THE FETISH OF HIGH TECH, MARX'S MATHEMATICAL MANUSCRIPTS, AND MARXIST-HUMANISM'S GREAT DIVIDE

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" (B.W. 2/13/84), 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 in WWII to drastically reduce the time it took to compute the trajectory of balistics. Even the first so-called higher-level language for business, COBOL, was a Department of Defense project.

Reagan is carrying this process to the limit to the point where "economics and military policies constitute a single spirit" (see Emma Rothschild "The Costs of Reaganism" NYRB 3/15/84). 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

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military in the personal computer industry which has its roots in an organization founded by anti-draft organizers (see Lenny Siegel "Silicon Valley's growing disillusionment with Pentagon" S.F.Chronicle 1-8-84). 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 "Computer Consciousness" sessions, 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.

I. 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 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 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 a 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 productive 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 ATT strike last year it was the operators who were the most militant and raised the most fundamental issue 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 agressively 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." (Capital pg. 481)

The way in which the totally dedicated data processing professional becomes monstrously crippled is well known as a personality type caused by the 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 required in order to digest or breathe." (Smaller Logic para 183)

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 opened 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 heat 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 of what it "encounters". The inversion of making "thought" mechanical as something objective with external validity is the alienation of human beings from eachother. 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 drives 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 data DP is concerned with. That

includes computer programs themselves where the goal of "artificial intelligence", aside from 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 incompletenss 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 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 <u>new</u> 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" (<u>Capital</u> pg.618). 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 overcomming capitalist reality, as he returned to criticize science in the particular form of mathematics in the 1880s.

II. Marx's Mathematical Manuscripts and the "veil of obscurity" Over Today's Mathematics

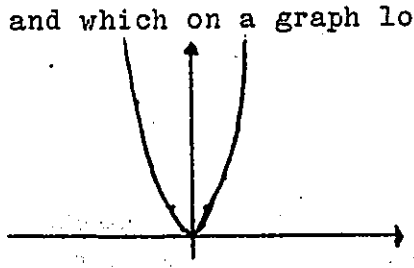
In Marx's day the process he continuously demonstrated, the incorporation of all science into the machine as a weapon against the laborer in production, hadn't differentiated to the point where mathematics was directly the form of science's role in production as it is in the second industrial revolution of today. Marx's own digging into mathematics as a separate science in the 1880s, 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 to the point of 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 was itself 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 "apriori 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 1880s.

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 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 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 and which on a graph looks like this:



This equation gives you the value of y for a given value of x. Taking the derivative proceeds by first viewing a given value of x (or point on the graph) dynamically, i.e., in terms of what it isn't or what it could become within the limits 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 Δx, so that $x + \Delta x$ is a new value of x in this equation giving a new value of y to which we have to add an unspecified Δy, 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:

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

$$\boxed{\Delta y = 2x\Delta x + \Delta x^2}$$

Dividing both sides by Δx we get:

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

Now if we undergo a second negation and view our original point x by setting its change, or what it isn't in this equation, equal to zero we get:

$0/0 = 2x$

Now $\Delta y/\Delta x = 0/0 = 2x$ is the instaneous 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 sybolic name dy/dx and only emerges when Δx, is set exactly to nothing.

Marx stresses that what is important is the process and dy/dx is introduced to symbolize that because 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." (pg.3) Marx attacks as a "chimera" "the closely-held belief of some rationalising mathematicians that dy and dx are quantively actually only infinitely small, only approaching 0/0..." (pg. 5).

It is as if a positive something "out there" had to be invented instead of the self-development of the idea which dy and dx are introduced to represent. In a method that is still taught today Newton got to the equation in the box but in the following form which mystified the process by beginning with the results (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 manuever--claiming that as dx becomes a very small but discrete quantity $(dx)^2$ is even smaller and inconsequential. Then suddenly both sides are divided by dx as dx and dy approach zero, resulting in: $dy/dx = 2x$.

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" (pg. 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. 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 reins on the free development of thought--banishing self-reference altogether as a 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 mathematician's 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 that 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.

When 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 "castastrophe" by the leading scientists like John von Neumann 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 by Douglas Hofstadter. For 742 pages, which, as the author himself describes them, "wallow in" (pg. 26) the possibility of "artificial intelligence", it is no further along at the end than the beginning which accepts the self-limiting limitations of formal logic systems and Godel'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". As though totality can somehow emerge externally through discrete blocks of interrelating 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 concrete self-movement beginning with 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 relegated to the "hardware" of neural activity with which it has some kind of undeciphered coded "strange loop" (pg. 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 relations and the nuclear precipice. Marx reminds us in the Mathematical Manuscripts of Hegel's incomplete break with Kant--the general foundation of his idealism (pg. 119). It is time to return to the roots of this new industrial revolution in the post WWII world with a view toward Marx's own general foundation which focused 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 Post WWII Present and Marxist-Humanism's Great Divide

WWII 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 WWII. The significant development, however, was that two fundamentally different ways of dealing with the horrors of this new technological stage emerged. One, which I'll return to emerged 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 Human Use of Human Beings 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 the formal logic of his former teacher, Bertrand Russell.

