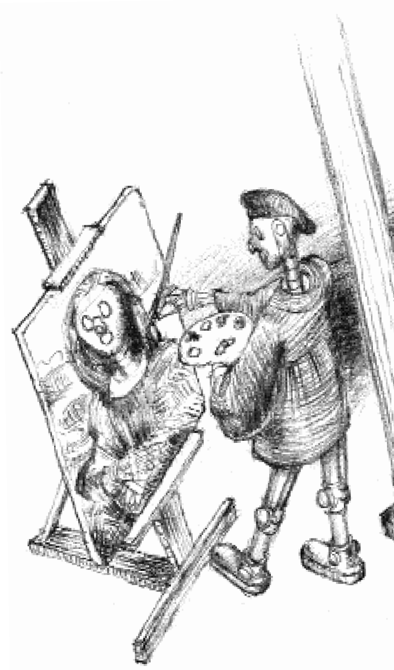
Life Inside the 'Information Society'

The Cult of Artificial Intelligence *vs.* The Creativity of The Human Mind



by Gabriele Liebig

The "information society" has engulfed us, and the exaggerated promises of its proponents have given way to a gloomy reality full of contradictions. No one will seriously argue against the advantages of ever-more-powerful computer, communications, and multimedia technologies. But, for most people, the two basic features of the information society—globalization, with its attendant destruction of jobs and lowering of living standards, as well as global financial speculation—have disastrous effects. On one level, the Internet is useful; but, it is also an indigestible mountain of garbage. A flood of virtual-reality titillation and simulation clouds perceptions of reality, and the epidemic of video games comes on top of the other plagues.

Reactions have been reported here and there to such problems: in Germany, *Maschinenstürmerei,* or "club the machines to smithereens." The perpetrators unjustifiably unleashed against home computers, their rage over some of the effects of the information society. But, the computers are certainly not to blame, when the much-lauded information society proves to be a flawed construct. The information society is *not* the same thing as the prevalence of computers. Computers are useful machines, which relieve human beings of having to do many tasks, or make the tasks easier to do, so that people can clear their heads for other, more important, work. The information society, however, is nothing but an ideology—or, in the computer age, one might say it is a "program," and a flawed one at that. In the interest of human beings, we ought to find out quickly where the bugs really are in this ideology.

One particularly big bug is the cult of "Artificial Intelligence," abbreviated AI, which bases itself on the claim that the human mind functions basically no differently than a computer. Massachusetts Institute of Technology Professor Marvin Minsky, one of the fathers of AI, does not see its purpose as developing "larger, more useful, but less profound practical systems"[1]—he leaves that up to the "computer sciences"—but in the proliferation of the AI ideology itself, which may be summarized in the following thesis: Since the human mind functions basically like a computer, it is possible not only to simulate human thinking to an ever greater degree of approximation by means of increasingly improved programs, but also ultimately to replace the human brain entirely with artificial, very complicated networked systems. But, since the demonstration models of so-called "neuronal networks" available today are not very impressive, Minsky and his followers fall back increasingly on science fiction to make their ideas seem plausible.

In 1992, Minsky published *The Turing Option* with Harry Harrison.[2] The action of this out-of-print novel is described in an Internet review:

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'What is science for, if not for people?'

Illustrations by Alan Yue

> In 2023, Brian Delaney, under contract to Megalobe, has just achieved a breakthrough in AI when someone engineers the theft of his research and murders all involved. Brian alone survives, but a bullet has destroyed much of his brain. Using Brian's own research, neurosurgeon Erin Snaresbrook grafts an advanced computer into his brain, reintegrating neural pathways, allowing access to memories to the age of 14. Brian learns to interface with the CPU, and downloaded databases become part of his memory. While the army keeps him a virtual prisoner for security and searches for the perps, the new, improved Brian creates a new, improved AI, named Sven. Meanwhile, a criminological AI named Dick Tracy begins to uncover clues to the raid and, once integrated with Sven, sports a new product—a robot gardener—that's programmed with Brian's AI code. Brian finds a clue to his would-be murderer's whereabouts in the programming and engineers his and Sven's escape. Travelling to his native Ireland, Brian then discovers that he can interface directly with Sven. Having found the criminal mastermind, he reveals Sven's existence to the world—and goes back to work a free man.[3]

This is by no means an abreaction with ironical intent, but the announcement of his ideological message, which Minsky obviously thinks is most appropriate for his purposes (and his target audience). It is only a science fiction cloak for what the author otherwise writes in objective publications. In the 1994 paper, "Will Robots Inherit the Earth?," under the subheading "Replacement of the Brain," Minsky wrote:

> Suppose that we wanted to copy a machine, such as a brain, that contained a trillion components. Today we could not do such a thing (even were we equipped with the necessary knowledge) if we had to build each component separately. However, if we had a million construction machines that could each build a thousand parts per second, our task would take only minutes. In the decades to come, new fabrication machines will make this possible. Most present-day manufacturing is based on shaping bulk materials. In contrast, the field called "nanotechnology" aims to build materials and machinery by placing each atom and molecule precisely where we want it.[4]

