It will be helpful in opening this discussion if we follow a distinction drawn by Marx and Engels in a section on the history of philosophy in The Holy Family. Here they observe two divergent trends stemming from the materialist rationalism of the Enlightenment. One tendency eliminated metaphysical and religious explanation from the natural order, and eventually merged into the positive sciences. The other was concentrated on a philosophic doctrine of man which insisted on his original goodness and educability; this tendency was the prior basis for the critique of social conditions that issued in the Socialist and communist movement. At the risk of excessive compression, then, we will note that two separate human projects have evolved under the aegis of Reason, each with its characteristic set of institutions, methods and norms. Some recent theorizing has set itself the task of describing the relationship between scientific reason and critical-social reason, and mapping out their respective domains. The problem of mutually ordering the two rationalities is especially urgent in the planes of psychology and social philosophy, since natural science and critical reason must both lay claim to a theory of man. The biological and behavioural sciences are bound, in working upon and with human material, to reach some general conclusions about the terms that govern man's actions and transactions. Equally the political theorist, or for that matter the everyday activist, has to arrive at some overall view of human action and the considerations which guide it. How far the human theory evolved by natural science can ever be integrated with that of a critical sociology, and how far the logic of the scientist is a separate enterprise from that of the critic, are likely to be questions of some moment as scientific education penetrates society and enters the mental formation of new recruits to the Labour Movement.

Certain recent treatments of this problem are founded upon a sharp dualism between scientific and critical reason, in which theoretical priority is assigned to a form of critical reason which is consciously disjoined and distant from the scientific endeavour, even proclaiming that its own basic criteria for the admissibility and truth of concepts display no coincidence with the chosen criteria of the sciences. A future article will examine the case made out by a group of psycho-
analytic writers working within this framework: these, who acknowledge some indebtedness to the ideas of Sartre, have sought to separate out the study of human action (illustrated by them in certain abnormal forms of behaviour) as a province outside the purview of the natural sciences. For the present, however, another essay in the bisection of reason, the latest book of Herbert Marcuse, will be considered. In this work, natural science is in its entirety made over into an object for the scrutiny of critical reason (i.e., his own sociological appraisal, and the various disciplines of science, as well as some of the assumptions of modern scientific method, are viewed as virtual "ideology," the intellectual counterpart of new modes of social domination and repression. Marcuse's argument takes him far afield into a large number of ideological and cultural disciplines: philosophy, sociology, physics, aesthetics, linguistics and psychology. Into many of these I cannot hope to follow him with any confidence but shall be content either to say nothing, or else to offer a very rough personal judgment or factual approximation based upon the best resources that I can muster (and master). Scientific readers will have to bear with the crude and elementary points that will be sometimes stated, or perhaps misstated, in an attempt to improve upon Marcuse's presentation of scientific method.

Marcuse's *recent* book *One-Dimensional Man*² can best be situated by reference back to his earlier work on Hegelian and Freudian theory. In *Reason and Revolution* (1942) Marcuse undertook a brilliant explication of Hegel as a fundamentally critical, radical and subversive thinker, a philosopher of "the negative"—an interpretation much in contrast to the reading of Hegel as a totalitarian precursor that has been given by Popper and Russell. Negativity is in Hegel the power of "what is" to transcend or surpass itself by relating itself to "something which is not". This transcendent power of negation, operated by an ideal, spiritual subject in Hegel, was later attributed by Marx, after some empirical inquiry in economics and law, to an actual subject in the material world, the working class. *One-Dimensional Man* is built upon the proposition that "the power of the negative" has finally disappeared in advanced industrial society, not simply owing to the diffusion of higher living-standards, but through a complete change in the terms of human rationality and the remoulding of the psychic mechanisms which have hitherto expressed dissatisfaction. Here Marcuse elaborates on a psychoanalytic model he presented in *Eros and Civilisation* (1954), where he attempted to reconcile the Marxist characterization of social repression with the Freudian. The repressive power of civilization is for Marxists an historically contingent feature occasioned by particular social institutions which can be changed; for Freud, civilization was unalterably linked with the repressive blocking of the psyche's egotistical lust. Marcuse's solution was to envisage, as a cardinal feature of the
liberated society, the diffusion of libido along socially non-repressive channels of sublimation. Eros would then be partitioned more equally over the human frame (its present concentration in the genitals being, so to speak, but a further instance of alienation and detail-work), and human industry, including work relations and the productive process, would itself be impregnated with an erotic charge. Sublimation, then, is a mark of transcendence; this forms an essential part of the argument in *One-Dimensional Man*, where overt, "unmediated" sexuality (said to be a predominant feature of modern literature and life) is held to function as a conservative force in society and as an ultimately repressive mechanism in the individual personality.

Something approaching Marcuse's present case is available in summary, in the supplementary epilogue he published in 1955 as an appendix to the second edition of *Reason and Revolution*. In this majestic elegy, he mourns the passing of the transcendent Spirit whose early course he had traced: "Reason is in its very essence contradiction, opposition, negation, so long as freedom is not yet real. If the contradictory, oppositional, negative power of Reason is broken, reality moves under its own positive law and, unhampered by the Spirit, unfolds its repressive force." With growing technological control and domination, all opposition is "pacified, co-ordinated and liquidated". "Today, the Spirit . . . helps to organize, administer and anticipate the powers that be, and to liquidate the power of negativity." Individuals are transformed into "total objects of society". "The economic and cultural co-ordination of the labouring classes" is now complete, and any remaining critical consciousness is only "the dangerous prerogative of outsiders". Advanced technology itself, the management by society of "its own dialectic on the ground of its own productivity" is the historical basis for the transformation.

*One-Dimensional Man* is in part a recapitulation and reworking of this theme. Marcuse enlarges on the assimilation of workers into production and consumption, the eclipse of the artist's cry against human alienation, the loss of political guilt in an age of atrocity. About half the book, however, is taken up by argument for a new contention: it is suggested that the very language of the modern intellect is evolving to "close the universe of discourse" so that no concepts pointing beyond the existent order of domination could be either formulated or understood. Natural and social science, as well as analytical philosophy, are increasingly permeated by "instrumental", "operational" terms and goals, blending with a stunted everyday discourse to form a "unified functional language" which is "irreconcilably anti-critical and anti-dialectical" (p. 97). Scientific rationality can be seen to terminate in the logic of technological tyranny. This is not simply the mis-application of scientific means for harmful ends lying outside science proper. Applied science, technology, projects a universe of total administration, of men as well as
of things, and the quantifying, formalist theories of basic science lay out the prospect of a functionalized, totally manipulatable reality.

On other occasions Marcuse has put forward some features of his case in calmer, more empirical terms. In *One-Dimensional Man*, however, logic and rhetoric twine inextricably. The harsh dithyrambs and diatribes that fill its pages are not dramatic flourishes serving to point up argued conclusions: they are the conclusions, the summings-up of what are offered to us as studied investigations of the modern consciousness. Although his preface admits that in other areas of society "the described tendencies do not prevail"; Marcuse feels obliged to add, "I would say: not yet prevail" (p. xvii). No indication is given that "the power of the negative" could re-emerge in present society anywhere but among a minority of defenceless "outsiders" (pp. 257, 53). We must, therefore, assume that Marcuse's picturesque language means roughly what it says.

In *One-Dimensional Man*, something still remains of Marcuse the revolutionary scholar, one of the galaxy of brilliant comrades around the pre-war *Zeitschrift für Sozialforschung*, the vindicator of the Negative in philosophical history. Particularly on aesthetic matters, Marcuse can be credited with a sensitive ear and eye, and there are parts of his last section that are of compelling interest; e.g., his argument that the present development of science (presumably computer-programming) makes possible "the translation of values into technical tasks—the materialization of values" (p. 232). However, most of the book is a severe disappointment. The work of critical philosophy, rooted in Hegel and Marx, that Marcuse pioneered in *Reason and Revolution*, now has been almost entirely abandoned in favour of a grandiose journalism of doom; it has been left to others, notably to Raya Dunayevskaya (to whose book *Marxism and Freedom* Marcuse contributed a sympathetic preface in 1958) to develop an intelligent Hegelian-Marxist account of contemporary capitalism and Communism (and of working class opposition within the two systems), employing alienation and negation as fundamental concepts. As an examination of the technocratic and corporatist tendencies undoubtedly at work in advanced managerial capitalism, *One-Dimensional Man* is nebulous, bitty and generally unempirical, especially when set against the writings of a critic such as Hal Draper (who covers part of the same area with a narrower but more searching focus). Dunayevskaya's and Draper's analyses have in fact both blended remarkably well, in action as well as in theory, with the great revolt against the corporate mind and machine that blazed out on the Berkeley, California, campus in late 1964. This revolt, which enjoyed fraternal links both with the Negro freedom movement in the south and with the local trade-union movement, was in itself a sharp and speedy refutation of the message of *One-Dimensional Man* (published a few months earlier). If a little counter-oratory may be cited
against the abundant rhetoric of Marcuse, we have the very pertinent speech by Mario Savio at the all-night sit-in at Sproul Hall:

"Here is the real contradiction: the bureaucracy hold history as ended. As a result significant parts of the population both on campus and off are dispossessed, and these dispossessed are not about to accept this a-historic point of view....

