41}Ibid., 68.

whatever his actual accomplishments, a vivid and "explicit verbalization" of the motivations of management.

Amid the diversity, tedium and mania of Taylor's prescriptions and activities, one central principle is evident Braverman shows: the separation of conception and execution. This constitutes an attempt to break down that which makes human labour distinctive, the intimate tie between the inner world of concept, imagination and purpose and the externalities of the practical arts, an attempt which is distinctive to managerial motivations:

This dehumanization of the labor process, in which workers are reduced to almost the level of labor in its animal form, while purposeless and unthinkable in the case of self-organized and self-motivated social labor of a community of producers, becomes crucial for the management of purchased labor.  

But what motivates this central principle is not an abstract mania for division; the goals are the political and economic advantages to be gained thereby. At the level of the political processes of the workplace, the polarization of knowledge is the same as the reassignment of control from the shop floor to the bureaus and this desire for control is impelled by the desire to break down the ability of workers to decide for themselves what constitutes fair labour for their pay.  


\[44\] Ibid., 119.

\[45\] Ibid., 92-97.
It must be noted well that what is chronicled in this depiction of the inner
intents of the scientific management movement is something old and durable within
something new. The expanded resources and size of monopoly corporations gave
rise to ranks of managers of unprecedented dimensions and set in motion a project to
systematize this burgeoning corporate function. This is a new historical phenomenon.
Nonetheless, Taylor is in the tradition of Smith, Babbage and Ure and his work shows
the durability of a trend and mechanism active in the formation of work processes
since the advent of capitalism. Moreover, the actual transformative impact of
Taylorism as a managerial theory, though it cannot be doubted that it was influential,
is not so much the issue as the testimony it bears to the motivational complex
consequent upon a productions system based on private means and "purchased
labor."

4. Firms show a tendency to renovate the conceptual foundations of production
through exogenous productive science (exogenous in the sense of arising outside the
inductive, empirical wisdom of workers) which eclipses worker-held knowledge.

Under pre-capitalist forms of production, and even well into the capitalist era,
productive wisdom was endogenous to labour. Relying on Pollard's account in The
Genesis of Modern Management,
Braverman in effect re-argues Marx's original position on the manner in which "early
workshops ... remained under the immediate control of the [direct] producers in
whom was embodied the traditional knowledge and skills of their crafts.” 

As we have seen, Marx was aware of the growing role of science and systematic exogenous innovation provided by the fledgling machine tools industry and the portent it bore for worker-held knowledge. Yet, what Marx could see was but the tip of the iceberg. In the decades that followed, the intersection of corporate innovation, science, and technology was to transform both.

Braverman cites Huxley, Landes, and Lindsay to show that early in the nineteenth century, prior to "its present highly organized and lavishly funded state" under the sponsorship of the monopoly corporations, science was "the province of amateurs, 'philosophers' ... seekers after knowledge." Even as late as 1880, Thomas Huxley could refer to the cadre of natural scientists as a "guerilla force, composed largely of irregulars." All that was to change dramatically, however, as science was drawn into the service of production under corporate sponsorship that saw "the transformation of science into capital."

Not only was science in an amateur state in the early phase, its role relative to the intellectual contribution of workers, Braverman argues, was minor. The industrial revolution had far less to do with science than is commonly supposed and more to

46Ibid., 59.
47Ibid., 156
48Ibid., 159.
49Ibid., 167.
do with the ingenuity that was at that time still lodged with labour. Lindsay, discussing the origins of the steam engine, for example, cites R.S. Meikleham as to the irrelevance of the formal science of heat:

There is no machine or mechanism in which the little that theorists have done is more useless. [The steam engine] arose, was improved and perfected by working mechanics - and by them only.\(^5\)

The claim is buttressed by a citation to Landes.

Bernal offers testimony that early engineers, like Bramah, Maudslay, Muir, Whitworth and Stephenson, were essentially craftsmen, and thus not the forebears of the exogenously developed modern engineer.\(^5\) In the early nineteenth century, it was craft that "provided a daily link between science and work."\(^5\) Some 1,200 British Mechanics Institutes devoted themselves to sponsoring lectures and discussions on science and to collecting large libraries.\(^5\) As E.P. Thompson notes:

Every weaving district had its weaver-poets, biologists, mathematicians, musicians, geologists, botanists ... there are accounts of weavers in isolated villages who taught themselves geometry by chalking on their flagstones, and who were eager to discuss the differential calculus.\(^5\)
However, the line that separated working knowledge and even science from the practical grasp of corporate control was to be erased in the final decades of the nineteenth century. Based on early German models, the Krupp labs and I.G. Farben, the turn of the century saw a rapid growth in corporate science. Between 1890 and 1920, the largest corporations - Kodak, Goodrich, GE, Bell and Westinghouse - set up their own labs:

By 1920 there were perhaps 300 such corporate laboratories, and by 1940, over 2,200. By then, corporations with a tangible net worth of over $100 million averaged research staffs of 170, and those with net worth exceeding a billion dollars averaged research staffs of 1,250. The Bell Telephone laboratories, employing over 5,000, was by far the largest research organization in the world.55

The labs represented the first great wave of systematic science tied directly to corporate objectives and were driven, Braverman claims, by a need to replenish the stock of innovation which had been largely spent by the first industrial revolution. This wave of science coincided with the rapid expansion of management, and management "science" a la Taylor et al, and this coincidence constitutes support for the polarization thesis proposed by Marx. The upshot, from that standpoint, is a vast renovation of the intellectual foundations of industry, one which leaves managers and their related technical elites at the commanding heights of the conceptual processes of modern production. To one side, then, there is science in growing importance, to the other pole, newly defined and designed work practices, simplified and intellectually denatured.

55Braverman, Labor, 134.
5. Mechanization, which is but the embedding of competence in machines and systems of them, proceeds at the expense of worker competence.

Harnessed to corporate needs, science takes not only the form of elite-based fundamental productive intelligence in the chemistry and physics of production, it is also physically congealed in the performative abilities of equipment. While from a general social perspective mechanization represents an advance both in the range and exactitude of productive action and in the consignment of toil to machines, from the standpoint of the working majority it constitutes a loss, Braverman claims. The pattern is one of technological innovation that leads to general systemic control while it reduces worker control by obviating the reliance on working knowledge.

Here Braverman relies primarily on selective evidence, drawn from a wide range of industries. Particular attention is paid to Numerical Control (NC) technology. After the application of NC equipment, Braverman shows, major assemblages of worker competence are eliminated in favor of fragmentary jobs which allow the substitution of cheaper, less well-trained workers:

In this connection, the evolution of boiler shop and other heavy plate construction is of interest. In these trades the best-paid craft has long been that of layout. The layout man takes off the blueprint the specifications of each part and inscribes them on the plate stock, along with directions for [subsequent operations]. It was at one point noted that the layout man spent a certain amount of time simply marking his layout with close-spaced center-punched marks. In those shops that had enough work to warrant a subdivision of tasks in the layout department, this was taken from the layout mechanic and vested in "markers," at a far lower pay rate. Then in the 1950s a method was devised for drawing each piece, in the drafting room, to accurate
scale on a transparency which could be projected on the steel from a slide projector ... Now the layout man became nothing more than a marker himself; after he had adjusted the focus ... he had no more to do than mark. But with numerical control, the steel can go straight to the flame-cutting tables, where the cutting torch is guided by the control tape.\textsuperscript{56n}

Here we see, first, the partial division of layout craft through the separation of marking to low paid workers. Second, new technology is used to reduce all layout to marking, and third, NC equipment is used to eliminate all labour but the routine moving and aligning of stock steel plate under computer-driven cutting torches.

A similar pattern of mechanical sophistication alongside work simplification is seen in the development of NC machine tools. Where machining had formerly been the province of highly trained machinists, after technological conversion the work was divided among three types of operatives: parts programmers who routinely convert blueprints into numerical codes, typists who enter codes onto a machine readable tape, and machine operators who require markedly less competence than their machinist forebears to monitor the automatic translation of tapes into parts.\textsuperscript{57}

For reasons we have seen, such evidence can do little more than nibble away at the question, can never cover more than a small part of the workforce. Is there any evidence that provides some form of overview? So far as Braverman can see, James R. Bright has produced the only empirical study of a large number of production processes linking, in Bright’s words, “machine evolution and worker

\textsuperscript{56}Ibid., 204.

\textsuperscript{57}Ibid., 200-03.
Bright was of the same opinion, stating that up to 1966 his was still the only empirically-based theory to address the question of the way in which successive generations of increasingly sophisticated machinery "supplement man's muscles, mental processes, judgement, and degree of control." On the basis of his research, Bright concluded that less skill was demanded as the degree of automation increased.\textsuperscript{59}

6. The upshot of the above drives, motives, and tendencies is a general lowering of the working knowledge demanded by, and the labour control allowed by, typical occupations.

The range of authoritative and exemplary evidence Braverman produces to defend this hypothesis is too great to make for easy summary. Through well referenced and plausible cases he shows the degradation of work in areas as diverse as computing and steel fabricating,\textsuperscript{60, 61} office work and packing-house cutting


\textsuperscript{59}Braverman, \textit{Labor}, 215.

\textsuperscript{60}Ibid., 328-30.

\textsuperscript{61}Ibid., 204.
lines,\textsuperscript{62, 63} retail clerical work and auto assembly work,\textsuperscript{64, 65} and this is only the tip of the evidential iceberg. However, instead of displaying this mass of evidence piecemeal, I want to turn immediately to the issue of how such evidence, ample in absolute terms yet sparse relative to the manifold of occupations which might be considered, can be generalized.

So far, in our review of Braverman's data, we have seen a pattern of evidence. The evidence suggests strongly the durability of ambitions toward an effective arrogation of control and knowledge by functionaries who are poles apart from workers who, again on the evidence, are relegated to fragmentary jobs requiring only routine performance. Mechanization of industry, a clearly ubiquitous tendency, can be seen, often at least, to go hand in hand with redundancy of worker control and competence. Similarly, the growth of management and technical elites, to whose hands is entrusted powers of decision-making, conceptualization, labour process design, and an increasingly essential body of basic science, is a clear portent of relative declines to the side of workers.

On this evidence, we must conclude that those \textit{forces or dynamics} the establishment of which Marx claimed to be coeval with capitalism continue into the

\begin{itemize}
\item \textsuperscript{62}Ibid., 314, 354.
\item \textsuperscript{63}Ibid., 81.
\item \textsuperscript{64}Ibid., 371.
\item \textsuperscript{65}Ibid., 146-50.
\end{itemize}
monopoly phase, being amplified and elaborated in the process. Moreover, a continuity of labour process consequences (simplification, roughly) such as was posited by the original theory can be amply evidenced, if only in theoretically windowed instances.

4. Generalization From Specific Evidence: The Labour Force Demography Argument

Now the issue arises as to the adequacy of this selection of evidence. That the ideas of managers, like Taylor, continue to conform to the motivations claimed essential to capitalist economy, is an inferential lever which allows for generalization from cases in which the putative labour process trend, so far as it concerns shop-floor transformations, is evident. If the managerial motivations are of a systematic nature, i.e., derive from institutional injunctions, then some confidence can be had that isolated confirmatory evidence is general.

But this is not the only support for the ubiquity of the labour processes predicted by the theory. To see this we must turn to what I will call the labour force demography argument. Here I construct, so to speak, the argument on Braverman's behalf, giving a degree of formality to what is implicit in his data. It will be recalled that Braverman indicates early in the restatement of the theory that a full investigation involves not merely scrutiny of processes and effects in distinct occupations but also the examination of shifts in labour force structure. Up to this point in our systematization of Braverman's empirical case, the evidence reviewed has buttressed 6 hypotheses about trends and motivations basic to the system and the
causal efficacy of those motivations in changing the nature of work. This has been an account of forces and impacts, based on selected instances.

As Braverman is aware, however, this only gives us one aspect of what we need to assess the changing nature of working class occupations. We also need to know the distribution of the workforce according to the varieties of labour processes. The forces at work, Braverman says, "Bring about new and different processes of labor, a new occupational distribution of the employed population, and thus a changed working class." 66

Now there is a subtlety here that is important to note. Braverman's labour force demography argument attempts to do two things: (1) describe a shift in the centre of gravity of specifically working class occupations and (2) describe a shift in the overall structure of the labour force, working class occupations and others. These are theoretically distinct tasks.

The former relates primarily to the issue of absolute degradation, the latter primarily to relative degradation. That is to say, in order to assess the absolute hypothesis - that of a secular decline within working class occupations - it is necessary to observe the shift in structure of working class occupations and to combine that structure with information about the labour process trends in each occupational group. On the other hand, in order to assess the relative hypothesis - that of a deepening polarity between working class competence and that of capital via

66 Ibid., 263, emphasis added.
It is important to the justification of the theory that a great deal of the labour force demography argument relies on explanations in which hypotheses integral to the theory play a role. The goods producing sector of the economy, for example, shows a declining share of the labour force in the modern period, and this decline, Braverman argues effectively, is driven by labour displacing productivity increases due to technological innovation. Within this sector, employment shifts away from jobs in direct production and toward office work. This, again, is driven in part by forces dictating a separation of conceptual and executional tasks; the conceptual tasks flow toward the bureaus, there to be subjected to detailed labour division and mechanization.

To take another example, large shifts have taken place in the distribution of the labour force in the monopoly period (1875 to the present) and they are intimately bound up with the forces integral to the labour process theory. At the beginning of the period, in the late nineteenth century, just less than half of all US jobs were employment, while by the 1970s almost all jobs were those of employees. This has much to do with the technologically-driven triumph of corporate, factory production which was able to undercut the price and often improve the quality of goods formerly produced by self-employed crafts workers and small entrepreneurs. The decline in agricultural work, from a 50 percent share in the late pre-monopoly period
to a current 3-4 percent share was similarly driven by productivity advances in farming. Moreover, these two trends were related in complex ways; decline in the rural economy undermined small-scale production and much of the independent craft integral to early rural economy. This opened markets for corporate products and, later, services. At the same time, the outflow of agricultural workers fueled the expansion of urban labour market and the consequent cheapening of corporate employment. It is to the explication of trends of this sort that Braverman turns the later chapters of *Labor and Monopoly Capital*. I will leave a full review of this to one side and return to the more or less direct evidence adduced in the labour force demography argument.

From the standpoint of the key tenets of the labour process theory, the major demographic shifts of concern are the rapid expansion of employment (as opposed to self-employment), the declining share of jobs in primary industries, manufacture and construction (goods production roughly), the increased female participation in the paid labour force, the decline in agricultural employment, the expansion in bureaucratic employment (in both corporation and state) and employment in trade and service industries.

The complex interplay of these shifts, and the intersection of them with the dynamic the labour process theory claims to be central to capitalist economy, is, despite its justificatory role, far too elaborate a matter to enter into here. What is important for our purposes is to note, first, that with the increased size of monopoly
corporations, their increased need for mechanisms of control over far-flung operations, and the increasing polarization of conceptual and executional tasks between bureau and shop floor comes a vast expansion of office work. This is supplemented by the growth of purely information-handling industries and the expansion of state services and their related office employment. It is these trends that form the soil in which clerical occupations grow from 6 percent of working class occupations to 26 percent between 1900 and 1970.67

As well, with the decline of informal economy and home craft production there comes an expansion of formal marketing, both as a function of corporate offices and as a set of occupations in sales and services. As a result, occupations in sales and services, while rising in absolute terms from 3.6 million to 13.4 million, maintain a steady 24 percent share of working class employment between 1900 and 1970.68

The two other occupational groups which, together with clerical and sales and service workers, form "the mass occupational categories which embrace, with a few anomalies and exceptions, the unmistakably working class occupations,"69 are operatives and labourers, and crafts workers. These two groupings have declined,

67Ibid., 379. Based on U.S. Census data.
68Ibid.
69Ibid., 378.
the former falling from a 50 percent share of working class jobs in 1900 to a 33 percent share in 1970, and the latter from a 20 percent share to a 17 percent share.\textsuperscript{70}

This picture of a shift in occupational center of gravity away from traditional employments towards clerical, sales and service sectors is crucial to Braverman's case. It is commonly believed that the shift represents an up-grade. Here are the new white collar workers. Here are the workers who have traded their blue collars for mental labour, for the clean fingernails of the information worker. Braverman neatly dissects this sanguine imagery.

It is important, he points out, not to confuse the separation of mental and manual labour with the separation of conception and execution, not to suppose that the growth of a "mental" (as opposed to manual) workforce represents the growth of a conceptual workforce. For, a moment's consideration shows that the cleaving away of creative and originating (conceptual) portions of work can be visited upon mental work just as readily as it can upon manual work. This is because what is called mental work, the manipulation of symbols, the analysis of information, the calculating, sorting and classifying is comprised, as a rule, of activities of a physical sort, done with pencils, calculators and computers, of activities taking as their workpieces registrations on paper or in electronic form. This is work as readily subject to the prescriptions of Smith, Babbage or Taylor as the fabricating of steel parts or the sorting of vegetables. And so, in fact, it is.

\textsuperscript{70}Ibid., 379.
This separation of conception and execution in mental work is by no means a recent achievement of the monopoly corporations, he shows. Babbage learned his lessons from one M. Prony who following the French Revolution was given the task of converting mathematical tables to the decimal system and was thus called upon to organize one of history's first great volumes of clerical work. Things did not go well using mathematicians; they made too many mistakes and the process was time-consuming and costly. Prony chanced to read Smith's *Wealth of Nations* while he was pondering this and hit upon the successful idea of dividing the work between (1) mathematician-directors, who devised conversion formulae, (2) a mid-level group who broke the formulae into detail operations, and (3) unlettered pencil pushers who ground out the numbers. With the advent of modern office work, Braverman says in effect, Prony's experiment has come of age.

Given that the forces at work have created a vast mass of clerical work, what evidence do we have as to its nature? The grouping has grown in absolute terms from 80,000 US workers in 1870 (0.6 percent of employment) to 14 million in 1970 (18 percent) and has changed in the process from what "in its earlier stages has been likened to a craft," one highly paid, to a mass near the bottom of the pay scale and in the main bereft of any substantial working knowledge and control. To show this, Braverman follows the same evidential pathways he has already traced to degraded manual labour processes.

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71Ibid., 295.
He cites authorities. Competent observers - Lederer, Speier, Corey, Mills, and Caplow - are called on in turn to describe a sequence of historical steps which carry early clerical craft toward, as Caplow puts it, "employments which are usually called 'semiskilled' [but which are] As a matter of fact ... not readily evaluated in terms of skill ... no lengthy experience is required to perform the work ..."\(^{72}\)

He cites evidence of managerial motivation. Beginning with such standard works as Galloway's *Office Management: Its Principles and Practice*, we see the emergence of familiar themes of control over workers and precise quantification and monitoring of their output.\(^{73}\) Leffingwell's *Scientific Office Management* is shown to have the same attitude toward clericals as did Taylor's toward manufacturing workers.

He cites examples. Shows how the former labour whole of the bookkeeper is subdivided, in larger operations, "into minute operations":

Characteristically, separate clerks open the mail, date and route the orders, interpret customer information, clear credit, check the items ordered for clarity and to see if they are in inventory, type an invoice, add prices to it, extend, discount, calculate shipping charges, post to the customer account, etc., etc.\(^{74}\)

He shows that the tendency to mechanization has the same effect here as in manufacture. The prime example, of course, is the computer. "For a short time in the


\(^{73}\)Braverman, *Labor*, 306.

\(^{74}\)Ibid., 314.
1940s and early 1950s, the data-processing occupations displayed the characteristics of a craft," he argues. Then, following Marx's original position on the clash between the labour process unifying potential and actual effects of machinery, he argues:

This automatic system for data processing [the computer] resembles automatic systems of production machinery in that it re-unifies the labor process, eliminating the many steps that had previously been assigned to detail workers. But, as in manufacturing, the office computer does not become, in the capitalist mode of production, the giant step it could be toward the dismantling and scaling down of the technical division of labour. Instead, capitalism goes against the grain of the technological trend and stubbornly reproduces the outmoded division of labour in a new and more pernicious form.75

The development of computer work has the advantage of being "so recent and so swift that here we can see reproduced in compressed form the evolution of labor processes in accord with [the general] tendency."76 The original craft unification of the 40s and 50s was soon fragmented into a hierarchy with a few systems managers and programmer-analysts at the top and masses of data-entry clerks at the bottom.

Even within the programmer stratum:

It became clear that a great deal of [the work] was routine and could be delegated to cheaper employees ... The training for this work occupies no more than a few months ... Below this level, computer work leaves the arena of specialized or technical skills and enters the realm of working class occupations.77

75Ibid., 328.

76Ibid., 329.

77Ibid., 330.
Given that Braverman has already shown the applicability of the causal dynamic to manufacturing and craft work, there remains but one further sector of the demographic map of the new working class to be evidenced: the sales and service workers. If the growth of corporate and government bureaucracy has given us the clerical workers, then the growth of marketing and service industries has generated a strong absolute growth in sales and service work. Here Braverman's argument, from an evidential point of view, is less satisfying than was the case for clericals. He more or less baldly states that these are degraded occupations on the whole. They are, he states, part of "a giant mass of workers who are relatively homogeneous as to lack of developed skill, low pay, and interchangeability of person and function ..."^78

As for service workers, he argues that the nature of their work, in general at least, can be deduced from the census data (1970). 55 percent fall into the two major groupings: cleaning service workers and food service workers. Here are the maids, chambermaids, cleaners, charwomen, janitors, and sextons, on the one hand, and the bartenders, busboys, cooks, dishwashers, food counter and fountain workers, and waiters/waitresses, on the other. Taken together with stewardesses, amusement and recreational attendants, porters and bellhops, and guards and watchmen, these categories comprise three quarters of all service workers. It is obvious, Braverman argues in effect, that "the incidence of developed skill, knowledge, and authority in the labor process in naturally very small in these categories."^79

^78Ibid., 359.