In the same paper, he refers, with praise, to the book *Mind-Children* of his student, Hans P. Moravec, in which the transfer of a human brain into a computer is described as if in a horror film: A person lies with an opened skull and a still-conscious brain on the operating table. A robot-surgeon generates a simulation program of the upper layer of the brain with a sensor hand and loads it into a computer. Then he removes the layer of the brain mechanically and repeats the process for the next layer. When he reaches the stem of the brain, the body dies, the "juice" drained away. The brain is now in the computer, and the person has become "immortal."[5]

That is the unappetizing result of an ideology which is as anti-human as it is anti-progress. Just like science-fiction writer and British Intelligence service chief H.G. Wells at the beginning of the Twentieth century, Minsky goes to the extreme to make his point. It is a mad idea: in all seriousness, Minsky proclaims the end of mankind as the goal of science, which then reduces science to absurdity. What is science for, if not for people? Whoever denies that, also denies science.

The reason Minsky does that, becomes clear if we recall what else the Massachusetts Institute of Technology has cooked up. It was at M.I.T. at the beginning of the 1970's that the Meadows and Forrester "First Report of the Club of Rome," *The Limits of Growth,* took shape—the opening salvo in an anti-development and anti-progress movement which, with its Malthusian cry for "population control," explicitly aimed to reduce the world's population by several billion people.

Minsky's own writings contain a slew of Malthusian remarks, e.g., in "Alienable Rights," where two computer-aliens in outer-space, an "Apprentice" and a "Surveyor," talk about human beings. The Surveyor announces that human beings will soon "replace themselves with machines—or destroy themselves completely." Shocked, the Apprentice says: "What a tragic waste that would be!" But the Surveyor objects: "Not when you consider the alternative. All machine civilizations like ours have learned to know and fear the exponential spread of uncontrolled self-reproduction."[6]

Minsky drives the absurd logic of the Club of Rome one step further: It is not only the uncontrolled reproduction of human individuals which he sees as a threat, but also the all-too-numerous emergence of genes. In a 1982 paper, Minsky argues at first correctly, that—in principle—every normal human being has the capacity to become a genius. If, instead of playing in a sandbox, children learned better ways to learn, "then that might lead to exponential learning growth! Each better way to learn to learn would lead to better ways to learn—and this could magnify itself into an awesome, qualitative change. Thus, 'creativity' of the first order could be simply the consequence of little childhood accidents."

In 1982, Minsky still thought this logical conclusion was "sad." His earlier works are far less malicious than the later ones of the 1990's, such as the conversation of the aliens in 1992, where, at the end, the Surveyor admonishes the Apprentice to switch to self-destruction immediately after he is hit by the transfer-beam, "in order not to pollute this world with any redundant intelligence." If there is a whiff of malicious irony here, it is not directed against the AI ideology.

The alleged threat to mankind represented by—to invoke Gotthold Lessing's expression for genius—too many "self-thinking minds"? Isn't this the key to answering the question of why our childen's education becomes worse after each "reform," why a youth culture such as the present one is imposed on them, and why, now, even their opportunity for independent play is stolen by video games?

The Inner Life of a Computer

Before we turn to the question of what a computer can or cannot do, we have to understand what it is they do, period. They execute commands: simple or complicated commands, depending on the characteristics of the computer and the program. But, the interesting issue is what all computers and their programs have in common, a general theory of computers. Alan Turing developed such a theory, in fact, and Roger Penrose explained it quite nicely in his book, *The Emperor's New Mind,* in 1989.[7]

Every computer can be reduced to the mathematically idealized original model of a "Turing Machine," which can be imagined to be an infinitely long band which runs through a button one can press. The band represents the theoretically infinitely large storage capacity of the computer, and then the input. It is divided into square boxes which represent the internal states of the machine. There is a number in each box, either 0 or 1, because a machine only understands "switch-on" or "switch-off." That is why all numbers have to be translated for the computer into 0 or 1.

Leibniz invented this code for binary numbers:

decimal	binary	powers
0	0	
1	1	
2	10	2^1
3	11	
4	100	2^2
5	101	
6	110	
7	111	
8	1000	2^3
etc.		

While the decimal numbers only get an additional 0 at the right in the case of an increased power of 10, that happens with binary numbers at each power of 2; for example, in order to translate the number 13 into a binary number, it has to be resolved into powers of 2:

$$13 = 8 + 4 + 1 = 2^3 + 2^2 + 1,$$

and then added in binary form,

$$1000 + 100 + 1 = 1101.$$

So, to write the number 13 in binary code, we say 1101. This sort of "translation" is one of the things that computers are better suited to do than the human mind, since, to do it, the mind has to act as if it were a computer.

Not only do all numbers have to be translated for the computer into 0 and 1. Everything else has to be similarly translated; for example, for the commands which the computer is expected to execute. Every command gets a number, and this number is coded in binary code. Or, in a word processor, each letter of the alphabet is assigned a number, which is expressed in arrays of 0 and 1.