"The most crucial problems facing the United States today are the problems of automation and the problem of racial injustice. Most people who will be put out of jobs by machines will not accept an end to events, this historical plateau, as the point beyond which no change occurs. Negroes will not accept an end to history here. All of us must refuse to accept as history's final judgement that in America there is no place in society for people whose skins are black...""

Marcuse, right on the last two pages of One-Dimensional Man, does allow, as "nothing but a chance" (p. 257), that the Negro struggle in the United States has genuine oppositional possibilities. Treated in Marcuse's manner, as the naked elemental rebellion of "outcasts and outsiders", the Negro freedom movement perhaps does not merit even the glimmer of expectation that he accords it. By contrast, the consciousness proclaimed by Savio at Berkeley fleetingly synthesizes the triple struggle which today contends with the core-structure of bureaucratized capitalism: the struggle for equality and rights of the working class of colonial heritage, the struggle over control and surplus-value of the working class in the factory, the political and professional struggle of the technical and white-collar working class (less and less a "middle class"), including its apprentices, the students. The "a-historic point of view", "the point beyond which no change occurs" is also the perspective of One-Dimensional Man; but the dialectic which ceased to churn between the first and the second editions of Reason and Revolution was not that of reality but, alas, that of its beholder.

* * *

The limitations of Marcuse's method can be succinctly displayed if we begin with his discussion of the economy (his analysis here being, as he would probably admit, the cornerstone of his larger thesis). The development of automation is said to mark "a change in the character of the basic productive forces" (p. 35). Manual and brain workers, producers and non-producers, get thrown together and homogenized in the new organization of work and consumption. Marcuse sees the narrowing of the gap between shop-floor and office as an invariably counter-revolutionary trend. Company-consciousness and a sense of interdependence with management are said to be more characteristic of automated processes than their reverse (pp. 24–32). Much of this argument has already been politely debunked by the economic soci-
ologist Serge Mallet\(^7\) (one of the authors cited by Marcuse (pp. 28, 31) in favour of his thesis): briefly, such a presentation simply fails to consider the comparative vulnerability of highly capitalized industry (with its relatively low rate of profit), it ignores the patchy, half-hearted dispersion of automation under capitalism, and its reportage on working-class attitudes is, to say the least, shaky. We will only add here one point exemplifying Marcuse's logical style. First, a quotation from a single factory worker is produced (p. 26): this worker said, "All in all, we are in the swing of things". This is retranslated into an epochal slogan: Marcuse concludes, "Things swing rather than oppress, and they swing the human instrument—not only its body but also its mind and even its soul". A further anecdote "elucidates the depth of the process" (it is from Sartre, citing the occurrence of sexual daydreams among girl assembly-line workers). Following this we are off with a vengeance: "The machine process in the technological universe breaks the innermost privacy of freedom and joins sexuality and labour in one unconscious, rhythmic automatism. . . ." (p. 27).

The political analysis of the book is even more cursory. The glaring failure of present-day capitalism to internationalize itself receives no notice: Western society, which is still "mobilized", as in the high Cold War, "before the threat from without", apparently "shows an internal union and cohesion unknown at previous stages of civilization" (p. 21). The Welfare State succeeds only in "raising the standard of administered living" (p. 48). Welfare provision is thus presented as a "functional" phenomenon of advanced capitalism, quite outside the arena of social struggle—this in a book largely centred on the United States. Any increase in living-standards "reduces the use-value of freedom" (p. 49), the implication being that men used to be more revolutionary when they were poor and hungry. Much of the flavour of the discussion is reminiscent of the language of "totalitarianism" as formerly applied to the Sino-Soviet bloc in Stalin's day, where "the whole" was likewise essentialized into an impermeable, all-powerful structure containing no possibilities beyond the control of the rulers. (The automatically equilibrating functional character of virtually all trends in the society is also reminiscent of the imperceptions of James Burnham's Managerial Revolution.)

In these pages can be seen the first outlines of Marcuse's own theory of human motivation, a surprisingly simple fixed-energy model in which depersonalized forces are switched, shuffled and shunted about with little reference to actual behavioural events. Marcuse thinks it likely that any possibility of a radical upsurge in the West vanished when the working class ceased to be paupers.\(^8\) On the prospects for revolution in the Soviet bloc, however, he is strangely sanguine, basing himself on a formula (similar to that of Trotsky's Revolution Betrayed) to the effect that "the ruling strata are them-
selves separable from the productive process—that is, they are replaceable without exploding the basic institutions of society" (p. 43). While the material conditions for a humanist transition in the U.S.S.R. can be prepared through the gradual quantitative progression of the economy, a political revolution would still be necessary after "the level of a possible qualitative change" was reached. One's principal objection to Marcuse cannot then rest on his pessimism, but on his thoroughgoing mechanism: his hope and his despair are equally based on some assumption of a constant, predeterminate technological threshold that can in itself function either to exclude or to impel the action of the class. In the West, the absolute limit is set low; it is a "ceiling", at which negativity cuts out and class-domination assumes an objective harmony. In the East, the critical value is set high, with a reverse operation: it represents the boiling-point of transcendence, the floor from which oppositional action can begin to take off. The bureaucracies may, indeed, attempt "to prevent the attainment of this level. In order to do so, they would have to arrest material and intellectual growth at a point where domination is still rational and profitable. . . ." (p. 45); the dialectical kettle would then, it seems, not even simmer. But the drive for economic emulation with the West may force the system on and up, over the top (pp. 44, 45).

One ought perhaps to be grateful that Marcuse allows a "Soviet exceptionalism" to break his otherwise total ban on the revolutionary possibilities of relative, culturally mediated deprivation. Even here, though, conscious intervention and intention are ascribed identifiably only to the bureaucracy, which is able to turn the stopcock of the productive process to which it is parasitically external. The "preconditions for liberation" are still formed by pure technology, fostered by an impersonal drive, the global competition with capitalism. The traditional abstraction of the "State-owned property relations", as a function independent of the relationship to society of those who actually form the State and command public property, is here further hypostatized into a causal engine of revolution.

Even in Marcuse's most subtle and sensitive chapters, when he is discussing the condition of the arts, we can see something of the same tendency to substitute mechanical or rhythmic analogy for close, localized reflection. Much of what Marcuse has to say here is very fine, and often finely put; he is especially concerned with the growing circulation of art products as mass-produced commodities, and with the loss of a genuine sense of artistic alienation. But he does not stop to examine the rôle of the market in different creative media; for instance, the visual arts are now wholly managed by their career outlets, the novel somewhat so, and poetry and music not much at all. Marcuse is possibly right to deny the present possibility of a romantic or "protest" art based on a formal iconoclasm: "the avant-garde and the beatniks share in the function of entertaining without
endangering the good conscience of the men of good will" (p. 70). But perhaps this only means that the revolutionary artist has to be specially canny and brainy if he is to avoid being lost or "taken up" in the welter of seven-day wonders; Marcuse comes close to a grudging admission that Brecht managed to stay intact in spite of the culture mill. What is more startling is Marcuse's insistence that the classics, too, lose their content in the omnium-gatherum of general cultural diffusion: "they are deprived of their antagonistic force, of the estrangement that was the very dimension of their truth" (p. 64). The restriction of culture to the privileged few at least "provided a protected realm in which the tabooed truths could survive in abstract integrity" (p. 65).

Thus, once again, the rational content of Marcuse's criticism consists of the disposition of fixed and finite quanta of energy, in which increase is impossible without dilution. In the arts as in the economy, More Means Worse. Somewhere in the psyche, or in society at large, there is a smallish tank containing the precious, primeval art-juice that has hitherto fuelled the creative voyager: technology, with its ever-widening network of conduits and channels for human energy, is always raiding and draining this source of vital supply. This, of course, is a caricature of Marcuse's position, but some schema of this kind does underlie much of his case. In his discussion of Nature, for instance, he writes of the shrinkage of "the insoluble core" of the natural world as the result of technological ingressions (p. 66); the power of the artistic symbol to evoke a qualitatively distinct realm depended in some sense on this unmastered core of Nature. Marcuse's view of the emotive power of Nature thus combines the Arcadian and the Gothic; Nature has to be wild, or minimally cultivated, and fundamentally stands in opposition to society. Twice he refers slightingly to National Parks, which are apparently "not reality" (pp. 66, 226). We are invited to "compare love-making in a meadow and in an automobile", to the detriment of the latter; the former environment "partakes of and invites libidinal cathexis, and tends to be eroticized" (p. 73). The "technological reality" of the automobile, on the other hand, cramps and restricts libido. (Had Marcuse compared a damp, cold, bug-ridden meadow with the erotic environment more usually offered by technology—i.e., bed, Nature's advantages might have been less apparent.) Pretechnical Nature was "a medium of libidinal experience which no longer exists". (ibid.)