^79Ibid., 367.
The same is true of the majority of sales workers employed as cashiers and shelf stockers. He makes no attempt to demonstrate degradation here, saying simply that the labour processes "require little description and analysis because they are conducted, for the most part, in the public eye, and the tasks assigned to most of them are readily visualized." Braverman buttresses this appeal to common sense with the argument that given that they are at the bottom of the pay scale, these workers cannot possess much developed skill, since skilled workers must generally fetch higher pay.

He then proceeds to sample the work process in sales and services, showing the degradation process at work in key groups. Chefs are becoming "thawer-outers" of pre-cooked and frozen fare. Retail food clerks (one of the largest groups) who were yesterday craft workers of a sort, have become swampers, shelf-stockers and checkout clerks whose competence is being shifted to computerized product scanners.

It is now possible to summarize the evidence, reviewing changes in the 5 major categories of the modern working class. Craftworkers have had their autonomy steadily eroded with the advent of technologies in which are imbedded much of the science and skill which formerly resided with them and with the conversion of production formerly proper to them from a craft basis to a mass production basis. Operatives and labourers have become the interchangeable ciphers

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80Ibid.
of the assembly lines, the machine-driven tenders of automated equipment. Clerical workers are the denizens of fragmented and automated offices where the labour process has been subject to the simplification formerly perfected in the routinization of goods-producing occupations. Sales workers are predominantly the retail clerks whose already low-control jobs are being further degraded through computerization. Service workers are the janitors and cleaners, to one side, the waitresses and busboys, to the other.

Given certain minimum assumptions about the representativeness of sampled occupations, the reliability of sociological, historical and other authorities, the labour force demography argument must be considered a strong demonstration of a shift in the center of gravity, as regards working knowledge and worker control, in the monopoly period. As such, the argument supports the absolute degradation hypothesis. Put simply, the two categories which comprised 70 percent of the working class at the turn of the century (operatives and labourers, and crafts) show clear evidence of degradation at the same time as their significance as a share of employment is eclipsed by degraded clerical, sales and service occupations, occupations which now account for 50 percent of workers.

Now these demographic shifts and labour process trends all provide a window on working class occupations and thus provide a measure of shifts and trends supporting the absolute degradation hypothesis. At the same time, it is possible to buttress the hitherto selective evidence of relative degradation, piecemeal
evidence showing the increased role of managerial authority and technical-scientific elites in production, with demographic inferences.

It is important, Braverman argues, to recognize that there has been a shift from the "middle classes" to what he terms the "middle layers of employment." The middle classes, or to use the classic terminology, the petite bourgeoisie, existed structurally outside the polarity of capital and labor. These independent small producers and artisans, neither employees nor to any great extent employers, have dwindled to insignificance in the face of the shift to an almost entirely employment economy. About half of the labour force at the beginning of the monopoly period, they have fallen to only a few percentiles today. This class has dissolved, so to speak, in two directions: either falling into the working class sectors of employment (which have swollen to between two thirds and three quarters of the paid labour force, or entering the middle layers of employment, becoming the managers and technical specialists who sit between owners and workers and share characteristics of both: on the one hand corporate authority, on the other, paid servant.

The point that is crucial for our purposes is that these middle layers, this 15-20 percent of employment is now within the polarity of capital and labour, is in a structural position, that is to say, where it functions as new authority in the work

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81Ibid., 404.
82Ibid., 381.
83Ibid., 404.
process relative to the decision-making prerogatives of labour and new technical-scientific expertise relative to the industrial intelligence of labour. Here is the group against whose lettered, patrician perquisites the pre-set routines and engineered work practices of typical working class groups must be assessed. And the assessment leads in a clear direction: since the day when the antagonism between capital and labour was a direct, unmediated tension between entrepreneur and workers there has grown a new intermediate class with whom has been lodged the practical, day-to-day exercise of authority and industrial conception and this growth has paralleled the absolute downward shift in the centre of gravity of working class intellectual mastery and autonomy.

5. Conclusion

Judged either as a piece of explanation into which a vast range of authoritative, statistical and ethnographic evidence drops neatly or as a structure of logically related hypotheses which find individual empirical confirmation, this twentieth century reproduction and empirical elaboration of the original theory must be judged a success. This area of investigation is, however, a field of enormous subtlety and nuance, one offering limitless opportunity for skewing of evidence and unfounded material inferences. For example, the degradation of work among the (dwindling) operatives, labourers, and crafts workers has been demonstrated through a combination of argument and evidence. The argument runs from premises about the ubiquity of certain motives, themselves dictated by the givens of capitalist

84Ibid., 407.
economy, and about the efficacy of persons and groups with such motives in bringing about change in the nature of technology and work. This argument has been buttressed by evidence drawn from numerous occupations among these goods producing workers. Now this sub-case has numerous opportunities for break-down. Perhaps the power of managers and technical elites is more apparent than real? Perhaps the sampled occupations are un-representative or misinterpreted? It would be too difficult, if it were possible at all, to go over the logic and evidence and close off every such opportunity. The most effective approximation to such an exhaustive process is to turn to an assessment of whatever opposing theorists have been able to produce as counter-evidence. We turn to that work in the next chapter.
CHAPTER 4
RIVAL HYPOTHESES: CONTROVERSY AND CONFIRMATION

The industrial organization of work has come a long way since the beginnings of capitalism. Does it still make sense to analyze it with the concepts that were fashioned by Adam Smith, and Karl Marx, or even Durkheim and Weber? There is no doubt that the most ambitious attempt to forecast history in the long run, that of Marx, has failed.

Dietrich Rueschemeyer,
*Power and the Division of Labour*¹

1. Introduction

Critique and Evidence

We have seen that, though it is inevitably small relative to the ideal observational basis for such a theory, Braverman's evidence for the contemporary correctness, hence the historical durability of the labour process theory, is substantial. Certainly the specific processes predicted by the original theory are still at work: Braverman has no difficulty providing evidence of the same relevant motivations and specific occupational transformations. Turning to the issue of the generality of those transformations, he has Bright's study of the relation between mechanization and

worker competence, apparently the only direct empirical study assessing the central hypothesis, on his side. In addition, what I have termed the labour force demography argument powerfully buttresses the claimed generality of those processes. It seems unlikely, then, that Braverman’s case trades in any simple way on judicious selection of evidence.

Popper has argued that any theory can find confirmation through the search for supportive evidence; a theory’s true test can only come through the careful search for disconfirmatory evidence, through disciplined attempts to draw out evidence for what the theory forbids. It is not necessary to accept Popper’s entire theory of falsification in order to recognize a core of truth in this view. Ability to withstand systematic critical evaluation must on the whole increase confidence in a given theory.

Braverman’s work led to a revitalization of the study of work and industry. At the same time it provoked a large critical response, particularly among industrial sociologists, but also to a lesser degree among historians and economists. To whatever extent Braverman’s theoretical terms of reference - his Marxian orientation - constrained his research and led him to either overlook, fail to seek out, or even have the conceptual gear to handle contrary evidence, we should be able to gain a measure of it by examining the deliverances of contrary traditions and researchers. Here, in the offerings of competent authorities who begin from alternate theoretical vantage
points, we should gain insight into the extent of evidence forbidden by the labour process theory.

There can be no doubting that Braverman's work constitutes a major node in industrial sociology. Even advocates of opposing theories have joined the likes of Heilbroner in assessing positively the challenge and stimulus to further research represented by Labor and Monopoly Capital. Rueschemeyer, who finds Braverman's work flawed and consigns it to what he regards as the failed tradition of Marxist nomothetic explanation, grants readily that "Braverman's work has ushered in a veritable renaissance of the social and historical study of work ..."²

The initial response to Labor and Monopoly Capital was positive, but the honeymoon did not last long. The critical response began in 1977, with Andrew Friedman's Industry and Labour.³ Friedman argued that Braverman had overlooked the possibility of managerial strategies which assured corporate control over labour by actually increasing worker autonomy. In 1978, Richard Edwards published the core essay of what was to become Contested Terrain a year later.⁴ ⁵ Edwards's essay

²Ibid., 88.


became the source book for the subsequent critical movement. Here, Edwards guided
his readers to six flaws in the Braverman account which were becoming "increasingly
visible" and which cumulatively seemed to thoroughly undermine the work. Michael
Burawoy's 1979 ethnography, *Manufacturing Consent*, claimed that direct evidence
from the shop-floor spoke against the growth of the managerial control so central to
the labour process theory.⁶ Workers in Burawoy's machine shop were perpetually
engaged in informal point-of-production negotiations through which, he argued, they
self-enlisted in the struggle for greater output.

More recently, Stephen Wood's 1982 introductory essay for *Degradation of
Labour*, an anthology of critiques of the labour process theory, concluded:

Above all else, [the anthology's collected papers] suggest that to cope with the
kinds of omission which critiques of Braverman have highlighted in his
analysis involves fundamental questions ... involves more than simply
extending one's analysis; it amounts to a theoretical reconsideration.⁷

Still more recently, Dietrich Rueschemeyer's 1986 *Power and the Division of
Labour* has depicted Braverman as caught in romantic preoccupation with
craftsmanship, neglectful of important "reskilling" tendencies in twentieth century
capitalist economy, and relying on a

conception of a transformation in North America according to inherent laws of
capitalist development [which] neither leaves room for class resistance and
struggle over the organization of work nor permits him to recognize other

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⁷Stephen Wood, introduction to *The Degradation of Work?* (London: Hutchison,
historical contingencies which co-determined the outcomes of the transformation. 8

In this chapter, I will argue, first, that the rejection we have just reviewed has been grounded in theoretical errors, in misconceptions of the logic or methodology of the labour process theory. The pervasive impression conveyed by much of the current literature that the theory has suffered a decline and fall since its 1974 reconstruction trades on an uncritical passing from hand to hand of criticisms which, traced to their roots, can be seen to stem from these misconceptions.

Beyond the issue of the fortunes of these criticisms there is the related matter of contrary evidence. I will argue that the critical literature, to the extent that it is able to present empirical bona fides, is theoretically underdeveloped: It fails to grasp the breadth of the case that must be made in order to refute the claims of the labour process theory. The issues of theoretical critique and the disposition of evidence are clearly interrelated. Without a relatively clear grasp of the hypothetical structure of the theory, such as I have formalized in chapter III, it is not possible to assess the available evidence and much of the counter-theory must be dismissed for just this reason. The critics generally fail to recognize the empirical hurdles placed before them by the causal complexity of the social object and fail to recognize the resulting demand for a theoretical strategy that goes beyond (however incisive) ethnography. The ethnographic approach itself leads to a theoretical myopia that effectively disables competing hypotheses. Moreover, as will be seen, many of the ethnographic

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8Rueschemeyer, Power, 88.
studies have evidential problems even at the level of the import of shop-floor data. The distinction is worth underscoring: there is a difference between a situation where clear counter-evidence is available but no means to assess its generality are presented and one where evidence presented either does not clearly show any counter-trend or, when properly analyzed, seems to conform to the theory under assessment.

As we saw in the previous chapter, the crucial evidence is that bearing on the degradation hypothesis. It is here that what I have termed the labour force demography argument comes into play, providing the panoramic observation that tests the theory centrally, tests the degradation hypothesis. This has been largely unrecognized by later investigators who, with the exception of Edwards, have left discussion of the overall pattern either weakly treated or not treated at all. Labour historian Richard Price concludes in a 1985 review of labour process research that "the subject remains in the exploratory stages of proliferating monographs and case studies ..." Rueschemeyer seems to speak for the discipline in his explicit retreat from the problem, avowing that "It would be preposterous to attempt to paint here such a comprehensive picture." A similar position has been adopted by Craig Littler for whom the labour process's "considerable diversity under capitalism" dictates a break with "the universal framework of Braverman." So varied are the forms of modern
work, Littler claims, that "it is necessary to realize that there can be no theory of the labour process."¹⁰

In section 2, I take major criticisms posed to Braverman's work and consider their merit. In section 3, I turn to the positive evidence that has been gathered and offered in contradiction to Braverman's theory.

Before proceeding, I should correct an impression I may have inadvertently conveyed. Though a clear majority of downstream researchers reject the Braverman position, not all the post-Braverman research on the labour process has been critical. Numerous case studies have carried the theory into straightforward empirical applications. The works of Clawson and of Noble in this regard have been particularly detailed and thorough.¹¹ However, insofar as this literature merely constitutes a greater accretion of like evidence, I leave it out of account in this paper, whatever its merit in buttressing the theory.

2. Attempts at Falsification

It is not unreasonable to say that the critical revolt began in earnest with Edwards's 1978 essay in *The Insurgent Sociologist*, "Social Relations of Production at

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the Point of Production." Here Edwards raised six criticisms. Some have survived, so to speak, while others have faded from prominence to be replaced by new critiques. By any reasonable standard, the following five criticisms are the most serious judged either by frequency of occurrence or by the importance of the challenge they pose. It is held that the labour process theory suffers from 1) a misuse of Taylorism as evidence, 2) the use of an idealized conception of craft work as a standard for evaluating typical contemporary work, 3) a failure to recognize the inherent tendency of capitalist production to generate new, skilled occupations, 4) a failure to recognize the impact of worker resistance on managerial strategies, 5) a blindness to new corporate labour control strategies which actually expand worker control and competence. I take them in order.

1. **Braverman wrongly supposed** that Taylor’s schemes were effective in transforming the labour process. In effect, he was taken in by management ideology, believing that Taylor’s wishes became reality.

   The charge here is one of logical frailty or *non sequitur* in reasoning from theory to general practice. In portraying in detail the changes in work control proposed by Taylor, Braverman supposed himself to be portraying actual changes on the shop floor.

   But what is the foundation for this charge? Here is Edward’s original statement of the criticism:

   The book accepts or seems to accept writings on management theory as evidence for actual developments on the shop or office floor. The most
important example is Braverman's reading of Frederick Taylor's writings as though they described real processes rather than simply Taylor's thinking and theories. The book has therefore taken what are clearly ideological sources of information and treated them as though the processes they describe were real.\textsuperscript{12}

Of course, as we have seen, there is a perfectly reasonable alternate interpretation available to Edwards. The labour process theory hypothesizes a mechanism underlying the transformation of work, a process in which economic imperatives are registered in the motivations of typical agents. Accordingly, it is appropriate that Braverman, like Marx before him, provide evidence as to the motives of central decision-makers and advisors within production.\textsuperscript{13} In this regard, Braverman explicitly locates Taylor in the progression running from Smith to Babbage and Ure, and on to later terms like Drucker.\textsuperscript{14} Given, then, that Braverman is able to present a wealth of relatively direct evidence of labour process changes, such an interpretation is favored textually. What, then, rules this interpretation out? If Edwards cannot rule it out (and he makes no attempt to do so), then it is his conclusion that is a \textit{non-sequitur}. Edwards's view that Braverman "seems to accept" Taylors' writings as evidence of actual transformations, rather than as evidence of managerial motivations, would be secure only if Braverman rested his case for the degradation hypothesis with an exposition of Taylor's writings. Then it would be clear that his conclusions relied on an unwarranted inference from ideas to deeds.

\textsuperscript{12}Edwards, "Social Relations," 109, emphasis added.

\textsuperscript{13}Ibid., 85.

\textsuperscript{14}Ibid., 85-88.
However, as we have seen in the prior chapter, Braverman presents within relevant limits quite thorough and independent evidence for his key conclusion.

It is significant that in his book-length treatment of these matters, Edwards never returns to this criticism. He does reiterate that Braverman "overestimates" the impact of Taylor. But he goes on to credit Braverman with having "brilliantly described" the central impact of Taylor's fundamental ideas. In spite of this tacit revision, the criticism has been passed hand-to-hand by lesser scribes, none of whom have sought to repair the logical deficiencies of Edwards's original speculation.

While the actual fortunes of Taylor's work has remained something of a controversy, no one has seen fit to challenge Edwards's revised view of the matter. The most that can be safely said is that while many of the details of Taylorism have been dropped, its essentials remain. The fact that many of the minor trappings of Taylorism - its mania for stop watches and minutely detailed written instructions, for example - were subsequently dropped has fueled the view that Taylor was little more than a crank. It has also fueled the view that since not all of the Taylor model was perpetuated (particularly those details which, like the stop watch and the time-motion expert, became in the public mind its symbols), its essentials were dropped. Stark, for example, cites Hoxie's work to this effect. Hoxie claimed that during his research into the spread of Taylorism "no single shop was found which could be said to

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15Edwards, Contested, 97-98.
16Ibid., 104.
represent fully and faithfully the Taylor system as presented in the treatise on 'Shop Management'. But from the fact that the complete system was nowhere replicated in its entirety it does not follow that the fundamentals proved ephemeral. In fact, given the very special nature of machining, to which Shop Management was directed, it would be astonishing to find the system applied "fully and faithfully" elsewhere.

Braverman held that the issue was not "the trappings of the Taylor system," or "specifics like functional foremanship or his incentive-pay schemes," Rather, it was "the fundamentals of the organization of the labour process" proposed by Taylor, fundamentals like the separation of execution and conception and the emphasis on controlling labour, which proved durable. In this regard, Edwards accepts Braverman's view:

One important element that did endure was the aggressive attempt to gain management control over the special knowledge of production - what Harry Braverman has brilliantly described as the 'separation of conception from execution'. Another element that survived was the notion that each worker's job should be carefully defined, including standards of 'adequate' performance.

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19Ibid., 87.

20Edwards, Contested, 104.
Moreover, Braverman did not argue that Taylor produced these prescriptive fundamentals out of whole cloth. He accepts the view of management historians Urwich and Brech that Taylor was simply giving coherence and contemporary effect to "ideas which had been germinating and gathering force in Great Britain and the United States throughout the nineteenth century." Taylor, in other words, is old wine in new bottles and as such he gives testimony to the durability of motivations claimed central by the labour process theory.

Notice, finally, that even had Braverman argued as Edwards originally speculated, it is not clear that his position was wrong. The logical step from Taylor's prescriptions to their practical enactment in the typical workplace is valid on two assumptions: 1) that Taylor bespoke the ambitions, at least in general, of contemporary managers and 2) that managers are, on the whole, effective in imposing their ideas. That is, if we assume that Taylor was not a lone voice but that his ideas were widely received among managers, and if we further assume that managers can and do typically put their plans into practice, then certain changes crucial to the labour process theory do follow, at least strongly, from Taylorism. Neither of these assumptions is implausible. That Taylor's work gained him a wide following, not only among American managers, but around the world, was argued by Braverman and is nowhere disputed. That managers are decision-makers with regard to the social and technical renovation of workplaces, is plausible. Of course, their plans may be ineffectual for various reasons, including resistance offered by workers, from

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21Quoted by Braverman, 89.
point to point. But since managerial errors in this regard do not lead to a challenge to the principle of labour management but only to specific practices, they act here, as they do in any human environment, merely as a stimulus to further experimentation. Moreover, insofar as worker resistance is a telling factor the evidence seems clear that the history of the most effectively resistant segments of the labour force, organized workers, has been characterized by a steady retreat on the part of unions from any confrontation with legally enshrined "management rights" doctrines, doctrines which give voice to managers' authority to design production.22

2. Braverman idealized craft work, thus presenting, in effect, a false standard against which to compare the labour processes of typical twentieth century jobs.

Some of the claims that have been made in this regard are tantamount to fabrication. Braverman did not, as Stark, for example, has claimed, think of craftsmanship as a past "golden era" to which a socialist society would aspire.23 Quite the opposite, he convicted craft of incompetence and feudal lethargy, of a "scrappy knowledge and fixed tradition"24 which condemned it to historical oblivion and left only one way for future generations of workers to develop a meaningful

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23Stark, Class Struggle, 94.
24Braverman, Labor, 155.
mastery over production: "in and through scientific, technical, and engineering knowledge."^{25}

Nonetheless, Braverman did regularly present cases of labour process transformation in which the first term is robust craft or craft-like work and the last is the tedium of the detail worker. This does implicitly suppose that craft had virtues (even if not those to be fostered in the future) whose departure is a loss. This reasoning is wholly justified. Although, as Braverman is aware, not all specific degradation scenarios begin with craft (supermarket cashiers, for example, whose work is denatured through the displacement of competence to computerized product scanners, are not initially craft workers) he cannot describe the transformation of work without at least regularly beginning with craft. This is true early and late. Weavers' craft fell before the onslaught of early nineteenth century automated looms. No less did initially craft-like work in computing decline with the advent of card-based computers, high level computing languages and packaged software. Moreover, the work of crafts and like workers does represent certain virtues. With its greater autonomy, based in close-held working knowledge, such work offers opportunity for undeniable satisfactions. Were today's craft jobs made easily available to those who now hold monotonous, repetitive and tightly-paced jobs, it is hard to imagine other than a vast exodus from the latter to the former simply because they meet real human needs, not the least of them the wages that go with apprenticed skill. Of course, it would be wrong to develop a romantic attachment to such work and to see in it an

^{25}Ibid., 443.
eternal locus of human fulfillment. But as we have seen, Braverman avoids this mistake.