Of course, the Turing Machine needs a program, which can be imagined, for the sake of simplicity, in the form of a second band with boxes, which contain either 0 or 1. The commands which the computer is supposed to carry out, are on the band. Let's assume that the band stops beneath the button for a certain box (internal state). Then the new command says (a) how many boxes the band (or the head) should move in which direction, and (b) whether it should leave the 0 or 1 which it finds there as it is, or should alter it. Many other commands of the same form may follow, until finally a coded signal is issued which says that the operation is finished.

What would a Turing Machine do, which is programmed to add the number 1 to a given number? The machine should calculate the result of 13 + 1. The binary code for 13 was 1101. The program for the Turing Machine now has to:

1. Find the end of 1101 (which is marked by a series of 0's at the end);
2. Look for the last 0 in 1101 (from the right), and replace it with 1; and
3. Replace all of the following 1's to the right with 0's.

If we do the work of the Turing Machine, we get the result 1110. Translated back into the decimal system, we have zero 1's, one 2, one 4, and one 8. So, 0 + 2 + 4 + 8 = 14. The machine did its work, since 13 + 1 = 14. Such "machine procedures" seem to be unusually intricate for such simple calculations, and we notice that the human mind is not suited to such formal operations. If we have large numbers, the computer's procedures come in quite handy. To demonstrate this tangibly, Penrose uses numbers whose binary form extends over several lines, over several pages of the book, which no human mind can digest. But that is no problem for the computer: It stubbornly carries out its commands, and coughs up a logical result.

Computers are not good only for computing. In principle, they can carry out all procedures which can be formulated as a succession of certain rules and numbered steps. The more powerful the hardware of the computer, and the faster the speed at which the computing operations can be executed, the more complicated and longer the chain of commands in a program can be.

That is where the AI sector makes its move. The first mistake in thinking here, which traces back to Bertrand Russell, and which was to have disastrous consequences for education in mathematics all over the world, was the proclamation that the formulation of any procedure as a logical succession of steps, was the highest intellectual accomplishment, and logical formalism was crowned as a new world religion.[8] One concrete result was the "New Mathematics" in schools.

It is now passé, and it actually met with a harsh critic in Marvin Minsky. With reference to "set theory" according to Russell and Whitehead, Minsky wrote in the 1982 "Why People Think Computers Can't," that this set theory had proven to be "too complicated for practical, common sense, use." "The basic goal was to find perfect definitions for ordinary words and ideas. . . . Educators once actually tried to make children use this theory of sets, in the 'New Mathematics' movement of the 1960's; it only further set apart those who liked mathematics from those who dreaded it."[9]

Minsky recognized that Russell's approach was a dead end, and that formal logic was a very bad model for human thinking. The aim of AI research was ultimately not the reeducation of the population to purely formal thinking (Minsky may have thought), but rather the development of programs which simulate human thinking with a "bag of clever tricks," so that computers might one day pass the "Turing Test." That is where the second mistake in thinking comes in.

The Trick with the Turing Test

The "Turing Test" is a hypothetical situation in which a jury consisting of human beings poses questions to a computer or several humans, for purposes of comparison, over an unlimited time and about an unlimited spectrum of subjects. The computer program passes the Turing Test if the jury cannot discern whether the answers were given by a computer or by a human being. If the computer answers all the questions like a human being who has to think about the answers, then the computer can be said to "think," according to Turing.

Of course, such an unlimited Turing Test has never been carried out, and no computer program has succeeded in passing it, even in approximation. But since it was first proposed, AI researchers have time and again orchestrated severely limited Turing Tests, wherein the attempt is made to persuade control persons of the supposedly human capabilities of their clever computer programs. The art of deception is primary, and the tricks are largely based on imitations of stereotypical, predictable, or pathological behavior of people.

Joseph Weizenbaum, a sharp critic of AI, developed the program ELIZA, in which the computer simulates a psychiatrist who speaks with human patients. The computer-psychiatrist speaks stereotyped sentences, into which it incorporates segments of the sentences uttered by the patient, and no one would ever want to sit across the table from such a psychiatrist. There also exists a simulation program of a paranoid-schizophrenic, PARRY, which frequently saves itself in tense situations, when it can't answer certain questions, by erupting: "Don't you know the mafia is out to get me?!" The AI people soon saw through this method: The more pathological and reductionist the simulated dialogue behavior, the simpler it was to generate the required program. Students joked that it would be easiest to write a program simulating a catatonic, who would answer each question with a monotone hum.

Nevertheless, similar experiments are constantly being cooked up. Raymond Kurzweil wrote a computer program which can supposedly write poems. In the book, *The Age of Intelligent Machines,*[10] he orchestrates a kind of Turing Test with the reader. The reader is supposed to look at 28 "poem" segments and ascertain which were written by the "Kurzweil Cybernetic Poet" and which by a human poet. It's not that hard to guess at the result: Since the human poems are as incoherent as Kurzweil's word-sequence model poems, it turns out to be impossible to distinguish the computer-poems from the human ones. Try it yourself! Which of the following "poems" came out of a computer?

1. "At six I cannot pray:
pray for the lover
through narrow streets|
and pray to fly
apart from the virgin in her winter-dark bed."

