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The Fetish of High Tech  
 and  
 Karl Marx's  
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 Mathematical Manuscripts

Contents:

- The Fetish of High Tech: Marx's *Mathematical Manuscripts* vs Computer Consciousness by Ron Brokmeyer, Bay Area
- Responses from Raya Dunayevskaya and Malcolm, Bay Area
- Further discussion from Franklin, Chicago, on the Russian distortions
- Raya Dunayevskaya on the roots of the Russian distortions in Bukharin
- Comment from Ted, Salt Lake City

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## THE FETISH OF HIGH TECH

Marx's *Mathematical Manuscripts* vs. "Computer Consciousness"

by Ron Brokmeyer

### Introduction

If we make it that long without going over the nuclear precipice, even more massive unemployment is in store on the other side of this "recovery" which has fed anew high-tech illusions of the Reagan economists. The small gain in productivity growth from computers which have greatly reduced the "lags between innovation and commercialization,"<sup>1</sup> has produced the earth shaking election year official unemployment rate of 7.5% which gets us back to where it was when Reagan got elected supposedly to put us back to work. But it is Reagan's massive buildup in state intervention in the economy in the form of militarization coupled with talk of winning a nuclear war which points to the total deathly form of U.S. state-capitalism which has always tied technological innovation to militarization. Indeed, the first computer was built during World War II to drastically reduce the time it took to compute ballistics. Even the first so-called high-level language for business, COBOL, was a Department of Defense project.

Reagan is carrying this process to the limit where "economics and military policies constitute a single spirit."<sup>2</sup> As opposed to Japan with its 10 year program which will be civilian, the focus of so-called "artificial intelligence" in the U.S. is military and is redirecting the computer science resources at universities throughout the country. The Department of Defense is struggling with the Department of Commerce to put an iron curtain around Silicon Valley's exports because the civilian advances in high tech have outstripped the military. There is dislike for the military in the personal computer industry which has its roots in an organization founded by anti-draft organizers.<sup>3</sup> But when giant IBM, which predominates in the computer capital goods market, decided to penetrate this last niche of entrepreneurship, the shakeout had already started and extended to even threaten those original makers of the personal computer at Apple.

The fetish of high tech and the illusion that technological innovation can be neutral in a capitalist society is unfortunately part of the thinking of many of those opposed to this society. The Bay Area, where groups like DSA sponsor "Computers and Consciousness" classes, is a special center of the fetish of high tech. Marx's 1880 *Mathematical Manuscripts*, as a critique of that independent branch of science alongside a lifetime of revolutionary praxis which included a critique of science as the handmaiden of capital, developing technology against the human being in the factory, speaks sharply to today's reality. Part of that reality is that this is the field I was drawn into as there was still an opening.

<sup>1</sup> *Business Week*, February 13, 1984.

<sup>2</sup> see Emma Rothschild, "The Cost of Reaganism," *New York Review of Books*, March 15, 1984.

<sup>3</sup> see Lenny Siegel, "Silicon Valley's growing disillusionment with Pentagon," *San Francisco Chronicle*, January 6, 1984.

### 1. The Fetish of High Tech and Capitalism's Division of Labor Today.

Computer programming demands great mental energy, tortuously tracked into narrow channels. You become painfully aware of your thought being tied to the capacities of the machine which is limited to those dimensions of thought that can be mechanized, i.e., reduced to a formal logic. Formal logic is what can be parodied in the millions of on/off switches that make up the micro chips of the computer. Right now computers are limited to a highly restrictive syntax which bridges the gap between it and everyday language. Knowledge of the syntax is the expert's basis. Each computer program, even if badly written, creates its own specialized syntax, and hence that programmer becomes an instant expert.

Programming is the alienation of the very activity of thinking. There is a new aspect to what Marx called the fragmentation of human capacities as capitalism has discovered new ways to use a certain dimension of thought as a tool. But your thinking plays no role in directing the process where your thought is used as a tool. Reducing thought to a mere tool separate from reality is also the method of formal logic, and goes hand in hand, with production relations where the purpose for the use of the tool remains as separate as ever. Programming perfects thought as mere means; it has no necessary relationship to thinking which determines the goal of an activity. The present reality lends itself to confusing the activities of computers with thought, since human thought as that which gives direction to human activity and in so doing informs human reality is nowhere the basis of activity organized around producing commodities.

The programmer still controls the machine within these narrow limits as opposed to those left in production where it is the goal of the program to replace people and to personify the machine to control as completely as possible the people left. Who can forget that during the national AT&T strike last year it was the operators who were the most militant and raised the most fundamental issues which the settlement didn't address: not only how their numbers had been drastically reduced, but working conditions where the work flow is controlled by computers.

The present programmer is like the craftsmen of the manufacturing period who built the first large scale machines. The overall tendency was their complete demise as large scale machinery was built to recreate itself. But in the early period of a revolution in production these craftsmen were seized upon aggressively in a process which (as Marx described 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 and inclinations."<sup>4</sup>

The way in which the totally dedicated data processing professional becomes monstrously crippled is well known as a personality distortion caused by intense singling out of abstract formal logic as everyday human activity. As the supposed truth of thought abstracted from life, Hegel called formal logic the "height of self-estrangement" and, explained why it was forgotten as "mere pedantry, of no further use either in practical life or in science," soon after its discovery because the "study of Logic is no more necessary to teach us to draw correct conclusions than a previous study of anatomy and physiology is

<sup>4</sup> Karl Marx, *Capital*, Volume One, translated by Ben Fowkes, Penguin Books, Middlesex, England, 1976, p. 481.

required in order to digest or breathe."<sup>5</sup>

But formal logic was resurrected in its most general form, abstracted from all meaning in fusion with mathematics, by Russell and Whitehead in their *Principia Mathematica*, which set the ground for the materialization of logic in computers using on/off states to parody a base two number system. Materialized formal logic is self-estrangement intensified because it distorts, way out of proportion, that aspect of thought by tremendously amplifying its capacity. A file is accessed 10,000 times in a few minutes and 100 different actions are taken on the information in there depending on 100 different criteria. Once the program becomes runnable on the machine it becomes part of its capability. You are responsible for keeping track of all its ramifications when set in motion.

Capital pays for itself by working and a computer which is down due to software brings neat from many directions. A common nightmare is having many unfamiliar processes turned over to you and being held responsible for getting things going after a crash. Relying on computer processes which often fail, brought out the sharpest opposition from PATCO workers who were accountable for the lives of thousands of people in the air. Many people may depend on software working and the only ones who can get it working after the inevitable crash are programmers.

Programmers in a data processing (DP) shop relate to each other by personifying these blocks of materialized formal logic. Systems have a name and a "personality" that does things on the basis on what it "encounters." The inversion of making "thought" mechanical as something objective with external validity is the alienation of human beings from each other. Intellect is directly linked to the capacities of the machine and the machine is what links people to each other. Marx's view of how contradiction totally infects the capitalist world in an address to British workers in 1856 is a more precise depiction of today's reality: "All our invention and progress seem to result in endowing material forces with intellectual life and in stultifying human life into a material force."

The task of directly "endowing material forces with intellectual life" runs up against the limits of formal logic as a way of categorizing the world, i.e., information about things keeps growing and whatever the machine's capacities it is exhausted. There are always new aspects of things or people needed as part of the complete picture. The real world is ever demanding even greater precision from the computer record of particular length and made up of discrete units of information. Because it is an external way of connecting something to a more general category through particular aspects, Hegel said totality would always elude formal logic because a thing is infinite in qualities.

It is not those infinite qualities, however, which drive capitalism's obsession with replacing people with machines rather, it is a completely phantom "quality" of things issuing out of commodity production, the amount of labor time "in" them, which looms larger than life in today's reality and in the data DP is concerned with. That includes computer programs themselves where the goal of "artificial intelligence," aside from the military, is to accelerate software productivity.

Of course one of the most diverse aspects of the real world is the infinite variety and nuances of meaning in everyday language. The incompleteness of the present revolution is reflected in the constant proliferation of new computer languages each with its own arbitrary syntax to learn, spinning off new

<sup>5</sup> G. W. F. Hegel, *The Science of Logic (Part one of the Encyclopaedia of the Philosophical Sciences)* also known as *The Smaller Logic*, para. 183.



cadres of "experts," and new jokes about the latest buzzwords. New languages arise with big claims to have bridged this gap. Just to "translate" they use a lot of the machine's capacity, a capacity which changes constantly as new technological innovation stores information even more microscopically. But what they reveal is both a language reduced to the machine's capacity as well as that capacity itself stripped of the mystifying syntax. The automating of programming itself has gone far enough so that already it is very difficult to get an entry level programming position.