3. Braverman failed to recognize the generation of new skills inherent to capitalist labour process transformation, failed to see that "deskilling" is offset by "reskilling".

Like so many of the criticisms that are passed from paper to paper without regard for their initial fidelity, this complaint originated with Edwards's 1978 essay:

The book's [Labor and Monopoly Capital] basic premise of "de-skilling" remains problematical ... the development of both forces and relations of production throw up ... a demand for re-skilled, especially educated labour as well as de-skilled labour. Thus accumulation must be seen as simultaneously de-skilling and re-skilling the labour force. Rather than the simple one-way process that Braverman describes, we must recognize this more complicated, two-way movement.26

Before proceeding, it is important to note that the apparently quoted reference here to Braverman's concept of "de-skilling" is inaccurate and misleading. Braverman never used the term "deskilling." Its by now conventional application to his central theory is entirely a creature of later critics who have sought to reduce and simplify the central concerns of Labor and Monopoly Capital. Braverman is concerned in the first instance with the displacement of productive intelligence, of which skill is a part. Beyond that, however, his central concern is with the political dimension, with the disposition of human decision, self-affirmation and social control in the workplace.

and with the close relationship that exists between the scientific and technical renovation of production and the various social dimensions of work.

Putting that to one side, however, it is difficult to see how Edwards and those who later join him in this complaint square their argument with the explicit theory in Labor and Monopoly Capital.

Braverman, as we have seen, takes the reduction of reliance on the competence of labour to be a principle of managerialism. This, of course, on his account, explains the range of historical and contemporary evidence for industrial renovation that downgrades the role of craft and like workers. However, though this principle is a crucial mechanism for the labour process theory, Braverman is clear that its functioning is not a one-way street:

... the principle is itself restrained in its application by the nature of the various specific and determinate processes of production. Moreover, its very application brings into being new crafts and skills and technical specialties which are at first the province of labor rather than management.\(^\text{27}\)

In this conviction, as we have seen, Braverman is not charting new ground but simply following out observations original to Marx. But neither he nor Marx take the regeneration of labour-based competence to be capable of offsetting the processes tending toward work degradation. That, of course is his reason for giving prominence to the fact that, in at least a range of central cases, observable "reskilling"

\(^{27}\)Braverman, Labor, 172.
is swiftly followed by "deskilling." Computer programmers and technicians are one hallmark instance. Even among such recent high skill occupations as engineers, Braverman remarks, we can see a tendency to stratify the work of engineering firms so that novice engineers spend much of their working lives doing lower paid, detail tasks.

The issue, then, is not one of the "recognition" of reskilling. On that all parties to the discussion are in agreement, an agreement they owe in some measure to the prescience of Marx. The issue is rather one of the net impact of (to use the unfortunate terms) deskilling and reskilling. This reinforces a point we are already familiar with; namely, that ethnographic data are in themselves insufficient. To assess adequately the main hypotheses of the labour process theory, it is necessary to adopt a more general perspective, such as we have seen in the labour force demography argument.28

Nonetheless, despite the absence of any alternate account of proper breadth (with the possible exception of Edward's _Contested Terrain_, which, as we shall see in the next section comes to relevantly similar conclusions to Braverman) this criticism has been passed hand-to-hand down the critical chain. Stark's 1980 "Class Struggle and the Transformation of the Labor Process," for example, reiterates Edwards's claim, charging that Braverman's "absolute deskilling," (by which Stark means not the comparison with prior working class jobs, as we use the term herein, but rather the notion of an "homogeneously unskilled working class") must be tempered with evidence of the way in which "The cyclical introduction of new technologies operates to reproduce positions for skilled workers ..." (See Stark, "Class Struggle," 94, 114.) Subsequently, in 1986, Rueschemeyer reiterates the criticism, claiming that Braverman "neglects the creation of new skilled jobs" in the shift to mass production. (See Rueschemeyer, _Power_, 88.) The issue, however, is not one of neglect or recognition, it is one of empirical impact.
4. Braverman fails to recognize the impact of worker resistance (or, variously, of class struggle or dialectical processes) on the evolving shape of work.

There are two distinct issues nested within this criticism. On the one hand, it suggests a failure to recognize that workers' resistance has had an impact. On the other, it suggests a failure to examine the extent of the impact. I leave this latter issue to the next section where I review the empirical findings of those who, like Edwards, suppose that displacing Braverman's model with a class struggle model leads to a new picture of the nature of work. Here, I take up the more straightforward criticism that Braverman does not recognize that workers' resistance has an impact.

Edwards raised this criticism as follows:

The book [Labor and Monopoly Capital] fails to take account of labor responses to the new forms of "degraded" work ... drastic effects [meet with] little apparent resistance ... Unions play no role, and there is no class struggle.29

This suggests both that a) there is little discussion of worker resistance and that b) worker resistance plays no theoretical role, whatever amount of ink it gets.

Now it is certainly true that Braverman's work is not a history of the working class painted in recurrent scenes of struggle against the effects of industrialization. This is because Braverman is intent to portray only the evolution of the labour process, and because he, like Marx, holds that workers' struggles, though important to that evolution, did not in fact force a serious deviation from capitalist's central

demands; they served, rather, only to blunt the labour process intentions of the better situated, more powerful capitalists. Nonetheless, Braverman clearly recognizes that such struggles took place. Not only does he recognize them in the trivial sense of citing examples from time to time, he gives them a central theoretical role, recognizing that they are a ubiquitous and necessary feature of capitalist production, a feature which conditions technological decision-making.

From its earliest days, Braverman claims, capitalist production had to be imposed, against the will of those it needed as its operatives. He spends the first three chapters establishing the motivational foundations of capitalist industry, setting out the industry-specific demands of capital, to one side, and following Marx (as we have seen) in detailing an anthropological account of the basic needs of workers.

These motivational poles establish a basic antagonism:

In this setting of antagonistic relations of production, the problem of realizing the "full usefulness" of the labor power he has bought becomes exacerbated by the opposing interests of those for whose purposes the labor process is carried on, and those who, on the other side, carry it on.\footnote{Braverman, \textit{Labor}, 57.}

\begin{quote}
We see this antagonism in the early factories whose alien disciplines had to be "enforced upon the workers." As evidence, Braverman cites Pollard:

There were few areas of the country in which modern industries, particularly the textiles, were not associated with prisons, workhouses and orphanages.\footnote{Sidney Pollard, \textit{The Genesis of Modern Management: A Study of the Industrial Revolution in Great Britain} (London: Edward Arnold, 1965), 163. Quoted by Braverman, \textit{Labor}, 66.} 
\end{quote}
But the antagonism is not restricted to the early period. As factories became established institutions, their large size demanded the creation of a new form of industrial authority: management. Naturally, the development of management reflected the antagonistic atmosphere within which it grew:

This enterprise [management] shared from the first the characteristics Clausewitz assigned to war; it is movement in a resistant medium because it involves control of refractory masses.32

Later still, Taylor's experiments at Midvale Steel led to a struggle which "was a classic instance of the manner in which the antagonistic relations of production express themselves in the workplace."33 And this workplace resistance was buttressed by a "storm of opposition among the trade unions ..."34 Summarizing all this, Braverman claims that "The necessity for ... overcoming natural resistance ... becomes a permanent feature of capitalist society."35 one which "renews itself in new generations ... comes to the fore repeatedly."36

It is hard to square Edwards's characterization ("little apparent resistance," "unions play no role," "no class struggle") with Braverman's steady application, and steady evidencing, of the Marxian conviction that capital and labour are inherently

32Braverman, Labor, 67.
33Ibid., 92.
34Ibid., 136.
35Ibid., 139-40.
36Ibid., 151.
opponents, that the dialectic of capital and labour is one of history's most durable drives. Edwards's early response was simply wrong, but his epigones have not allowed this conflict between readily available textual evidence and Edwards's claim to deter them. In dozens of scholarly articles and books the charge of "undialectical" theory, of the effacement of workers' resistance has been reiterated.

The issue, of course, is not whether workers resisted, nor whether their struggles had an impact. No serious commentator, certainly not Braverman, disputes the facts in this regard. Rather, the issue concerns matters only resolvable in the broad perspective: given the antagonism that undergirds capitalist work process evolution, what has been the actual historical trajectory of work? If Edwards's criticism is to come to anything, he must show that capitalist ambitions have been significantly restrained by the resistance everyone recognizes. We leave consideration of that issue to the next section.

What is essentially the same criticism is often raised as a charge of crudeness. Braverman, Stark charges, simply took the easy route, assuming that an omnipotent capitalist class imposed the designs outlined in various theoretical statements (Taylor's most prominently) on "infinitely malleable" workers, and concluding that scientific management finished the job, producing a homogeneous working class, stripped of "all discretion and subjectivity" in the labor process." But Braverman consigned a whole chapter to this matter (Chapter 8) and there he seems at pains to

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37Stark, Class Struggle, 119.
argue just the opposite of the omnipotence-malleability thesis commonly attributed to him. Managers are generally successful, Braverman says, but not omnipotent. Of H.L. Gantt's ambition for control down to "the smallest detail of labor" he says, "And it is the scientific-technical revolution which furnishes the means for the partial realization of this theoretical ideal." Of the economically motivated and theoretically registered drive of managers to separate workers from conceptual functions and make themselves the only subjective element in production (reducing workers to objects mediating the ideas and will of superiors), he says, "This is the ideal towards which management tends," but it is "an ideal realized by capital only within definite limits, and unevenly among industries." Finally, having reviewed the underlying dynamics of labour process transformation and the way they tend, however strongly, toward this displacement of labour as the subjective element in production, having discussed how this corresponds to a managerial ambition to control exactly the flow of materials through the productive mechanism and thus the pace at which products pile up in warehouses, Braverman reminds his reader:

This is a description of a "theoretical ideal" system from management's point of view, and not an attempt to describe the actual course of events. We are here omitting for the moment the fact that workers are rebellious, and that the average pace of production is decided in a practice which largely assumes the form of struggle, whether organized or not.

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38Braverman, *Labor*, 171, emphasis added.
39Ibid., 171-72, emphasis added.
40Ibid., 172, emphasis added.
41Ibid., 180n.
The "no dialectics" charge, then, cannot be supported. Since the conviction that Braverman failed account for struggle and fine nuance is insupportable with recourse to his explicit testimony, let alone the implicit direction of the whole structure of his argument, it will not be surprising if we later find that this theoretical revision is frail in its ability to make room for new empirical evidence.

5. **Braverman failed to recognize that new corporate control strategies would allow workers greater autonomy within production.**

The critics' argument here is straightforward. Though each variant has its own unique features, the general drift is the same. Beginning with an invocation to the ubiquity of class struggle at the point of production, the argument proceeds to point out a growing need in large, monopoly firms for cooperation with labour and the consequent ability of workers to extract, as the price of their cooperation, certain concessions as regards discretionary activity. In short, late in the game, workers are able to struggle for and win the right to direct their own activities, in some measure at least, within production. Looking at the matter from management's point of view, it is argued, it became desirable to grant a **limited** autonomy in order to secure **general** control.

Friedman puts the matter this way: "Braverman must be criticized for confusing one **particular strategy** for exercising managerial authority ... with
managerial authority itself." Braverman supposed, Friedman claims, that Taylor's system of "strict disciplinary rules" was the only strategy for exercising managerial authority. What Braverman should have recognized is a new strategy that, however ambivalent, is an advance for workers. In the monopoly phase "Top managers [may] decide to reduce their direct control over the direction of worker activity ... in order to increase their authority over workers ..." The lushness of monopoly profits, so to speak, allows for an unprecedented managerial largess. Management, that is, may decide to grant workers a perimeter of "responsible autonomy," such that they may "act within production according to their own judgement and their own will (over such things as their work pace, the particular tasks they do and the order in which they do that work)." An example, Friedman says, would be the attempts by Volvo and Saab "to humanize car assembly work."

Again here there are two distinct issues: Braverman's putative non-recognition of such subtleties and the larger empirical question of their generality and impact, to which we turn our attention in the next section. In fact, Braverman explicitly recognizes this sort of control tactic. Referring to job enlargement experiments of the Volvo sort and to the more general "humanization of work" movement of the

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42 Friedman, Industry, 80.
43 Ibid., 84.
44 Ibid., 83.
45 Braverman, Labor, 37.
he comments that the consultants who trade in such schemes have "a valuable stock in trade" in their knowledge that "various jobs have been broken down into fragments of fragments and can be partially reassembled without injury to the present mode of organizing the work process ..." But, he argues, these easily recognized schemes cannot work. At most they place relatively direct coercion in a reserve position, thus failing any true test of humanization, and failing to make a serious dent in the trend to degraded work.

On the contrary, as in all of the functionings of the capitalist system, manipulation is primary and coercion is held in reserve - except that this manipulation is the product of powerful economic forces, major corporate employment and bargaining policies, and the inner workings and evolution of the system of capitalism itself, and not primarily of the clever schemes of labor relations experts. The apparent acclimatization of the worker to the new modes of production grows out of the destruction of all other ways of living, the striking of wage bargains that permit a certain enlargement of the customary bounds of subsistence for the working class, the weaving of the net of modern capitalist life that finally makes all other modes of living impossible. But beneath this apparent habituation, the hostility of workers to the degenerated forms of work which are forced upon them continues as a subterranean stream that makes its way to the surface when employment conditions permit, or when the capitalist drive for a greater intensity of labor oversteps the bounds of physical and mental capacity. It renews itself in new generations, expresses itself in the unbounded cynicism and revulsion which large numbers of workers feel about their work, and comes to the fore repeatedly as a social issue demanding solution.

Friedman's theme of liberty within control is taken up in greater ethnographic detail by Burawoy, as we shall see in the next section. For Burawoy, too, the central empirical point is that, contrary to Marx's prophecies, monopoly capitalism was able

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46Ibid., 36.
47Ibid., 38.
48Ibid., 150-51.
to 'harness' the class struggle because "workers extracted concessions that would make it more tolerable."49 But if Friedman's scenario of freedom within dictation seems ambivalent, the empirical basis for Burawoy's conclusion that workers have wrested more tolerable work from a reluctant management seems positively contradictory:

Thus the differences between the organization of work at Geer [an early, competitive firm] and Allied [a later, monopoly firm] suggest ever greater "quantitative" choice within ever narrower limits. In identifying the separation of conception and execution, the expropriation of skill, or the narrowing of the scope of discretion as the broad tendency in the development of the capitalist labor process, Harry Braverman missed the equally important parallel tendency toward the expansion of choices within those ever narrower limits. It is the latter tendency that constitutes a basis of consent and allows the degradation of work to pursue its course without continuing crisis.50

The genius of the monopolies, then, appears to be the creation of new methods which allow not a reversal, but a prolongation of basic patterns, without disruption!

That capitalist enterprise typically employs some combination of both the carrot and the stick can hardly worry Braverman. In fact, as he would have been aware from reading Pollard, this approach was developed not in the twentieth century, in the context of monopoly, as the critics would have it, but rather at the very moment of birth of industrial management in the early nineteenth century.51

Once again, the issue is not the recognition of subtleties no competent commentator would deny. Rather, we want to know if ethnographic precision about them leads to

49 Burawoy, Manufacturing, 195.

50 Ibid., 94, emphasis added.

51 Pollard, Genesis of Management, 186.
significant general conclusions or if, alternately, it merely constitutes an elaboration within the paradigm. As far as Rueschmeyer is concerned, the however "grandiosely" proclaimed responsible autonomy and work humanization experiments constitute "minor reversals" unlikely to seriously affect the main trend.52

3. Counter-Evidence to the Labour Process Theory

In this section I review in detail four major works: those of Friedman, Edwards, Burawoy and Rueschmeyer. The first three are Marxist studies, while Rueschmeyer's, despite some reliance on Marxian concepts, is a work within the Weberian tradition. All agree that Braverman's framework (for some, the Braverman/Marx framework), is inadequate. Beginning from that conviction, each proceeds to provide an alternate account of the underlying dynamic and the consequent pattern of labour process development.

At heart, all of these begin from criticism 4, in the previous section: Braverman's theory is undialectical in that it omits struggle. Rueschmeyer states the matter in his distinctive Weberian manner, invoking "power" rather than "class," "conflict" rather than "struggle," and making the customary terminological shift (familiar to professional sociologists) in which the object of concern is "the division of labour" rather than "the labour process." But the fundamental theoretical conviction remains quite similar between the Marxian and Weberian researchers. In Rueschmeyer's claim that:

52Rueschmeyer, Power, 96.
The interests of the powerful and the conflicts among groups with different power resources critically shape the processes that advance division of labour or block it, and that determine the forms that it takes.\textsuperscript{53}

we hear a theme of antagonism and resultant social vector ubiquitous to modern industrial sociology, Marxian or Weberian.

Friedman: \textit{Industry and Labour}

Bearing the sub-title \textit{Class Struggle at Work and Monopoly Capitalism}, Friedman's work developed out of an attempt to explain why contiguous small areas within cities or regions have differing levels of prosperity. Arguing his thesis that managers' creation of different classes of workers within factories is responsible for neighborhood patterns, he claims that within the typical factory, there are two sub-classes, roughly speaking, which arise because "managers normally think of their workers as either central or peripheral."\textsuperscript{54} Central workers get the better jobs which often feature a measure of "responsible autonomy" and better pay, while those regarded as peripheral have jobs subject to "direct control" by managers and poor wages.

Managers have a measure of discretion in setting the proportions of responsible autonomy versus direct control jobs. A major determinant of the extent to which they exercise the former option is the market position of their firms. Managers of stable, low-competition, prosperous firms can design production so as to create

\textsuperscript{53}Ibid., 2-3.

\textsuperscript{54}Friedman, \textit{Industry}, 7.
more responsible autonomy positions; firms with narrow profit margins cannot afford this luxury. And luxury it is, because giving such a measure of control to workers is a means of co-opting them, of undermining their normal antagonism.

Friedman derives two points from this. First, since neither Marx nor Braverman recognizes either the resistance of workers or the discretionary strategies open to managers in response, they fail to notice the capitalist potential for labour autonomy. Second, since the worker autonomy option is more available to the larger, monopoly firms of late capitalism, it is a phenomenon likely to prosper with time rather than be squeezed out as per Braverman.

So this is one of numerous works in which a "dialectical" or class-struggle view is proffered as the theoretical framework within which to bring into its deserved prominence whatever growth of well-paid, autonomous, highly-skilled jobs in fact obtains. However, what I have just offered is but the neatest reading of Friedman's thesis. There is a fly in the ointment. The centre-periphery workforce pattern, Friedman says, is unstable. It "creates conditions which lead top managers eventually to try to destroy" it because:

Central workers' security, status, and relatively high wages will probably prove to be an intolerable burden on top managers at some future date.\(^5\)

\(^5\)Ibid., 8.
This amendment is no minor matter. It is not merely an added complexity; it runs headlong into the neat progression Friedman has previously offered his reader and suggests that the trend to monopoly may not bode so well for workers after all. Which pattern triumphs in point of fact, a general spread of responsible autonomy strategy and growing numbers of central workers, or conditions for their destruction?

Friedman uses his class struggle framework to lay bare the inner working of three case studies. The first two cases, silk ribbon manufacture in the Coventry area and hosiery production in Leicester, are not specially helpful as regards his main purpose. In both, some rather vague shifts between disparate aspects of the two strategies ends with the stagnation of the subject firms, the flight of capital to other locales, and general disruption and unemployment for the workers.

Only in the case of Coventry car plants does any even mildly clear pattern emerge. However, this too ends in the decline of the industry and the demise of responsible autonomy jobs. During the prosperous years between 1932 and 1957, responsible autonomy made its appearance in the U.K. auto industry. This, for Friedman, was seen particularly in the advent of the "gang system," essentially a worker-inspired system for wage-averaging, shop floor negotiation, and internal contracting for piece-work. But the system did not endure. It broke down at Standard Motors in the still prosperous 1950s, and a "major switch away from Responsible Autonomy strategies in other car firms [came] later, when the market
conditions had deteriorated further.\textsuperscript{56} Thus, as the affluence of the 40s and 50s (wherein "the vast majority of workers were treated as central workers") gave way to the "competitive pressures" of the 60s, "inappropriate Responsible Autonomy strategies began to tell on the major car firms."\textsuperscript{57} Managers retreated from their ill-advised largess and a "significant loss of autonomy" for workers ensued.\textsuperscript{58} Alas, this may not, Friedman says, be a merely temporary retreat on the part of the managers; the long-range prospects are glum too:

> In future, as large firms adjust to increased competition, particularly by shifting their operations out of this country, manual workers in large car firms are likely to fall in status from central to peripheral workers...\textsuperscript{59}

It cannot be said, then, that there is much on offer here to disturb the labour process theory. It is hard to give much credence to Friedman's estimation of the centrality, hence autonomy, enjoyed by the vast majority of auto workers, even in the heyday of the industry. Indeed, his evidence for any substantial autonomy in this period is extremely thin, a matter constructed largely of shifts between common garden variety piece-work and work-group-controlled piece-work. To the extent that there is an overall pattern of labour process transformation available in Friedman's evidence, as opposed to his macro-economic conjectures, it speaks more to an inevitable, competition-driven pressure toward degraded work.

\textsuperscript{56}Ibid., 215.

\textsuperscript{57}Ibid.

\textsuperscript{58}Ibid., 233.