2. "What for ocean coasts granite islands before my ribs
And forest thrushes, which call my daughter
Through the fog."

You may find the solution in the notes.[11]

Instead of having computers approximating the potentials of human thinking, the level of the human activity which the computer is to simulate, is kept as low as possible. From the standpoint of AI research which seriously works on intelligence, this is a dead end. Fortunately, there are people who were less fixated on pseudo-Turing Tests, and who wanted to come up with better solutions to certain problems. Minsky himself reports on such a thing—a program by the name of STUDENT from the 1960's, which was able to solve algebra problems like the following:

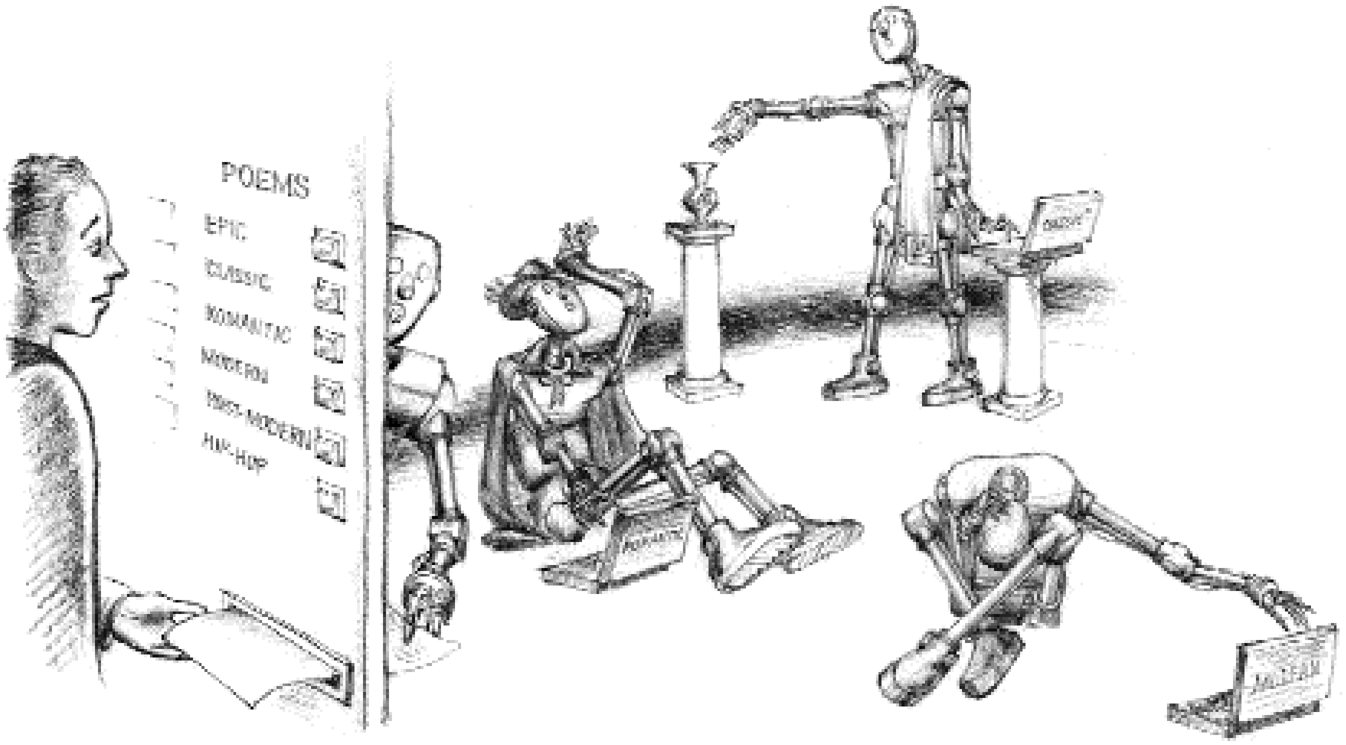
> Bill's father's uncle is twice as old as Bill's father. Two years from now Bill's father will be three times as old as Bill. The sum of their ages is 92.
>
> Find Bill's age.

Most students find these problems much harder than just solving the formal equations of high school algebra. That's just cook-book stuff—but to solve the informal word-problems, you have to figure out what equations to solve and, to do that, you must understand what the words and sentences mean. Did STUDENT understand? It used a lot of tricks. It was programmed to guess that "is" usually means "equals." It didn't even try to figure out what "Bill's father's uncle" means—it only noticed that this phrase resembles "Bill's father." It didn't know that "age" and "old" refer to time, but it took them to represent numbers to be put in equations. With a couple of hundred such word-trick facts, STUDENT sometimes managed to get the right answers—if it didn't get caught in misunderstandings, which can easily happen even to a non-computer in the case of the above word-problem.

But it is easy to see that, with the aid of a multiplicity of such programmed "meanings," passably useful computer programs can be developed for certain special purposes. We can try, for example, with translation programs, to exclude the mistakes made by a too-literal translation, by programming in ever more special meanings of certain word-contexts. That makes the programs increasingly specialized, so they are useful only for very specific kinds of texts or authors. Such authors would also have to write a lot, so that it would pay to generate such a program.