Marx described this process where capitalism constantly revolutionizes production, creating new extremes to the fragmentation of the human being while keeping in reserve great masses of people in misery to be thrown from one industry to another, as an "absolute contradiction." Because these constant revolutions in production produce ever new forms of the old ossified division of labor, Marx added that the only positive aspect to this "absolute contradiction" is the emergence of the "totally developed individual."<sup>6</sup> Before we return to Marx's concept of the totally developed individual as the opposite to capitalism, we will gain an appreciation of that from Marx's own multidimensionality, not separate from his focus on overcoming capitalist reality, as he returned to criticize science in the particular form of mathematics in the 1880's.

## II. Marx's *Mathematical Manuscripts* and the "Veil of Obscurity" Over Today's Mathematics

In Marx's day the process he continuously demonstrated, the incorporation of all science into the machine as a weapon against the laborer in production, hadn't differentiated to the point where mathematics was directly the form of science's role in production as it is in the second industrial revolution of today. Marx's own digging into mathematics as a separate science in the 1880's, however, casts illumination on problems of today. What Marx was subjecting to critical scrutiny was differential calculus, tracing the root of over 200 years of confusion in Newton's and Leibniz's original creation of calculus. Newton was the supreme materialist proclaiming "I assume no hypotheses" to demonstrate how completely he considered thought speculation to be separate from the external truths of the physical world which he viewed as one big machine. Indeed, Newton's calculus, as all his mathematics of *Principia Mathematica*, was also called "natural philosophy."

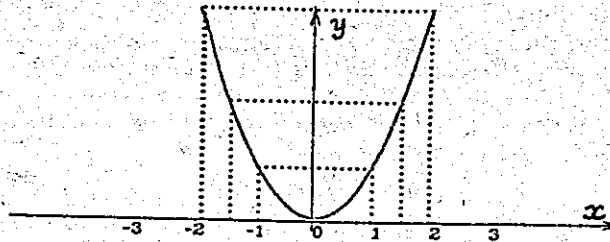
He created calculus to find the common ground for the phenomena of gravity pulling things back to the earth and the motion of the planets. That ground was for Newton the rate of change of velocity. But what Marx criticized was his mathematics. Marx had long before broken with science as "a priori a lie" when having a basis separate from life, but what he felt compelled to return to criticize near the end of his life was the development of a field most directly based on the force of thought itself. Newton's very eagerness to get to the result was at the cost of rigor in mathematics from which that field hadn't fully recovered as Marx was investigating it in the 1880's.

The use of a differential equation, a new way of viewing the original equation from which it is derived, has never been questioned in its ability to reveal something new. It is the process which has been mystified over the centuries. Marx characterizes the process of its derivation as negation of the negation which was hidden in the mystifying methods of mathematicians because they could not conceive how something could come out of nothing. Marx shows how

<sup>6</sup> Karl Marx, *Capital*, p. 618.

there is nothing magical about it, how the derivative comes from simple binomial algebra--a fact which was later discovered but still only considered as a parallel proof of the validity of calculus. This can be illustrated with a graphic example.

Take the equation  $y = x^2$  which Marx uses to contrast his method with Newton's and which on a graph looks like this:



This equation gives you the value of  $y$  for a given value of  $x$ . The graph represents each individual value as a point. Taking the derivative proceeds by first viewing a given point dynamically, i.e., in terms of what it isn't, or what it could become, within the whole of this equation. That idea is symbolized by a new value, a change in  $x$ , a change completely unspecified with respect to its magnitude, we'll call  $\Delta x$ , so that  $x + \Delta x$  is a value of  $x$  in this equation giving a new value of  $y$  to which we have to add an unspecified  $\Delta y$ , or:

$$y + \Delta y = (x + \Delta x)^2$$

If we substitute the value of  $y$ , which is  $x^2$ , we get:

$$x^2 + \Delta y = (x + \Delta x)^2$$

By ordinary algebra we get:

$$x^2 + \Delta y = x^2 + 2x\Delta x + \Delta x^2$$

$$\Delta y = 2x\Delta x + \Delta x^2$$

Dividing both sides by  $\Delta x$  we get:

$$\frac{\Delta y}{\Delta x} = 2x + \Delta x$$

Now if we undergo a second negation and view our original point  $x$  by negating its change, or referring it back to itself and not what it isn't (mathematically making  $\Delta x$  equal to zero), we get:

$$\frac{0}{0} = 2x$$

Now  $\frac{\Delta y}{\Delta x} = \frac{0}{0} = 2x$  is the instantaneous rate of change of  $y$  per unit  $x$  in the original equation. It is a dynamic way to view any given point in the above graph. (For example, when  $x=1$ ,  $y$  is increasing twice as fast as  $x$ ; when  $x=50$ ,  $y$  is increasing 100 times as fast as  $x$ .)  $2x$  is the derived equation which has been given the symbolic name  $\frac{dy}{dx}$  and only emerges when  $\Delta x$  is set exactly to nothing.

Marx stresses that what is important is the process and  $\frac{dy}{dx}$  is introduced to symbolize that because  $\frac{0}{0}$  by itself is meaningless or, as Marx put it: "First

making the differentiation and then removing it therefore leads literally to nothing. The whole difficulty in understanding the differential operation (as in negation of the negation generally) lies precisely in seeing how it differs from such a simple procedure and therefore leads to real results.<sup>7</sup> Marx attacks as a "chimera" "the closely-held belief of some rationalising mathematicians that  $dy$  and  $dx$  are quantitatively actually only infinitely small, only approaching  $\frac{0}{0}$ ..."<sup>8</sup>

It is as if a positive something "out there" had to be invented instead of the self-development of the idea which  $dx$  and  $dy$  are introduced to represent. In a method that is still taught today<sup>9</sup> Newton got to the equation in the box but in the following form which mystified the process by beginning with the results  $\frac{dy}{dx}$  in the form of "infinitely small quantities":

$$dy = 2(dx)x + (dx)^2$$

Contrary to all mathematical rigor,  $(dx)^2$  is spirited away in a spurious pragmatic maneuver--claiming that as  $dx$  becomes a very small but discrete quantity  $(dx)^2$  is even smaller and inconsequential. Then both sides are divided by  $dx$  as  $dx$  and  $dy$  approach zero, resulting in:

$$\frac{dy}{dx} = 2x$$

The point here is not a lesson in mathematics but rather the form of Marx's critique of this most abstract of sciences which was to strip away its "veil of obscurity"<sup>10</sup> by tracing the self-development of the idea of calculus over 200 years. In particular, Marx was showing how second negativity--the dual rhythm of self-development through negative self-relation--is no abstraction but the concrete even in the idea of an algebraic equation. Marx was adding that even though you mathematicians have simplified things after 200 years you are not home free because the foundation, the method, was wrong.

Where Marx demonstrated concretely the source of movement in negative self relation, after his death a new foundation for modern math was laid by the *Principia Mathematica* of Russell and Whitehead introducing direct reigns on the free development of thought--banishing self-reference altogether as a

<sup>7</sup> *The Mathematical Manuscripts of Karl Marx*, translated by C. Aronson and M. Meo, New Park Publications, London, 1983, p. 3.

<sup>8</sup> *Ibid.*, p. 5.

<sup>9</sup> Today's unthinking schoolroom calculus is a well defined mechanical procedure based on an ambiguous concept of "limit value" which Marx said has its origins in "the first mystical and mystifying methods of calculus." (p. 126) The second derivative is taken from the equation  $\frac{dy}{dx} = 2x + dx$  in the form of  $\lim_{dx \rightarrow 0} \frac{dy}{dx} = 2x$  which is explained as "evaluate the limit of the right hand side as  $dx$  approaches zero." The problem is that  $dx$  is zero or it isn't which no symbol coupled with linguistic obfuscation can sweep under the rug. In the resulting equation there is nothing, not even an infinitely small  $dx$  on the right hand side, so it must have either been spirited away or actually reached zero. The cost of the concept of limit is a falsification: the right hand side equals "limit" or  $dx = 0$  and the left hand side equals "approach" or  $dx = \text{something very small}$  and the two sides are not related by equality.

Put another way, Marx first shows that this peculiar concept of "limit value" is no tautological limit (like .33333 etc. =  $1/3$ ) but rather springs from the generalization of a whole series of equations symbolized by varying  $dx$  in  $\frac{dy}{dx} = 2x + dx$ . He points to the "childishness" of the assumption that the right result is attained by hanging out in the right neighborhood ( $dx$  is very small and getting smaller) without taking the plunge to zero. The whole series vanishes as soon as  $dx = 0$ . In other words, you can add to  $dx$  and take away from  $dx$  short of making it 0 and you stay in this little universe of equations, but as soon as  $dx = 0$  you've reached the point of no return. The point of no return is no "limit value" but stands by itself in a relation of equivalence. It is not so much a "limit" as a new beginning which can itself undergo differentiation.