We may wonder just when it did exist: at any rate, it is only one strain of romanticism that has opposed Nature to human industry as such. Domesticated Nature (from Marvell's garden to Hart Crane's bridge-spanned bay) has at times offered images of a transcending power at least as compelling as those of the uncultured scene. One can agree with Marcuse (p. 168) that "technology has become the great vehicle of reification"; but it must be added that the most re-
sounding instance of this reification is nothing other than the idea of technology itself, as exemplified in *One-Dimensional Man* as well as in much current political cant. Historically, the major crisis of man's relationship to Nature arises not with technology or industry as such, but with industrialism, i.e., the advancing technology of commodity production. We may see our hankering for the "natural" as a kind of tribute that men pay to use-value, to unmediated sensual enjoyment, in an age dominated by exchange-value, where the proper qualities of things are overlaid and distorted by the mystifying equivalences interposed in the commodity transaction and its social apparatus. "Nature" is not the address of a territory, a determinate frontier which is violated in proportion to the advance of human culture: it is a horizon to which any heightened human consciousness tends; and as such is bound (despite Marcuse's forebodings) to remain at the centre of the artist's vision.

Marcuse's use of Freudian concepts in aesthetic criticism is all of a piece with his general model of man: Freud's later metapsychology, the flow of Life and Death instincts within the organism, which Marcuse embraces without question, lends itself admirably to the replacement of history by hydraulics. (Marcuse's handling of these concepts raises certain questions about his grasp upon scientific criteria of explanation, a point to which we shall return later.) Although a Freudian, Marcuse is not very sympathetic to the clinical applications of psychoanalysis. Analytic couch-therapy is regarded as an administrative technique of conflict-resolution, managing world-sorrow and the pangs of the spirit: "the psychiatrist takes care of the Don Juans, Romeos, Hamlets, Fausts, as he takes care of Oedipus—he cures them" (p. 71). (It may not be too pedantic to contend that he doesn't, on the evidence of objective studies of "success" in psychotherapy; Marcuse's faith in the omnipotence of technique can at least be checked and countered here.) At all events, *One-Dimensional Man* is principally interested in the explanatory force of Freudian libido-theory in accounting for creative motivation.

As has already been noted, Marcuse attaches considerable importance to the role of sublimation in the creative process. Sublimation, which in Freud consists of the deflection of sexual energy upon a non-sexual (usually a "higher" social or ethical) goal, is taken to be the characteristic means by which art is produced. Whether in art or in life, sublimated Eros is a primary source of "negativity", of implicit transcendent criticism; it sets up a kind of oscillation "between the conscious and the unconscious, between the primary and the secondary processes, between the intellect and instinct, renunciation and rebellion" (pp. 75–6). Retaining the impress of the social constraints that have forced libido into a circuitous path, it provides a starting-point for the romantic artist's alienation. The permissive sexuality of modern times destroys sublimation and its work of
transcendence. The Pleasure Principle is shorn of its overtones of ultimate desire, and "pleasure, thus adjusted, generates submission" (p. 75).

Marcuse thus believes that an increase of sexual activity and stimulation entails a falling-off in the revolutionary potency of the masses: and he sees the demon of sexual titillation laying his traps in every corner of the modern market-place. We find that "the body is allowed to exhibit its sexual features in the everyday work world and in work relations. . . . The sexy office and sales girls, the handsome, virile junior executive and floor walker are highly marketable commodities, and the possession of suitable mistresses—once the prerogative of kings, princes and lords—facilitates the career of even the less exalted ranks in the business community." Modern architecture is in sex-promotion too: "Shops and offices open themselves through huge glass windows and expose their personnel; inside, high counters and non-transparent partitions are coming down. The corrosion of privacy in massive apartment houses and suburban homes . . . exposes more easily the attractive qualities of other wives and other husbands" (pp. 74–5). Seldom can the rancid, vigilante sensuousness of the Simple Lifer—the note struck elsewhere by Muggeridge, Holbrook, the early Huxley—have been expressed so artlessly in a serious writer.

So lavish a release of libidinal energy would in ordinary Freudian theory make it difficult to admit the possibility of a simultaneous discharge of aggressiveness; there is only so much libido available, so that if sexuality were to expand, the destruction (death) instinct would have to undergo shrinkage. In Marcuse's eyes, however, contemporary society is flooded with aggressive energies, sometimes sublimated, sometimes openly brutal. In order to leave space in the psyche for its aggressivity, he therefore postulates that overt, "localized" sex involves "an actual compression of erotic energy" (p. 78) instead of (as in Freud) its discharge. A surplus of free libido will thus be generated by a sexually charged environment, and can then flow over to the death-drive. On the side of Thanatos, too, we observe the localized diversion and "desublimation" of instinct: the main outlet here is technological achievement. "Assuming that the Destruction Instinct (in the last analysis: the Death Instinct) is a large component of the energy which feeds the technical conquest of man and nature, it seems that society's growing capacity to manipulate technical progress also increases its capacity to manipulate and control this instinct. . . . Here too, we would have controlled desublimation" (p. 79; author's italics).

The main burden of criticism for the above will not lie in the simple comment that Freudian constructs deal with unobservables; every theoretical behaviour-system has at present to posit structures to which no presently known findings of physiology correspond. We shall therefore lay no special emphasis on the fact that there is rather
more evidence for the existence of leprechauns than there is for the reality of an energizing libido, or for Eros and Thanatos as fundamental drives of organic life. A more usual criticism of Freud's metapsychology is that it predicts no consequences that are testable. This is true of most of Marcuse's version of it, but we can still track through the sequence of inputs that is laid down in the system he describes, and see if it will end in the outcome he says it will. It will be recalled that Marcuse writes a new instruction into the Freudian programme: the localized gratification (desublimation) of a drive is to entail a compression of energy at the focus of satisfaction, thereby increasing the energy-supply outside it. However, he does not carry this through to the desublimation of aggression: if Thanatos is, as he says, funnelled into technical pursuits, extra instinctual energy should be triggered off by this local motor activity. What happens to it? Marcuse does not say, though he mentions sublimated aggressiveness as one possible form (p. 78). If, however, Thanatos is somehow sublimated, the process should favour the development of oppositional, transcendental ideas in society; for the sublimation of libido is, according to Marcuse, the ground of the alienated consciousness. If the extra drive is shunted back to the Eros side, the cycle is started all over again. There may be other possibilities: the extra libido might just be repressed, but that would cause large-scale neurosis (which would spoil Marcuse's picture of a complacent, "adjusted" society). What Marcuse presents as an ultra-stable instinctual structure under tight technocratic control would actually be most erratic and possibly even explosive.

The preponderant role given to sublimation in the system may also be queried. Although some of the psychic strategies identified by Freud (repression, introjection, projection, for instance) have proved susceptible to objective definition, and even suggested some notable experiments, sublimation is not one of these. The leading compendium of empirical studies in psychoanalysis is able to quote only one inquiry on the matter, a survey dealing with libidinal outlets among young unmarried artists and intellectuals. If these had turned out to be behaviourally undersexed, their cultural interests might have been derived, in accord with Freudian theory, from sublimated lust: but this proved not to be the case. While this particular study may seem rather naive in its approach, the fact remains that it is extraordinarily difficult to investigate a construct like sublimation, where the sexual origins of the behaviour in question are said to have been subsumed without trace (except such as can be gleaned through a retrospective individual interpretation like that of Freud on Leonardo). One can still justify an unanalysed, commonsense use of the term, kept for situations where an etherealized, spiritual mode of expression appears to resonate in tune with a lurking sexual motif: but we are very far from a satisfactory basis for anything like Marcuse's use of sublima-
tion as a basic explanatory concept. Indeed, in speaking of sublimation as a process that preserves "the unhappy consciousness", Marcuse goes counter both to the Freudian and the everyday understanding of the idea. Freud saw sublimation as a device which could substitute a social for a sexual object without colliding with the Censor, and so engendering conflict; it is not one of the defence-mechanisms. Far from transgressing "the social barrier to instinctual gratification", as Marcuse holds (p. 76), it does not even approach the latter. Equally, the sublimation of commonsense does not connote some inherent contradiction tensing desire against its denial. There are in any case contexts (such as Catholic rituals of "betrothal to Christ" or the Methodist hymns recounted by E. P. Thompson in The Making of the English Working Class), where sexual sublimation involves a regressive "adjustment", and strengthens (rather than transcends) a reactionary social code. What Marcuse seems to have done is gratuitously to identify the Freudian concept of sublimation with the Hegelian operation (aufheben, "sublation" or "sublimation") whereby a dialectical stage is simultaneously negated-and-preserved-at-a-higher-level. But the conflict-free character of Freud's sublimation—which makes it Marcuse's favourite route for the discharge of libido in the unrepressed future society—should debar it from fulfilling any transcendent, oppositional role this side of communism.