\textsuperscript{59}Ibid., 243-44.
Edwards: *Contested Terrain*

As was pointed out in section II, Edwards was the originator of most of the major criticisms of Braverman. Among the theory's flaws he highlighted its failure to recognize either worker resistance, the play of antagonistic forces on the shop floor, or the historic dialectic of class struggle and its consequences for the labour process. In this he joined Friedman and a host of later critics, insisting that "This is what must be studied if we are to understand the dynamics of the labor process and the formation of the modern American working class."  

We have seen that the issue is not the recognition of class struggle as an explanatory principle, about which Marx, Braverman and Edwards et al agree, but rather the empirical consequences of its operation. Recognizing worker resistance, as we must, we want to know how such recognition - or the greater recognition Edwards et al give to it, more accurately - allows for recognition of empirical results differing significantly from Braverman's. It is appropriate, then, to examine Edwards's empirical claims. What new data can be captured within his alternate perspective?

Edwards agrees with Marx and Braverman that the arrival of capitalism represents the genesis of fundamentally new authority in production and a natural worker resistance to it. Beyond that, he readily grants that Marx and Braverman are right not to take resistance as an wholly effective counterfoil to management designs:

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But this is not exactly an equal fight, for employers retain their power to hire and fire, and on this foundation they have developed various methods of control by which to organize, shape, and affect workers' exertions.⁶¹

Still, Edwards argues, the struggle for corporate control in the teeth of resistance has spawned a series of crises of control. Managers have responded to these crises by developing a succession of three control strategies and these are evident in the transformations of major American firms. First, there were the early "simple control" systems which mediated authority via the direct personal power of supervisors and foremen. These systems, characteristic of smaller, competitive enterprises, were resisted by workers and ultimately and thrown out. The corresponding crisis led to the advent of new "structural" forms of control, devised by the larger monopoly firms of the later period. This development ushered in the second and third subsequent strategies. In the second, the early, primarily interpersonal patterns of domination and subservience were replaced by "technical control" in which control was mediated by the systemic structure of enterprises. We see this form of control in its "classic image" in Detroit auto assembly lines.⁶² But this technical control with its mechanical pace-setting also proved intolerable, led to resistance and, eventually, supersession. Finally, third, in the period following WW II, large firms replaced technical control with "bureaucratic control" in which order was maintained by a sort of impersonal legalism, a fabric of subtle co-option

⁶¹Edwards, Contested, 16.

⁶²Ibid., 20.
comprised of administrative guidelines, grievance procedures, detailed job
descriptions and impartial rules governing reward and promotion.

This typology of control methods, Edwards says, illuminates the field,
describing both the evident surface pattern of differing work types and showing the
underlying dynamic which led to the pattern: "The typology of control embodies both
the pattern of historical evolution and the array of contemporary methods of
organizing work."^63

It will be noted that there is a clear suggestion here of an improvement of
sorts:

The defining feature of bureaucratic control is the institutionalization of
hierarchical power. "Rule of law" -the firm's law - replaces "rule by supervisor
command" in the direction of work, the procedures for evaluating worker's
performance, and the exercise of the firm's sanctions and rewards; supervisors
and workers alike become subject to the dictates of "company policy."^64

Despite this suggestion of advance, the upshot (in terms of labour process changes) of
the forces Edwards depicts as driving the control typology through its successive
terms is, I believe, substantially the same as Braverman's.

In the period of technical control, the changes were essentially those posited
by Braverman and symbolized by Taylorism. Edwards does accuse Braverman of a
view of scientific management that "overestimates scientific management's impact."

^63Ibid., 21.

^64Ibid.
Braverman does not recognize, he says, that worker resistance meant that Taylorism "failed to solve the crisis of control." But he still must agree that Braverman got his hands on the essentials. Managers, Edwards says, eventually cast off the "chaff" of Taylor's system and "much was learned":

One important element that did endure was the aggressive attempt to gain management control over the special knowledge of production - what Harry Braverman has brilliantly described as the "separation of conception from execution." Another element that survived was the notion that each worker's job should be carefully defined, including standards of "adequate" performance ... [as well] the transfer of hiring, disciplining, wage-setting, work directing, and other functions to personnel departments and planning or industrial design offices would take hold.65

In other words, what we have seen to be for Braverman the heart of Taylorism "did endure" at least through the stage of technical control. Did bureaucratic control change things?

Bureaucratic control, it seems, has left workers no better off. Alvin Gouldner is cited to the effect that bureaucratic rules "serve to narrow the subordinates' area of discretion [so that they] now have fewer options concerning what they may do or not do..."66 And this, Edwards adds, is close to the essence of bureaucratic control:

Bureaucratic control [provides] strong and systematic incentives to obey company rules, to develop work habits of predictability and dependability, and to internalize the enterprise's goals and values ... Remembering Michel Crozier's observation about power - "the predictability of one's behavior is the sure test of one's own inferiority" - we can begin to perceive the repressive essence of modern structural control.67

65Ibid., 104.

66Quoted at p. 138.

67Edwards, Contested, 152.
What is the upshot of all this? The final term of the control scenario is bleak indeed for workers:

Bureaucratic control has created among American workers vast discontent, dissatisfaction, resentment, frustration, and boredom with their work.68

Edwards's control typology is one of the most striking theories in the labour process literature. No one familiar with basic research in the field will fail to find in it a powerful model for organizing large amounts of historical data. Clearly, there are specific events and processes which can be used to put flesh on the typology's bones. But how general is the consistency of data and model here? How empirically reliable is Edwards's scenario of evolving control methods? He is relatively candid about the problem of selecting representative materials, telling his reader that he has adopted the simple device of drawing illustrative materials from the development of a small number of large corporations:

In this endeavor I draw repeatedly on the history and operations of a "panel" of large companies: American Telephone and Telegraph (AT&T), International Business Machines (IBM), Ford Motors, General Electric (GE), Polariod, Pabst Brewing, Pullman, United States Steel, and International Harvester. The approach taken is not one of case studies per se, but rather repeated appeal to these companies for examples, illustrations, and evidence.69

As a result of this method, it is not possible to say reliably just how many workers are to be found under each term of Edwards's typology:

68Ibid., 154.

69Ibid., ix.
On the one hand, each form of control corresponds to a definite stage in the development of the representative or most important firms; in this sense ... [the terms of the typology] characterize stages of capitalism. On the other hand, capitalist production has developed unevenly, with some sectors pushing far in advance of other sectors, and so each type of control represents an alternate method of organizing work; so long as uneven development produces disparate circumstances, alternate methods will coexist.\(^{70}\)

To get a more systematic sense of the labour process disposition of the overall labour force we must turn to Edwards's later chapters in which he constructs a demographic argument. Here he follows Braverman in using developments in the workplace as the basis for devising meaningful categories of social division. The dynamics of struggle and control at work determine the "redivision" of the working class into new "fractions":

The rise of technical and bureaucratic control inside the core corporations altered the way in which core firms recruit, evaluate, motivate, and discipline their workforces ... This process has created, as distinct elements, the working poor, the traditional proletariat, and the middle layers.\(^{71}\)

This new three-termed labour market has arisen due to the "underlying uses of labour power" in the firm.\(^{72}\) So to understand the makeup of the modern working classes we must look at "how labor power is consumed in the labor process."\(^{73}\)

\(^{70}\)Ibid., 21.

\(^{71}\)Ibid., 197.

\(^{72}\)Ibid., 165.

\(^{73}\)Ibid.
We are confronted, Edwards claims, with three, roughly equal, fractions in the modern working class. These correspond to what he terms the "secondary," "subordinate primary," and "subordinate independent" labour markets. What is work like for each of these fractions?

For the lowest fraction or "secondary" workers - found in small, non-union manufacturing, in services like janitors, waitresses, and orderlies, in sales and checkout clerks' jobs, and in low-level clerical and migrant agricultural occupations - work can be aptly called degraded:

What marks these jobs as secondary is the casual nature of the employment. The work almost never requires previous training or education beyond basic literacy. Few skills are required and few can be learned. Such jobs offer low pay and virtually no job security. They are, in other words, typically dead-end jobs.

For the middle fraction or "subordinate primary" workers - those in unionized, stable, better paying jobs with prospect for advancement, found in old-line, heavy, mass production industries, and in major retailing, utilities, transportation, and wholesaling firms - work seems to be similarly degraded:

their work tasks are repetitive, routinized and subject to machine pacing. The skills required are learned rather quickly (within a few days or weeks), and they are often acquired on the job. The jobs provide little opportunity for workers to have any control over their own jobs.

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74 Ibid., 166.
75 Ibid., 167-68.
76 Ibid., 172.
Thus we have the lowest two thirds of the working class, according to Edwards's analytical framework. What about the highest third? Primary independent workers - the "long-term clerical, sales and technical staffs," the craft workers (carpenters, electricians, etc.), and the professionals (doctors, RNs, lawyers, research scientists, engineers, lawyers, etc.) - appear to have escaped the fate of the lower fractions. Here are the educated and lettered workers who direct their own work lives in large measure, often according to professional standards, who enjoy "independent initiative or self-pacing." 77 As a result of this different status within production, members of this fraction have distinctive attitudes toward their work and their employers:

... today's Fraction III employment produces the organization person ... [whose] characteristics ... are rules orientation, habits of predictability and dependability, and internalization of the enterprise's goals and values. 78

Not for these workers, then, the permanent conflict with corporate values, the inevitable 'contest' over antagonistic goals.

If Edwards's control typology yielded nothing to discourage the Braverman thesis, neither does this picture of resultant class fractions. The picture is at least generally consistent with Braverman. Braverman held that between two thirds and three quarters of the labour force were in typically degraded working class jobs; Edwards argues for two thirds. Where differences appear between Braverman's and

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77Ibid., 174.

78Ibid., 193. Of course, this description applies only to members of Fraction III who are employees, as opposed to self-employed professionals.
Edwards's analysis is in the classification and consequent assessment of the third fraction.

Where Braverman separated the population into three groups - owners and directors, "middle layer" elites, and the working classes - Edwards bifurcates the population into employers and employed and then sub-divides the employed (all in the working class on Edwards's view\(^79\)) into three "fractions." This classificatory difference makes the two accounts appear somewhat incommensurable. Since Edwards's working class includes the elites - scientists, engineers and administrators - that Braverman assigns to a mid-position between capital and labour, his estimation of the general fate of working class work (absolute degradation) appears more sanguine than Braverman's. As well, the polarity between capital and labour (relative degradation) appears less than in Braverman's account, since managers and scientists, as bearers of productive power and knowledge, are assigned positions inside the working class. But this is purely due to classificatory differences or, better, to theoretical differences as regards proper classification, not to fundamental differences about the empirical disposition of the field.

However, Edwards's classification can be seen to be inelegant on his own terms and theoretically unstable. This can be seen when we consider that Edwards's classificatory scheme groups as workers, as members of the working class, employees who do not share the property that is for him the *sine qua non* of working class

\(^79\)Ibid. 185.
status: antagonism toward and struggle with capital, with one's employer. Edwards, that is, who (versus Braverman) stresses his own fidelity to Marx's class struggle model, who stresses his own orthodox use of concepts of conflict and 'contest' in the point-of-production relations between capital and labour, would have us group together with the working class those Fractions III personnel who do not share, on his own account, the essential antagonism with capital. The constant and inevitable contestation over the terrain of production which marks the relations of Fractions I and II with their employers is not characteristic of Fraction III on Edwards's own account. Fraction III workers are quite unlike the unruly workers of the lower fractions; their pay and perquisites co-opt them and they 'internalize' the enterprise's "goals and values." What marks quintessential workers, we are constantly told, is "resistance." What marks Fraction III is loyalty.

However inelegant this classification may be, it cannot mask the basic empirical agreement between Edwards and Braverman. Edwards agrees with Braverman that the shift from the "old middle class" to the new middle layers of employment (Fraction III workers) is a step down in autonomy:

Where the old middle class had command over its immediate conditions of work ... today's Fraction III work is organized and governed by the highly structured apparatus of bureaucratic control. Where members of the old middle class were constantly making decisions based on their own interests, middle layer workers today are perpetually applying preestablished rules or other work criteria.80

80Ibid., 193.
But for Braverman the middle layers comprise 15-20 percent of the workforce, while for Edwards they are about a third. This quantitative disparity is readily explained. Edwards’s Fraction III includes many workers who are in fact not in elite, high control positions. It includes many carpenters, for example, whose jobs in wood-product mass production are of the most routinized sort. It includes many managers of small food outlets whose jobs are similar to supermarket clerks. If we subtract these workers from Fraction III and reassign them to lower fractions then Edwards’s top one third approximates more closely Braverman’s estimated 15-20 percent middle layers.

What could be dismissed as classificatory inelegance on Edward’s part has serious theoretical consequences. It erodes the real picture of both the absolute and relative degradation of work. On the one hand, it groups the robust elite jobs in the working class. This quite artificially elevates the (absolute) central tendency of working class jobs. On the other hand, since Edwards retains the authority and knowledge that has, in fact, departed the working class in the working class, he eliminates any possibility of depicting the real contrast (relative) between the industrial science in the hands of his ‘contesting’ workers, to one side, and in the hands of loyal elites, to the other.

At the end of the day there is little beyond such classificatory differences to distinguish the labour force demographies of Braverman and Edwards. The abstract "theoretical" difference conjured by Edwards, the make or break role of a class
struggle framework, has vanished into thin air. Where Edwards and Braverman
differ is in the relative prominence each gives to workers' resistance. But the only
reason to invoke a greater discussion of class conflict, apart from, of course,
ethnographic thoroughness, is to give prominence to a dynamic that leads to different
conclusions about the nature of work. In this regard the empirical assessments about
who is doing what, in which stratum of the workforce, come to relevantly identical
conclusions.

Burawoy: Manufacturing Consent

Like Friedman and Edwards, Burawoy is a Marxist who thinks substantial
revisions are necessary to make Marx's ideas applicable to the twentieth century. His
1979 Manufacturing Consent dealt with, as its sub-title says, "Changes in the Labor
Process under Monopoly Capitalism." The key term here is "changes": monopoly
brings something new with it, a labour process unforeseen by Marx and unrecognized
by Braverman.

Manufacturing Consent grew out of experiences Burawoy had as a machine
operator at Allied Corporation, a heavy manufacturing firm, in the early 1970s. His
ethnographic immersion led him to pose a simple question. He was struck by the
intensity he and others gave to their alienated work, by "what I thought was a
excessive expenditure of effort and ingenuity" on behalf of Allied's bottom line:
Why should workers push themselves to advance the interests of the company? ... Why was I actively participating in the intensification of my own exploitation and even losing my temper when I couldn't?^{81}

The answer seems quite evident to the lay reader: the plant had an incentive system under which machine operators got more money if they exceeded base-line production quotas. But Burawoy implicitly rejects this straightforward explanation. Based on narrative about the day-to-day life of his shop, he sets out to show that Allied had devised, perhaps unwittingly, a method of "manufacturing consent" to greater exploitation.

Certainly the answer to Burawoy's question about workers' seemingly perverse industriousness was not "coercion." Marx had thought this to be the answer, Burawoy says, but, however well that may have worked in the nineteenth century, it is too simple an answer for modern times.^{82} Contemporary monopolies not only use the stick of coercion but also the carrot of consent. And so Burawoy parts company with both Marx and that twentieth century Marxism that:

has accepted Marx's view of the labour process and has therefore missed the significance of its transformation, in particular the ability of the factory to contain struggles and to produce consent.^{83}

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^{81}Burawoy, _Manufacturing_, xi.

^{82}Ibid., xii, 27.

^{83}Ibid., 202.
Now it is worth pausing to do some elementary conceptual analysis before we proceed. Notice, first, that all coerced labour involves some consent, and must do so given the nature of forced labour. Consider the acme of forced labour, slavery. It must involve both a measure of alien control and a measure of independent contribution or worker participation. Clearly slave drivers give slaves orders and enforce them. But this coercion can only go so far. If the slave driver had to drive the slave’s every minute work motion against obdurate resistance, the system would collapse on grounds of inefficiency, since it would require at least as many slave drivers as slaves. So we are led to one elementary lesson: all labour coercion involves impelling workers to a discretionary exercise of human abilities within a framework of command.

It follows from this that the mere demonstration of a measure of discretionary action in any work process whatsoever does not suffice to show consent, the coordination of the nature and needs of workers with the demands of the workplace. Nor is such a demonstration in itself a cause for any special interest, since it is, in fact, an inevitability.

This being the case, we can set in advance the benchmark for Burawoy’s ethnographic endeavors. He must show not merely that workers consent to perform work (even intense work). That shows nothing about the specific nature of the labour process. Rather he must show that the trend in the labour process leads to an expansion in the sphere of discretion, to more consent.
On the surface, Burawoy's work has the right logical form. He sets out to compare the labour processes of two firms, one an early, competitive machine shop and the other a later, monopoly shop. Over time, the argument goes, we see a shift toward the greater consent associated with the advance of monopoly economy. If this is a concomitant of monopoly, then the necessary advance of domination depicted by Marx and Braverman is illusory. However, Burawoy's case in this regard remains mired in analysis that seems to give with one hand what it immediately retrieves with the other. Workers, it appears, get more and more choice within a perimeter of discretion that is always shrinking.

To the extent that clear comparisons are made between the early and later terms in the labour process, the changes seem to support Braverman's model:

In 1954 there were more setup men than in 1975; this was due in part to wartime manpower policies but also to a greater need for setup men. Fixtures and machines have improved and become more standardized over the past thirty years, and the skill required in setting up has therefore declined. Moreover, under Geer [the early employer], there was greater diversity in the operations that any one machine could perform, and it therefore took operators much longer to master all the jobs that they would have to run. But this sort of comparison gets short shrift.

Most of the book turns around a putative multiplication of what Burawoy terms "games," particularly that of "making out." Making out is a matter of exceeding production quotas and this requires the machine operator to enter into subtle negotiations with other workers. For example he must enlist the good favor of the

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84Ibid., 55.
crib-attendants who dispense tools or else lose precious time waiting while others are served. Or, again, he must stay on the good side of the stock-carriers who can throw a wrench into his efforts by denying him supplies. Burawoy intends that the reader see in the numerical increase of these "games" a new "autonomy." But he also intends that the reader see this autonomy flourishing on ever scarcer soil:

Thus the differences between the organization of work at Geer [early, competitive firm] and Allied [later, monopoly firm] suggest ever greater "quantitative" choice within ever narrower limits. In identifying the separation of conception and execution, the expropriation of skill, or the narrowing of the scope of discretion as the broad tendency in the development of the capitalist labor process, Harry Braverman missed the equally important parallel tendency toward the expansion of choices within those ever narrower limits. It is the latter tendency that constitutes a basis of consent and allows the degradation of work to pursue its course without continuing crisis.\textsuperscript{85}

This counter-argument contains more admission of failure than pertinent and contrary facts. Braverman, it seems, was right about all that shrinking skill and narrowing discretion but omitted to note the "quantitative" increase of "games" workers get to play on the shrinking terrain. But if this phenomenon of choice within work-related games is to serve Burawoy's critical purposes vis-a-vis the Marx-Braverman theory, he must show that it bodes a resurgence of worker authority and competence in the workplace, and this he fails to do.

Though his analysis derives from a single case study, it is an indicator of a more substantial shift, according to Burawoy. Geer and Allied represent "two different types of capitalist labor process":

\textsuperscript{85}Ibid., 94, emphasis added.
The first is the despotic organization of work, in which coercion clearly prevails over consent ... The second type of labor process, the hegemonic organization of work, is based on consent predominating over coercion.\footnote{Ibid., 194.}

However, Burawoy's data clearly will not support this claimed reversal and his subsequent formulations show it. In the later term, at Allied, workers experience "a very limited but nonetheless critical freedom in their adaptation to the labour process."\footnote{Ibid., 199.} Notice that it is not freedom per se that is critical but "freedom in their adaptation" which has "opened up an area of choice within which workers can constitute work as a game." Even here, workers are "sucked into the game," but:

participation has the consequence of generating consent to the rules which define both the limits of choice and the limits of managerial discretion. Thus it is not the rules themselves but the activities they circumscribe that generate consent. Of course, the extent of the area of choice is affected by technological imperatives, but its existence, no matter how small, is crucial.\footnote{Ibid., emphasis added.}

What Burawoy has discovered empirically is a truism: some worker discretion ("no matter how small") is present under even the harshest labour command, even in work situations where the perimeter of discretion and opportunity to exercise working knowledge is, however small, shrinking.

There is simply no need to search for a basis of consent, in the organization of workplace "games" or in the participation of workers in rudimentary work decisions,
unless there is something striking about the measure of the consent, about its expansion over time. And Burawoy presents no compelling evidence of this.

Burawoy's failure to grasp the inner logic of his chosen problematic, to appreciate the demands placed upon his evidential labour by the theoretical context within which he resides, is reflected in loose and inappropriate analytic categories. "Consent," the coordinating concept of the book, is the wrong category for analysis. For, consent implies something to which consent is given and the issue is the nature of this something. What would upset the labour process theory is a demonstration of an expansion in what might be termed "democratic consent" (consent to cooperatively generated rules, or personally established standards), and a decline in what might be termed "bureaucratic consent" (consent to managerial fiat). Burawoy, however, is at pains to show how worker-constructed games lead to greater bureaucratic consent.