<sup>10</sup> *Ibid.*, p. 109.

source of contradiction. When self reference is separated from the live human subject as a property of abstract thought, it creates the celebrated paradoxes of mathematics, the simplest of which is: "This statement is false." Though materialization of formal logic required that information be encoded in discrete, i.e., noncontradictory, on/off states, it was the mathematicians' method of viewing thought as perfectly separated from reality which created the illusion that contradiction could be purged. A "little universe"--elementary number theory--was to be created which was totally consistent and about which it could definitely be said of any proposition: it is either true or false. Because content is viewed as totally purged in this kind of logic, form, or proof, is everything.

In 1931 a mathematician, Kurt Gödel, proved within the limits of the rules of number theory or any formal system that undecidable propositions exist and, in general, that it could never be proved that a formal system is free of internal contradictions. It was seen as a catastrophe by the leading scientists like John von Neuman who were pushing computers as the mechanization of thought. The real shocker is that this had no effect on the direction of their work, least of all a turn to reevaluate their method in order to work out a human logic, rather it generated a new round of speculation and debate about the capacities of machines.

The tizzy mathematics is in today is reflected in the ludicrous extreme of this speculation in a popular 1980 work *Gödel, Escher, Bach*.<sup>11</sup> For 742 pages, which, as the author himself describes them, "wallow in" (p. 28) the possibility of "artificial intelligence," it is no further along at the end than at the beginning which accepts the self-limiting limitations of formal logic systems and Gödel's proof that the nature of their totality could never be determined from within such systems. A work which purports to be about machines is an ongoing speculation on form and content, the centrality of self reference and contradiction in art, music, and mathematics tied to its central concept whose very name is mystifying: "strange loops."<sup>12</sup> As though totality can somehow emerge through discrete blocks of externally interrelated formal logic, the mystification of "strange loops" is never any clearer or closer to its goal of mixing up what can be materialized through formal logic and thought itself. Thus the end turns to "consciousness" not, however, its own self-movement including the bubble Gödel burst of those who put forth such pretension for formal logic. No! Hofstadter turns to "consciousness" which "has been proposed for eons, by various holistically or 'soulistically' inclined scientists and humanists...[as] a phenomenon that escapes explanation in terms of brain-components," as a "candidate" for something outside of definitely decidable propositions. Definitely decidable propositions, in turn, are relegated to the "hardware" of neural activity with which consciousness has some kind of undeciphered coded "strange loop" (p. 708).

We could laugh heartily at this if we didn't have to return to face today's reality: specifically contradiction not as abstract thought tied to the capacities of machines but the live human being facing unemployment, alienating work

<sup>11</sup> Douglas R. Hofstadter, *Gödel, Escher, Bach: an Eternal Golden Braid*, Vintage Books, New York, 1980.

<sup>12</sup> This mystifying form in which contradiction has been reintroduced into mathematics has helped generate a new culture around computers. See Sherry Turkle, *The Second Self, Computers and the Human Spirit*, Simon and Shuster, New York, 1984, a new study of this culture, undertaken to reveal what "lies behind" the computer as an "evocative object" (p. 13), which challenges not Hofstadter's method, which views contradiction as an attribute of the machine about to "bridge the gap between the mental and the mechanical" (p. 304), but rather turns to "feelings" and the "law of the heart" as what is specifically human (p. 311).



relations and the nuclear precipice. Summarizing the development of post-Newtonian mathematics, Marx reminds us in the *Mathematical Manuscripts* of Hegel's incomplete break with Kant--based on the development of post-Kantian philosophy which never "investigated the general foundation of Kant, of idealism in general."<sup>13</sup> The development of mathematics from its foundation to today impels a return to the roots of this new industrial revolution in the post World War II world with a view toward Marx's own general foundation which centered negation of the negation on labor, as human activity which encompasses contradiction driving toward resolution, a resolution which could transform labor into self-activity and unite the ideal and the real.

### III. The Future in the Present: the Post World War II World and Today

World War II came out of the world capitalist collapse of the 1930s. Like today's economic "growth" through militarization that slaughter was the impulse to reduce the lag between "innovation and commercialization" of new technologies. It gave birth to not only the bomb, but the first computer and "cybernetics" in the form of self-aiming anti-aircraft guns.

Not all were uncritical of this technological revolution which emerged out of World War II. There were two fundamentally different ways of dealing with the horrors of this new technological stage. One, which I'll return to, came from the workers actually facing this technology, another from the scientist, Norbert Wiener, who invented the term cybernetics and was one of the prime movers of this revolution. He projected in 1950 in *The Human Use of Human Beings*<sup>14</sup> the most dire consequences, raising the question of what is specifically human. Yet he had no vision of what is human development outside of his model for self-development in machines, based on the formal logic of his former teacher, Bertrand Russell.

The closest analogy he achieved in his suggestions that learning might be reduced to the ability to alter taping--i.e., the way a person or machine automatically responds to a given stimulus from the outside--was Pavlovian psychology. As was mentioned above, from a critical perspective it was Hegel who first projected the kindred relationship between formal logic and autonomic body functions like digestion.

The shock is that today Wiener is still held up as a model for the technological innovator taking responsibility for the consequences of his actions.<sup>15</sup> A whole generation of intellectuals was drawn to Wiener's work as a vision of the positive possibilities of the new technology. But it is the future horror it projected which became the reality of today--from the "apocalyptic spiral" (p. 175) of the arms race to "...an unemployment situation, in comparison with which the present recession and even the depression of the thirties will seem a pleasant joke." (p. 220)

Warning and foreseeing does not mean being able to influence events. Technology out of control is not an abstract question but the concrete experience of work relations under capitalism where the machine dominates you. Historically, the introduction of machines was no mere transition requiring a new moral imperative but was, as Marx shows again and again, the very weapon used against workers' revolt. It is centuries of division between mental and manual labor which makes even the most humane scientists see the self-development of

<sup>13</sup> *Op. cit.*, p. 119.

<sup>14</sup> Norbert Wiener, *The Human Use of Human Beings*, Avon Books, New York, 1950.

<sup>15</sup> see Steve J. Heims, *John von Neuman and Norbert Wiener: From Mathematics to Technologies of Life and Death*, MIT Press, Cambridge, Ma. 1980.

the machine as parallel to what is human. Facing the 1984 reality we can no longer afford the luxury of Wiener's view of *Cybernetics and Society* (his subtitle) as parallel entities with its view of history which views the future from the present as external reality with a life of its own: "...For the individual scientist, even the partial appraisal of this liaison between the man and the [historical] process requires an imaginative forward glance at history which is difficult, exacting, and only limitedly achievable... We must always exert the full strength of our imagination."<sup>16</sup>

In spite of this view that the scientist may intervene in the historic process by imagining the impact of his invention far into the future, by now we can see how little impact that imagining has had. But more important is breaking with the method that views development as process which is external. The fetish of high tech reflects the fetishism of commodities where human thought united with action doesn't recreate social reality, but, rather, investigates social reality as something external based on the laws of commodity production which are given the status of objective validity. That fetish was not only Karl Marx's own specific critique of the whole of bourgeois thought but also pointed to freely associated labor as the only way to transcend that barrier.

The future as self-development of the machine is the present for workers in capitalist production. They project the need for a totally new direction when they speak for themselves in their own spontaneous actions. The U.S. coal miners in 1949-50 staged a general strike which included opposition to the introduction of a machine, the continuous miner, which was the first recorded use of the new automation. The miners carved out a completely independent path departing from their own leader, John L. Lewis, and taking on the company and the state with its new state-capitalist weapon, the Taft-Hartley injunction.

By now wildcat strikes against automation have swept every industry, showing repeatedly the objectivity of this drive to unite mental and manual labor, as workers' opposition from the beginning was not only against the unemployment caused by the new technology but the new conditions of labor. Yet there has been no bridge from post-Marx Marxists or those who seem to be raising a kindred question like the "human use of human beings" to this form of self-development. In 1949 Wiener did reach out to labor by writing to Walter Reuther, then the head of the UAW, but Reuther as a labor bureaucrat could only praise the new technology as "progress" he would never oppose. A few short years later, when automation was introduced in auto, the wildcat strikes which swept the industry marked the great divide between the rank-and-file and the labor bureaucrats.<sup>17</sup>

Look at the Bay Area today, where Fremont workers demonstrated on a baseball field just over a year ago against their own International Union (UAW) who locked them out of their own union hall to clear the way for the new extreme roboticized production in the new GM/Toyota plant. Every worker there knew of working conditions in Japanese auto plants described in Satoshi Kamata's book originally called *Toyota: Factory of Despair* which was quoted at length in the local press. One of the workers I met at that demonstration has been permanently displaced (the new roboticized plant will need only 3000 workers where 8000 worked before) and is now in a retraining program in electronics which he says isn't for any real job. He added that the worst part is the "extreme anti-unionism and claims that all the high tech firms don't have

<sup>16</sup> Quoted in Helms, *Op. cit.*, p. 337.