This discussion, while perhaps more finicky than its subject-matter deserves, at least helps to display the kind of empirical methodology that is offered by Marcuse. It is possible also to feel a more rooted emotional dissent from his general attitude on sexual matters: the vista of Communist society in which genital sexuality is dethroned and diffused into body-tone, work and the outdoor life is not too far from the ideology of sublimation fostered by some English public schools (and is liable to prove no less unrealistic in practice). The main point, however, is that by assuming a stand outside and against the methods of science, Marcuse has discharged himself from any felt obligation to control his hypotheses by internal or external checks. As he pounces on the testing procedures which have been developed within modern science, stigmatizing them seriatim as the ideology of technocratic dominion, he is seemingly able to avoid personally thinking through the requirements of empirical statement, and to spare himself that moiety of self-critical doubt that is part of the scientist's routine.

For Marcuse's portrait of contemporary science, despite his pointed collation of scraps from different investigators and theorists, is misleading in gross and in detail. "Operationalism" and "behaviourism" are simply not dominant ontological tendencies among scientists whereby the meaning of concepts "is restricted to the representation of particular operations and behaviour" (p. 12). They are, generally speaking, methodic rules-of-thumb which are compatible with a
variety of ontological standpoints. Marcuse in any case makes no adequate distinction between the activities of natural scientists (including the laws they propose within their own specialities) and the theorizing that some of them undertake to relate their own to another science, or to connect the sum of sciences with the world of nature. It has for some time been relatively easy to point out that certain formulations in "philosophy of science" savour of idealism or social conformity; physics particularly has tended to generate its own brand of idealist sage, from Jeans and Eddington in the thirties to Schrodinger and the "Copenhagen School" more recently. But this hardly counts towards Marcuse's main case, which is that the scientific undertaking itself projects a specific set of ideological and societal assumptions. The only examples he quotes from actual scientific work come from the conformist wing of applied sociology, a field where the social values of the researcher obviously have a specially determining role. Investigations from physics, chemistry, biology or psychology are never instanced in the text. Without some such exemplification, Marcuse is hardly justified in speaking of a general "shift in theoretical emphasis from the metaphysical 'What is...?' to the functional 'How...?'" If he had taken a look at some general texts in physics or biochemistry, for example, he would have found that the actual objective language in which sub-nuclear particles or protein molecules are discussed suggests that the scientist's continuing concern is, as ever, with a highly non-metaphysical "What is...?" Until he can provide some harder detail (similar to that, e.g. which links medieval scientific concepts with the total medieval world-view), Marcuse's intriguing suggestion that in a liberated society "science would arrive at essentially different concepts of nature and establish essentially different facts" (p. 167) is utterly vacuous.

Instead of a factual portrayal of the state of the sciences, what we are given in One-Dimensional Man is the prolonged exercise of a technique which might best be called "guilt by free-association". The concepts of contemporary science are, we are told, operational, functional, instrumental, behavioural: the terms are bandied freely and almost interchangeably, with never a glance at the contexts and issues in which they historically originated. Science aims to dominate nature, and this involves the domination of man. The operational-behaviourist base of expanding technology has created a corresponding operational-behaviourist superstructure of philosophic and scientific reasoning. Or maybe it was operational scientific reason that issued in the operational superstructure of advanced technique; the path of causation is left rather obscure. Marcuse does not, of course, employ the crude vocabulary of base and superstructure, but the correspondence he asserts between (as he puts it) "the scientific and the business enterprise" (p. 156) is so close and literal that the comparison with Stalinist-Zhdanovite reflectionism is
not too unjust. What Marcuse and the older attack on "bourgeois science" have in common is an almost total inattention and indifference to the scientific content of the ideas whose "societal" implications are being teased out. The logic of Marcuse's arguments on science and philosophy is possibly even cruder than that which established, e.g., that "the connection of orthodox genetics and eugenics, with Malthusianism, and with theories of race superiority and ultimately with Nazism are not accidental". It will be worthwhile to take a closer look at each of Marcuse's scientific shibboleths in the light of their rational background.

Operationism

Scientific operationism (or "operationalism") started, as Marcuse says, from the physicist P. W. Bridgman, who declared that "we mean by any concept nothing more than a set of operations; the concept is synonymous with the corresponding set of operations" (i.e., operations of measurement). However, this can be taken only as a provocative heuristic slogan which was not always applied literally even by its author. In its "strong", literal sense, the operationalist criterion is confused and even logically unworkable: e.g., as Popper has pointed out, the "operational" definition of length involves corrections for temperature and the usual operational definition of temperature involves measurements of length. Operationalist standards have become widespread in scientific strategy only in a much weaker sense: they are in general tantamount to the requirement that theoretical constructs should be empirically "get-attable". Measures then stand towards concepts not as synonyms but as credentials. Now it may be said that this, after all, amounts to no more than the traditional demand of the scientist for evidence. Operationism has, however, forced upon research workers a much greater self-consciousness about the relationship between the constructs they devise and the measures they wield. It is true that, as in the examples from psephology cited by Marcuse (where the investigators "operationally defined" politics in terms of observed electoral behaviour), operational definition can be used like Humpty-Dumpty's "fine knock-you-down argument", the researcher validating his ideas through the baptism of his favourite observations. But this type of inanity can be met—as Marcuse meets the example he quotes—by pointing out the awkward facts, the dissonant operations that have been ignored. Operational analysis largely consists, in fact, of doing precisely this, of taking sightings upon reality through comparing the discordance and agreement of various measures. Bridgman, for instance, proposed that a concept should be admitted into science only if it could be measured in at least two different ways; for a hypothesized process or structure that can be defined by two independent sets of operations is less subject to the bias of a particular instrument, and is more likely to be
confirmed by future observations of yet another kind. Moreover, a study of the discrepancies among different measures of a process may help to establish the degree to which it is unitary. N. E. Miller, for example, has taken three separate scales of thirst in an animal (the rate at which it would press a bar to get water, the amount of quinine that had to be added to the water before it would stop drinking, and the actual amount of water it drank) and found that these were affected in different ways by the direct introduction of water into the animal's stomach. This sort of operational approach (which has been called "convergent operationism" or "operational triangulation") shades off into the information-flow type of analysis in which the checking of input against output operations is used to try and trace the "wiring diagram" of causal lines within the organism. So it is unjust of Marcuse to conclude (p. 151) that modern scientific methods "in its operations with matter, is with good conscience free from commitment to any substance outside the operational context" (unless the loss of the metaphysical sense of "substance" is being deplored, which is presumably not the case). Marcuse's discussion at this point is mostly about physics, from which I am unable to provide counter-examples; but the general drift of public accounts by physicists of their work is equally lacking in the "strong" operationism that he deplores.

**Formalization and Quantity**

Marcuse draws strange conclusions from the building of formal models in scientific explanation. To express relationships within and among structures by means of equations apparently smacks of rank subjectivism: if the real relations mirror the formal ones, then "matter itself would be objectively of the structure of mind—an interpretation which contains a strong idealist element" (p. 150). Science is said to engage in "the mathematization of nature" and to have "stripped matter of all but its quantifiable qualities"—just like the capitalist reduction of men to quantifiable units of labour-power (p. 157). Scientific mathematics is politically tendentious: "Formalization and functionalization are, prior to all application, the 'pure form' of a concrete societal practice" (ibid., author's italics).