But no one would want to question the progress which is possible in this area. Such progress is becoming a daily tool for an increasing number of people. Instead of questioning the progress, the point is to hunt down the fundamental mistake in thinking, which is responsible for the AI cult and its horror-movie form, as described above.

Minsky was not always this nasty old man who wanted to shut off mankind. His writings in 1981-82, available on the Internet, differ significantly from his morbid science-fiction of the '90's, yet the seed of degeneracy, the deliberately fatal error, is evident in the earlier works as well. In the 1980's, however, Minsky was clearly concerned to find young, academic followers for this AI theories, and that concern is reflected in the way he approached the subject. And, although he argues as the counterpole of Lyndon LaRouche, as far as the "science of the human mind" is concerned,[12] he sometimes discusses similar topics, such as the function of humor, or the characteristics of Classical music.



In his 1981 "Jokes and the Logic of the Cognitive Unconscious,"[13] Minsky argues the view that jokes have a very serious function in exposing the absurdity of wrong ways of thinking. The absurdity of formal-logical thinking is one of these, including the inherent paradoxes. You only need say, "The proposition I now utter, is a lie," and an unsolvable paradox arises. If the proposition is a lie, you are telling the truth. But if it is true, it is a lie, etc.

Formal logic, as is well known, gets into severe problems with statements that are self-referential, or what are called, technically, "sets which contain themselves." Penrose cites the Russellean paradox of the "set of all sets which does not contain itself as an element," which can be illustrated with the following example. There are two catalogues in a library: one lists all books which refer to themselves in some way, and the other list contains all books with do not mention themselves. In which catalogue should the second catalogue be listed?[14] In every case, this leads to an insoluble paradox.

That is why Minsky correctly doubts "that anything very closely resembling formal logic could be a good model for human reasoning. . . . In particular, I doubt that any logic that prohibits self-reference can be adequate for psychology: No mind can have enough power—without the power to think about Thinking itself."

Minsky correctly takes the Aristotelian syllogism as an example of the flaw of deductive logic, where a conclusion is derived from two premises with a common middle term. It works if A = B, and B = C, so that A = C; but it no longer works if the middle term is "almost the same," and the series of comparisons becomes "too long": 10 is almost 11, 11 is almost 12, . . . 99 is almost 100. We could impose the rule on the computer (and on ourselves), that the series must not be "too long," in such syllogistic statements, but even Minsky thinks this is not a very elegant solution.[15]

The main problem with the syllogism, the reason it so often leads to absurd results, is the middle term, which only *apparently connects* the premises A and B, and the fact that it takes the place of a real causal connection between them. But Turing's thesis of a Turing Test is just such a syllogism: The human being solves certain problems by thinking. If a computer solves the same problems, then it is thinking. The middle term is "solve the problem." Just what it is which a human being or a computer *does* when it solves a problem, is not an issue for Turing, nor an issue when Minsky claims that the tricks we can train a computer to perform are not fundamentally different from the tricks of the human mind.

The fundamental mistake of the AI cult lies in this syllogistic absurdity. It is the sort of mistake to which LaRouche repeatedly refers, and which is to be met with not only in the AI cult, but also in the prevalent methods of science on the whole. Nicolaus of Cusa long ago criticized the mistake of claiming that a circle is the same as a polygon with an ever larger number of corners inscribed in a circle, and then denying that underlying a circle (as a product of rotation) is a *generative principle* fundamentally different from what gives rise to a similar-looking polygon (an array of triangles). We can use the calculation of the surface area of the polygon for the practical purpose of measuring the surface area of the circle, but we cannot then pretend that there is no ontological difference, and that the circle is not a form which belongs to a higher mathematical species. A plastic flower differs from a real one for the same reason; so too a virtual car design from a real prototype, or Minsky's "nanotechnical" computer system from a living human mind.

Denial of the Idea

What is initially intriguing about Minsky, at least in his early writings, is his interest in human thinking. Much too little is known to science about how ideas come about in the human mind. AI research is necessary to gain clarity about the processes of thought, Minsky claims. He does appeal for a thorough study of human creative thinking in order to derive new approaches for new program-tricks. We might object that such knowledge about creative thinking processes would best be used by applying the knowledge to the better education of as many people as possible. It is interesting, nevertheless, (a) that Minsky makes creative thinking a subject of investigation at all, and (b) that, and how, he fails to understand the fundamental issue. This leads us to the basic contradiction in the AI ideology, its implicit bug, which is the basis of its distasteful anti-human attitude.