<sup>17</sup> see Charles Denby, *Indignant Heart: A Black Worker's Journal* especially Chapter 28, "Worldwide Struggle for Freedom", South End Press, Boston, 1978.

unions because they 'take care of their workers,' as though a \$6 an hour job in Silicon Valley is a rosy future. High tech has affected our way of thinking."

Apart from a totally new way of thinking there is no way to escape still greater degenerations produced by a method which views thought as mechanical. Thus the latest idiocy, called "Human Sciences" at Westinghouse, is to use electrodes to track the brain wave p300 to make sure workers are paying attention. This is being touted as an answer to the air traffic controllers' strike and the continuing deterioration of work conditions in that field after the destruction of PATCO as well as "a key productivity measure for the information age."<sup>18</sup>

At the end of his life, in his *Mathematical Manuscripts*, Marx not only anticipated today's crisis in production but also a new direction to the fetish with his critique of science's attitude toward thought itself, showing how the science of mathematics was thwarted. Nor did we have to wait for a challenge to the methodological foundation of Newton's view of the universe which reigned supreme for over two centuries. That view was finally overthrown by Albert Einstein whose breakthrough was also methodological when he criticized Newton's "I assume no hypotheses" and not only made the observer but the thinker a dimension of the truth of the physical world: "We now know that science cannot grow out of empiricism alone; that in the construction of science we need to use free invention... This fact could elude earlier generations, to whom theoretical creation seemed to grow inductively out of empiricism without the creative influence of a free construction of concepts."<sup>19</sup>

However, it wasn't the new theoretic departure in itself that unleashed the human energy to put  $E=mc^2$  into practice. After several decades the first form of its realization was the bomb. It is time to unite thinking with activity, science with life, in a new unity of theory and practice beginning with the objectivity of the drive to become total individuals that emerges out of today's total crisis. As far back as 1843, in his essay "On the Jewish Question," Marx had posed the incompleteness of "political emancipation" and saw the need for "declaring the revolution to be permanent" to reach the "individual human being... in his everyday life, in his particular work, and his particular situation" and thereby accomplish "human emancipation." In the section on "Fetishism of the Commodity and Its Secret" in *Capital*, Marx makes the particular barrier to emancipation explicit--human activity which takes the form of commodity production. People are related to the social whole and to each other through this particular thing, reproducing a false attitude to objectivity in bourgeois thought. In seeing through the fetish Marx's philosophy of revolution in permanence is concrete, the self-development of the idea and revolution are inextricably bound together. The full development of science will come only with the full emancipation of the human being.

--August, 1984

<sup>18</sup> see Michael Schrage "Is Everyone Paying Attention?", *San Francisco Chronicle*, June 17, 1984.

<sup>19</sup> Quoted in Abraham Pais, 'Subtle is the Lord...' *The Science and Life of Albert Einstein*, Oxford University Press, Oxford, 1982, p. 14.

June 14, 1984

Dear Colleagues:

Because what I received in my "hideaway" -- "The Fetish of High Tech: Marx's *Mathematical Manuscripts* and Marxist-Humanism's Great Divide" by Ron -- marks a very high theoretical breakthrough in its reconnection with one of those magnificent documents from Marx's final decade, the *Mathematical Manuscripts*, and at the same time is most today-ish in recreating that analysis as it relates to this age's craze for computers, I felt I had to write to you again. The reason I consider it so important is that I fear that, precisely because we have transcended narrow economism of all the post-Marx Marxists, we may not study this as seriously as it deserves. Let me therefore begin at once with the fact that it brings a new element to the whole question of fetishism, showing that it is not only fetishism of commodities that is involved in the senility of state-capitalism, but the whole so-called second industrial revolution and its robotics, micro-chips and endless mystifications of what is really at stake.

From its very introduction, Ron reveals that by this time, "Reagan's massive buildup in state intervention in the economy in the form of militarization coupled with talk of winning a nuclear war points to the total deathly form of U.S. state-capitalism which has always tied technological innovation to militarization." That the fetish of high tech has also overwhelmed even groups like the DSA who are sponsoring classes in, of all things, "computer consciousness" does, indeed, demand a look into Marx's contribution, in his *Mathematical Manuscripts*, to the whole question of the ideologues' false consciousness, which tries to pass off the differential calculus as a neutral phenomenon as it does with all of science, which had led Marx the minute he broke from bourgeois society to declare that the separation of science from life is "a priori a lie."

Ron has spelled this out theoretically and concretely at the same time by showing that the machines are of necessity "limited to those dimensions of thought that can be mechanized, i.e., reduced to a formal logic. Formal logic is what can be parodied in the millions of on/off switches that make up the micro chips of the computer."

Let me warn you about one thing. If you're as opposed to economics as I am and especially when it's expressed in formulae, you will, I hope, not do what I did ever since I got through analyzing those three Five Year Plans and arguing with Luxemburg on her attack on Marx's formulae on Accumulation of Capital, as if the formulae were the issue instead of the philosophy of "revolution in permanence." So if you feel the way I do and am telling you not to feel, you'll take one look at pages 8 & 9 [5 & 6] and run the other way. Please don't. First of all, it's very simple; secondly, if you remember it's a question of process, of differentiation as a thing develops and leads to negation of the negation, you'll know that even if you skip those two pages you'll get the correct direction from page 10 [last para. p. 6].

Here is how Ron sums up pp. 8 and 9: "The point here is not a lesson in mathematics but rather the form of Marx's critique of this most abstract of sciences which was to strip away its 'veil of obscurity' (p. 109) by tracing the self-development of the idea of calculus over 200 years. In particular Marx was showing how second negativity -- the dual rhythm of self-development through negative self-relation -- is no abstraction but the concrete even in the idea of an algebraic equation."

Anyone who is old enough to have been a member of the Tendency in 1950 knows how the question of cybernetics, which I dare say inspired this whole high

8317



tech movement, affected one Tendency member, as if it really carried an answer, rather than our projection of a philosophy of revolution. The excuse was how humane the inventor of cybernetics, Dr. Wiener, was and, as proof of it, they cited his work, *Human Use of Human Beings*. I not only opposed cybernetics as any sort of solution, but insisted on how sensitive to language we must be, so that we would be able to recognize there is no neutrality in language, the the word "use" involves the whole philosophic question of utility, which Marx opposed as being no answer to human creativity, so that even when Wiener, supposedly loves human beings, the fact that he want to "use" them, reveals his technological attitude. In any case, insofar as Ron's thesis goes, one of the other features I liked was that he is most concrete in taking up all these mathematical minds from Russell to Weiner, from Kurt Goedel to Douglas Hofstadter. In a word, not only is he precise in his references to the ongoing debates on computers and micro-chips and all high tech work, but he never forgets the Marxist-Humanism philosophically as well as concretely. About the only thing I would have added would be something to his last paragraph on the question of complete individuals, in order to say that the way to achieve this is never to separate the individual from the universal, and that this, indeed, cannot be achieved by separating philosophy of revolution from organizational problems. Indeed, only by making philosophy of revolution the ground of organization will we really achieve growth.

On the other hand, I'm sufficiently impressed to see whether we can get this article published in some journal, and in that case, instead of adding a paragraph I would take out two or three paragraphs from his conclusion where he directly related it to ourselves, and our own organization. Let's see at the convention whether we can come up with some suggestions as to how we can get it published in an outside press.

Yours,

Raya

Some comments on Ron's article on "The Fetish of High-Tech..."  
by Malcolm, Bay Area

This paper strikes a special chord with me, and also, I believe, is a real step forward in our growth and practice. This was the Particular question which radicalized me as a student years ago to the point of breaking with this society. From my position, Civil Rights and Vietnam were certainly not enough in themselves. One could be a radical in those areas and still end up a liberal reformist, a social democrat, or worse.