Marcuse does not explain why the activity of model-building should have these idealist implications: a successful fit between a conceptual structure and an objective one, where the degree of fit is tested through practice, in experimental observation, could more plausibly be scored as one up to materialism. It is equally hard to construe his interpretation of quantity and formalism. The distinction between "quantity" and "quality" is not very helpful if pushed into all scientific contexts: e.g. now that physics has catalogued a hundred or so elementary particles, is it more "qualitative" than when there were only three or four, and will it become more "quantitative" again if the
pattern of matter is finally derived from the three "quarks"? Is a
detailed structural model, like the double spiral of D.N.A., or a com-
puter simulation of neurotic behaviour, more quantity than
quality, or vice versa? Marcuse believes that the formal dis-qualifica-
tion of reality began when geometry began to be expressed by means
of algebra "which replaces 'visible' geometric figures with purely
mental operations" (p. 148). But whether we choose a graphical or
some other representation of such relationships is often and up to a
point, a matter of convenience. Generally speaking, in mathematics
(as elsewhere) the distinction between quantitative and qualitative
modes is partial and contingent; one gathers that much of basic physics
employs a mathematics of pattern or relation rather than of quantity.
Marcuse's political, technological rendering of mathematics is very
odd, and seems to come once again from ascribing daemonic purpose
to an impersonal process, in this case "scientific rationality". Mathe-
matics is a storehouse of possible forms and functions laid up with,
usually, no particular technical end in view. (Sometimes there has
been a practical aim behind the theorems, but the maths tends
to remain long after the original purpose has been forgotten—much
of the probability mathematics associated with present-day biological
experiment has its original in problems connected with the gambling
habits of an effete French aristocracy.) Members of other disciplines,
e.g. physics and psychology, pick and choose from the store, trying
to translate bits of the language of immaterial functions into another
language of material, causal ones. This is not "mathematizing nature"
so much as naturalizing parts of maths. Heisenberg, for example,
decided that matrix algebra was just what he needed as a language
for his physics problems, some seventy years after the symbolism
had been invented; other algebraic and geometrical expressions were
tried at various stages by other workers. The passage from the for-
malized statement into applied work is far from smooth in science;
Marcuse's quotations from Husserl in support of the link between
mathematics and technics are not very convincing here (pp. 162–5).
"Once one possesses the formulas" (said Husserl) "one possesses the
foresight which is desired in practice." This is true, of course, of a
great many problems in technology, but it is not a history of how
either the formulas or the foresight got there.

The connection that Marcuse believes to hold between a "quantifi-
cation" science and a bureaucratic social practice is argued in a peculiarly
allusive, indirect manner; its clearest statement is probably in the
observation that science and scientific method "extend, rationalize
and insure the prevailing Lebenswelt without altering its existential
structure—that is without envisaging a qualitatively new mode of 'see-
ing' and qualitatively new relations between men and between men
and nature" (p. 165; author's italics). This may well mean that the
scientific culture by and large takes the existing social order for
granted, habitually rendering unto Caesar in a world where he who is not against Caesar tends to be for him. This is all too true, but has little to do with the "inner conceptual structure" (p. 164) of science. Marcuse at times seems to be hinting more, something to the effect that a critical theory of society could and should emerge from the scientist's investigations of, say, fluid dynamics or blood coagulation; but he never quite says it, which is perhaps just as well. Surely the professional narrow-mindedness (technocentricity) characteristic of many scientists, as well as of other specialists, has something to do with their education and their social position. At its worst, the mentality of "bureaucratic Utopianism" — which may well be more pronounced and pernicious outside the scientific world—incriminates our present society's relations of intellectual production and formation; it is not implicit in an experimental view of nature.

**Behaviourism**

Some of Marcuse's fiercest passages are reserved for what he conceives to be a predominant behaviourist trend in some academic departments. He is particularly scornful of linguistic philosophy, which is said to restrict itself to purely behavioural, ordinary-language criteria for the validity of concepts. Marcuse's account is unfortunately a complete travesty of the actual position in Anglo-American philosophy. For one thing, he has not troubled to separate out the different stages of philosophical controversy in the last fifty years. His catalogue of empiricist misdeeds in philosophy (p. 187) includes examples drawn from Russell's early work and the phenomenalism of the pre-Wittgenstein era, in the same breath as more recent discussion which has been devoted precisely to exploding this earlier empiricism. Throughout Marcuse's presentation, there is a strong covert suggestion that the transcendental metaphysics which was eliminated by modern philosophical analysis used to work as a progressive, critical intellectual force. Interestingly enough, it is precisely British philosophy in its pre-analytic days that furnishes one of the most vivid examples of a reactionary and mystical transcendentalism founded upon Plato and Hegel. Philosophy was certainly no more subversive of the existing order when university quadrangles echoed to the disquisitions of MacTaggart and Bradley on the Absolute, or to Bosanquet's apology for the organic State. In kicking out and keeping out this and allied rubbish, philosophy has undoubtedly tended to become philistine and stereotyped (though the best work of writers like Ryle, Austin and Strawson deserves to outlast the generations). Nevertheless, the empiricism, behaviourism and positivism still at work in the academies has to be overcome—is being overcome—empirically, behaviourally and positively, on its own ground; it will not yield to a metaphysical counter-revolution under the banner of transcendent universals (which are apt not to be of the progressive-sounding kind listed by Marcuse
in his own efforts (pp. 209–16) to develop a materialistic style of Platonism).

An inspection of present trends in experimental psychology, the very fatherland of the behaviourist invasion denounced by Marcuse, will point this moral. The truth is that behaviourism is no longer the prepotent conceptual framework among psychologists, even among those specializing in animal work. As Marcuse implies, behaviourism is a "one-dimensional" ideology inasmuch as, focusing on the array of existing stimulation that is conceived to impinge on the subject, it allows the organism no opportunity to test or surpass the offerings of the stimulus-field. Cognitive models of action, which provide the subject with an alternative to present reality, i.e. with some means of mapping and checking the press of stimulation, have been regarded by behaviourists as too vitalistic and obscure to enter the scientific canon. Recently, however, work in experimental psychology has been converging, from very different quarters, upon the project of devising a non-mystical cognitive model, and a whole family of cognitive behaviour theories, rigorously proposed and with definite operational consequences, is now available. The impetus behind the transcendence of behaviourism has not in the first place been social or ethical; stimulus-response theory could not even cope with the behaviour of rats, let alone humans, and some alternative had to come forward on empirical grounds alone. A cognitive psychology using cybernetic principles does, however, make the integration of determinist-causal and rational-voluntarist explanations of human action at least much more feasible than it was possible to imagine previously. Cybernetic theory tries to offer "the mechanism of teleology", the subsumption of the split between "efficient" and "final" causes in the analysis of systems whose parts display reciprocal action. What most of the various cognitive-cybernetic behaviour theories have in common is the notion that the subject can operate with some internal representation of contingencies (or of a field of possibilities), in accordance with which the response to sensory input can be varied; depending on the nature and state of these stored contingencies, the organism decides whether, for instance, to treat a given input as too unimportant to be processed any further in its central nervous system, or (at the other extreme) as so alarmingly important that the environment must be changed until the signals coming from it accord with the internal model. Just how distant this conception is from a one-dimensional view can be seen from some remarks by writers of this persuasion. Thus, in information theory "it is not the ensemble of present stimulation which is emphasized, but the ensemble of possible situations which might have been present but are not". In an apparently automatic musical task, "the response which eventuates is determined not only by what the singer hears but also by what note he is attempting to sing but does not hear". Again, "the organism struggles to reduce
the mismatch between its own criteria and perceived reality"; for the operator of a steering-wheel, the "stimulus" is not the road, or the car's direction—"the stimulus is the discrepancy between the...''Some of these comments illustrate a central idea of cybernetics, "negative feedback", in which, as with Hegel's brand of "negativity", "what is" gets changed by reference to "what is not". By discussing the pattern of action in terms of information-flow, of the processing programme that is at work within the subject, we are at least partly freed from the fixed-energy considerations that plague drive-reduction theories of the Freudian or behaviourist type. Marcuse's own general theory of motivation is in this respect not so very different from the model of man that is commonly held by radical "cultural" critics, on the Left or not, and runs something as follows. Human behaviour is channelled and energized by needs. These needs are of two kinds: there are innate or "vital" needs (the "primary drives" of the behaviourists) which are part of man's basic nature, and there are socially conditioned needs ("secondary" or "acquired" drives in behaviourism) which in the present age are increasingly instilled into him through the hidden persuaders of advertising. In both classical behaviourism and critical need-theory, fresh motivational components get inserted into the wiring-circuit of the experimental victim, by some process of conditioning. Then (says the critic) he has acquired "false needs", perhaps on the lines of false teeth, except that these cannot be taken out as smartly as they were put in. However, if we think of the subject as an active perceiver and operator, constantly coping with information from his environment and through himself, there are a variety of tactics or sub-programmes (perhaps within an overall strategy or programme corresponding to his most basic attitudes) which he might have for dealing with what is presented to him. Some inputs he will encode in ways that suit his cognitive economy, others he will filter out early and discard, others he will circulate briefly for short-term action and then drop, others again he will act on more persistently, perhaps changing his overall criteria for action in the process. There is no reason to suppose that advertising experts have discovered any method of breaching the barrier posed by the limited capacity of the organism, which forces it to be choosey in the face of a plenitude of stimulation. The individual's patterning of the information-flow is a sufficient description of the way in which his behaviour becomes specified for the different purposes of life. How his behaviour is energized can to some extent be looked at separately. The source of energy for the organism is its metabolism. Given that we are alive, and that we eat and drink, we can "take the biological source of our vitality for granted"; we now ask "not where the energy for social action is coming from, but where it is going... The psychological problem is how we organize
and guide a flow that must inevitably continue" until, in death, metabolism fails Libido; Libido-theory, like drive-discharge theory in general, tries to answer too many questions (the energizing of behaviour in general, the initiation of particular behaviour, and its steering and termination) with a single mechanism of need. Its general result is to downgrade the importance of the analysing and decision-making structures of the subject.