The closest analogy he achieved in his suggestion 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 in part I, 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 technical innovator taking responsibility for the consequences of his actions. (see John von Neumann and Norbert Wiener "From Mathematics to Technologies of Life and Death" by Steve J. Heims, 1980 MIT) A whole generation of intellectuals was drawn to this 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" (pg. 175) of the arms race to "...and unemployment situation, in comparison with which the present recession and even the depression of the thirties will seem a pleasant joke." (pg. 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 the division between mental and manual labor which makes even the most humane scientists see the self-development of the machine as parallel to what is human. Facing 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 in the present as an 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." (quoted in Heims pg. 337)

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 human 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.] skip till ¶ on p 15

In Marxism and Freedom: "From 1776 Until Today" (1958) Raya Dunayevskaya projected a very different view of the future in the present, i.e., in the strivings of workers themselves when they speak for themselves in their own spontaneous actions. Crucial to the unfoldment of that view were the miners in 1949-50 who staged a general strike against 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.

The full story of this strike is just now being told in

a new pamphlet: "The Coal Miners' General Strike of 1949-50 and the Birth of Marxist-Humanism in the U.S." by Andy Phillips and Raya Dunayevskaya. It was a new kind of strike in that miners were raising the importance of thinking for themselves in face of this new stage of production and asking the question "What kind of labor should man do?" In these discussions as well as the strike itself a central role was played by Marxist-Humanists and Raya Dunayevskaya in particular who had a new appreciation that Marx's focus on labor was via the Hegelian dialectic of self-development which rejected any external objectivity that could be posed outside the human subject. This praxis of philosophy recognized that out of the movement against this new stage of production came a new theorectic departure pointing to the path to freedom out of the present reality.

By now wildcat strikes against automation have swept every industry fleshing out this view over a 30 year history, showing repeatly the objectivity of this drive to unite mental and manual 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 great movement from practice. 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 (see Charles Denby Indignant Heart: a Black Worker's Journal).

Look at the Bay Area today, where Freemont workers demonstrated on a baseball field just over a year ago against their own International union (UAW) who locked them out of their 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 those workers who has been permanently displaced (the new roboticized plant will need only 3000 workers where 8000 worked before) is 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 unions because they 'take care of their workers,' as though a $6/hour job in Silicon Valley is a rosy future. High-tech has affected our way of thinking."

It is time to unite thinking with activity, science with life, in a new unity of theory and practice which begins with the objectivity of the drive to become complete individuals which emerges out of today's absolute separation between doing and thinking.

October 11, 1985

Dear Raya,

This is just to send you the latest on my encounters with the "Fetish of High Tech." Enclosed is a new version along with a letter to Susan Himmelweit. She along with Albelda had a favorable response while Schweickart was the exact opposite. Their criticisms along with the discussion we've been having in N&L have made it more tightly argued. I also included the central point of what I did on Sartre. I hope I can begin that discussion anew along the lines you suggested. I have an appreciation that I hope I can translate concretely of "Marx's Marxism...**as totality and as a new beginning for our age.**" (p. 25 Perspectives) As against what Marx was doing with math all these theoreticians want to appropriate theoretic activity (what Sartre calls "thought itself as a dialectic activity") itself as an enclave while human activity is treated as a sub-phenomenon. Every human endeavor is guided by thought and every idea has consequences. Marx began with the former while the usual route ala Weiner etc. is at best to view an idea's consequences disembodied from activity. Subjectively revolutionaires often want **their** ideas to have consequences. But as you say "the self-thinking idea does not mean **you** thinking." All Marx's concentration to get to the new through labor was his way of making the consequential idea concrete, i.e., to realize his vision of making labor **self-**activity. This was troublesome to Marcuse when he caught it in *Gotha* because what he did philosophically was the opposite. The maturity of our epoch is seen in the movements from below questioning the very form of human activity: "What kind of labor should man do? Why the division...?", WL came out of a profound critique of the very form of activism in the 60s, the thorough emersion of the Black masses in their own concrete activity beginning with the MBB is what gave the idea of freedom such energy in the 60s.