I started university with a certain amount of trepidation but a lot of idealism. I wanted to be a scientist and felt to some degree that science could solve most of the world's problems. In three short months I was to learn otherwise. The concept that everything could and had to be reduced to discrete bits of information was drilled into us constantly from the start; we were told that "science" dealt only with those things which could be quantitatively measured & that qualities or "qualitative aspects" of things were "unscientific" and therefore "unknowable." The classes were real horror stories, especially a brutal course on experimental psychology and a section which dealt with a sort of "brain mechanics." I was aghast to find that many scientists regarded thought as a function of the brain, which they held to be a highly complex machine, and they would equate the synapse patterns of the brain to thought itself, that thought or ideas and synaptical impulses were one and the same thing! With a real world going on outside, it was eerie and grotesque to see this sort of thinking going on. I began to regard the successful science students as the real dumb ones, since they were the ones who were too dumb to ask themselves any questions. What do you do if a kid gives several answers to an I.Q. question, while the "smart" one is only capable of one answer, the "right" one? At one point a fellow student told me that if we each looked at an object, let's say a "chair," that the chair did not relate to any idea of a chair, but rather that nerve impulses "caused" us to "perceive" a "chair." It was a very chilling experience, and for a moment images of W.W.II holocaust and the death camps flashed through my mind. It was quite a sudden shock to realize that war and racism were not just momentary aberrations in our society, but were at its very core in thought itself. At such a point, there is no truly possible way of going back and reconciling with capitalism. Nonetheless, when I tried to discuss these questions with the people I knew on the Left, none of them had the remotest idea of what I was talking about. Even those on the New Left who seemed to be the best were deaf to this kind of question. Obviously, to criticize the "scientific method" was infinitely more taboo than to talk about sex or other forbidden topics. In fact, that Châteaubriand elite found other "taboo" topics to be fashionable. I became very quiet for many years.

This is the background against which it became clear to me that this wasn't just a band-aid job, but that any significant change would mean digging to the very foundations of this society and its alienated thinking. All this just to say why seeing this discussion opened up in this way, with the miner's strike pamphlet and the new Afro-Asian pamphlet, is so especially important to me!

Perhaps what I like most of all about Ron's article is that he speaks also as a programmer. This brings to terra firma the "pure" realm of math, and along with Marx's mathematical manuscripts, divests it of its veil of mystical purity. It reminds me of many of the stories told by Uniroyal workers and auto workers. When I told Ron this he laughed and said "Yea, I feel like I've just written a huge shop story!" And that is true.

This should instruct us and hint to us as to our on-going attitude and our continuing activity with labor. In fact, I like this article so well that I would like eventually to translate it, but I'll get back to that in a minute. What we have to realize, continually, is this: the "common condition," the voluntaristic "same struggle" attitude which intellectuals are so quick to pounce into cannot be allowed to reduce worker's struggles to how workers "hate their jobs" (you know, it's noisy, the food is bad, the foreman is a creep, there's toxic gas in the air, etc.), because workers do not express their alienation just in those terms, but arrive with a notion of what their true relation to labor could be, what life itself might or "should" be. As a shop story, this article on the High Tech Fetish addresses workers on the very highest level. When we talk about the movement from practice and the movement from theory we are remembering that worker's revolt, and in this case even a "high-tech worker" brings them together as a moment of cognition, praxis, and the very fact of our bringing up these questions theoretically in this way is an important moment in our practice, philosophy as action.

I believe that it is important in many other areas. Certainly it should contribute a great deal to the Women's Liberation movement discussion, especially as a response to biological determinism, which is as much a form of mystified formal logic as Pavlovian psychology. By the way, I still do not see to this day very much difference between Simone de Beauvoir and the Pavlovians. And it also has a lot to do with the Youth question and the entire concept of education in this society, as I have already mentioned. I also hope that those who consider themselves to be "artists" will examine these questions very closely and fearlessly, as I have found them to be by far the most problematic group of all. If there ever was a separate and parallel world to the actual world of experience of most and with never the twain meeting, it is in the sanctified world of "the Arts", not so "opposite" from the sciences with their formal logic, as it might seem. Aesthetics and the crisis therein is one of the deepest signs of the emptiness of this civilization, but that is another subject for another time.

I believe that with this new stage in our discussion of a new stage in production, we can continue to approach the question of labor on the very highest level (as in *Workers Battle Automation*, the first *News & Letters* publication which I ever read!). That is why this carries with it the highest internationalism. While workers in different countries might see common elements in the negative side of capitalist exploitation in each respective country, this is not enough in itself to inspire or achieve international solidarity. It would really be the ultimate insult to workers' intelligence. And we can't just talk "worker stuff" with workers, "Youth stuff" with Youth, even if it is that dimension which brought the individual into the movement originally, as though each were to remain fragmented in the way that they are by this society. It is when we reach the highest level of the notion of freedom which workers, Women, Youth, and oppressed groups in every country arrive with in their revolt, this active notion, whether it be the masses in motion in Solidarity, or the labor resistance which is everywhere in the United States, or the Third World masses, or this challenge to capitalist thought from within the high-tech monster itself, that we open up a new stage of internationalism. Now, back to the question of translation! I would like to eventually translate this article into French as part of an opening "salvo" in the battle of ideas in Canada (when we re-open that battle, and we shall!). I believe that it be of particular importance, together with the new pamphlets, in linking the struggles of workers, Youth, Women, and Native peoples in Québec, which has for so long been in the grip of "L'informatique" -- cybernetics(!) (see various past issues of *N&L*), and in that form, even earlier than most of the United States. Because of that reality, this

discussion of high-tech might be the key to re-opening the battle of ideas there, because it corresponds to both the need and the thirst for ideas there. Also I believe that the most likely (though certainly not the only) path to English Canada will be through Québec. I would like to see the revolutionary movement there be more part of the international movement. Today, we are living under the grip of world capitalism in this age of super-tech, super-destitution, and nuclear threat, and we need this deeper internationalism whether our struggle "Abroad at home; At home abroad" is here in the United States, in Europe, or South Africa, the Third World, Eastern Europe, and 'etcetera'--all other countries!

Enough said for now! There's lots more discussion to come, I'm avidly reading all the many contributions to the bulletins, and I'm looking forward to the Convention with great excitement!



August 27, 1984

Dear Ron,

Here are some thoughts on Marx's mathematical manuscripts and your "The Fetish of High Tech, Marx's *Mathematical Manuscripts*, and Marxist-Humanism's Great Divide." Let me begin with some numbers: According to Yanovskaya, the editor of the 1988 Russian edition of the *Manuscripts*, and to Kol'man, whose review of the Russian book is translated in the English edition (see p. 225), the Russians have photocopies of 1,000 "closely written" sheets of Marx's manuscripts, annotated excerpts, outlines, etc. on math, written from about 1848 to about 1882 (the originals are in Amsterdam). It's difficult to guess whether these sheets with mathematical formulas would work out to more or less than the usual ratio of 2.2 printed pages per sheet, but if it were the same, they should amount to about 2,200 pages. Notwithstanding the deceptive statement on the book's back cover (Marx's "*Mathematical Manuscripts* are published here in English for the first time. Reproduced from 1,000 handwritten sheets, they are..."), this book contains only 140 pages of translations from Marx's work, by this estimate only about 6% of those 1,000 sheets. (The Russian edition included what might be about twice as much, but the translators neglect to explain why they chose to include only the original essays, not the annotated excerpts, outlines, etc. Also not included in the translation is the catalog giving a "detailed description of these difficulties [in dating the manuscripts]...the archival number of manuscript, its assigned title, and the characteristics of either its sources or its content." See p. XXIX.) A task yet to be done is to track down all Marx's related correspondence.

Nearly half the book (114 pages) is filled with the pontifications of the Russian academicians Yanovskaya and Kol'man. Kol'man explains the practical purpose to whose ends such state-capitalist ideologists wish to pervert the *Manuscripts*:

"Despite the misconception, current for a long time among the majority of Marxists working in the field of economic statistics, that Marx's statements on stochastic processes apply only to capitalist economics, a misconception based on the non-dialectical representation of the accidental and the necessary as two mutually exclusive antitheses, these statements of Marx--to be sure, in a new interpretation--have enormous significance for a planned socialist (sic) economy, in which, since it is a commodity economy, the law of large numbers never ceases to operate." (Pp. 222-223)

(In this letter, all emphasis added in quotes from persons other than Karl Marx are added by me.) At the same time, he, as representative of a state-capitalist ruling class that calls itself "Communist," wishes to oppose revolution by attacking the Hegelian dialectic:

"Thus Marx, like a genuine dialectician, rejected both the purely analytic reduction of the new to the old characteristic of the methodology of the mechanistic materialism of the 18th Century, and the purely synthetic introduction of the new from outside so characteristic of Hegel." (P. 228)

He claims that "In the *Philosophic Notebooks* V.I. Lenin criticized the statements of Hegel on the calculus of infinitesimally small quantities" (p. 223), then adduces a quote that instead praises Hegel's "most detailed consideration of the differential and integral calculus, with quotations--Newton, Lagrange, Carnot, Euler, Leibnitz, etc., etc." An independent examination of what Lenin

actually wrote on that chapter of Hegel's *Science of Logic* shows the correctness of what Raya said in *Dialectics of Liberation*: "Lenin, who did know a great deal about calculus, makes very short shrift of this whole section precisely because he agrees with Hegel in his Analysis on Conclusions." (P. 8 of the "Rough Notes on Hegel's *Science of Logic*")

That Kol'man's attack is really on the method of Marx is seen on p. 232:

"Marx...proceeded along a path which we today call algorithmic, in the sense that it consists of a search for an exact instruction for the solution, by means of a finite number of steps, of a certain class of problems. He was on a path which has been the fundamental path of the development of mathematics. Thanks to the dialectical materialist method which in his hands was a powerful, effective tool of research..."