An information-handling model of perception and action is in any case applied, even by the critics of the mass-media, to one important area: their own behaviour before the media. For example, in *One-Dimensional Man* the arts of past and present "become cogs in a culture machine which remakes their content" (p. 65). But it looks as though this applies only to the general public; the radical critic is still evidently able to decode and reconstitute the scrambled message of romantic art. Similarly with Marcuse's recommendation that we go to commercial TV and radio for "the most telling evidence" (p. xvii) for his general thesis. The implication is that the writer, and his sympathetic readers, can come out of the interchange as the processors rather than the processed. The stimulus-response paradigms of conditioning, reinforcement, motive-acquisition, etc., hold good, as in the writings of most cultural sociologists of this kind, only for a different sort of people, i.e. for other people.

**Instrumentality and Industry**

There are two senses in which Marcuse accuses natural science of pursuing "instrumental" ideals. One has already been discussed: it is the charge that scientific method stops short at its own instrumentation, so to speak, refusing to go beyond its pointer-readings and its formal calculi. The objection is that Marcuse exaggerates both the literalness and the influence of the operationist case: here, the inexorable practice of science (which on pain of death must make contact with reality) necessarily corrects the wanderings of theory. The second sense of scientific "instrumentalism" (which Marcuse does not separate clearly from the other, though the two seem to be mutually exclusive) is the scientist's search for predictive control over natural phenomena. "The science of nature develops under the technological *a priori*, which projects nature as potential instrumentality, stuff of control and organization" (p. 153). Marcuse seems to be saying here (i) that the desire to comprehend and control nature is a kind of pride of the overlord, a drive towards omnipotence over all lower forms of being (ii) that this presumption harmonizes with technocratic manipulation on the same level of being, i.e. in human society. Now we cannot deny that the control of nature presents a considerable attraction for scientists. All the same, a different perspective on the interrelations of science, nature and society can be put forward, which has none of the baleful consequences of Marcuse's position. Such an
account, which lays its principal emphasis on man's technical relation towards nature, and even asserts the primacy of the technical in man's own nature, is nonetheless actually incompatible with an interpretation of science as the "organization and handling of matter as the mere stuff of control" (Marcuse, p. 156). Although other sources could be cited in support of the viability of a non-technocratic instrumentalism, I shall mostly refer to the writings of Marx and Engels on science. Apart from their intrinsic interest, these have the further advantage of blowing apart Marcuse's identification of a technically-biased rationalism with the ideologies of class domination. The founders of Marxism were almost as keenly pro-technics as they were anti-class.

There is a reading of Marx (which has become widely accepted in recent years) which sees him as the Jesus or Socrates of critical-sociological theory, whose teachings on man and history were perverted into a wholesale doctrine of Nature by the St. Paul-Plato figure of Engels. Against the weight of scholarship associated with this view, I can only press on regardless. Thus: The Holy Family attacks the "Critical School" precisely because "it excludes from the historical process the theoretical and practical relations of man to nature, i.e. natural science and industry". Marx's industrial sociology rests upon an industrial biology of human "species-action": industry stands as "an open book of the human faculties, and a human psychology which can be directly apprehended". In historiography, "the first fact to be established" about human individuals is also a question of natural-scientific physiology: "the physical constitution of these individuals and their consequent relation to the rest of nature". Men "begin to distinguish themselves from animals as soon as they begin to produce their means of subsistence, a step which is determined by their physical constitution". (Engels' later essay on The Part Played by Labour in the Transition from Ape to Man amplifies this early biological emphasis in the light of evolutionary Lamarckian theory; its central suggestion—that the selective development of the human hand forms the prototype for all subsequent high-level skills, including speech—has recently been proposed independently by non-Marxist scholars.)

For the founders of Marxism, historical and scientific reason, natural and critical-social science, are continuously joined; the mature Engels' project of a unified scientific corpus is hopefully anticipated in young Marx: "History itself is a real part of natural history, of the development of nature into man. Natural science will one day incorporate the science of man, just as the science of man will incorporate natural science; there will be a single science." This synthesis will begin when the natural sciences comprehend the rôle of industry as "the human essence of nature or the natural essence of man"; they "will then abandon their abstract materialist or rather idealist orientation, and will become the basis of a human science".

This last prognosis is especially interesting in the light of subse-
quent empirical developments: an important element in the "activist" challenge to stimulus-response theory (in some sense the heir to nineteenth-century associationism) has stemmed from researches into the performance of "the human operator" in industrial or quasi-industrial control and transmission systems. The main trends of scientific discovery in this century can indeed be said to promulgate the "dialectic of nature": not of course the one which consists in unearthing of Hegelian categories in natural processes (which forms a very small part of Engels' scientific writing and from which Marx himself was not quite as immune as some commentators imply).40 but the vision of nature and society as constituting together a "closed-loop" type of system, whose main channel is an industrial dialogue initiated, but never completely dominated, by man. Despite Marcuse's contrary conclusions, the progress of science takes us further and further away from the philosophy which (to re-mint a phrase) divides nature into two parts, of which one part (man) is above nature. The external "Galilean science" of Husserl and Marcuse (pp. 162–5) which "shapes the world in terms of calculable, predictable relationships among exactly identifiable units" has given way to a physics which, in important respects, has to limit the specification of what is measured by a surrounding description of the terms of measuring. The "disturbance-effect" of the participant observer in the system which includes him has not escaped the attention of information-theorists, who have also raised a crop of fresh problems in natural epistemology: the organism's identification of sensory signals amid the random noise of its own nerves, the upper limits of transmission and classification imposed by the finite ensemble of neurons. The inductive study of the micro-dissected brain here offers no better alternative to the perplexities of the "black box"; the techniques of staining, necessary for the discernment of any detail, irretrievably destroy part of the phenomena in question. "At every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature—but that we, with flesh, blood and brain, belong to nature, and exist in its midst... The sovereignty of scientific knowledge predicated by Marcuse is, in fact, by now a thoroughly moth-eaten proposition.

Generalizations like the above should be platitudinous, and probably are to many people. That they are not entirely so, on the Left, is in large part due to the existence of a contrary intellectual trend which, whatever lip-service some of its proponents may pay to materialist monism, consistently divorces man from his historical roots in nature. This ideology, whose present influence originates more from an interpretation of early Lukács than from Marcuse, has a strong tendency towards the generation of dualist polarities ("subject/object", "thing-for-itself/thing-in-itself", "praxis/process") which only reflect a more basic separation of critical-Marxian spirit from
Engels-lumpish matter. Dualism of this sort being an unstable compound, one element in the split must win out. In the work of Herbert Marcuse, "matter", and its institutional science, are held to have vanquished the critical spirit, and we are asked to bear witness to the final triumph of the inert. In the other wing of the disjunction (the modern "Critical School"), it is the spirit that presides in judgment over sullen, soggy matter. The material loop joining theory and practice, which evolution has reeved in the modelling, testing properties of human nervous tissue and its sensori-motor connections, is snapped and de-natured. Practice, now parted from its work of verification, becomes "praxis", pure will-towards-action, which may be allotted the objective embodiment (e.g. in the party or an idealized class) which a post-Hegelian age requires. Marcuse has avoided the voluntarist path in his solution, only (as we have seen) to fall into a total and enervating determinism: there is however, a kind of material content in his statements (partly drawn from their Freudian pseudo-neurology) which means that many of them can be established as false. Disprovable hypotheses are much superior to actual mysticism.

If any single lesson can be drawn from this discussion, it is that the maxim "society is a totality" (Marcuse's "the whole") can be extraordinarily misleading. The essence of Marx, it could be said, is that it is nothing of the kind, or (at best) an incomplete totality. On the general relationship between science and critical theory, Antonio Gramsci's conclusions are hard to beat. Gramsci writes of man's "struggle towards objectivity (towards being free from partial and fallacious ideologies)", a struggle which "is itself the struggle for the cultural unification of mankind". "Experimental science has offered the basis on which this cultural unity has, up till now, attained its greatest extension: it has been the aspect of knowledge which has contributed most towards unifying the 'spirit' and rendering it universal. . . . For Gramsci, "the scientist-experimenter is also a worker, not a pure thinker. . . ." "The experimental activity of the scientist . . . is the first model of the dialectical mediation between man and nature. . . . The promulgation of the experimental method separates two worlds of history, two epochs, and begins the process of the dissolution of theology and metaphysics and the development of modern thought, whose crowning is Marxism. Scientific method is the first cell of the new method of production, of the new form of active union between man and nature."