In 1981, Minsky wrote a paper on "Music, Mind, and Meaning," which provides some clinical material for examination.[16] First of all, there is the usual mistake, and one made not only by AI people: that is, he grabs onto the products of creative processes and thinks that their "pattern" constitutes an explanation of the mental processes out of which they emerged. The pattern of Classical music which Minsky praises as worthy of imitation, e.g., for pedagogical purposes, is that of the sonata form—exposition, development, recapulation—, and he speaks of the sonata as a learning machine. Or he derives the conclusion, from the correct observation that a person has not understood something, if it is understood only in one way, and that it is already creative if one looks at the same concept in different areas, drawing analogies and the like. So he wants to build that into computer programs.[17]

But that is not all there is to it. It is necessary to know that Minsky plays the piano, and loves the music of Bach, Mozart, and Beethoven—and he is credible when he makes such claims. When he was young, he also made technical inventions, and so he has certain insights into his own creative activity. For our purposes, what is especially interesting are his observations on the great works of Classical music, such as Beethoven's Fifth Symphony. In contrast to banal background music, which just diverts the listener from the effort of thinking and which is intended to transpose a person into a state as far removed as possible from reality, Minsky sees in great Classical compositions a process of successive, but unexpected changes. The human mind is so formed, that it perceives what has changed and does not attend to what remains self-identical. Up to that point, we can agree with him. The mistake arises with Minsky's desire to see the composition only from the standpoint of the listener, and not from the standpoint of the composer.

The mistake becomes especially clear in the following passage, although it sounds promising at the beginning:

> Music, too, immerses us in seemingly stable worlds! How can this be, when there is so little of it present at each moment? I will try to explain this by (1) arguing that hearing music is like viewing scenery and (2) by asserting that when we hear good music our minds react in very much the same way they do when we see things. And make no mistake: I meant to say "good" music! This little theory is not meant to work for any senseless bag of musical tricks, but only for those certain kinds of music that, in their cultural times and places, command attention and approval. . . . To see the problem in a slightly different way, consider cinema. Contrast a novice's clumsy patched and pasted reels of film with those that transport us to other worlds so artfully composed that our own worlds seem shoddy and malformed. What "hides the seams" to make great films so much less than the sum of their parts—so that we do not see them as mere sequences of scenes? What makes us feel that we are there and part of it, when we are in fact immobile in our chairs, helpless to deflect an atom of the projected pattern's predetermined destiny? I will follow this idea a little further, then try to explain why good music is both more and less than sequences of notes.

That's the decisive issue, so one might think: At the moment that one hears only a tiny part of a composition, and then a whole composition arises in the mind? The only answer to that is what one reads frequently in LaRouche's writing: A successful performance of a musical work of art has the effect which Minsky describes, if the performer plays what is "between the notes," and if the performer has the *unitary* idea of the composition as a whole present to his mind before playing the first note, which idea then encompasses the entire succession of ideas into one.

This is precisely where Minsky breaks apart, because this is just what he does not want to see, and so he therefore vehemently rejects it: no, the seamless, undivided whole of composition or film, is only an "illusion" according to him, and the film really just consists of sequences of flickering particular pictures; music consists of assemblies of notes (which means he nullifies, by sleight of hand, the difference he emphasized between good and bad films). And, one's own soul is just as much an illusion, Minsky adds:

> We are all convinced that somewhere in each person struts a single, central self: atomic and indivisible. (And secretly we hope that it is also indestructible.)
>
> I believe, instead, that inside each mind work many different agents.[18]

This is the thesis that Minsky developed in his 1992 book, *The Society of Mind.*[19] Many different agents are also at work in people who listen to music, and each of them analyzes different aspects of the music, he claims.

Why Minsky wants to know nothing of the soul, any more than he wants to concede a uniting, creative idea, is something be betrays in "Why People Think Computers Can't":

> Our standard concept of the self is that deep inside each mind resides a special, central "self" that does the real mental work for us. . . . The trouble is, we cannot build good theories of the mind that way. In every field, as Scientists we're always forced to recognize that what we see as single things—like rocks or clouds, or even minds—must sometimes be described as made of other kinds of things. We'll have to understand that Self, itself, is not a single thing.

In other words, no computer program can be derived from the unity of the soul and the unity of the creative idea, and *therefore* Minsky must deny both so vehemently. But whoever denies the basic characteristic of creative human thinking, cannot understand it. The AI cult will inhibit, and not advance, the science of the human mind—to put it politely.

What Is an Invention?

According to Minsky in his "Jokes and the Logic of the Cognitive Unconscious," a general theory of unique discoveries is utterly superfluous, because the barest minimum of such discoveries have been made by a single human being. It is much more important, he claims, to find out how new ideas come about in "common sense" thinking. Of course, in all of the mentioned Internet papers, he mentions only one single concrete example of such a "new idea."

For contrast, I want to provide an example of such an idea; it is simple and, although it is taken from mathematics, everyone can understand how its "common sense" includes operations with natural numbers. I am talking about the well-known anecdote about Carl Friedrich Gauss. Gauss's teacher set up a problem to keep the class calm and busy for a while, by telling them to add up the numbers from 1 to 100. Before the other students had even begun to attack the boring task (today, even a pocket-calculator would not be of much help, because as soon as you type a wrong number, you have to begin all over again), the little Gauss was already finished. He brought his teacher a slip of paper upon which he had written just one number, the solution.