This sounds very much like Hegel's formalism, or, even more, the school of formalism in the philosophy of mathematics which you criticize so incisively (von Neumann's school). It is the opposite of what you show Marx's method to be--the self-development of the Idea through negation of the negation. It is, in fact, the method by which machine capabilities are constantly extended without altering their position of domination over the human being.

The fact that the attack on Marx's method predominates over any ostensible purpose on the state-capitalists' part is proved by the many mathematical mistakes, misstatements, and questionable interpretations in their notes.

Yanovskaya's preface says that "Differential calculus is characterized by...such notions as...'infinitely small' of different orders," (p. XVII) which notion was discarded by calculus in the 19th Century, and which Marx's *Mathematical Manuscripts* show were already in the process of being discarded in the 18th Century. (cf. pp. 75-101). Pp. XX-XXI contain a most peculiar paragraph, nearly all of it wrong:

The fact is, Marx strenuously objected to the representation of any change in the value of the variable as the increase (or decrease) of previously prepared values of the increment (its absolute value). [She means to say, the increment is not a known quantity.] It seems a sufficient idealization of the real change of the value of some quantity or other, to make the assertion that we can precisely ascertain all the values which this quantity receives in the course of the change. [It is not a question of 'ascertaining' the values the quantity 'receives.'] Since in actuality all such values can be found only approximately [the only time it makes sense in calculus to speak of 'finding values approximately' is in computer programs estimating derivatives or integrals], those assumptions on which the differential calculus is based must be such that one does not need information about the entirety of values of any such variable for the complete expression of the derivative function  $f'(x)$  from the given  $f(x)$ , but that it is sufficient to have the expression  $f(x)$ . [This is the opposite of the truth. Everything in calculus depends on neighborhoods, not on isolated points.] For this it is only required to know that the value of the variable  $x$  changes actually in such a way that in a selected (no matter how small) neighborhood of each value of the variable  $x$  (within the given range of its value) there exists a value  $x_1$ , different from  $x$ , but no more than that. [(Her emphasis.) Perhaps it is the translators' fault, but this sentence makes no sense at all. The description has nothing to do with continuity or differentiability.] ' $x_1$  therefore remains just exactly as indefinite as  $x$  is.' (p. 88)

What Marx is saying in the last quote is that  $x_1$  is a variable, just as  $x$  is.  $x_1$  is not "a value" but "the increased  $x$  itself; its growth is not separated from it;  $x_1$  is the completely indeterminate form of its growth" (p. 88). Here it appears that both Yanovskaya and the translators understood neither Marx nor the elementary concepts of calculus.

Where Marx speaks of the different historical import of the two ways of expressing differences (pp. 85-88), Yanovskaya turns it into a denunciation of what Marx shows to be the second historical form, which developed out of the first (where Marx speaks historically, she wishes to turn it into a moral judgment and still gets it backwards):

Marx emphasized...that to represent this  $x_1$  as the fixed expression  $x + \Delta x$  carries with it a distorted assumption about the representation of movement (and of all sorts of change in general). Distorted because in this case here, 'Although  $\Delta x$  in  $x + \Delta x$  is just as indefinite, so far as its magnitude goes, as the the indefinite variable  $x$  itself,  $\Delta$  is defined as a distinct quantity, separate from  $x$ ...' (p. 87) [I have used the translation on p. 87 which is clearer than the inexplicably different translation of the same quote on p. XXI.]

(Contrast what Yanovskaya says with the next paragraph after her quote from Marx on p. 87: " $x + \Delta x$  not only expresses in an indefinite way the fact that  $x$  has increased as a variable; rather, it expresses by how much it has grown, namely, by  $\Delta x$ ." Far from having anything to do with "distorted assumptions" (which he doesn't mention), what Marx is interested in is that "in  $x_1 = x + \Delta x$  1) The difference is expressed positively as an increment of  $x$ ," and "The development of the increase of  $x$  is therefore in fact a simple application of the binomial theorem" (p. 88).

Yanovskaya was so far from seeing any relevance for today of Marx's method that she convinced herself that "the heart of the matter is the operational role of symbols in the calculus" (p. XVIII). The true heart of the matter is articulated in your article in the paragraph on pp. 9-10 [p. 6 in this edition].

Mathematical knowledge must not have been the reason it was Yanovskaya who edited this book: she acts as if all functions are one-to-one ("In general, if  $u$  and  $z$  may be considered to be interchangeable functions of one and the same independent variable, then assigning a value to either one of  $u$  and  $z$  determines the  $x$  value of the independent variable..." p. 199 n. 21); she seems unaware of the distinction between the limit of a series and the limit of a function of real numbers (see pp. 147-48); on p. XIX she mentions a theorem "which permits the derivative of a product to be expressed as the sum of the derivatives of its factors"--perhaps this inaccuracy is due to the translators, but in any case it is false (Marx states the theorem correctly many times, e.g., see p. 15); she refers to "the equality of  $\frac{\sin x}{x}$  and  $\frac{\tan x}{x}$  as  $x$  goes to 0" (p. 149) but means that the limits of the two quantities are equal. Similar imprecise and incorrect statements are scattered throughout the editor's preface, notes, and appendices.

Marx makes some incorrect assumptions, e.g., that all functions are differentiable (e.g., pp. 4-7). On p. 22 he treats  $dx$  as a denominator to from A) to B), where in fact  $\frac{dy}{dx}$  is not a ratio but a symbolic expression for a particular limit of ratios. On p. 31, to get from 3) and 4) to 5), he assumes that  $\frac{dy}{du} \frac{du}{dx} = \frac{dy}{dx}$ , where he claims to be proving it. And contrary to what Marx says on p. 48, in the "usual algebra  $\frac{0}{0}$  can" not "appear as the form for expressions

which have a real value," and can not "be a symbol for any quantity." In his example,  $x-a$  can only be canceled under the assumption that  $x-a$  is not 0. Yanovskaya's explanation that it is "continuity by predefinition" is not supported by anything Marx wrote. We must keep in mind, however, that all these mistakes were also made by great mathematicians whose works Marx had studied and have no bearing on his critique of method.

And while Marx at times speaks of  $\frac{\Delta y}{\Delta x}$  as "a ratio of infinitely small differences" (p. 29), he has insights into what it really is:  $\frac{0}{0}$  "appears only as the expression of a process which has established its real content on the right-hand side of the equation (the derived function)" (p. 8); and expressions like  $\frac{dy}{dx}$  "are mysterious only so long as one treats them as the starting point of the exercise, instead of as merely the expression of successively derived functions of  $x$ " (p. 8).

His insight into the concept of limit is shown in his appendix "On the Ambiguity of the Terms 'Limit' and 'Limit Value.'" See p. 124: "the value as well of the entire right-hand side  $3x^2+3xh+h^2$  more and more closely approaches the value  $3x^2$ , we must then set down, however, 'yet without being able to coincide with it.'" Therefore, to be mathematically correct, it is not simply a matter of setting  $h$ , or  $\Delta x$  and  $\Delta y$ , to 0. It is the well-defined concept of limit which took mathematicians so long to discover and without which their explanations of how the derivative is arrived at are mathematically incorrect. That's why, though at one time they did go through the process you use at the top of p. 9 [p. 5] of your bulletin, in our day no one does. By the way, as you prepare your piece for "outside" publication, there are some statements I would like to see you make more precise: this one and your description of Gödel's Theorem on p. 10 [p. 7]. Gödel proved that any formal logic system containing a model that satisfies the axioms of elementary number theory either contains internal contradictions or contains undecidable propositions, and that it can't be proven to be free of contradictions. The way you described the theorem on p. 10 is, of course, correct, though I've never heard it described in this creative way. Also, are you sure that Newton's method is still taught today (p. 9)? I've never heard of this being done.