Even were we to grant to Burawoy a growth in democratic consent between Geer and Allied, a crucial issue would remain: is this observation more than serendipitous? What assurance can we have that this pattern is in fact a window on what is typical? In a word, none. Beyond replicating Edwards's view of how advancing corporate legality "constituted workers as industrial citizens with rights and obligations," which rights allow workers "a very limited" perimeter within which to make choices89 (this, as we have seen, being in itself empirically uninteresting), Burawoy is quite candid that he has no firm basis for assessing the generality of his putative findings:

89Ibid., 198.
The hegemonic organization of work [the form found at Allied] does not pervade monopoly capitalism. Different sectors of advanced capitalism employ different forms of labor process, and by no means all of them have elaborated an internal state [hegemonic organization] and an internal labor market like the ones developed at Allied. Not even all the largest corporations have erected hegemonic systems ... Since the labor process in the competitive sector [as opposed to the monopoly sector in which Allied operates] is by definition less well insulated from markets, one may argue that in general there is less to be gained there by introducing the internal labor market and internal state.\textsuperscript{90}

In short, it is possible that Burawoy has his finger on the main pulse (supposing for the sake of argument that he has unearthed a new labour process), but he has made no effort to secure such data as would give confidence in that regard.

Edwards's and Burawoy's work has been reviewed in detail herein because they represent the most substantial critical works in the field, because they are typical of a wide range of critical work, and because they most clearly set forth key characteristics of the critical response.

First, they raise apparent theoretical differences which cave in when any great weight is put upon them. Edwards, for example, claims to displace what might be termed a capitalist motivations hypothesis with a class struggle hypothesis. Yet, as we have seen, neither Marx nor Braverman suppose that labour process design is unaffected by the antagonism inherent to the workplace. In fact, both give worker resistance a central role within a framework in which capitalists hold most of the aces. Consequently, there is little real difference in terms of conflicting hypotheses

\textsuperscript{90}Ibid., 199.
between the labour process theory and the critical position. This, as I said is typical. In Burawoy's case, the putative difference turns around the role of consent. But, again, it is hard to imagine anyone supposing that consent plays no role in capitalist production relations. If there is to be an real separation along these lines, it must be one of quantitative shift, of a change in monopoly practices that allow for greater levels of discretionary activity as compared with earlier forms of labour. But as we have seen, Burawoy is unable to produce anything substantial in this regard.

Second, they fail to raise any fundamentally new labour process transformations. Edwards's bureaucratic control would be better described as a new method of mediating managerial control rather than a reduction in capitalist control. In Burawoy's case, greater consent comes paired with a shrinking terrain within which to exercise it (whatever "exercising consent" might mean).

Third, they fail to deal with the issue of overall patterns and trends; that is, they rest content with what can only be component processes, leaving the issue of general trends to one side. Edwards agrees with the labour process theory's general perspective so far as he takes the question on, but fails to recognize a need to explicate this effective agreement. Burawoy simply leaves the reader with a view of the labour process in one firm in one small sector of U.S. production.

All of this provides a measure of corroboration within a falsificationist framework: the labour process theory survives the criticism of those who have made
a disciplined effort to disconfirm it, to unearth evidence it forbids. But it may be
properly responded that these are after all criticisms from within the Marxist
paradigm and that this explains why their evidential divergence from the Marx-
Braverman theory is minor. The question arises, then, as to the forbidden evidence
mustered by more independent authorities. The work best meeting this criterion is
Rueschemeyer's 1986 *Power and the Division of Labour*.

**Rueschemeyer: Power and the Division of Labour**

As the quotation that heads this chapter makes clear, Rueschemeyer holds
Marx's theory to be, in historical perspective, a failure. However, on closer
examination, this failure seems less crushing than that quote suggests.

There exists between Rueschemeyer and the Marxist tradition a substantial
overlap in basic concepts. Both agree that processes inherent to the workplace give
rise to changes in extramural social structure, Rueschemeyer stating that "Division of
labour and social differentiation are the social processes that underlie shifts towards
more complex social structures." Rueschemeyer agrees that force or domination,
not mere neutral market forces, is generally needed to impose the division of labour
that features repellent, disciplined work and that capitalism has brought about a
tremendous advance in this regard. Theories of a technological determinist nature
that "take off from the productivity gains attributed to specialization" are

\[\text{Rueschemeyer, Power, 1.}\]

\[\text{Ibid., 14.}\]
inadequate, he says: only a theory that recognizes the role of power, the differential power resources of different interest groups, and the resulting conflictual basis of labour process evolution can "contribute to a causal analysis of division of labour."\(^{93}\)

The "failure," then, does not lie in the disutility of the Marxian concepts. This Rueschemeyer grants readily. Weber's conceptual framework, to which he subscribes\(^{94}\) "showed important similarities to that of Marx."\(^{95}\) and its central ideas, he says, "remain useful for understanding division of labour in industry even after several generations of massive economic change."\(^{96}\)

The failure, then, must lie elsewhere, in the specific results of an injudicious application of these concepts perhaps. So we can turn to Rueschemeyer's own account of "current patterns of work." But before doing so, notice the argument with which he defends the view that Marx's forecasts have ended in failure. He accepts with Burawoy that "what Marx missed was the possibility of tempering the worst effects [of capitalism as] workers extracted concessions that would make it more tolerable."\(^{97}\) However, this was only a minor part of Marx's failure. A "more

\(^{93}\)Ibid., 2.

\(^{94}\)Ibid., viii.

\(^{95}\)Ibid., 102.

\(^{96}\)Ibid.

\(^{97}\)Burawoy quoted at p. 101.
fundamental" problem was Marx's whole commitment to nomothetic explanation, to explanation based on laws of historical development:

His was a prophecy about the course of history; it had to fail despite his astute analyses which shaped so much of social science. That anticipations of the historical future turn out wrong would not be astonishing even of (sic) social analysis were more scientific than it is. It is easy to point to mistaken forecasts in the work of Smith and Spencer, Durkheim and Weber, and even Tocqueville. What sets Marx apart is a Hegelian view of history, a conception of history as an organic whole with an end inherent in its law of development. It is this that has been shattered - by arguments and events.⁹⁸

What are these events, and what the counter-arguments they have occasioned? Rueschemeyer first appeals to the failure of "the new corporation-dominated and state-managed capitalism" and "Soviet state socialism" to provide human fulfillment, the (false) implication being that the theory is committed to a scenario in which these developments are fulfilling.

Beyond this, little by way of hard counter-evidence and nothing of a systematic nature such as is demanded by the nature of the object under scrutiny is presented. Rueschemeyer's section on "Historical Transitions" in the labour process consists almost entirely of glosses on the various Marxian hypotheses proposed by Edwards, Braverman, Thompson, Sabel, Marglin, Stark and Palmer and ends with acceptance of Edwards's view that Taylorism, while failing in some details nonetheless "accomplished changes of lasting importance," changes that involve the

key concepts of the labour process theory; namely, separation of conception from function and detailed design and monitoring of work.

A subsequent section summarizes evidence regarding "Current Patterns of Work Organization." Here Rueschemeyer chooses explicitly to avoid attempting to knit the fragmentary processes reported by the major studies into a coherent pattern. Instead, he rests content with what is in effect a checklist of specific patterns reported by those studies, stating that

The various forms of work organization and control we have discussed historically continue to exist side by side today. In different lines of work, in different types of firms and in different industries we find direct supervision and command-obedience relations, fairly self-directed craft-like production, highly mechanized work in which pace and discipline are technically determined, and various types of labour whose standards are set by engineering design and time-motion studies.\(^9\)

Bureaucratic control (after Edwards and Burawoy), for example, is deemed to be quite important, because it holds the prospect of more worker consent and autonomy while "reaping for the employer the benefits of worker loyalty and voluntary cooperation."\(^10\) But since this configuration exists side by side with other patterns, it... does not define the whole of current patterns and tendencies in industrial work organization. It would be preposterous to attempt to paint here such a comprehensive picture.\(^11\)

\(^9\)Ibid., 93.
\(^10\)Ibid., 94.
\(^11\)Ibid., 95.
Work enrichment experiments, phenomena which have received considerable attention, Rueschemeyer deems unlikely to lead anywhere because they are, in the final analysis, simply specific methods of manipulation\textsuperscript{102} and because, so far as we can see, they constitute only "minor reversals in the minute specialization of machine-paced work."\textsuperscript{103} Again, the superior work processes Sabel found in an Italian high-technology industry "may" present a challenge to finely controlled work. But the spread of the pattern would require a huge shift away from mass production, so who can say?\textsuperscript{104}

I have dealt with Rueschemeyer only briefly because his work is theoretical, in the sense that it develops a summary view from the empirically-based conclusions of other investigators, as opposed to being generative of original data. What is significant, for our purposes here, is that Rueschemeyer is in effect committed, by virtue of his own theoretical disposition, to avoiding the challenge posed by what I have termed, in chapter III, Braverman's labour force demography argument. Rueschemeyer's reasoning in this regard is obscure, but it seems plain that since, in his view, there are no laws of historical development, the nomothetic tradition must fail. For reasons that are similarly obscure, Rueschemeyer takes this view to deny the possibility of constructing a "comprehensive picture," a single pattern of labour process development. It seems, however, that such a pattern is just what Marx

\textsuperscript{102}Ibid., 96.

\textsuperscript{103}Ibid.

\textsuperscript{104}Ibid.
predicted and Braverman confirmed. Meanwhile, the more piecemeal approach to the study of the labour process advocated by Rueschemeyer provides no data capable of unseating the labour process theory, nor does he offer any clear argument here as to why only a piecemeal approach is of worth. In the absence of one or the other of these, we are left with the labour process theory holding the field.

4. Conclusion

We have reviewed four substantial post-Braverman works and found no forbidden evidence. Nothing, that is, that deals the labour process theory more than a glancing blow. Of course, evidence is found of specific processes that run counter to the dominant trend, but that is in keeping with the theory which is, as is proper to such a theory, an attempt to chart the long-term forces and general consequences of capitalist production, and which, in any event, explicitly recognizes the necessity of point-to-point reversals.

Scores of articles have been written, and several other book-length treatments in a critical vein have been published. Beyond these, numerous articles and books supportive of the Braverman theory have appeared. In none of them is there gathered evidence constitutive of any substantial anomaly. Within the limits of current investigations and the state of the sociological enterprise as a whole, the theory stands confirmed. It is as well supported as a theory in this field can be at this juncture.
Over the course of the last three chapters I have set forth the anatomy of a social theory, its origins and process of elaboration, its sources of evidence, its patterns of reasoning from evidence to conclusions that describe broad social tendencies, and its empirical trials at the hands of rival theorists. In the last two chapters I have analyzed the manner in which the actual debate between rival positions is waged. This is clearly an empirical debate. The directness of experience varies from case to case, from Burawoy’s participatory, ethnographic method, to Friedman’s case study approach, to Edwards’s reliance on data collected on a panel of selected firms, to Braverman’s use of a wide variety of evidential sources. In all cases the theoretical edifices seem to stand on slender empirical base such that we might wish for more thorough data and analysis. But however adequate the grounds of these theories may be, it seems clear that it makes perfectly good sense to speak about what really is the case in labour process evolution. If the data at hand do not settle the question, if they do not, in fact, provide a reliable decision regarding the degradation hypothesis, it hardly seems preposterous to suppose that under some ideal conditions (research funding, corporate and governmental cooperation, coordination of the work of investigators around a common paradigm) we might actually settle the question beyond reasonable doubt.

Marx constructed a theory of labour process degradation, one that explained how under capitalist social relations of production a social mechanism was structured which led to degradation. Under the pressure of competition within a surplus-accumulation economy, owners of productive facilities and related managers are
enjoined to adopt only certain practical means to the realization of do or die ends. Just how this structure of motivation works is set out in the six hypotheses explicated in the prior chapter. The theory in question clearly predicts (among numerous, lesser empirical commitments) an overall pattern of labour process evolution, by which prediction it stands or falls. That prediction is assessable via observations of the sort registered in the labour force demography argument. The degradation hypothesis is one that stands to be, and is in fact, tested by the investigations of competent researchers and the debate in this field is ultimately resolvable, within limits of reasonable doubt, by recourse to data that is publicly available. That the prediction here concerns a broad pattern, that it is a tendential prediction referring to a trend which fails to specify what will be observed in specific cases (technological developments within individual enterprises) comes to nothing so far as testing is concerned.
CHAPTER V
EXPLANATION AND PREDICTION IN
CAUSALLY COMPLEX FIELDS

1. Introduction

Little has argued that Marxian theory provides scientific explanations which do not meet the requirement of predictive testability, and do not need to. However, as I have shown in prior chapters, thorough analysis of the labour process theory and the evidence provided by later investigators, shows that prediction is central to the theory's justification. Given that the labour process theory has a far better claim to represent Marx's explanatory paradigm than the fragments on which Little's analysis rests, his view must be reconsidered.

But are there general theoretical grounds for doubting the conclusions that have flowed from the foregoing analysis? Is social science in general explanatory but not predictive? It is these questions that I consider now. I take a key argument to that effect - Scriven's\(^1\) - and provide a critique. There is no good reason from this quarter, I argue, to waive the criterion of predictive testability in the case of the

labour process theory. What is apparently prediction in Marx and predictive confirmation in Braverman (and the related normal science) should be taken as testimony for a naturalistic reading of a significant portion of Marx's social scientific work.

Little's position conforms to a common perception about the difference between theories in the experimental sciences and in the social sciences. In the latter, it is frequently held, the complexity of causation and consequent lack of access to invariant relationships and strict laws undermine predictive testability. Consequently, the measure of a good social theory can be no more than the degree to which it possesses such ineffable qualities as "insightfulness." Beyond this common perception, Little's view has a measure of theoretical support. It is, of course, often held that a naturalistic methodology is possible in the social sciences. However, this view seldom indicates more than "in principle" possibility. Hempel and Popper had similar views on the centrality of prediction to scientific theories and neither saw any reason why his conception of prediction should not apply to social theories. Specific sorts of theories of the "historicist" type, Popper argued, could not meet the standard of scientific testability, but he declined to generalize:

The argument does not, of course, refute the possibility of every kind of social prediction; on the contrary, it is perfectly compatible with the possibility of testing social theories - for example, economic theories - by way of predicting that certain developments will take place under certain conditions.

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Nonetheless, the matter has remained more a statement of faith than a conviction supported through analysis of theories in the social sciences. Ryan speaks for the received view when, at the end of destructive analyses of common arguments against the possibility of social prediction, he concludes that though in social sciences "long-range prediction is not in principle impossible," as a matter of practical methodology such an ambition is of "dubious value." Moreover, in reply to Hempel and Popper, Scriven has argued that in causally complex fields even the notion of an "in principle" predictive testability is "somewhat unhelpful" since it does not mirror anything like a real feasibility corresponding to the actual epistemological conditions in such areas.

Little's analysis of Marxian theory gains support from a similar analysis Scriven has provided for Darwinian theory. Scriven uses evolutionary theory as a proving ground for his criticism of Hempelian explanatory and predictive symmetry, arguing that here we find non-predictive theory that nonetheless is perfectly explanatory from a scientific point of view. There is a strong similarity between Scriven's and Little's positions inasmuch as they both take the view that causal complexity in certain fields means that they can attain no better than tendency predictions which are not serviceable for testing. In what follows, I argue that Scriven's position must be rejected. The theoretical objections Scriven raises prove unreliable both in their own right and in their application to appropriately analyzed

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5 Michael Scriven, "Explanation," 480.
theories in what he calls "irregular subjects." As with Little, it becomes evident that one source of Scriven's position is an inadequate analysis of the theory he chooses as a proving ground: Darwinian evolutionary theory. Mere fragments, as with Little, or glosses loosely associated with theories, as with Scriven, will not do. Careful analysis dispels notions constructed in abstraction from the real methodological procedures in complex fields.

In this chapter, I first reiterate Little's position on the predictive testability of social theories (section 2) and then pass to a comparison between his view and Scriven's (section 3). I discuss key aspects of Hempel's and Popper's views on scientific prediction (section 4). This is followed by a critique of what Hausman calls Scriven's "classic attack" on the symmetry thesis in which he argues that Darwinian theory is asymmetric (section 5). It is not my purpose, in this critique, to vindicate Hempel's conception of scientific explanation; one need accept neither the covering law model nor the deductive-nomological model of explanation in order to recognize something important in the idea that scientific explanation - explanation that exhibits the causal regularities that undergird phenomena - and prediction are closely related. It is this narrower thesis that I argue so as to show that the support Little might derive from the anti-symmetry position is, if not non-existent, at least frail. At the same time, a number of interesting parallels between Darwinian and Marxian explanation are presented (sections 6 and 7).

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2. Little's Position

Naturalism, in the sense employed by Little, is the view that the methodology of the natural sciences is applicable, if not in all details then at least fundamentally, in the social sciences. Little, as we have seen, takes an anti-naturalist position with regard to Marx's work, arguing that a well-worn, orthodox form of naturalism is inapplicable to the explanatory endeavors in Capital. An outline of the view Little calls P-T naturalism has been given in Chapter I. To meet P-T naturalist standards a theory must exhibit 1) axiomatic unity (or some close approximation thereto), 2) unobservable mechanisms, 3) strict universal laws, 4) precise predictions, and 5) empirical corroboration. In my view, the labour process theory fulfills the central criteria of P-T naturalism insofar as it posits a unifying mechanism related to law-like generalizations by which it can be predictively tested. However, I do not argue this broad position here. Instead, I restrict my attention to the latter three terms of Little's P-T naturalist model; it is the relations between these that makes it appropriate to designate the model predictive-theory naturalism. As Little puts it, on the model:

[A] theory consists of a set of general laws. When conjoined with appropriate bridge laws and boundary-condition statements, these laws entail a class of observational and experimental predictions. And the theory as a whole is corroborated according to the degree of success found in its family of predictions.

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9Ibid., 15.
Little's reasons for rejecting the applicability of this methodology are of concern. Marx, he says, cannot formulate laws of the relevant type, being restricted by the causally complex nature of his object to tendency laws. Given this restriction and the highly conditional nature of social regularities, Marx lacks the equipment which allows for predictive testing:

A tendential prediction ... is not refuted by the nonoccurrence of the event in question, for tendencies may be offset by competing causal factors ... predictions take a conditional form: If other factors do not intrude, then these tendencies will emerge. But of course other factors generally will intrude, so [predictive] testing is not of much use in social science.¹⁰

This argument is, in turn, the basis for Little's position on just what is possible in Marxian normal science. What Marx bequeaths to later theorists, like Braverman, is not hypotheses ripe for testing but loose recipes and materials for constructing explanations:

What these social scientists have in common with Marx is a fund of central concepts ... a loose set of shared concepts about what is explanatorily fundamental within capitalist society.¹¹

According to Little, Marxian theory cannot be justified predictively but, fortunately, does not need to be: it is already justified by its empirical fidelity to data available to Marx and by the cogency of Marx's reasoning. His argument is a special form of the asymmetry position. For in his view while Marxian theory is justified by empirical evidence, that justification is based on Marx's historical and sociological research. Later social scientists are not part of the justificational process; they merely

¹⁰Ibid., 170.

¹¹Ibid., 39.
inherit "a fund of central concepts" which aid them in the production of analyses which are "given theoretical organization by some of the concepts and explanatory assumptions of classical Marxist theory."  

The Marxian dialectic of theory and evidence exhibits a peculiar closure inasmuch as only past and contemporary events ground the explanations. Marxian justification makes no essential reference to the future.

3. Scriven's Position

Little's position regarding Marxian theory bears a strong similarity to Scriven's position vis-a-vis evolutionary theory. Scriven argues that there are occurrences explainable on the theory which could not have been predicted, and that these examples must illustrate the rule. Central to his case is the claim that the theory does not frame universal laws but only laws in the form of "tendency-statement[s]."  

It follows that it can only generate weak, conditional predictions and that since we cannot predict when the antecedents of the conditionals will be fulfilled, we can never derive precise or "actual" predictions to the effect that "at a certain time, an event or state of affairs will occur." Thus it is, Scriven concludes, that the theory's predictions cannot serve for justification; we must look to explanatory power for that.

12Ibid., 38-39.

13Scriven, "Explanation," 481.

14Ibid., 480, original emphasis.