Gramsci's conception of natural science forms in its own way a secular re-statement of the Baconian charter for the experimental method: that active, sensuous materialism seen by the authors of The Holy Family as a transient integration of the trends that were soon to go their separate ways, as positive science or as humanist critique. The general absence of any such vision from present-day Socialism is nothing less than a mutilation of our intellect, a testimony
to the bane of the split. In the light of the last few decades, Gramsci would appear to have been unwise in supposing that theology and metaphysics were henceforth forever distinct from the "modern thought" of Marxism. The expulsion of the metaphysical, and even the theological, from the rational tradition of Marxism has become a task requiring conscious, perhaps painful effort.

NOTES


3. See Marcuse's essay "Industrialisation and Capitalism" in *New Left Review* 30 (March-April 1965), and his address on "Socialism in the Developed Countries" reprinted in *International Socialist Journal*, Year 2, No. 8, April 1965.


8. In his address on "Socialism in the Developed Countries", Marcuse says that "We ought to ask ourselves whether we should so readily jettison or re-interpret the Marxist concept of pauperization. I know that Marx, like Engels and like the whole later Marxist tradition, insisted that pauperization should not be seen as the necessary pre-condition for a revolutionary development and that the most advanced and best-off sectors of the working class could certainly become subjects of the revolution. But today we should re-examine this view. In other words, we must ask whether it is possible to conceive of revolution when there is no vital need for it" (*loc. cit.*, p. 150). An answer to the question posed by Marcuse would have to start by examining the economic position of the European working class in those few cases where its activity has achieved a revolutionary climax, as well as in the much more numerous situations where its struggles have shown a revolutionary tendency. Whether the association between radical working-class action and a state of pauperization would turn out to be positive, negative, or virtually nil, is hard to know in advance of such an analysis. More important questions are raised by Marcuse's formulation: why should a pauper class come to feel that it must oppose the social system? Why won't any pauper class do—or will it? Much discussion on
the Left—including some of Marcuse's own—consists in a hunt for suitable paupers (e.g., colonial migrants, poor peasants, schizophrenics), to carry the burden of negativity.

9. Marcuse's other comparison of a libidinal with a mechanized environment contrasts Eros "on a lovers' walk outside the town walls and on a Manhattan street" (ibid.); Marcuse is, of course, not the first German thinker to have rhapsodised with a hey-nonny-nonny view of Nature. An interesting parallel with the present case is to be found in a polemic waged by two technological enthusiasts of the last century: "Mr. Daumer flees before the historic tragedy that is threatening him too closely, to alleged nature, i.e., to mere rustic idyll. . . . We see that this cult of nature is limited to the Sunday walks of the inhabitant of a small provincial town. . . . There is no question, of course, of modern sciences, which, with modern industry, have revolutionized the whole of nature and put an end to man's childish attitude towards nature as well as towards other forms of childishness." With appalling technocratic zeal the authors argue that "it would be desirable that Bavaria's sluggish peasant economy, the ground on which priests and Daumers likewise grow, should at last be ploughed up by modern cultivation and modern machines." (K. Marx and F. Engels, reviewing Georg Friedrich Daumer's The Religion of the New Age, Neue Rheinische Zeitung, No. 2, 1850; given in Marx and Engels On Religion, Moscow 1957, pp. 93–4).

10. The first few sections of Capital are of course invaluable for their dissection of natural properties from exchange properties; A. Sohn-Rethel (in "Historical Materialist Theory of Knowledge", Marxism Today, April 1965) has offered a fascinating and original analysis of "exchange abstraction" or "knowledge of nature in commodity form", which he develops out of George Thomson's argument relating primitive logical categories to market relationships.


18. It is not suggested that scientific (or other) concepts "reflect" reality. There are, as Popper suggests (in his chapter in British Philosophy in Mid-Century, ed. C. A. Mace, London, 1957), roughly three ways of conceiving scientific truth: there is essentialism, which holds that science attains the final verities about reality; there is what Popper terms "instrumentalism", the view that all science ever states are constructions from particular observations; and there is Popper's own account of the progress of science as a voyage of successive approximation towards knowledge of reality, whose steps are marked by the falsification and elimination of hypothesis rather than any definitive confirmation of a theory. Marcuse seems to think that the only alternative to an essentialist "thing"-description is some kind of
instrumental subjectivism; he considers Popper's interpretation only very cavalierly (p. 151), remarking that while it implies "progress toward the real core of reality", still "reality may turn out to be an onion without a core, and the very concept of scientific truth may be in jeopardy." It is not clear why the objectivity of scientific truth should be jeopardized if the "onion" has an indefinite series of layers (i.e., of hypotheses or levels awaiting investigation). Popper's insight is perfectly compatible with an uncompromising materialism: in fact, Engels' account of scientific truth as an infinite journey of approximation through error (Anti-Diirhing, Moscow 1954, pp. 122–3) is a more primitive statement taking up a very similar position.

19. Lancelot Hogben's Statistical Theory (London 1957), admirably relates probability theory to the sordid calculations (of gambling and life-insurance) that provoked its original systematization. For readers as incorrigibly un-mathematical as myself, the late E. T. Bell's Men of Mathematics (London 1937; reissued 1965) provides an exhilarating conceptual history of the subject through the medium of biography.

20. See J. T. Clarke, "Remarks on the Role of Quantity, Quality and Relations" in Logic, Methodology and Philosophy of Science, E. Nagel, P. Suppes, A. Tarski, eds. (Stanford 1962), for an enlightening discussion of the interplay between empirical phenomena and mathematical systems.

21. It is intriguing to note that during the Berkeley students' strike of December 1964 (whose success depended critically on the solidarity of the graduate teachers) the most militant department was not in an Arts faculty, but was the Department of Mathematics. In this it was at the opposite pole to the (predictably scabby) Business Department. (See Solidarity Pamphlet No. 18, Students in Revolt; London 1965).


28. George A. Miller, op. cit., pp. 266, 201; Miller's book is an invaluable source of references on this topic.

29. Marcuse's conception of human motivation is grossly behaviouristic: "The intensity, the satisfaction and even the character of human needs, beyond the biological level, have always been preconditioned". Whether or not a
possibility "is seized as a need, depends on whether or not it can be seen as desirable and necessary for the prevailing societal institutions and interests" (p. 4); "The preconditioning does not start with the mass production of radio and television and with the centralizing of their control. The people enter this stage as preconditioned receptacles of long standing..." (p. 8). Food, clothing and housing are "vital needs" (p. 5). The distinction between "true" and "false" needs is made in terms of explicitly elitist criteria. "In the last analysis, the question of what are true and false needs must be answered by the individuals themselves, but only in the last analysis: that is, if and when they are free to give their own answer. As long as they are kept... indoctrinated and manipulated (down to their very instincts), their answer to this question cannot be taken as their own" (p. 6). But Marcuse, in the meantime, interprets the General Will; e.g. "to relax, to have fun, to behave and consume in accordance with the advertisements, to love and hate what others love and hate, belong to this category of false needs" (p. 5).

By contrast, Marx's discussion of changing human motives usually speaks of the development of new needs by individuals, or of the impoverishment of needs by the social system; man's "drives" are his "natural powers and faculties", though once he refers to the capitalist inducing "imaginary appetites" in the consumer (a clear Utopian-elitist formulation). (See Karl Marx: Early Writings, ed. T. B. Bottomore (London 1963), pp. 164–5, 168–72, 207).


31. The conclusions of Rosser Reeves' Reality In Advertising (London 1961) are worth considering here. It is a vigorous attack on "motivational research" methods in advertising, conducted on straight commercial and empirical grounds by an ad man with access to the findings of his own large agency. Reeves argues that advertising often causes consumers to avoid the advertised products, and has to contend with the fact that people are prepared to pay only so much attention to news about a particular kind of product. Advertising is "a desperate attempt to buy brands a bit of space in the memory box of the consumer"; "when a new campaign goes in, it must displace one that is already there". Reeves is highly critical of the unbridled "brand image" trend in the advertising media (i.e., he thinks it doesn't sell, and cites survey results tending to establish this). On the "hidden persuaders", he declares that "we have not reached the stage where such research techniques can be applied to population masses". The Detroit car industry lost millions through listening to motivational researchers who told them that cars had to be phallic monsters with huge tail-fins: people flocked to buy small cars instead. A fifteen-year national survey of the public response to advertising (covering only campaigns spending over five million dollars annually) discloses that "while a few commercials do reach an enormous number of people, we find that on the average seven out of ten people are not even aware of having seen the advertising at all". Need-creation theory also comes under attack; among other considerations, Reeves gives a long list of products available in ancient Rome, which appear to fill much the same needs as the present range of consumer goods. Advertising has some part in the evolution of products, but its principal function is in brand-competition within the same
type of product. While the presentation of evidence from such a commercial source is not likely to be up to academic standards, Reeves' approach does represent a degree of empirical disclosure of the ad world's "official secrets". Apart from its general interest for perceptual and motivational theory, it raises the question for Socialists: should not more attention be concentrated on the gargantuan competitive waste of advertising rather than on its supposed effectiveness in co-ordinating the human psyche?