Marx has penetrated deeply into the self-development of the Idea by showing the meaning of the changing methods the mathematicians use:

"The symbolic differential coefficient becomes the autonomous starting point whose real equivalent is first to be found... The Differential calculus also appears as a specific type of calculation which already operates independently on its own ground... The algebraic method therefore inverts itself into its exact opposite, the differential method... Originally having arisen as the symbolic expression of the 'derivative' and thus already finished, the symbolic differential coefficient now plays the role of the symbol of the operation of differentiation which is yet to be completed." (pp. 20-22)

"No mathematician has taken account of this inversion, this reversal of roles... The symbolic differential coefficients thus themselves become already the object or content of the differential operation, instead of as before featuring as its purely symbolic result ... they thus become operational symbols... The process of the original algebraic derivation is again turned into its opposite." (pp. 50, 55, 56)

This is not only a logical development but a historical one: the point of departure Newton's method obtained "through covertly or overtly metaphysical



assumptions, which themselves lead once more to metaphysical, unmathematical consequences, and so it is at that point that the violent suppression is made certain, the derivation is made to start its way, and indeed quantities made to proceed from themselves." (p. 84) Then:

"Why the mysterious suppression of the terms standing in the way [in Newton's method]? ... this is found purely by experiment... Therefore: mathematicians really believed in the mysterious character of the newly-discovered means of calculation which led to the correct (and, particularly in the geometric application, surprising) result by means of a positively false mathematical procedure. In this manner they became themselves mystified, rated the new discovery all the more highly, enraged all the more greatly the crowd of old orthodox mathematicians, and elicited the shrieks of hostility which echoed even in the world of non-specialists and which were necessary for the blazing of this new path." (pp. 92, 94)

Marx shows that the real method of development of mathematical ideas is transformation into opposite, negation of the negation, in a word, the dialectic -- contrast those (like Kol'man, see above) who insist that their method is "algorithmic," or is the method of formal logic, something that can be copied by a computer (some computer scientists' pet project at one time was a program that could prove new theorems -- needless to say no such program has ever been developed that can provide significant results). This is the kind of illusion behind "artificial intelligence"; the truth is that, because formal logic is the science of mathematical triviality, computers can mimic only the trivial aspects of human thought and creativity. (You discuss this on pp. 2-3 [p. 2] and again on pp. 9-10 [p. 6-7]) The truth is that, as much as some mathematicians and philosophers of mathematics may pretend their method is that of formal logic, the only way mathematicians can be more than an ant that carries one more grain down a well trodden path, the only way mathematicians can be part of new historical development, is, like it or not, through the dialectic. How much deeper a creativity could they find, then, if they should shed the pretension that math is an abstraction separate from real life and take to heart Marx's analysis of science in "Private Property and Communism" (all mathematicians know that it's much easier to find teachers, students, positions, and funding in fields that have the most direct "applicability," i.e., can be used for Automation or the military).

By the way, when you mention the Russell-Whitehead "theory of types" (p. 10), your creative description of it can be extended to the other systems of mathematical foundations. W.V. Quine's system allow "non-stratified" expression, but only guarantees existence to sets which can be described in a "stratified" way, i.e., without direct or indirect self-reference.

The most common system, that of Zermelo and Fränkel, and the related ones of von Neumann and Bernays, allow finite sets and (possibly) infinite sets that aren't "too big," i.e., it allows the finite and puts limits on the infinite -- anything lesser than something extant also exists, but some concepts are too infinite to be allowed to exist in these systems. What all have in common is a denial of existence to an infinite number of infinite concepts.

As for programming, your description is so profound and so correct, the first thing I said to myself was, "Yes! Yes!" For now I can only add, first, that the company I used to work for was developing a system called SystemGen, wherein the user fills in blanks and checks boxes on some screens, and, voilà, the computer writes the programs. Many other companies are working on similar things, including one that bought the capital (i.e., the programs and programmers) of that now-defunct company. Clearly, the prospect is continued

- 21 -

reduction, deskilling, and speedup of programming jobs. And, secondly, when on p. 5 [p. 3] you speak of the personification of programs, you might note the widespread and disgusting custom of referring to both the CPU and programs as "he."

Looking forward to hearing from you,

Franklin

8327

October 5, 1984

Dear Franklin:

Your letter to Ron of August 27\* on Marx's *Mathematical Manuscripts* introduces something new in the already new field of a Marxist-Humanist analysis of High-tech, which Ron had opened. I consider it a most profound contribution, because in that newness -- taking issue with the Stalinist editors of the work, which had been disregarded by Ron -- you manifest yourself as very perceptive on our history from state-capitalism to Marxist-Humanism as directly related to and needed for the battle against Stalinism, not just "in general" nor the way we have correctly heretofore proved our point by pointing to the labor/capital relationship, but even in such rarified fields as mathematics. Thus, the second paragraph on page one at once declares: "Kol'man explains the practical purpose to whose ends such state-capitalist ideologists wish to pervert the Manuscripts" -- which point you prove by quoting directly from Kol'man's analysis:

"Despite the misconception, current for a long time among the majority of Marxists working in the field of economic statistics, that Marx's statements on stochastic processes apply only to capitalist economics, a misconception based on the non-dialectical representation of the accidental and the necessary as two mutually exclusive antitheses, these statements of Marx -- to be sure, in a new interpretation -- have enormous significance for a planned socialist (sic) economy, in which, since it is a commodity economy, the law of large numbers never ceases to operate." (pp.222-223)

Your "comment" (with "sic" when Kol'man says "socialist" and underlining of "it is a commodity economy") points exactly to where I want to begin, both as history and as philosophy related to the specific field of mathematics, though I know nothing at all about calculus. As history, of course, the study I made of the Russian economy as state-capitalist revolved around the capitalist attitude to labor, the retention without admission at that time that the law of value operated in what claimed to be a socialist society. The proof was that they didn't even change the capitalistic word "commodity" as the product of labor. But that latter point about the word "commodity" didn't become the key word directly from *Capital* until suddenly out of the blue Russian study of political economy demanded that the first chapter in *Capital* on Commodity should be eliminated in 1943. Even then, it took the Russians a full further decade before, instead of limiting it to an article, they issued a whole book on political economy where, without explaining that it ever had been taught differently, it was stated as if that were Marx. It is that which Kol'man is now repeating as "the misconception," that is to say, Marx's own way of articulating his discovery of the laws of capitalism. That you, as a young Marxist-Humanist, could so precisely emphasize the key word in an abstract -- or what they hoped would remain abstract -- essay on differential calculus, points to the perceptiveness you show now that we have a trilogy of revolution.

Now then, I wish to roll the clock back further than 1941, to 1931 to be precise, when Bukharin attended the Second International Congress of the History of Science and Technology in London. I have now learned, for the first time, that this Kol'man and Yanovskaya (the editors of the *Manuscripts*) who evidently worked on them since 1933, were present at that Conference with

\* but I didn't get a copy of it until a week ago.

Bukharin. In a word, as early as 1931 they began looking at the Marx manuscripts they had had since the early 1920s, two years after the five-year Plan was first introduced, and when the whole world was in throes of the Depression, and Plan (with a capital P) was introduced as the answer to capitalist chaos, and philosophy was totally disregarded though Lenin's *Philosophic Notebooks* were first becoming available in Russian only. By "totally disregarded" I do not mean that they didn't know what Lenin had to say on the dialectic. I mean they totally disregarded what he had to say; not only that, they fought it as mechanical materialists, as the real scholars (Bukharin, Deborin) rather than that great revolutionary Lenin they had to obey "politically." In a word, Lenin was not considered the theoretician of economics; Bukharin was. Lenin was not considered a theoretician of philosophy; Deborin was. No one dared oppose Lenin since all recognized him as the only one who had led a successful proletarian revolution. But it was strictly as a political theorist and actual revolutionary leader. In a certain sense, even Lenin considered Bukharin as the greatest "theoretician" and it is for reason that he was so very shocked that he had to conclude in his will that Bukharin could not be considered a full Marxist because he never understood the dialectic.

It is so hard to grasp that fact, and Lenin didn't make it easier by not having published his *Philosophic Notebooks*. Let me point to something else: it's very, very important to grasp that single moment of what I have called the "Great Divide." Indeed, it is crucial. That "single moment" is the following:

1) A few months before Lenin grasped the full significance of the Hegelian dialectic of *Science of Logic*, he had appended his name to an Introduction which was printed in Bukharin's book, *World Economy and Imperialism*, which called it a great Marxist work on Imperialism. That was 1914.

2) When the betrayal occurred in August and Bukharin -- who was against the betrayal and with Lenin -- wanted to blame the whole imperialist war on the state-form as piratical, Lenin called Bukharin's theory "imperialist economics," holding that the imperialist war "suppressed the reasoning" of even great revolutionaries.

3) He then decided to embark on his own study of economics (1915-16). This was after he tried to recall his essay for the Granat Encyclopedia on Marx, in order to add some other things on the dialectic. (Read the section in *Marxism and Freedom* on those six weeks.) But, again, it was that the public debate was conducted on politics and not on dialectics. (Incidentally, his *Notebooks on Imperialism*, which are 768 pages against the small brochure we know as *Imperialism*, also list as among the books Lenin was reading Hegel's *Phenomenology of Mind*. But I have never discovered his commentary on it.)