15Ibid., 478.
While Little's argument regarding Marxian theory poses the debate about naturalism in the most straightforward sense of that term, comparing the methods of natural to social theory, it is not the only way the debate can be posed. Most analytic discussions of the applicability of natural scientific methodology in this regard assume that the model methodology is narrower than that found in the natural sciences. It is not the methodology of the natural sciences generally that is at issue but rather that exemplified in the pre-eminent natural sciences, physics and chemistry. It is in this sense that Scriven takes an anti-naturalist position vis-a-vis evolutionary biology.¹⁶

In Scriven's view, it is only in fields where the subject matter exhibits a characteristic simplicity of variables and consequent potential for comprehension under invariant laws that prediction and predictive testing play a role. Scriven's position here is related to his well-known views about the symmetry of explanation and prediction. Some subjects, he argues, though so causally complex as to be predictively opaque, are nonetheless the arena of perfectly adequate scientific explanations. The importance of Scriven's work on prediction in evolutionary theory is that it constitutes one of the few instances where the symmetry debate proceeds with sustained reference to a paradigm of scientific explanation. But he intends that his analysis be seen to apply to a wide range of "irregular subjects," the social sciences among them, in which scientific explanation is perfectly possible "even when

¹⁶Ibid., 477-82.
prediction is precluded."\textsuperscript{17} Thus, he attempts to discredit the view of Popper and Hempel that scientific explanation is tied essentially to prediction.\textsuperscript{18} Explanation and prediction do sometimes go together, he argues, but that is a matter of accident rather than rule.\textsuperscript{19}

4. Prediction in Hempel and Popper

Consideration of the principal contrasts and similarities between Hempel's and Popper's conceptions of prediction can clarify just what question must be posed regarding the relationship between scientific explanation and prediction. Hempel's covering-law model asserts that explanation and prediction are in effect the same process viewed from different temporal standpoints. Adequate explanations must exhibit a symmetry with predictions because forming the basis for prediction is a criterion of empirical adequacy for explanation. Since explaining an event is a matter of setting out the laws and conditions from which the event could be inferred, it follows that given just the laws and conditions one could have predicted the event. This follows from the conception of explanation under which it is fundamentally a matter of presenting argument. An explanation is an argument such that the premises provide reasons why the event described in the conclusion was to be expected. A criterion of a fully adequate explanation, then, is that its explanans statements provide sufficient conditions for its explanandum claim and that the

\textsuperscript{17}Ibid., 477.
\textsuperscript{18}Ibid., 477.
\textsuperscript{19}Ibid., 479.
explanans information "if taken account of in time, could have served as the basis for predicting the event in question." Thus whether an argument is an explanation or prediction of any event depends on one's point of view: before the event the argument reasons for it, after the event the argument offers causes and laws answering to why the event occurred.

Hempel's position that explanation and prediction share "the same formal analysis" (the symmetry thesis) has been widely criticized. None of these criticisms, in my view, cut very deep. Most of them are concerned to show that the putative symmetry does not hold universally (as, indeed, it does not). But the real question remains: does the thesis, though collapsing at the margins, nonetheless hold the middle ground in an illuminating manner? Does the covering-law model capture something important and essential about the relation between good scientific explanations (numerous, important and typical explanations) and prediction; namely, that explanation in terms of covering generalizations "may be expected to show a close affinity to scientific prediction"?

To this question the mere exhibition of cases where explanation sketches fail to predict, or engineered cases where predictive derivations from laws and initial conditions provide no explanatory insight does not

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21For example, an utterly non-explanatory empirical correlation, such as that planes require more time to take-off on days when nearby laundry takes longer to dry on the line, may give a good basis for predicting relative take-off times.

provide an illuminating answer. The substantial question remains untouched. Hempel has responded, adequately in my view, to such criticisms, and I will not review the discussion here. It is telling that in the case of one of the rare substantial criticisms of Hempel’s symmetry view based on an analysis of full-blown scientific explanation - Toulmin’s objection that Darwinian evolutionary theory though explanatory is non-predictive - Hempel’s cursory reply has proven to be correct. Hempel’s rejoinder in that case was that the apparent asymmetry flowed from asking for specific predictions from a theory that explains only generally, a theory that is unable for epistemic reasons to “account for the details of the evolutionary sequence.” As we shall see in this chapter, Hempel’s schematic response in this case has been shown to be correct by Williams, whose supportive analysis is now widely accepted.

Hempel’s understanding of the relationship between explanation and prediction points to a conceptual linkage between prediction and unification, in Friedman’s sense. Hempel recognized a form of unification and took it to be an aspect of the explanatory and predictive function of a theory. He recognized that

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23 Ibid., 367-74.

24 Ibid., 370.

25 Ibid., 370, emphasis added.


"theories have the function of establishing systematic connections among the data of our experience ..." he also saw that theories met this unifying function in degrees of comprehensiveness. Now, for Hempel, establishing this unifying, systematic connectedness among phenomena was equivalent to showing their derivability from the laws that figure in explanations and he took it to be possible and important to construct a measure of the unification, connectedness, or "systematic power"; a coefficient of derivational strength in effect:

Now it seems possible to compare different theories, at least in an intuitive manner, in regard to their explanatory or predictive powers: Some theories seem powerful in the sense of permitting the derivation of many data from a small amount of initial information; others seem less powerful, demanding comparatively more initial data, or yielding fewer results.29 The importance of the relationship between prediction and unification will become evident in the discussion of Darwinian theory.

As regards prediction, Popper's and Hempel's positions share a great deal, but exhibit a marked and important difference in emphasis. While Popper accepts the covering-law model, he locates the center of gravity of scientific methodology not in explanatory endeavor but in corroborative testing. Thus, while Hempel tended to discuss prediction as a reflex of explanatory endeavor, Popper set predictive testing at center stage. This feature gives Popper's general view of science a superiority to Hempel's in so far as it conceives science as centrally methodological rather than logical, as a dialectic of thought and practice rather than an exercise of explanatory endeavor.

28Ibid., 278.
29Ibid.
reason. In order to understand fully the nature of scientific prediction we must make a gestalt shift that brings working investigation into view and emphasizes the methodological role of prediction.

Popper's discussion of prediction arises because, for him, testing is the heart of science. That is, Popper thought that to be a scientific theory was to be such that empirical implications followed. This defined testability. Agreement of test implications with states of affairs was to be taken to mean that the theory from which they had been derived "has, for the time being, passed its test: we have found no reason to discard it." Popper understood clearly that temporal location of test events was irrelevant to this sort of testing. Testing involved, at the logical level, the derivation of singular statements from universal statements and statements about antecedent conditions. Thus from a law about the conditions under which thread will break, it follows that a given thread, suitably loaded, will break. This simple relation of following from, Popper says in effect, is what he calls "prediction." It is important to note that prediction here is taken in a wide sense. In its narrow sense, scientific prediction is a matter of forecasting occurrences in the objective field of a theory. For example, Darwin would predict in this sense if he foretold features of the evolving biosphere. It is this sense we generally recognize in the notion of pragmatic predictive success. However, a wider sense can be distinguished: here prediction is a matter of foretelling the results of theoretically motivated investigations into either

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30 Popper, Logic, 33.

31 Ibid., 60.
past or future events. This is the way Popper conceives prediction, precisely because his central focus is on theoretical endeavor:

The theorist is interested in explanation as such, that is to say, in testable explanatory theories: applications and predictions interest him only for theoretical reasons — because they may be used as tests of theories.\(^{32}\)

Given this focus on methodology, Popper takes prediction to be coextensive with test implication; the temporal relation of evidential events to theory is irrelevant:

The term ‘prediction’, as used here, comprises statements about the past (‘retrodictions’), or even ‘given’ statements which we wish to explain (‘ explicanda’);\(^{33}\)

Here Popper is indicating that the importance of prediction is not primarily a matter of illuminating the future. The core concept is methodological, the activity of testing by prediction as opposed to pragmatic prediction. In all this, Popper gives testimony to the simple fact that what is important in science is the dialectic between theory and scientific intervention.\(^ {34}\)

While Popper’s conception has the strength that it sets in relief the methodological role of prediction, it nonetheless does so at a price; that of portraying the divide between the justificatory role of formative and predictive evidence in such a way as to efface their essential continuity. This has the untoward consequence that any theory’s justifiability must decrease in proportion to the thoroughness of its formative theorists. Putting that complaint to one side, understanding the essential

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\(^{32}\)Ibid., 59n.

\(^{33}\)Ibid., 60n.

\(^{34}\)Ibid., 59.
interchangeability of formative evidence, evidence treated in the original effort of
theory formation, and predictive evidence, evidence corresponding to test
implications, is one of the conceptual keys to grasping the plausibility of the
symmetry thesis.

5. Critique of Scriven's Anti-Symmetry Position

Scriven and Evolutionary Prediction

Scriven's view is that Darwin was "the paradigm of the explanatory but non-
predictive scientist"35 inasmuch as evolutionary theory is perfectly explanatory
"although it is not committed to any predictions about the future course of
evolution."36 His argument in this regard is part of a wider attack on the symmetry
thesis and on the form of naturalism we are considering as P-T naturalism here;
namely, the view that scientific explanations are methodologically tied to predictive
testing. We can see asymmetry, Scriven says, in the fact that while evolutionary
theory can explain the "survival" of individual organisms, it could not have predicted
them because survival depends upon environmental factors and thus cannot be
predicted

...except in so far as we can predict the environmental changes. But we are
very poorly equipped to do this with much precision...37

We can nonetheless readily explain individual organisms' survival, and so:

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36Ibid., 481.
37Ibid., 478.
...there will be cases where we can explain why certain animals and plants survived even when we could not have predicted that they would.\(^{38}\)

I judge Scriven to be making a two-level argument: an asymmetry argument about the relation of explanation and prediction in Darwinian theory, supported by a sub-argument as to why Darwinian theory cannot predict. Thus his case has this form: We can point to things which can be explained by Darwinian science (survivals of organisms) but which cannot be predicted thereby. If we ask why this prediction cannot be made, we see that the reason has to do with tendency laws. The causation relevant to the occurrence of events typically explained by Darwin is complex, including factors which are predictively opaque. As a result of this opacity, we never get better than conditional predictions from Darwinian theory; no "actual", pragmatic predictions can be made and no useful predictive testing is possible.

The value in using an actual piece of theoretical science as proving ground for the symmetry debate is that it obviates the need to explicate precise criteria of explanatory adequacy. Given the agreed upon explanation provided by the theory, we can proceed directly to the question of prediction. This, however, is only satisfactory on the proviso that the inquiry begins from an adequate analysis of the theory's actual explananda. Scriven's use of Darwinian theory as a case to buttress the asymmetry thesis fails because he does not discuss the theory's ability to predict the sorts of things it can in fact explain.

\(^{38}\)Ibid.
Scriven provides no analysis as to why individual "survivals" should be seen as the object of evolutionary explanation and his choice seems completely at variance with Darwin's objectives. Why isn't the Linnaen taxonomy the explanandum? Or speciation? Or adaptation? His lack of analysis leads Scriven to stand the explanatory relationship in Darwin on its head. For, on its most natural construal, evolutionary theory offers survival of the fittest as part of the explanatory causal mechanism, the mechanism that gives rise to phyletic adaptation and speciation (which have perhaps the best credentials as evolutionary explananda). Putting that aside, the question remains: Does evolutionary theory, in fact, explain the survival of particular organisms? Since Scriven documents no cases, it is worth examining his own schematic version of an evolutionary explanation. In this regard, he claims that evolutionary theory might well explain that a certain organism survived a recent flood because it could swim:

It is not only true but obvious that animals which happen to be better able to swim are better fitted for surviving a sudden and unprecedented inundation of their arid habitat, and in some such cases it is just this factor that explains their survival. Now, it is possible, by way of generic explanation, to provide accounts of this sort. But we don't need evolutionary theory to do so, and this is indeed why the

39 Of course, there is no need to isolate a single explanandum here. In a theory as rich as Darwin's, it is evident that phenomena of varying sorts are explained. It still seems fair to say that if we were to ask what is centrally illuminated by The Origin of Species, then, as Darwin's title attests, it is the origination of species diversity via the process of natural selection that is exhibited.

40 Ibid.
explanation is "obvious." There is nothing distinctively evolutionary about this explanation. While this case may provide an instance where we can explain what we could not have predicted (and this must be shown, of course) it is not suited to the task Scriven puts it to: exhibiting the relationship between various facets of scientific method.

Scriven's Theoretical Position

Even if Scriven's case is insufficiently incisive in regard to Darwinian theory, a matter I return to shortly, we may still ask whether there is not a more serious challenge posed by the general theoretical position for which Darwinian theory serves here as a, however felicitous, proving ground. At the theoretical level, Scriven argues plausibly that the orthodox Hempelian account of explanation, because it gives universal laws too prominent a place, naturally invokes an explanatory and predictive symmetry which is only rarely the case. There are, he allows, areas of science where invariant correlations are prominent and where a consequent availability of universal laws means that explanations and predictions are symmetrical. But it distorts matters to treat these cases as paradigm:

It is natural enough that the logic of explanation should appear to parallel that of prediction. Sometimes it does. There are specific occasions, particularly in classical physics, when we explain and predict by reference to the same laws. But this is an accident, not a necessity, as it turns out.\textsuperscript{41}

\textsuperscript{41}Ibid., 479.
The supposed explanatory centrality of covering laws, he continues, led Hempel and Oppenheim to hold that lawful correlations were the basis of both explanations and predictions, to hold that:

... to predict, we need a correlation between present events and future ones — to explain, between present ones and past ones ...  

The problem with this formulation, Scriven argues, is a failure to notice a "gross logical difference" between explanation and prediction; namely, that while prediction depends on laws, explanation is fundamentally a matter of finding causes. But we can often find causes, and thus explain, in situations where no laws are available. More strongly, causes are commonly found where no strict correlations can be determined.

The logical key to the whole affair is that one can identify a cause without knowing what the conditions are which are necessary for its causal efficacy.

Predictions, on the other hand, must meet steeper fees: "Without universal law, it is not possible to make predictions." 

So, for example, we are often in a very good position to say that the cause of a fisherman's skin cancer was excessive exposure to the sun even though no law correlates such exposures with cancer. There are, in fact, far fewer such cancers than relevant exposures, presumably because other factors combine with exposure to

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42Ibid.
43Ibid., 480.
44Ibid., 481.
45Ibid.
produce the cancer. To make the logic of such situations evident, Scriven turns to a simple example, that of the explanation and prediction of paresis. Here the facts are that 1) we never find paresis other than in those who have contracted syphilis, and 2) very few syphilitics develop paresis. Thus, Scriven argues, we can explain any given case of paresis, \( p \), by pointing to the cause: syphilis. But if we had known in advance that \( p \) had syphilis, we could not have predicted the later paresis. Indeed, since syphilitics rarely develop paresis, we should predict that \( p \) will not get paresis.

According to Scriven, we typically explain in science incompletely. That is, we explain in situations where our understanding is partial. Thus, we typically do not have the sort of information which, known in advance, would ground predictions. We can explain a case of paresis with reference to prior syphilis because, even though we do not know in detail the mechanism involved, we know that paresis is always preceded by syphilis. Few syphilitics develop paresis, but still we can say "The only cause of paresis is syphilis," thus explaining what we could not have antecedently predicted:

Hence when \( A \) [syphilis] is observed, we can predict that \( X \) [paresis] is more likely to occur than without \( A \), but still extremely unlikely. So we must, on the evidence, still predict that it will not occur.\(^{46}\)

Here then we have the heart of Scriven’s position. Partial explanation, where incompleteness confounds prediction, is typical.

Naturally [Scriven continues] there are further questions we would like answered if we are research scientists, such as what the particular conditions are that, in this case combined with \( A \) [the syphilis] to bring about \( X \) [the

\(^{46}\)Ibid., 480.
paresis]. But the giving of causes, and of scientific explanations and descriptions in general, is not the giving of "complete" accounts; it is the giving of useful and enlightening partial accounts.\textsuperscript{47}

More strongly, Scriven holds, the sort of completeness-chasing suggested by Hempel's criteria of adequacy reveals a fundamental misunderstanding of science. In science every success in locating causes is relative; what appears at one stage as "complete" merely reveals another investigative frontier: "The search for a \textit{really} complete account is never-ending, but the search for causes is often \textit{entirely} successful ...\textsuperscript{48}

But do Scriven's cases support his conclusions? It seems right that we might explain, incompletely, the fisherman's carcinoma by pointing to the extreme exposure to sunlight, just as it seems right that we might explain a given case of paresis, incompletely, by pointing to prior diagnosis of syphilis. And in these cases, it is clear, our foreknowledge of either the exposure or the diagnosis will not allow for prediction. Closer examination, however, raises doubts about this easy divorce between the conditions for explanation and prediction. In the syphilis/paresis case, there are not two distinct diseases, but rather two stages of a single affliction. Both syphilis and paresis are caused by an infection of \textit{T. pallidum}, or, to be more precise, by the body's response to \textit{T. pallidum} invasion. When the organism affects only certain portions of the nervous system, syphilis is diagnosed. When the infection later spreads to the cerebral cortex and overlying meninges, paresis is diagnosed. Consequently, it is not clear that it is proper to say that syphilis causes paresis, any

\textsuperscript{47}Ibid.

\textsuperscript{48}Ibid.
more than, in the case of a common cold, we can say that an initial tightening in the chest causes a later inflammation of the nasal mucosa.

Putting that difficulty to one side, doubts still must remain about the worth of this case. The explanation of paresis by prior syphilis is obviously incomplete, at least. Granting for argument's sake that we do thus explain, the explanation is clearly relative to a specific question: Why do paresis sufferers have the disease, while everyone else does not? If we turn to the more probing question as to why one group of syphilitics as opposed to another group of syphilitics has paresis, prior syphilis provides no explanation; only a more complete understanding of the etiology will be explanatory in this case. Now it is not, first off, clear that the pursuit of more complete explanations in such cases is permanently vexed according to Scriven's principle that "The search for a really complete account is never-ending." The cause that explains paresis to the satisfaction of the paresis sufferer who wonders why other syphilitics have escaped his/her fate is that in his/her case the \text{T. pallidum} infection has spread, perhaps because he/she does not have a defence mechanism possessed by the others. But this explanation is symmetrical with prediction even though it is not complete in any ultimate sense. To know that individual \text{i} has a \text{T. pallidum} infection and that \text{i} lacks the bodily defenses (or other relevant mechanisms) which will prevent spread of the infection to extremities of the brain is to be in a position to predict paresis for \text{i}. This simply makes a point argued elsewhere by Scriven: the nature of the information that is explanatory in a given case depends on the nature of
the ignorance of the audience. Where all we need is information about the origins of paresis, a gesture toward prior syphilis will do. Where we need to know what distinguishes classes of *T. pallidum* carriers, more is required. However, and this seems crucial, it is clear that as we move from partial to more complete explanations, we move in the direction of predictability and symmetry.

A happier case for Scriven's position is the fisherman's carcinoma. Here the common language propriety of the explanation in terms of excess exposure to the sun is not in question: in a given case we might straightforwardly appeal to evident occupational exposure as the cause of the cancer. Once again, however, while this explanation is adequate relative to a concern as to why the fisherman has what almost everyone else lacks - cancer of exposed skin - it does not explain why this fisherman, and not relevantly exposed others, has the disease. Presumably, the latter explanation will refer to such additional factors as genetic characteristics, personal work procedures and environmental features that have combined with solar radiation to break normal control over growth in this fisherman's cells. Such a fuller explanation, if and when it can be constructed, would be symmetrical with prediction, as was the case for the fuller explanation of paresis.

Behind Scriven's position stands a conception of partial explanation in which necessary conditions can be explanatory, or, alternately, in which necessary conditions

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can be causes. The Hempelian view is that "adequate" explanation requires more, requires sufficient conditions. Hempel argued that a requirement of explanatory adequacy for any "rationally acceptable explanation" is that it answer a question of the form "Why did x occur?" by offering information which shows that x was to be expected "at least with reasonable probability." Such a definition of adequacy, obviously entails predictive symmetry. Thus, this debate turns on conceptions of explanation. For Scriven, "the search for [explanatory] causes is often entirely successful" even when it only unearths salient necessary conditions; pointing to such conditions may be "useful and enlightening." For Hempel, the likes of "excessive exposure to the sun" does not explain, not adequately, any more than my prior purchase of a ticket explains my lottery win. It would appear then that in large measure the debate could be resolved by recognizing that explanatory demands differ from situation to situation. It is true as Scriven says that often only cursory knowledge is required to fill the gap in our understanding and that such knowledge will be insufficient as a basis for prediction. Hempel is also correct to point out that more complete explanations will often be symmetrical with prediction. Furthermore, Scriven is clearly unduly pessimistic in this latter regard. His view that the search for "really complete" accounts is never-ending is less incisive here than it seems: the sort of asymptotic approach to completeness he depicts, however plausible it may be

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50 For Hempel's reply to Scriven's deployment of the syphilis/paresis case, see "Aspects," 369-70.


52 Ibid., 369-70.
regarding the general nature of scientific explanation, quite evidently counts for little in this context.

There seems no reason why explanation of paresis or industrial carcinoma that falls short of ultimate completeness should not be relevantly predictive, in the sense of providing a basis for expectation of at least "reasonable probability." In each of the cases Scriven offers to show normal asymmetry, we can readily point to the kinds of further knowledge that would allow for the more complete explanations which would serve as a basis for prediction. Pursuit of such "completeness," sufficient to provide for rational expectation, for prediction, is not a "never-ending" search. Quite the contrary, there is every reason to expect that the steady progress of the related disciplines will eventually reveal the factors which would allow us to predict individual cases of paresis and the events that lead to a specific carcinoma.

This review of Scriven's position, both his discussion of Darwinian theory and his theoretical argument, suggests that part of his strategy is to turn attention away from working scientific methodology. In the case of Darwin, he focusses not on the central explanatory endeavor but on side issues. In the case of occupational carcinoma and paresis, he focusses on cursory explanation, rather than on explanation in depth. To the extent that this does stand behind Scriven's position, turning attention back to a robust case of Darwinian explanation will aid the further evaluation of Scriven's argument. Accordingly, I turn to the analysis of a clear example of Darwinian explanation in order to address the question whether evolutionary theory can be considered naturalistic science in the specific sense of
availing itself of a certain methodology, namely the refining of explanatory hypotheses via empirical testing.