"Its own working existence" is both a reality and a category that proclaims the ability of the masses to transform reality through their own activity. Marx couldn't get to the consequential idea for the capitalist epoch--the commodity-form vs freely associated labor--without, as he warns the reader, the "power of abstraction." Marx's turn to math, based directly on "the power of abstraction"--reveals his affinity to Hegel more than just as a new demonstration of second negativity. Rather it was a deepening of his profound opposition to any duality between objects of sense vs objects of thought to reveal in a new way "human activity as **objective** activity." Only today is it obvious that the method he attacked is the front line of capitalism's fragmentation of the human being. Lukacs introduced reified thought into his concept of totality, making any

transcendence of alienation impossible from within. Today's fetish of the computer as the actual reifier of thought is making us realize more profoundly the centrality of the subject to reveal totality.

Marx's *Manuscripts* and the use of math today reveals the profundity of Hegel's view that all ideas have consequences. His summation, after suffering through all the different phases of the idea's consequences, point to something totally new. The summation points to the idea that is a new beginning in the whole process and was implicit in all previous transitions. That idea both has liberty for its aim and is the way to produce it. What makes the movement from practice a form of theory is that questioning of universal forms of of human activity and the practice of something new. The problem is to fully realize the universal of human activity as the practice of the idea. To liberate the idea in activity is to project concretely Hegel's consequential idea. If the new stage of production revealed more profoundly capitalism's negative character creating a new stage of cognition, our task is to unveil the philosophic structure of concrete activity in a way that makes the revolution permanent. Only then will we unchain the idea as it informs activity from external determinants. Theory as an enclave not only views the movement from the perspective of external determinants but is itself one of those retrogressions.

Also enclosed is a communication from Meo who reviewed the "Fetish of High Tech" for an Indian Math history journal. He tacked it on to a review of Gerdes book and reached into part "two" and the footnote criticising him though I told him that article was just a draft discussion article. I guess the power of the idea is that he is still my "friend."

Yours,
Ron

October 16, 1984

Dear Ron:

With all the correspondence around Marx's mathematical manuscripts, I hope you've been thinking about how to develop that further. Raya has suggested that we put out a bulletin around the beginning of December, with contributions by her, you, Malcolm, and me. Please let me know your thoughts on this within a week. I will be thinking about how to work out what Raya has brought out in her letter of October 5th.

Secondly, I still don't agree with your footnote 9 and discussion in your letter of September 16th on limits. I'm sorry that at the moment I don't have time to go into detail. My concern is that I do not want mathematicians to discount your beautiful thesis because of a passage that I am sure they will universally regard as mathematically erroneous. I do not want to see critics seize on this as a means of attempting to discredit the whole thing, or to see you be attacked as I have attacked Yanovskaya.

Finally, I'm sure you'll want to look up what Bukharin and his delegation said in full at the 1931 conference. Jane has found the book Science at the Crossroads, published by Kniga Ltd., Bush House, Aldwych, London WC2. No doubt the UC library will have it; the Library of Congress number is Q127 R954.

Yours,
Franklin

December 3, 1984

Dear Raya,

Here's the new bulletin. I got a note from Olga that you might be interested in seeing the Russian/German manuscript the translators used for their excerpts from Marx's "Mathematical Manuscripts". I sent the copy I made separately last week. Olga wrote that you suggested that I start with the paragraph on page two that starts with the "The fetish of high tech..." which I'll be glad to do except I already sent it to Ted and received a letter from URPE that it'll take 16-20 weeks to decide. But there'll be plenty of chance to change it. Enclosed here are also an RV I sent to Mike on Mike Meo as well as an article Meo wrote for the Marxist Scholars Conference (which he walked out of when he saw they were thoroughly Stalinist). He is impressed that the form of the differential Marx paid most attention to played a crucial role in Einsteins's breakthrough. The part I think is interesting is where he sees the continuity with the young Marx. Meo and Aronson thought their translation would make a big splash, showing Marx as such an "idealist", when they sent it to the NYRB which just ignored it. They said they tried several Left groups and publishers before the Healyites (with whom they have no other connection) agreed to publish it. The Manuscripts had been competely ignored with one exception being the Italian journal "Testi & Contesti" in 1982 which had a long article by Antonio Drago. Frank went over it with me the other night. Drago says it points to a big gulf between Marx and Engels and also shows, against Althusser, that there is no separation between the young and mature Marx. But, get this, he says there is no doubt about Marx's total rejection of Hegel and that Marx's parenthetical use of the expression "negation of the negation" was inserted just to pay homage to his friend (Engels) on his birthday.