4) Then came the Revolution in 1917, and all revolutionaries were in it. But that hardly ended still newer disputes that followed the victory. The one that showed dialectics never left Lenin's mind was the famous Trade-Union Debate of 1920-21 against Trotsky and Bukharin. Lenin won, but again it was on the political question and nobody singled out what he had to say on dialectics.

5) It was only with Bukharin's new book, *Economics of the Transition Period*, 1921, that Lenin not only wrote his very dialectical notes right into Bukharin's book but evidently began rethinking the question of theory and scholarship insofar as Bukharin was concerned. And when they were published after his death, they were used purely factionally by Stalin, only to have Bukharin capitulate to him. In fact, he became Stalin's theoretician; that is to say, he, Bukharin, was really the one who was the theoretician of "Socialism in One Country." By that time Trotsky was against him, but certainly not on dialectics. Poor Bukharin. He hated the very guts of Stalin, was the total



opposite as personality and "softness", and truly an abstract theoretician, but, but, but...

6) OK, it is 1931. I'm very interested in that 1931 paper, but I cannot get it anywhere. Also, though I've been very dissatisfied with Bukharin's *Historical Materialism* that became the principle work on so-called dialectical materialism, which came out in the mid-1920s, I did not dare attack it openly, because I myself didn't know enough about dialectics so that I couldn't back-up a contrary view to the great theoretician, Bukharin. It would be in the 1940s, when I had completed my "economic" study of the Russian economy and my study of dialectics that I once again tried to get that 1931 lecture. The reason I was so interested in it was that it was on technology, and I knew that I could then prove my point on dialectics as well. Still, it was not available anywhere in the U.S. It would be the 1950s when Harry McShane joined the Tendency and his friend, an MP could get it xeroxed for me from the British Museum, before I had a copy in my hands. Since then I have been carrying it around like a prized possession, without however knowing either that all those mathematicians were present with him or that there was any connection.

Now, dear Franklin, here is what is crucial and is a determinant between the practicality of philosophy and mathematics. First, there was the great Depression and all intellectuals were running around as if their heads were cut off and the bourgeois intellectuals began with Keynes' theories on unemployment, effective demand, and all that we now know as Welfare State, teaching the bourgeoisie to accept certain responsibilities for the mess they were in if they they wished to save their skins from a revolution. At approximately the same time, came "socialism's" answer -- the Plan. And that certainly included the Trotskyists in the most intense "firstism" ever, wanting the credit for LT being the first one to propose planning the economy. To complicate matters further, fascism emerged to propose State Plan and anything for the state being the authoritarian decision. Isn't it fantastic that in the next decade, when I was studying the Russian economy, I rediscovered all that dialectic in *Capital*, which I had been teaching for years without stressing dialectics? And finding that it was Marx who first underlined and capitalized that little word, Plan, only he used it to prove his point about the fact that in the factory, as against the chaotic market, what ruled was "the despotic Plan of capital." That is when I discovered the French edition of *Capital* and all those additions to the fetishism of commodities and the fact that even if all capital was in the hands of a single capitalist, etc., etc. there would be no change in the actual capital/labor relations unless "freely associated labor" planned the direction of the economy, controlled it, did not separate it from the whole of their self-development.

The 1931 paper of Bukharin is so abstract, has so many "correct" ways of using the words "dialectical materialism", "historical materialism", that it is very nearly impossible to see what really dominates it, which is the quantitative, mechanical, vulgar materialism, which would seek to resolve crises, not by uprooting capital/labor relations, but having the State, supposedly workers, do the determination. In between those sessions, the Kolmans and the Yanovskayas must have been running around and finding out what the capitalists were doing with their technology. The *Mathematical Manuscripts* we now have of Marx are introduced by referring to the Russian mathematicians' talks during the 1931 period, saying they were reproduced in 1971. I have asked Kevin to find, when he is in N.Y., the following book: *Science at the Crossroads* papers presented to the International Congress of the History of Science and Technology held in London from June 29 to July 3, 1931, by the

Delegation of the USSR. Bush House, Aldwych, London WC2, 1931. Republished in 1971. Will everyone please hunt for whatever we can find out about this Congress. Insofar as Bukharin is concerned as an aid to you in mathematics, here are the errors he is making, which I'm absolutely sure was the philosophic ground from which the mathematicians were working:

1) The reduction of the concept of history from what Marx conceives it to be as history made by men and women, as history not only of past, but the history of each day, to history as a bunch of dates. To be even more specific, as history was suddenly used by Stalin in 1943 as "proving" that Chapter 1 of *Capital* needed to be thrown out in order to see that history today in the USSR shows that the law of value operates and "therefore" it is not strictly capitalistic.

2) Economic laws operate irrespective of will, (supposedly their good will to be for the workers), so that there is no way of escaping crises altogether.

3) The point is that since they, as Communists, are "dynamic" and so not, as capitalists do, consider categories as immobile, their plan will solve it all.

4) Contradiction, though mentioned, is really reduced to Kantian antinomies; that is to say, there are a few antinomies and they can be specified -- and Russia is not subjected to it, because, instead of formal logic, they use "a higher form of logic." Bukharin is constantly using expressions such as: "higher form"; "more complex"; "scientific"; proving that there are no "supernatural," "miraculous," "abstractions", because science is "rational." "Theory" becomes a reflection of reality which at best "influences" practice, but it's clear that this practice they are talking about from which theory comes is because the practice is of the theory, the State has established, its "system of rules." It is funny, as technology becomes so "rational", the practice of theory, the dominant which can teach them all so much -- and you, instead, keep thinking of Marx's definition of technology, whose history, says Marx, will reveal that it took the resistance of the workers, their constant opposition, which led the capitalist to always discover something new technologically with which to beat down the workers' opposition by transforming every movement of the workers' hands into a new "tool."

I'm enclosing a copy of the 1931 paper by Bukharin. See whether you, who know the latest of computer science, can work out how to reject totally Bukharin's quantitative ground in a more concrete way.

In conclusion, I wish to call attention to your first paragraph which shows that, in fact, the 140 pages of Marx's *Manuscripts* we now have are an infinitesimal part of the 2000 pages he evidently left behind. Obviously, they disregarded entirely any of his summaries of other people's work -- supposedly on the ground that those mathematicians no longer count anyway. That is exactly the idiotic methodology they have been using all the time, whether it was to reject so much of what Marx wrote in the last decade, as if it was the new moments that predominated which they have yet to work out, but as if what predominated was the illness they called a "slow death." And when it comes to Lenin's time, to this day, they are acting as if the 253 pages of his *Philosophic Notebooks* were merely scribbles and only the four and half pages "On the Question of Dialectics" could be stretched to be considered an essay. Had I not published those *Notebooks* in 1957 (and tried to, ever since 1947, have either the Trotskyists or the Columbia U. or any publisher) would we have them to this day in English?

Yours,  
Raya

8331

P.S. Do also please read at least Gramsci's "Critical Notes on an Attempt at Popular Sociology", which is Gramsci's critique of Bukharin, pp. 419 - 472 of his *Prison Notebooks* (1976 edition by International Publishers). Better yet, read the whole part on the "Study of Philosophy", pp. 323 to the end.

Monday, Oct. 29, 1984

Dear Raya,

Enclosed are some materials that I found in the library on the 1931 Congress. Most interesting I think will be Thomas Greenwoods' report of July 11, 1931 on the Congress from *Natura*, p. 77. He gives a summary with some of the points of conflict between the delegates. The Russian delegation is discussed in a paragraph on p. 78, (marked in red.) It's interesting how much the debate centered on the relation of science to life in the third section of the Congress in which A. Joffe from the Russian delegation took part. (organicist vs. mechanists)

I also included the text of the inaugural address referred to in the *London Times* article I sent. I was especially struck by his referring to process of development and his definition of the word "scientific" as knowledge making, and "no body of doctrine which is not being progressively made can for long retain scientific attributes." His concept is evolutionary but it reminded me of our view of "re-creation" answ on the basis of new forces and passions. Also interesting was his linking of science and life in the way he saw the origin of science in mathematics and medicine.

I wonder, to return to Greenwoods' summary, about the relationship of "masses" to "genius". This is one of our foci in the Marxist-Humanist Perspectives. For Zawadovsky the "process" of "development" is on the basis of "conforming to certain laws" and the "economic requirements of production". (labor discipline)

Prof. Colman, or Kol'man, demonstrates mechanical materialism's reduction of consciousness to the material base in referring to Darwin and Marx. It seems the debate was individual scientists' "genius" vs. material conditions (and there is a statement on "the integrative work of the masses").

I will see if I can find anything more on the congress by looking for *Archeion* in the library. The article by Bukharin spends a lot of time to say that "practice" is production and method is technique.

Needham and Hogben champion physics and materialism and blame resistance to their view on religious culture and social unrest. Anyway, I hope this is useful scrap of information in your current work.

Yours,

Ted

8333