I now argue that this question must be answered in the affirmative. So as to bring out the essential plausibility of this claim, and to make evident the methodological relationships between explanation and prediction, I proceed first to an analysis of Darwin's coral reef theory. This analysis has the upshot that it is at very least not universally the case that Darwinian theory is restricted to conditional predictions and, hence, is predictively untestable. The case in question however, the coral reef theory, cannot be considered an isolated instance divorced from the rest of the Darwinian corpus. If that theory exhibits the methodology generally employed by Darwin, as Ghiselin argues, Scriven's case seems even more dubious.\(^5\)

Moreover, the work of Williams, Lloyd and Kochanski has shown that at least as far as methodological prediction is concerned, Ghiselin is right.\(^4\)

6. Explanation and Prediction in Darwin

I turn to an explication of a piece of Darwinian explanation that shows Scriven wrong on certain key points, wrong about what he takes to be the very paradigm of


an asymmetric theory. Contrary to Scriven, I argue that theories in "irregular subjects" must normally make and be tested by "actual," or unconditional, predictions. Moreover, conditional predictions prove perfectly useful methodologically.

During the Beagle’s travels in South America, Darwin was led to the belief that the entire southern portion of the continent had been elevated above sea level in recent geological time. He spent a good deal of time testing that hypothesis and found ample evidence for it. Patterns of surface erosion, the distribution of fossils, the degradation of pigments in fossil marine shells, etc., corroborated his conjecture. With that confirmed, Darwin reasoned that such extensive elevations must have counterpart subsidences covering other parts of the Earth’s surface. And this, in turn, led him to offer an explanation for the three species of coral reef: fringing reefs which hugged island shorelines, barrier reefs separated from the adjacent shoreline by lagoons, and atolls which appeared as rings of coral surrounding central lagoons. Darwin conjectured that adjacent to rising shorelines fringe reefs were formed as submerged coral was elevated above sea level. Adjacent to subsiding shorelines barrier reefs were formed as portions of the reef near the shore became submerged and covered with sediment deposits while seaward portions of the reef, beyond the reach of sedimentation, continued to grow outward and upward. Eventually, when low-lying, barrier reef-encircled islands sank beneath the sea, only the atolls were visible. The hypothesis, then, of widespread elevation and subsidence of the earth’s surface led to a subsidiary hypothesis concerning the formation of coral reefs from which Darwin derived a prediction: coral reefs would be found in only a certain
characteristic distribution. Species of reefs would be found not intermixed, but rather grouped by type over large areas. A subsequent review of existing geological data on the distribution of reefs over the Earth's surface confirmed the prediction and Darwin was able to prepare a map showing that, as Ghiselin puts it, "Within any given area, the type of reef is quite uniform." On the Beagle's return to England, Darwin presented his theory to Lyell who gave it his "immediate approval." In essence, Ghiselin claims, Darwin's theory remains the standard account to this day.

What is noteworthy here is that the theory of coral reefs, as Darwin had constructed it prior to his investigation of the data on distribution, predicted the occurrence of no specific reef, nor even the rough shape of a pattern of distribution. It could not make such specific predictions because it did not comprehend the totality of forces that produce reefs; it simply exhibited the mechanism that speciates them, that undergirds their simple taxonomy. And since it only explained what speciates reefs, since its explanation was thus specific and partial, it predicted in a specific and partial manner.

Symmetry in the Coral Reef Theory

The interplay of explanation and prediction here is clear and it suggests symmetry, at least superficially. We can see that the coral reef theory is methodologically predictive and that explanatory and predictive endeavors are co-

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resident therein. What exactly is the relationship here? What is the nature of the symmetry?

Based on Ghiselin's account, we cannot say just which South American observation first led Darwin to entertain the idea of continental elevation.\textsuperscript{56} We might suppose, for the sake of argument, that it was the stepped continental slopes that suggested a history of marine erosion during a process of stepped, or temporally punctuated, elevation. Now the elevation hypothesis, once formulated, predicts in conjunction with other processes known to be at work further evidence reflecting continental elevation such as Darwin finds in the differing level of fossil pigmentation, the differing diversity of fossil species at each level, etc. In this manner Darwin's investigation proceeded as a steady progress of unification; evidence and conjecture being knit together, certain states of affairs abductively suggesting hypotheses, hypotheses predicting further states of affairs.

Viewed under the methodological gestalt, then, the theory exhibits rudimentary symmetry in the sense that we can see in its genesis an explanatory and predictive symbiosis. Darwin's tentative explanation for stepped continental slopes - temporally punctuated elevation - naturally suggests a search for (that is, predicts) other evidence. For example, fossils of inter-tidal species at higher elevations must,

\textsuperscript{56}In Ghiselin's view, Darwin discovered elevation, in a conjectural manner, while in South America and then devoted energy to supporting the hypothesis. Ghiselin, \textit{Darwinian Method}, 18-22. Since elevation is not directly observable, we may assume that Darwin reasoned that elevation would explain evidence at hand.
by hypothesis, be more ancient. Together with what is known about the degradation of fossil pigment, a prediction can be derived about field observations; namely that fossil pigments will be less vivid at higher elevations. By such predictions the core theory can be tested. Darwin is now in a position to make a further, unifying, step. If this fundamental mechanism is at work, he can ask, how would it interact with the mechanism of reef formation? Clearly, the exoskeletal coral must be carried above sea-level and shoreward. Furthermore, if elevation in one geographic area is accompanied by subsidence in another, that too must have an effect on patterns of reef growth. In this manner, the explanation for the diversity of coral reefs grows out of consideration of the predictive consequences of the prior explanatory hypothesis.

To understand the symmetry relation more fully, we may consider how the theory would explain phenomena of various sorts and consider its predictive ability in each case. The first consideration relates to the phenomenon that clinched the theory for Darwin, and apparently for Lyell, that of the distribution of reefs, or the pattern of occurrence of different types of reefs. Prior to gathering the data, Darwin's theory allows him to predict it. Alternately, with the data in hand he can explain it. It should be noted, however, that Darwin can neither predict nor explain the whole of the data on distribution. Rather, it is a specific feature, grouping by type within large

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57 Of course, by testing here we are indicating planned forays into the field with the intention to assess theoretical implications. This is not the only means by which the theory can gain empirical support. A set of previously collected fossils could be arrayed according to collection site in such a manner that it is evident that pigmentation is inversely proportional to elevation. Later, it might be recognized that this data bears out a test implication of the theory. Not all support that corresponds to a test implication needs to flow to the theory by test procedures.
areas, he can predict and which he would have been able to explain had he stumbled
upon it. Darwin apparently used the data to prepare a map of reef distribution. It is
tempting to suppose that it is this map that he had been antecedently able to predict.
But this over-reaches, as does the supposition that, having stumbled upon the map
pre-drawn, he could have explained it thoroughly. Darwin can only explain the map
insofar as it exhibits grouping by type within large areas. Numerous other aspects of
the map - the specific shape of a given area of fringing reefs, the spatial relation
between a fringing and barrier area - are due to components of the reef production
mechanism Darwin does not grasp.

Nonetheless, what is salient for our present purposes is simply to observe that
the prediction in question allows the theory to be tested. It is a straightforward
matter to enunciate potential disconfirmatory findings: observed random
interspersion of reef types would have doomed the theory.

It might be thought that this symmetry at the level of pattern belies asymmetry
with regard to more specific phenomena. Surely, Scriven might argue, the theory can
explain things too specific to be predicted? There is something to this view, but not,
as I now show, as much as Scriven needs to put the rout to Hempelian symmetry.

Notice first of all that on the theory Darwin can both explain and predict
features of specific reefs. If he happens on a fringing reef, for example, he has a
ready explanation for it:
EXP 1: Fringing reef x occurs here because in areas where the sea bed is rising, coral growing in the shallows is gradually elevated above sea-level, thus forming a band of exposed reef at the shoreline, and here the sea bed is rising. Superficially, it appears that Darwin could not have predicted anything so specific as x, simply because the causal complexity that underlies coral growth is such that he cannot know just where the conditions will be met. However, this is a mistake. The question here is not whether Darwin can predict the occurrence of a given reef, but rather whether, given the occurrence of a reef, he can predict its type. This is because with the theory in hand, Darwin cannot explain the existence of x, except insofar as he can explain the existence of it as a certain type of reef. EXP 1, that is to say, is a proper response to "Why is this type of reef here?" not "Why is there a reef here at all?" But this is exactly what Darwin could have predicted if, as Hempel would have it, he had taken account of the explanans information in time. Thus, for example, knowing that there is a reef at x on the coast of South America, an area he knows to be rising, he is in a position to predict that it is fringing.

The temptation to make a purely verbal error here must be avoided. Since the coral reefs theory is incomplete in the sense that it does not comprehend the mechanism of reef production, but only of reef speciation, it is easy to claim that a) the theory cannot predict any specific reef. That is to say if we ask Darwin where we can find a reef as yet unknown to us, he cannot say. Yet it seems that, b) having observed any reef, Darwin can explain it. This looks asymmetric but in fact is not. Given any reef, Darwin cannot explain why it occurs where it does. He can explain why it is of the type it is, but not why it is here. He can, of course, claim vacuously
that this must be a coral growing area, but this is uninformative and explains nothing. All Darwin can explain, given this reef, is why it is of a certain type. Hence, the appropriate question is, could he have predicted beforehand that it would be of this certain type? And the answer to that question is yes, provided the theory together with available evidence indicates the elevation/subsidence status of the area.

We may, however, still suppose a case where Darwin could explain a given fringing reef, \( x \), but could not have antecedently known, for whatever reasons, either that there was or had been elevation at \( x \). As before, Darwin can explain \( x \) along the lines of EXP 1. He could not, however, have antecedently predicted \( x \). To predict any fringing reef whatever, he needs to know that there is a coral-growing site where elevation has occurred, and this by our supposition he does not know. It seems quite straightforward that Darwin can explain \( x \) if he comes upon it. Given the theory and \( x \), he explains via EXP 1. EXP 1, of course, embeds the claim

1) Here the sea bed is rising,

which on our hypothesis cannot be known independently: Darwin’s only grounds for 1 are the theory and \( x \) (1 is in fact a prediction of the theory, given \( x \)). 1 is obviously essential to the completeness of the explanation and it is equally obviously the information necessary to the prediction of \( x \) and, as Scriven might wish to point out, there will be cases such as the one hypothesized here where we can explain what we could not have antecedently predicted. Moreover, while we do not here have independent warrant for 1, we may have excellent rational grounds for it just in case
the theory is highly confirmed and we observe $x$. Thus, while unable to predict $x$, we can provide sufficient conditions explanatory of $x$.

There is however a fly in the ointment from Scriven's perspective. For though it is true that the most we can do by way of prediction here is to frame what he calls conditional predictions (e.g., if elevation, then fringing reefs) and hope to unearth independent indicators of elevation, still such predictions are perfectly useful from a methodological standpoint. The only problem posed by the restriction to conditional prediction here - that is, the problem of the absence of an indicator of elevation - is a technical one, one that is a commonplace of normal science. If we can solve that problem (as Darwin was able to do in at least one area: South America), we are in a position to test the theory predictively with respect to specific phenomena.

Thus, while Scriven is right that there can be cases like this where we can explain what we could not have antecedently predicted, this does not undermine the universality of Hempelian symmetry. For, Hempel can claim, as he has in response to such cases, that all that his thesis asserts is that where there is adequate explanation of a phenomenon, prediction is in principle possible. That is, if explanans information had been known in advance, it could have served as the basis for prediction. To this Scriven has replied that "in principle" is used here illegitimately. In such cases it

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... is a somewhat unhelpful sense of "in principle," since until that day when everything is predictable, there remains the fact that we can often explain what we could not predict, and surely this feature should be mirrored in any analysis of these notions.\textsuperscript{59}

However, I see no reason why Hempel cannot reply that this use of "in principle" in fact mirrors an important feature of scientific methodology, namely that momentary inability to predict the antecedents of conditional predictions often constitutes a motive to devise the means to do so in order to test theories. In the case at hand, Darwin can test his theory if he can devise a ready indicator of elevation. The issue, \textit{pace} Scriven, is not the prediction of "everything," but only the prediction of the relevant specific antecedents. That, of course, is often \textit{practically} impossible for epistemic reasons relating to causal complexity.\textsuperscript{60} But such practical constraints, where they constitute an impediment to a crucial test, may for that very reason become the focus of the whole of the research effort.

I have used the coral reef theory because its relative simplicity allows for clear exposition of the relevant conceptual relations. But the results I have established there are more than fortuitous. They can be established quite generally for the mature evolutionary theory. There too Darwin is able to abstract from the complexity of causal relations and to illuminate theoretical relationships that are symmetrical as to explanation and prediction. As Williams has shown, evolutionary theory explains

\begin{itemize}
\item \textsuperscript{59}Scriven, "Explanation," 480, original emphasis.
\item \textsuperscript{60}There may be cases where such prediction is impossible \textit{simpliciter} due to causal indeterminacy. In these, of course, the universality of Hempelian symmetry would collapse.
\end{itemize}
and predicts phenomena at a certain level and is susceptible of predictive testing at that level. It predicts, for example, that fossil remains will exhibit a certain pattern: fossils morphologically intermediate between two species will be found to be dated at times intermediate to those species. This is a straightforward prediction by which the theory can be confirmed. The theory is not about Scrivenesque particulars; it is about general patterns and where these are patterns of past events, they are in at least numerous cases methodologically predicted. The theory makes such predictions about findings concerning past events and it also makes and is confirmed by predictions of events lying downstream from its formation. Williams, for example, shows that the formalized theory predicts a certain pattern of distribution among existing natural populations in different stages of speciation. Given appropriate statistical and genetic techniques, this prediction is testable and testing it constitutes a field of active research in contemporary evolutionary biology. Scriven’s conclusion as to the asymmetry in evolutionary theory arises, Williams argues, from a failure to understand the ontology of evolutionary biology and, hence, a failure to identify correctly the phenomena predicted:

Patterns are the subject matter of biology ... [Biologists] test, revise and reject hypotheses on the basis of predictions about such patterns.61

That prediction in biology is less concerned with datable or clocked events than with patterns does not mean that it is any the less serviceable from a justificatory perspective. Williams, moreover, has provided a convincing

61Williams, "Falsification," 534. See also Hull’s, and apparently Peirce’s, similar views, David Hull, Philosophy of Biological Sciences (Englewood Cliffs, N.J.: Prentice-Hall, 1974), 58-59.
demonstration that deriving and testing predictions like these constitutes the typical activity of normal science within the Darwinian paradigm.62

No one can deny the merit in Scriven's referring to evolutionary biology or sociology as "irregular subjects" relative to physics and chemistry. No doubt the existence of a wide range of irregularity producing factors in the object field of the former subjects makes for epistemological indeterminacy and for methodological differences in comparison to the latter. Yet clearly these differences do not extend to the key practice of predictive testing. Despite the greater complexity of biology it is possible to apprehend regularities that form the basis of explanation and prediction.

7. Discussion
Prediction in Causally Complex Fields

Certain preconceived notions must now be laid to rest. Both Little and Scriven hold that in complex fields predictions can only state what tends to be the case and that, hence, they do not prove serviceable for confirmatory purposes. The reasonable reply here is now obvious in both the case of the labour process theory and in Darwinian theory. The labour process theory predicts a pattern available in aggregate data by which it can be assessed. If the pattern observed by Braverman via his labour force demography argument showed a declining share of degraded jobs, the theory would have to be considered disconfirmed. On the other hand, the

observable pattern which pairs the maturation of capitalist relations of production with both absolute and relative degradation, in the aggregate, confirms the theory.

Predictions in causally complex fields like evolutionary biology are not always conditional predictions. Some are, of course, and Darwin's coral reef theory generates such predictions: If there is elevation and coral growing conditions are met, then a fringe reef will occur. Even here, however, pace Scriven, the prediction is methodologically useful: it functions as the basis of a test for the theory. A coral growing area that was demonstrably undergoing, or had recently undergone, elevation and yet lacked fringing reefs would undermine the theory. But the theory's prediction that reefs will be found grouped by type over large areas is not conditional; it is an unconditional statement about what will be observed about the distribution of reefs. As Williams' work shows, this same conclusion must be extended to the whole of evolutionary biology. Causal complexity, and epistemological indeterminacy, whatever their methodological import, do not disturb this basic feature of scientific justification.

There is evident in Darwin's coral reef theory an interplay of explanation and predictive testing. Whether any given evidence is either explained by the theory, confirming it during formation, or is subsequently confirmatory by way of predictive testing seems fortuitous. In fact, the very line between formation and test seems quite arbitrary. Does the work on coral reefs confirm the elevation/subsidence theory or is the hypothesis of elevation and subsidence part of the formation of the coral reef
theory? Explanation and prediction appear here to be merely aspects of a single investigation.

Nonetheless, methodological analysis of the coral reef theory does make evident what must be the normal relationship between adequate scientific explanation and prediction. For example, if the hypothesis of continental elevation explains the uniformity of continental shelves, then the shelves confirm the hypothesis because, when taken together with auxiliaries concerning marine erosion, torrential fanning, etc., they bear out an implication thereof. But if we, plausibly, assume that any theory will only explain part of the evidence relevant to it at the formative stage, then the theory must predict, in a logical sense, as-yet-unexplained evidence. That is to say, the only cases in which a theory does not predict test evidence (beyond replicative evidence) will be one in which initial research is exhaustive. Barring that, however, the theory must be predictively testable. Had Darwin not, as part of the original construction, explained the degradation of fossil pigmentation according to elevation, that evidence would remain as a potential ground for predictive confirmation.

To search for an explanation for a given phenomenon is to raise the question: for what hypothesis or theory is this phenomenon evidence? Or, to put the same thing another way, what theory would be justified by this phenomenon? We may suppose that Darwin noted the uniformity of stepped slopes at various of the Beagle's South American ports-of-call, and was concerned to explain them. The hypothesis he
found was temporally punctuated continental elevation. Darwin could, and did, go on to derive further test implications. Given the hypothesis, which already had the explanandum data as evidence, it would be found that fossil shells deposited at higher elevations were older, a matter evident in the more advanced degradation of shell pigments. Subsequently, as we have seen, Darwin proceeded to cast his theoretical net further, binding data about diversity of fossil species and the distribution of reefs into a growing explanatory nexus.

Two aspects of this methodology can be noted. First, there is an evident progression of unification here. Darwin's theoretical work steadily incorporates a widening range of observable phenomena, moving from geological data, to fossil evidence, to biological systems. Secondly, it can be seen readily that the temporal order of the evidence in the unification process is theoretically flexible; how the theoretical events are sequenced is in large measure arbitrary. Darwin could have begun, for example, with the fact of increasing fossil pigmentation at successively lower steps as an explanandum occurrence, hypothesizing that this was explained by earlier fossil deposition on steps of greater elevation. This could have led to the test implication that steps were formed by marine erosion during punctuated continental elevation and to a search for evidence, say the presence of continent-wide uniformity of the steps. The simple lesson here is that the nature of evidence, as regards its division into formative versus predictive, is a matter set by patterns of scientific curiosity. Outside of the psychological satisfactions related to such patterns, the distinction is artificial.
There is no essential difference between formative and predictive evidence. They are interchangeable according to the fortunes of patterns of discovery which are determined by social and technical developments. The evidence which responds to test implications of a theory and the data which prompt the theory's formation are of a piece from a justificatory standpoint. To explain a striking phenomenon is to construct whatever would have antecedently predicted that phenomenon. To predict theoretically is to posit a description of evidence for which an hypothesis or theory is explanatory. This being the case, it seems extremely implausible that there might be methodologically non-predictive theories; unless, of course, there is no justification whatever for the theory, i.e., it does not in fact explain. But given that the issue is the symmetry problem, the question of the relationship between scientifically adequate explanation and prediction, it must be the case that theories enjoying evidence can be tested via methodological prediction on pain of having no unificational prospects whatever, due to an original formative exhaustion of relevant evidence.

With this in mind, we can return to Little. Marxian theories are justified by evidence on his account and thus meet the primary criterion of scientificity. This evidence, however, is drawn from contemporary sociology and from historical data available to Marx. Further evidence of a predictive sort is a) not possible for epistemic reasons and b) unnecessary because of the ample non-predictive evidence Marx has at his disposal during theory synthesis. One possible interpretation of Little's discussion would be that Marxian theories are asymmetrical in the sense that they can invoke support only from evidence available to Marx, not from the research
of later investigators. However, it seems unlikely that Little would wish to argue such an extreme view. He would not, we must suppose, want to deny that, for example, later investigators might be able to review Marx's own historical and sociological sources and examine whether or not they really provide support for Marx's theories. Little explicitly commits himself to a less implausible view, namely that Marxian theories "cannot be evaluated through the truth or falsity of its predictive consequences," a thesis that must be discarded in the light of analysis of the labour process theory. Nonetheless, inasmuch as he systematically avoids discussion of any justificatory assessment of Marx's work in terms of later researcher's efforts, the possibility of such an evidential asymmetry is left before the reader. It is thus worth observing that such an asymmetry seems implausible. It is hard to see how an extreme asymmetry position like this can be any more true in regard to Marxian theory than it can be in regard to the coral reefs theory. It could not be the case that Darwin's theory might be justified in positing elevation and subsidence as the fundamental causation speciating reefs and yet not also be the case that evidence for further elevation and subsidence be correlated with relevant patterns of reef formation. Even were the elevation/subsidence process to cease, the fact would be detectable on the theory in the cessation of specific processes of reef formation. The same applies to the labour process theory. Marx locates the basic causation in capitalist social relations of production. If he's justified in that regard, then, on the condition of a prolongation of those relations, the relevant forms of degradation are predicted.

