October 5, 1984

Dear Franklin: (copy to Ron)

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 dxplains 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 pp. 222-3:

"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 the latter point about the word "commodity" didn't become the key word directly from Capital [redacted] 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 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 abxtract -- essay on differential calculus, points to the perceptiveness

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

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 [redacted] 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 Yanov skaya (the editors of the Manuscripts) who evidently worked on them since 1933, were present at that Conference with Bukharin. In a word, as early as 1931 [redacted] 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 wheh the whole world was in the 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. Noone 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 that 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 [redacted] 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 [redacted] state-form as piratical , Lenin called Bukharin's theory "imperialist economics," holding that the imperialist war "suppressed the reasoning" of even great revolutionaries. (1915-16)

3) He then decided to embark on his own study of economics. 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 M&F 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 bpochure 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 principal work on so-called dialectical materialism, which came out in the mid- 1920s, I did not dare attack 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 "economics" 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 Frankly, here is what is crucial and as 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 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 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 [redacted] 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" [redacted] 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 Kol'mans 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 [redacted] the Russian mathematicians' talks during the 1931 period, saying they were reproduced in 1971. I have asked Kevin to find [redacted], 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 [redacted] 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 [redacted] 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 os 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 antimomies; 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". [redacted] 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 taach 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 [redacted] 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 infinitessimal 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 a 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 [redacted] would we have them to this day in English? Yours,

Raya

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.

August 27, 1984

Raya

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 thos 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 origiral 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 the 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 significanee 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 emphases 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 introducion 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 would 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 emphases.) 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 developped out of the first (where Marx speaks historically, she wishes to turn it into a moral judgment):

> 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 indefinite variable x itself, Δx 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.

Mathematical knowledge must not have been the reason it was Yanovskaya who edited this book; she acts as if all function 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. 199n21); 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 sin x / x and 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 get from A) to B), where in fact dy/dx is not a ration but a symbolic expression for a particular limit of rations. On p. 31, to get from 3) and 4) to 5), he assumes that (dy/dx)dx = (dy/du)(du/dx) = dy/dx, where he claims to be proving it. And contrary to what Marx says on p. 46, in the "usual algebra 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 cancelled 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 $\Delta y/\Delta x$ as "a ration of infinitely small differences" (p. 29), he has insights into what it really is: 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 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 the 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 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. 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--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 and again on pp. 9-10.) 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 a 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 Frankel, 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 profoud 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 develpping a system called System , wherein the user fills in blanks and checks boxes on some screens, and, voila, the computer writes the programs. Many other companies are working on similar things, including the one that bought the capital (i.e., the programs and programmers) of that now defunct company. Clearly, the prospect is continued reduction, deskilling, and speedup of programming jobs. And, secondly, when on p. 5 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