Did the little boy have a computer in his head? How did he figure it out so fast? That is an exciting question, especially for people who are not familiar with the problem, because they should think about it themselves before just grabbing onto Gauss's solution. The solution begins with what is initially a vague idea: What would happen if, instead of beginning by adding $1 + 2 + 3 + \ldots +$, we begin with the two numbers at the extremes of the series, 1 and 100? And what happens if we then move, on each end of the series, one number inward, i.e., to 2 and 99? Aha! Both add up to 101, so that there is a continuing symmetry. Fine: so let's move to the center: $50 + 51$. Now we are almost done. We only have to calculate 101 fifty times, i.e., 5,050.

That was the number Gauss wrote on the slip of paper, and nothing else. While the other students laboriously added one number to another like little computers, Gauss had found the solution by generating a new idea. His teacher was speechless. We can use the same example to show how we can generate a general rule for calculation, an algorithm for the addition of all natural numbers from 1 to n. We simply describe what we have already done in the concrete example: multiplication of half of n with the sum of $1+n$, or $(n/2) \times (1+n)$.

We could, of course, program this formula into a computer, and thus make an improvement in the computer's programming. Some people make the objection, "The computer can carry out the calculation $1 + 2 + 3 + \ldots + n$ so fast that it makes no sense to generate a new program." That may be, but could it also be that the calculating power of the computer is sometimes an argument not to improve its programming under certain circumstances?

The Psychology of Discovery

Roger Penrose refers to the book, *An Essay on the Psychology of Invention in the Mathematical Field* (1945), by the Frenchman Jacques Hadamard, who cites Henri Poincaré's description of an important discovery, in addition to other examples.[20] The crucial idea came when he was boarding a bus and thinking about something completely different:

> At the moment that I set my foot on the step of the bus, the idea came to me—apparently nothing having paved the way for it in my previous thinking—, that the transformation I had used to define the Fuchs function, was identical with those [transformations] of non-Euclidean geometry. I did not verify the idea; I had no time to do so, either, because I continued a discussion I had already begun once I was seated in the bus, but I was completely sure of my idea. For the sake of comfort, I verified the idea only when I had returned to Caen, and had the time to do it calmly.

Penrose emphasizes that the idea which came to Poincaré, and which proved to be right, "apparently came like a blitz while his conscious thinking was somewhere else entirely, and that this is not the case of a simple idea, which might be expressed in a few words." Instead, Poincaré would

> have needed a lecture of about one hour's length for experts . . . , to communicate the idea. Obviously, the idea could come to consciousness so fully only because he had become familiar with various aspects of the problem at hand in many long hours of focussed conscious activity. Nevertheless, the idea that occurred to Poincaré as he was boarding the bus was a "single" idea in a certain sense, which was comprehensible in a single moment and completely! More astonishing was Poincaré's conviction that the idea was true, so that it almost seemed superfluous to him to verify it in detail later.[21]

In this connection, Penrose recalls another similar experience of his own. He had been pondering over a physical problem for some time, and the idea for a solution came to him while he was escorting a guest across a street. As the conversation continued, he forgot the idea. What remained was simply

> a strange feeling of joyous excitement . . . which I could not explain to myself. I passed review over the various events of the day, and attempted to find the reason for this mood of elation in them. After excluding a number of inappropriate possibilities, I recalled the idea consciously, which I had had when I was crossing the street: It had excited me for a short moment because it provided the solution to the problem which had been running through my head the whole time![22]

These are two examples of the psychological phenomenon of a flash of insight, that singular moment when an idea is transformed from the pre-consciousness into conscious thinking. LaRouche has repeatedly emphasized the importance of this singularity as characteristic of human creative thinking since his "Beyond Psychoanalysis" (1973).[23]

The great Classical poets have sung of the creative idea, the "Götterfunken" (Godly sparks), and Friedrich Schiller writes in his poem "The Favor of the Moment"[24]:

> . . .
>
> But if Heaven's spark appear, it
> Strikes a flame of lightning-dart,
> For the fire-drunken spirit,
> And the overflowing heart.
>
> From the gods, like summer showers,
> Blessing falls from cloudless sky,
> And the greatest of all powers
> Is—the twinkling of an eye.
>
> From the first of all endeavor,
> When the universe was wrought,
> The Divine on earth has ever
> Been a lightning-flash of thought.
>
> Stone by stone the work arises;
> Slow the hours pass on earth.
> Swift the work's *design* surprises;
> Swift the spirit gave it birth. . . .
>
> So the Beautiful must vanish
> Like a sudden bolt of light,
> Which the stormy vapors banish
> To the darkling grave of night.

The poet here allows an idea to emerge in the mind of the listener with the device of poetry, but it is not only a beautiful metaphor, but rather—as Penrose and Poincaré attest—a feeling, a physiological phenomenon. I would make the claim that it is an electrical phenomenon which could be observed with modern methods today, Positron Emission Tomography (PET), on condition that a human being comes up with a creative idea while he or she is being tested!