32. George A. Miller, op. cit., p. 270.

33. Donald Clark Hodges' "Engels' Contribution to Marxism" (Socialist Register 1965, pp. 297–315) presents an impressive roster of arguments in support of what is roughly this view; previous statements of this position have been made by Marcuse, Sidney Hook, Sartre, and other analysts listed in Clark Hodges' introductory footnote (p. 309). Without attempting to trespass too far inside the vast new department of Marxism-Studien, I will venture the following comments, mostly addressed to Clark Hodges' article:

(1) Marx and Engels developed a common philosophy of science and nature in such early works as The German Ideology and The Holy Family; the idea that Marx was unsympathetic or indifferent to Engels' later scientific writing can be validated only by treating Anti-Dühring as Engels' sole responsibility. However, Anti-Dühring to some extent continues the tradition of collaboration between Marx and Engels on philosophical matters: "I must note in passing that inasmuch as the mode of outlook expounded in this book was founded and developed in far greater measure by Marx, and only in an insignificant degree by myself, it was self-understood between us that this exposition of mine should not be issued without his knowledge. I read the whole manuscript to him before it was printed, and the tenth chapter of the part on economics ('From the Critical History') was written by Marx. . . . As a matter of fact, we had always been accustomed to help each other out in special subjects" (Engels' preface to the second (1885) edition of Anti-Dühring, loc. cit., pp. 14–15).

(2) While differences can be found between the views of Marx and Engels on a number of matters (especially if writings separated by many years and produced for entirely different purposes are collated and contrasted with one another), it is fair to say that on certain questions which they regarded as fundamental, they evolved a common world-view. For example, they were broadly agreed that the advance of science would destroy philosophy as an independent activity; Engels differs from Marx only in stating that logic and dialectics (which he took to be generalizations from actual thought processes) were to be counted as a legitimate province of philosophy. This may well be only a terminological discrepancy, and is in any case of much smaller import than the general position common to Marx and Engels, relating the scope of philosophy inversely to that of science. (3) Clark Hodges' analysis appears to deny objectivity and generality to the work of Marx: e.g. "Marx's materialist historiography was tied to the interests of the labour movement". While this emphasis is perhaps a useful antidote to the endowment of Marx with a posthumous Founding Chair of academic sociology, it does little justice to the theorist of the Asiatic mode of production, the historian of feudal society, or the philosopher of practical consciousness, to name but a few more Marxes. Clark Hodges also tends to underplay the critical-pragmatic elements in Engels' work: Ludwig Feuerbach does after all conclude by welcoming the German working class as the inheritor of German philosophy, and Engels' treatment of, e.g., causality in the Dialectics of Nature is completely in line with the practical approach towards perception found in Marx. (4) Clark Hodges states that "Going beyond Marx, Engels found in natural-scientific
materialism the foundation of the edifice of human knowledge”. He did not go far (if at all) beyond Marx. The section of The Holy Family acclaiming the materialism of Baconian science was written by Marx, as was the attack on the "Critical School" for overlooking natural science. It is true that one can see in Engels a deep sense of kinship and solidarity with natural scientists. But the identification with science expressed by Marx is hardly less powerful. Bottomore's judgment is that "there is little evidence in Marx’s own writings (including the early writings) that he wished to make a radical distinction between the sciences of nature and of man" (Introduction to Karl Marx: Early Writings, p. 16); an unfashionable estimate, but one borne out by Marx’s scattered remarks on science, as well as by much in his life. The nine hundred pages of notes on mathematics that he left are mostly unpublished, though his treatise on the logic of the infinitesimal calculus (available only in Russian) is apparently of brilliant quality (see Dirk J. Struik, "Marx and Mathematics", Science and Society, vol. XII (1948), pp. 181–96). The memoirs of Wilhelm Liebknecht on Marx show him avidly following every new development of the day in physics and chemistry, even faithfully attending the lectures of Liebig and Huxley; "for months we talked of nothing else but Darwin and the revolutionizing power of his scientific achievements”. Marx, of course, wrote to Darwin asking permission to dedicate to him the English translation of Capital, but was politely turned down. Finally, in the famous Marx family quiz, when Marx was asked to name his favourite motto, favourite virtue, etc., he offered two choices for "favourite hero": Spartacus and Kepler. The leader of the oppressed and the genius of pure science were, as revolutionaries, equally dear to a man who in his own heart fused the passions of both. (5) It is not to be denied that Engels, in the very last years of his life, became (under strong pressure from the German Social-Democracy) a political "revisionist" of Marxism. Nonetheless, the intellectual collaboration of Marx and Engels remains, in its warmth, its depth, its duration and its range of subject-matter, a phenomenon which it is extraordinarily difficult to parallel from anywhere else in the history of human thought. Any discussion of the founders of Marxism which fails to convey their lifelong mental harmony is seriously defective.

34. I have used the translation in T. B. Bottomore and M. Rubel (eds.) Karl Marx: Selected Writings in Sociology and Social Philosophy (London 1963), p. 75.

35. Economic and Philosophical Manuscripts, cited ibid., p. 87 (italics removed by me).


37. See, for example, George A. Miller, "Communication and the Structure of Behaviour", in Disorders of Communication (Research Publication of the A.R.M.N.D., vol. XLII, Baltimore 1964). It seems from one interpretation of the evolutionary evidence that the specific features of man's brain "evolved after bipedalism and consequent upon the use of tools", following which it enlarged threefold; "it was the altered selection pressures of the new technical-social life that gave the brain its peculiar size and form" (S. L. Washburn and F. C. Howell, "Human Evolution and Culture", in S. Tax, ed., Evolution After Darwin, vol. II, Chicago 1960). It is a well-known feature of the human motor cortex that the representation on it of finger, thumb and whole-hand function is almost equal in extent to the area allotted to the whole of the rest of the body below the head; this disproportion is not present in the brains of species near to man.

38. Economic and Philosophical Manuscripts, in Bottomore and Rubel, p. 85. (Clark Hodges, in his argument that “Engels changed the order of prece-
dence assigned by Marx to social theories and to theories of the physical universe" (loc. cit., p. 301) quotes the Manuscripts as declaring that "eventually the science of man would subsume under itself natural science"; this is exactly half of what Marx actually said.) Kostas Axelos, in Marx Penseur de la Technique (Paris 1961) thinks that Marx projected the unification of natural and social science as a possibility to be achieved only "after the abolition of alienation" (op. cit., p. 251). But Marx seems to have conceived of the synthesis as a forthcoming stage in the internal logical development of the sciences.

40. Marx related some economic data to the quantity-quality leap displayed within the molecular theory of chemistry, in an aside in the first volume of Capital (Moscow 1954, p. 309), and was roundly attacked for it by Dühring for allegedly performing Hegelian "dialectical miracles". Whether he also thought that the negation of the negation and the unity of opposites were also to be found in nature is anybody's guess. Engels' scientific thinking is scarcely exhausted by his own efforts to fit Hegelian categories of this kind to scientific phenomena, or even by his attempt to order the sciences through a taxonomy of "forms of motion" undergone by matter. A fair and frank assessment of Engels' work on science is offered in J. B. S. Haldane's preface to the Dialectics of Nature (London 1940).
41. The quotation is from Engels (Dialectics of Nature, Moscow 1962, p. 183). J. Bronowski's "The Language of Science" (in Encounter, November 1965) is an eloquent set of variations on something very like the same theme.
42. Cf. "The standpoint of Professor Lukács regarding Marxism needs to be examined. It seems that Lukacs asserts that one can only speak of the dialectic for the history of man but not for nature. He may be right and he may be wrong. If his assertion presupposes a dualism between nature and man he is wrong, because he falls into a view of nature proper to religion and Greco-Christian philosophy and also into idealism, which in reality does not manage to unite men and nature and relate them together other than verbally. But if human history should be conceived also as the history of nature (also through the history of science), how can the dialectic be separated from nature?" (A. Gramsci, The Modern Prince, London 1957, p. 109).
44. The Holy Family, loc. cit., p. 172. E. P. Thompson's citation of Bacon in last year's Socialist Register (pp. 333–4) did much, in its context, to expose the primitive "dialectical" quality of the Baconian vista of nature. (As a point of detail, Gramsci's contrast of the scientist-worker against the "pure thinker" recalls Bacon's parable of practice and theory, whereby human wit must "work upon matter" like the bee and avoid the example of the spider's self-generated webs.)