63Little, *Scientific Marx*, 171.
In either case, the process is best understood as one of theoretical unification in which evidence is drawn into an expanding hypothetical matrix. Therein, the processes of explanation and test implicational prediction are intertwined so that the distinction between them is evidently quite artificial. To construct an empirically adequate theory, one which exhibits what Little regards as primary scientific justification, is simply to devise hypotheses which antecedently would have predicted explanandum phenomena. To proceed from such an initial explanatory theory to testing just is to engage in methodological prediction. Finally, on the assumption that the fundamental causation posited in explanations is temporally uniform, it cannot be the case that a theory whose test implications can be corroborated by past occurrences does not also stand to be corroborated or disconfirmed by future occurrences. Of course, neither natural nor social causation is eternally uniform but rather epochal in nature and so the assumption of temporal uniformity is only met to some relative extent in any given case. But Little could not avail himself of the epochal nature of social ontology in order to argue that the transitoriness of social regularities renders prediction impractical. For, Marx's own view that he was demonstrating causation basic to capitalist social relations entails the empirical commitment that at least insofar as these social relations are durable, certain labour process effects will obtain. Capitalist social relations of production might, of course, cease to obtain or change their nature in some fundamental way. But if such forces as state intervention or general social discontent were to effect a large-scale change in labour process development contrary to degradation, that would only show that Marx's original
explanation was wrong, inadequate in its characterization of the forces fundamental to capitalist society.

Aspects of Symmetry in the Labour Process Theory

It is crucial to Little's conception of non-naturalistic Marxian theory that the causal complexity of social life allows Marx only the formulation of tendency laws and, consequently, tendential predictions which do not allow for predictive testing because they are consistent with the occurrence or non-occurrence of predicted phenomena. Thus otherwise scientifically adequate explanations have no clear or useful predictive consequences for Marx. Clearly, this does not apply to the labour process theory's prediction vis-a-vis the general pattern of labour process evolution shown in Braverman's data. Braverman takes the "underlying dynamic" posited by the original theory through a painstaking up-date, showing in the process how the manifold of novelty historically subsequent to Marx is the result of the processes Marx identified as effective causes, showing how the theory explains new striking features of twentieth century production. Posing the question of explanatory and predictive symmetry, it seems clear that as regards the broad pattern of labour process development the original theory is both explanatory and predictive. The theory clearly predicts that the spread and maturation of capitalist relations of production would have the degradation of work as a causal consequence. This hypothesis is confirmed within relevant limits by the evidence and is in turn explained, on the theory, by derivation from other generalizations (hypotheses 1 - 5,
chapter III) and conditions (the spread and maturation of capitalist relations of production).

But what of more specific phenomena? It would appear that the theory can explain more than could have been antecedently predicted with its use and that this might provide some resonance with Little's position. I now examine in a preliminary way two instances of more specific twentieth century phenomena which the theory clearly explains and consider its predictive ability in regard to them. While it might appear initially that in such phenomena we have the sorts of entities that can be explained but not predicted under Marxian concepts, I want to show that this plausible view is less than compelling.

A clear instance of explanatory application of the original theory is the explanation of clerical work. Clerical workers, the largest contemporary labour force grouping, Braverman explains, arose for a variety of reasons, some exogenous to the theory, some integral to it. The major cause for the rapid growth of clerical workers is the separation of conception and execution, a process endogenous to the theory. Corporate bureaucracies with their large clerical staffs, Braverman argues, came into existence as a means of organizing conceptual work appropriated from production workers. As more and more conceptual functions were taken over by owners, it

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64 Obviously, for neither the explanation nor the prediction here are we concerned with deductive relationships. Hypothesis 6 is both explained and predicted only by reasonable inference from hypotheses 1-5, themselves propositions for which evidence can be provided. I leave this matter unanalyzed, with the previous chapters' analysis as supporting testimony.
became necessary to, first, hire and divide labour among managers, and, second, divide and streamline managers' work among ranks and files of clerical workers.\textsuperscript{65}

To this burgeoning conceptual workforce managers swiftly applied the principles discerned by Smith, Babbage, and Taylor. Hierarchies of information-handling office workers, graded by education, training, competence and, thus, wages, became the characteristic shape of bureaucratic workforces, mimicking the fine labour divisions already implemented in goods production. Moreover, these hierarchies were markedly polarized: the upper ranks filled with relatively few accountants, engineers, and systems programmers, and the vast majority consigned to lower-echelon, routinized, machine-feeding tasks. The theory explains why the rapid growth of the clerical workforce should be accompanied by a process of internal differentiation and structuring of this sort.

\textsuperscript{65} Forces exogenous to the theory, forces like the growth of state services (and their attendant bureaucracies) and the growth of new economic functions like marketing (and their attendant bureaucracies), also contributed substantially to the growth of clerical workers. Even here, however, the theory can be called upon for partial explanations. The growth of the state, for example, is explained in part by the collapse of rural, self-help economy occasioned by technologically mediated productivity advances in agriculture and the attendant depopulation of the countryside and the similarly technologically mediated collapse of home-based production and exchange. These demographic shifts gave rise to demand for government provision of services formerly produced in rural communities. At the same time, the decline of the rural economy explained an expansion of marketing functions driven on by the increased ability of factory technology to out-perform handicraft and home-based production.
The theory, then, can readily explain both the occurrence of the contemporary clerical workforce and the nature of its work. However, it seems quite implausible to suppose that the original theory could have predicted anything of this degree of specificity. Certainly the vast corps of modern clerical workers are not directly countenanced in the mature, *Capital* version.

Nonetheless, it can be observed that the clerical phenomenon is at least implicitly forecast there in an approximate manner. For, the explanation we have reviewed is, when simplified in the extreme, that the clerical occupations and the nature of their work are the effect of two general principles: a) separation of execution and conception, and b) the Babbage principle. Application of (a) yields the conceptual workforce to which (b) is applied. These are, to follow Hempel loosely, the laws which cover the phenomenon in question and together with statements of initial conditions (the maturation and increasing prevalence of capitalist relations of production in the monopoly phase, for example) explain it. Now, as to predictive symmetry, Hempel would say simply that if it could have been known in advance that there would be separation of execution and conception, and Babbage fragmentation, then, along with the relevant initial conditions, they could have served as a basis for prediction. Moreover, within appropriate limits (a) and (b) were known in advance, and the tendency of capitalist economy to the sort of large-scale centralization seen in monopoly corporations was well understood by Marx.
To summarize the results thus far, then, it appears that we should say that the theory exhibits symmetry at the level of aggregate data on the overall pattern of labour process evolution but that symmetry at the level of more specific phenomena is less clear. Moreover, the theory, it would appear, cannot be either confirmed or disconfirmed by data on a specific occupational group, such as clerical workers because, insofar as the growth of the clerical workforce is at issue, it is simply not clear that the original theory so predicts, and because, insofar as the nature of clerical work is at issue, it could be the case that the group exhibits degradation as an exception, rather than as the rule. Data on a specific occupational group, like clerical workers, is evidence for the theory, but only in conjunction with other data demonstrating that the group represents a case of what is increasingly the rule. In this sense it is true that the tendential prediction represented by the degradation hypothesis is consistent with either the occurrence or non-occurrence of cases like clerical workers.

What of even more specific phenomena? Marx's theory stated in advance at very least the increasing generality of degraded work but this feature of contemporary social life is general as opposed to specific. The telephone operator, on the other hand, with whose work and technological setting we began our account of the theory in chapter 2, is just the sort of work/technology configuration explained by the theory, explained as the upshot of the underlying mechanism the persistence of which is predicted. It seems equally clear that given the mechanism posited by the theory, work/technology configurations of this type can be predicted. That is, the
theory predicts the increasing availability of phenomena with those general features exhibited by the telephone operator.

While the specific phenomenon of the telephone operator’s job is apparently one far too specific to be predicted by the theory, a closer examination tends to dispel this sense of asymmetry. The work/technology configuration of this job is readily explained by the theory. At first glance what the theory predicts, however, is not this job with this feature but rather the generality of jobs of this type. Jobs with these abstract characteristics, that is to say, should be found to be typical, as indeed they seem to be. This is a straightforward consequence of the symmetry the theory exhibits at the abstract, or aggregate level. It predicts, that is, a tendency, an economy-wide pattern; something only observable in aggregate data, and this allows the theory to predict types statistically. The theory thus seems to be more explanatorily robust than it is predictively.

But having dismissed the theory’s predictive function in this regard, the question arises: does the theory really explain the operator’s job as a specific set of practices and relationships? Does it explain, for example, that the operator calls up a new task by the simple act of terminating a prior task, that her work is thus paced by the machinery? The answer seems, at first glance, to be yes. It explains this technical configuration by covering it with a generalization to the effect that work that is paced technologically conforms to basic injunctions characteristic of the causal mechanism. However, there appears to be a greater specificity of explanatory capacity than
predictive capacity only because the covering relation is indiscriminate: every instance of technologically-paced employment, and these vary descriptively over a wide range from work on assembly lines to telephone operators' jobs, is covered by this generalization. This is because covering is inherently a one-many relationship, a matter of marshalling tokens under types. So while the theory can explain a wide range of quite different work processes, it does so by applying the same explanation to each case whose features can be classified (shown to be instances of more abstract categories) under certain types themselves basic terms of the theory. A given case can be explained by the theory precisely to the extent that it is properly describable as possessing abstract features for which the theory offers an account.

This leads on to an important distinction: that between explaining specific events and explaining the specifics of events. While a covering generalization may explain a wide variety of detailed occurrences, it does not necessarily explain the details of the occurrences. Detailed events are often explained only as types. Specific features of the telephone operator's job are only illuminated by the theory to the extent that they are instances of more abstract properties which are explained therein. The theory, that is to say, explains that the operator calls up a new task by the simple act of terminating a prior task as an instance of a type of machine-pacing, as a token of a theoretically relevant type, and this pacing is, in turn, explained as a type of control.
Thus the apparent explanatory power of the theory relies on those theoretical activities involved in the work of ground-level investigators in which specific details of phenomena are related to theoretical generalizations by a bridging procedure. It is, so to speak, the direct empirical enterprise under which specific details are descriptively judged as belonging to classes explained by the theory that allows the theory to have its broad explanatory reach. The direct empirical investigation, of course, can quite evidently judge a given token to fall under a given type without being able to give an account of the causation specific to the situation which leads to the token. The genesis of the hard and software and related work rules that structure the operator’s job may be a closed book to the investigator who nonetheless reasonably classifies the work process as "control via machine-pacing" by inspection. Since the explanation can proceed, then, in ignorance of fine causation specific to the explanandum process, it would appear that explanation needs less than would be required for prediction. Notice, however, that this says nothing more nor less than that the explanations at issue are always in some measure explanation sketches: they indicate that a thorough investigation would presumably be able to actually trace the causal genesis of the operator’s job as the upshot of specific decisions and technical processes, themselves in accord, or at least not inconsistent, with the theory. Were such specific explanation available, it seems likely that the explanans, if they had been taken into account antecedently could have been the basis for just the precise sort of prediction that would count as predicting the specific job. If, finally, this line of reasoning is sound, it would suggest that we might well go beyond the overthrow of Little’s view at the level of pattern predictions. In principle, it would seem, there
is no reason why the theory should not predict and be confirmed by processes in specific industries and firms.

The initial sense of asymmetry as regards specifics, then, is more apparent than real. The theory predicts only types (and those conditionally) but it also explains specifics only as types (and those only when relevant conditions are given). This, it seems to me, offers a partial answer to the question how is it possible for social theories to predict? The answer is: they predict abstractly, just as they explain abstractly. The crucial consideration needed to understand the predictive confirmability of a social theory concerns the concept of the relevant level of abstraction at which the theoretical object is characterized and observed.

Tendency Laws and the Labour Process Theory

The doubts and arguments that lead Little to reject a P-T naturalist reading of Marx are as unfounded as Scriven's view of Darwin. Reliance on tendency laws in explanation does not place the labour process theory beyond the pale of methodological prediction any more than Darwin's reliance on less-than-universal laws so impoverished his methods. Marxian theory is predictive both pragmatically and methodologically; as with Darwinian biology, the normal science proper to it consists in the derivation and testing of predictive consequences.

Marx's explanation of the degradation of work proceeds by showing the regularities that arise under certain social relations and how these constrain the
evolving nature of work so that it is steadily denatured, in the sense denoted by "degradation." In chapter III, we saw that the explanation proceeds in outline as follows.

Capitalist producers confront one another in a socially regulated matrix of competition and can only appropriate surplus by maintaining themselves in a race for productivity gain and labour cost reduction. This is not a freely chosen ambition; in a setting of capitalist institutions, its pursuit is a matter of do or die. An enterprise that fails to meet this injunction must eventually be underpriced and driven from the market wherein alone the process of surplus appropriation can be completed in the form of a cash return on investment.

In order to maintain their enterprises in a state of market viability, capitalists must gain control over innovation, the disposition of labour, and production costs by delegating authority for innovation and control to managers and by creating a body of productive wisdom controlled by them. Again, this is not a freely chosen ambition, not one option among many. Given the value-transferring nature of the productive mechanism, given its inherent attribution of wealth to capital, the motivational force that might be derived from workers' self-interest in production is not available to the firm. Alienated workers cannot be relied on for the sort of restless innovation and stern labour discipline which alone can keep the firm ahead of its rivals. The innovatory function has to be gathered unto the capitalist and labour discipline has to be motivated artificially. Both entail managers.
Because managers must motivate, by whatever means, work that is foreign in the sense of designed apart from the interests of workers, and because the criterion of managerial effectiveness is in large measure reduction of costs, labour costs among them, managers put a premium on innovation which decreases dependency on knowledgeable, autonomous workers. This is not a matter of aesthetic preference. In fact, the prevalence of low-skill, routine jobs may personally disgust the manager. Nonetheless, those are the kinds of jobs easily measured and, hence, easily paced through supervisory pressure; those are the jobs readily filled out of the pool of common and inexpensive labour. Again, this is a matter of necessity (tendential social necessity, of course), not free choice.

The goal of corporate appropriation of productive knowledge (so as to be able to control the innovatory function and so as to reduce reliance on worker competence) is achieved through expansion of research and development, through corporate science. This, along with the more general urge to reduce labour costs, puts a premium on mechanization and the embedding of productive wisdom in machinery. The causes of capitalist mechanization, then, are injunctions determined by a specific institutional setting. Machines can undermine strikes by reducing the need for experienced labour, by threatening strikers with ready replacement from the ranks of the unskilled. Machines can cut labour costs by substituting common for trained labour. Such virtues set the design criteria for new technologies.
The upshot of the above drives, motives, and institutional constraints is a general lowering of the working knowledge demanded by, and the labour control allowed by, typical occupations.

There can be no doubt that this explanation appeals to tendency laws, to laws that state what happens typically, with exceptions of varying degrees of significance. This has its roots in the nature of social causation: the relevant regularities are mediated by human decision-making, collective or individual, and possess the stability they exhibit as typical relations simply because agents are institutionally constrained to take certain factors into consideration and, having reason to take such constraints into account, will do so normally, but not universally. The decisions entrepreneurs, managers and workers make are never rigidly enforced upon them: they may deviate from what is, from an institutional point of view, rational. Moreover, what is rational in this sense may frequently change as abnormal economic and social conditions develop. One general pattern within the field of the labour process theory, for example, is pursuit of increased productivity via technological innovation. It is well known, however, that one of the common negative features (from the standpoint of conventional economics) of a glut of cheap labour is the arrest of technological investment. Under such conditions, capitalists can secure financial efficiency without being greatly concerned about labour-time efficiency, if wage rates give them a market edge. Thus the "law" of technological productivity is not rigid, not universal. To take an example even more to the point, various firms have
attempted experiments in labour process up-grading.\textsuperscript{66} Obviously, no iron law forbids such, but the fact remains that such experiments are "experiments" in the sense of special endeavors. They are few in number and typically short-lived. Degradation tends strongly to be the rule.

Thus we can readily grasp that the mechanism set out in Marx’s theory is fraught with unpredictables as Scriven and Little would have it. Nonetheless, this does not prevent the framing of predictions at the appropriate level which allow the theory to be tested. Like the coral reefs theory, the theory does not predict what will occur in a detailed manner, at the enterprise level at specific times, but it does predict a broad demographic pattern: a reduction in the control allowed by and the competence required by working-class occupations and polarization of such control and competence across the occupational spectrum. This is why Braverman’s labour force demography argument constituted such a decisive contribution to the contemporary research and served as a spur to further research; it was the first thorough assessment of the broad pattern predicted by the theory.

Prediction of the Degradation of Work: The Marx-Braverman Relationship

I have argued that the labour process theory evolved from an Hegelian version, first glimpsed in 1843 writings and seen most clearly in the 1844 Manuscripts, to a political-economic version, seen in outline in Wage Labour and

Capital and fully developed in Capital Volume I. Marx, however, retained an Hegelian sensibility and so continued to see the political-economic progression as a roughly dialectical process. So while there was a shift from Hegelian regularities\textsuperscript{67} to political-economic regularities,\textsuperscript{68} Marx retained a sense that history exhibits an organic unity. Thus, the progression of the labour process is one of organic maturation, a traverse from germinal manifestations to mature, fully ripened forms. And the maturation here is animated by inner contradictions which must reach a zenith of dialectical tension before they can be resolved.

Marx is predisposed to view capitalist production, and the path of the labour process within it, as moving from germinal to mature status. Moreover, he brings to this scenario the view that the system will endure until some peak of productive development is reached. He outlines three phases of this progression, including the last phase within which his own work takes place. He generalizes the as yet germinal manifestations of that last phase, based on his conception of the mechanism that gives rise to them. These as yet minor signs, he says, will mature and deepen. Capitalism's advance, the maturation of its essential tendencies, will bring this

\textsuperscript{67}Workers "objectify" or "externalize" themselves, translating internalities into externalities. Since the material product of their externalization belongs to capital, workers "alienate" themselves. Thus "universalization" proceeds in a distorted fashion, with universality accruing to capitalists and "negation" accruing to workers.

\textsuperscript{68}The capitalist strives for competitive edge via increased "productive power of labour" won through "greater division of labour" and "constant improvement of machinery." The result is "labour simplified" as it becomes ever more like "any other commodity."
mechanism into greater prominence and the trend to degradation will spread and 
mature.

It is this view that Braverman tests against contemporary data. Marx 
confronted a mid-nineteenth century economy in which capitalist labour covered only 
a minority of the working population. If his view of the mechanism at work in such 
an economy is right, we should find that with the spread of capitalist relations of 
production to cover more and more of the working population\(^{69}\) there should occur 
a spread in degradation.

This is what Braverman finds. Marx, Braverman says, developed his own 
account of the dynamic at work beneath the manifestations of the labour process by 
generalizing over the relatively "meager instances [of capitalist labour processes] of 
his own time."\(^{70}\) In the subsequent century, Braverman says, the working of the 
dynamic has become more prominent and at the same time the depth and extent of 
degradation have increased:

Marx completed this work in the mid-1860s. During the past century this very 
same dynamic has been far more powerful than the manifestations of it which 
Marx witnessed in his own lifetime...\(^{71}\)

\(^{69}\)This is itself a matter predicted by Marx: the superiority of capitalist forms of 
production, in terms of productivity and price, as well as quality of product, would 
tend to eclipse non-capitalist forms.

\(^{70}\)Braverman, Labor, 9.

\(^{71}\)Ibid.
Braverman regards Marx's original theory as possessing a "prescience": subsequent changes in production have been "remarkably faithful" to the analysis.

So well did [Marx] understand the tendencies of the capitalist mode of production, and so accurately did he generalize from the as yet meager instances of his own time, that in the decades immediately after he completed his work Marx's analysis seemed adequate to each special problem of the labour process, and remarkably faithful to the overall movement of production.\(^72\)

The analysis was not only accurate in its characterization of those immediate decades; as Braverman's research shows, it was equally accurate in regard to the twentieth century.

8. Conclusion

I have presented an argument in favour of the view that central portions of the work normally identified as Marxian social science, the work in Capital, can be understood as science of a rather straightforward sort. This argument provides a valuable corrective to the contemporary analytic studies of Marxian methodology or at least provides a stimulus for their reconsideration. For, if we take Cohen and Little to exemplify the varied trends in this area, we are left, I think, with a residual sense of unease. Marx's work appears on those accounts to be scientific only if he is allowed the luxury of some especially forgiving model of science. In Cohen, Marxian theory is science of a peculiarly functional sort; of a sort that is at least controversial. Cohen can only welcome Marx to the scientific fold through the most finely nuanced and painstaking re-appraisal of the worth of functional explanation. Putting aside the

\(^{72}\text{Ibid.},\text{ emphasis added.}\)
truth of the debate Cohen has revivified regarding functionalism in social science, an undeniable impression remains that a great deal of ingenuity is needed to shoe-horn Marx into the scientific mold. In Little, a similarly suspicious burden of fine argument seems needed to provide Marx’s work the veneer of science. Marx’s economics must first be shorn free of any dependency on historical materialism and dialectics. Then, it must be cast adrift from any ongoing confirmatory dialogue with economic and sociological facts, must be rendered predictively toothless.

There are at least reasonable grounds for holding that central portions of Marx’s social scientific work are scientific in a standard way. This, I submit, is preferable to alternate accounts on which only a Marx carefully trimmed to fit novel models of science can be viewed as methodologically unsuspect.
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