What is striking in this on the difference between Marx and Engels is what you raised in RLWLKM -- "the relationship of concrete to universal always remains, with Engels, in two separate compartments" (p.185). In spite of the fact that in his 1885 preface to Anti-During Engels points to the "extremely important mathematical manuscripts left by Marx" for his work on nature, his treatment is very different first, by merely listing "dialectical laws" as "really laws of development of nature" as though those laws and the "inner interconnection of these laws" is another discussion not to be worked out in the subject matter at hand (p. 27 Int.Pub.1940) (Sartre, who likewise truncates the movement from abstract to concrete to create his own enclave, goes to town on Engels suprahistorical "laws" in his Critique) second, uncritically calling Descartes' "variable magnitude" the coming of "motion and hence dialectics in mathematics" which he adds meant "at once also of necessity the differential and integral calculus" (p.199). Engels seems to have lost his head when it came to all the new scientific

data about nature and forgotten also Marx's critique of the whole of science--"to have one basis for life and another for science is apriori a lie." What I mean is that Engels seems to have forgotten that "nature" is itself a concept which evolved out of history. That's one of the aspects of Marx's break with the Fuerbachian view of focusing on the distinction between objects of sense vs objects of thought instead of conceiving "human activity itself as objective activity" which you singled out as the meaning of "one, not two." Engels' statement that the dialectic came into mathematics with calculus which captured motion in nature is a view taking only the operational results which Marx criticized. Marx not only made no such claim about a single point of the emergence of the dialectic in mathematics but looked at the process, i.e., mathematics as a human activity, to work out that dialectic himself in the concrete unfolding of the idea of the differential from its mystifying origins--a mystification made all the greater because of its success in creating the ground for a new view of motion in the physical universe. Marx's critique of the calculus itself is the very opposite to applying it to anything.

Because the dialectic for Engels remains an abstraction, development in general, the determinant is not what human beings make of nature but nature itself. Thus, in Origin of the Family Engels claims that the first gneat division of labor was masters and slaves and that before that the "division of labor was a pure and simple outgrowth of nature; it existed only between the two sexes" as if what is human can at any point just be nature and not a specific human form of a relationship to nature. Primitive society didn't have an unmediated relationship to nature. It was nature infused with a rigid, traditional religion with its own social division of labor. Marx points to this right in the section on the fetish. The whole so-called scientific revolution began with freeing physical reality from religion, a freeing which came with the development of commodity production and its "objectivity". This very freeing was at the same time a loss of a relationship to nature as the bourgeoisie abrogated responsibility for human social reality, viewing this particular social form as "nature imposed necessity". The science created was separated from the concrete self-realization of human beings through nature, the labor process. Marx's point is to break with science which also pretends to be an unmediated relationship to nature so that we reach a point where "nature and man exist through themselves." (1844)

The fetish is the ground of all these "new" views of development sans subject. With human reality based on a mystified relationship to nature, i.e., mediated by the commodity and its "laws", bourgeois science has been very adept at what Bukharin hailed as the achievement of the "socialist" plan--the unity of "applied" and "pure" science--to the point of the frenzied fetish of high tech

today, as long as that enhances the domination of dead over living labor.

Marx's development in his last decade does indeed stick out sharply against the relief of all post-Marx-Marxists partly because they missed the profound opening he created in the fetish. When Marx points to the necessity that the "Russian intellect, concentrates all the living forces of the country" to have a revolution that doesn't follow the pathway of those "countries enthralled by the capitalist regime" (Marx and 3rd World p.29), shouldn't more be made of the continuity of the whole of Marx right there? What I mean is not that there is nothing new in the last decade but rather that the fetish isn't just about capitalism. Capital doesn't prescribe any apriori course of development. The opposite of the fetish, freely associated labor, does point to a different pathway. The commodity is something that appears deep in pre-history amplifying all the contradictions in primitive society, whether that is a social division of labor or natural determinants like a division of labor through biological differences or environmental niches of whole tribes. The long drawn out process and the revolutionary opposition it engendered was vastly quickened as capitalist tentacles encompassed the globe in the 1850s and the Taiping revolt broke out "to encourage the others." In any case there was some mystification there of humanity's direct relationship with nature. The separation between Marx and Engels on transitions is all the more stark when it comes to what you said Marx considered the fetish to be--"the crucial transition point..."(p.145) for humanity--because the duality, the opposition to the commodity's unilinear development is there on the merest embryonic stage of commodity production, quickening the "dissolution" of the commune.

Yours,

Ron

Ron

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."[7] 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 $\frac{0}{0}$..."[8]

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[9] 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"[10] 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

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

[8] *Ibid.*, p. 5.

[9] 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 $\lim_{dx \to 0} \frac{dy}{dx} = 2x$ 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 $dx =$ *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.

[10] *Ibid.*, p. 109.

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 1968 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 1846 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 structuralism, 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. 86). 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 Δx in $x + \Delta x$ is just as indefinite, so far as its magnitude goes, as the the indefinite variable x itself, Δ 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 Δx.") 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. 86).

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. 46, 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 Δx and Δy, 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. 6) 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. 64) 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 -- needles 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