Minsky and the AI cult—and this is no surprise—reject the idea of a flash of thought as an illusion:

> Many thinkers firmly maintain that machines will never have thoughts like ours, because no matter how we build them, they'll always lack some vital ingredient. They call this essence by various names—like sentience, consciousness, spirit, or soul. Philosophers write entire books to prove that, because of this deficiency, machines can never feel or understand the sorts of things that people do. However, every proof in each of those books is flawed by assuming, in one way or another, the thing that it purports to prove—the existence of *some magical spark* that has no detectable properties. I have no patience with such arguments.

We have seen that the creative spark does indeed have "detectable properties." But Minsky has to cast it aside as "magical," because it is unfit for representation in a computer model of thinking. For his computer model, Minsky needs a myriad of little, expert agents of the mind, each of which does its work like a screw in a clockwork of the mind, and without any suspicion of having insight into any overall context and coherence. Allegedly—*and this is what actually ought to be called "magical"*—the little agents are nevertheless supposed to generate an overall coherence. Myriad pieces of information are supposed to be added up to "knowledge." That is the credo of the information society, which may people call the "knowledge society" for that reason. Now, we have the Internet, this heap of information—and it is rather clear that we can only find something there, if we have an idea of what we are looking for.

The human mind does, after all, function on the basis of ideas—human thinking does, and not only that, but also human perception. In contrast to a camera or a tape-recorder, the human mind see and hears only things of which it has an idea, and this is something which the mind somehow expects. That is why it is so important for the scientist to keep his eyes open for unexpected anomalies, for phenomena which are *not* explainable with the available theories. Otherwise, the scientist could never discover anything new. A paradox results from the contradiction between these "unexplained" phenomena and existing theories, an interesting scientific problem of the kind that "went around in the back of the mind" of Poincaré and Penrose.

The solution to the paradox comes with a new idea, often in the form of a flash of insight, a brainstorm, when a chain of pre-conscious thought processes suddenly come together. The new idea by no means arises out of nothing, but its emergence is a *singularity!* Such singularities are, as LaRouche emphasizes, the decisive characteristic of all non-linear processes. These include evolution as well as creative human thinking. Nicolaus of Cusa and Leibniz took account of this, but their adversaries, who dominate scientific ideology down to our own time, insist on *linearizing* the representation of all processes, subdividing everything into common elements, so that they can be calculated or generated by a computer model. That is something we should indeed do, say Leibniz and LaRouche, but, for all the *many* elements, we must not let what is more important fall by the wayside: the *one,* the singular, unifying idea, which makes it possible to think and to feel the most complicated coherence, hardly expressible in words, in a single moment!

It is out of the source of this flash of insight that the other ideas flow, so that the original idea can be articulated—not like the electronic transfer of information, but with certain hints, words, metaphors, and the like, which are sufficient to allow the idea to emerge in the minds of others as well.

This, which the AI cult fights against and denies, is the object of art, and ought to be the main aim of education. LaRouche recommends the re-living of the most important scientific discoveries, and the reconceptualization of the ideas and *Motivführung* in compositions of Classical music or poetry.[25] This training can begin with the discovery of the "idea" in a short poem or fable.

In his *Abhandlung über die Fabel* (*Discussion of the Fable*), Gotthold Lessing—who, in contrast to Minsky, did not fear that a growing number of geniuses would have negative social effects—wrote:

> Why is there such a lack in all sciences and arts of discoveries and self-thinking minds? The question is best answered

The Donkeys

The donkeys complained to Zeus that human beings treated them cruelly. Our strong backs, they said, carry their burdens, under which they and any weaker animal would be crushed. And yet they want to drive us with merciless blows, to move at a speed which would make it impossible for us to carry our burdens—if Nature herself had not made it impossible for us to move so fast. So prohibit them, Zeus, from being so cruel, if it is possible to forbid human beings from doing other cruel things. We want to serve them because it seems you have created us for that purpose; but we do not want to be beaten without cause.

My creatures, Zeus replied to their spokesman, the request is not unjust; but I see no possibility of persuading human beings that your natural slowness is not laziness. And as long as they believe that it is, you will be beaten.—But I shall think up a way to lighten your fate: From now on you will be blessed with insensitivity; your skin will be hardened against the blows, and it will tire the arm of the driver.

Zeus, cried the donkeys, you are ever wise and merciful!—They went joyously from his throne as if it were the throne of universal love.

—Gotthold Ephraim Lessing,
version of Aesop's Fable 112

> with another question: Why are we not educated better? God gives us the soul, but we have to get *genius* from education. A boy, all of whose powers of soul one educates and expands continuously in all kinds of situations; whom one accustoms to rapidly compare everything he adds to his small knowledge, on a daily basis, with what he knew yesterday, and to pay attention to whether, by means of these comparisons, he does not himself come upon things which no one yet told him; which can be continuously transferred from one context to another; whom one teaches to elevate himself from the particular to the general as easily as he descends from the general to the particular: This boy will become a *genius,* or in this world it is impossible to *become* anything at all.
>
> Among the exercises, now, which must be made according to this plan, I believe that the discovery of Aesop's fables is one of these which is most suited to the age of the student; not that I would attempt by this means to make all students into poets, but because it is undeniable that the means by which the fables were invented, is the same as that which one will most frequently encounter among all inventors.[26]

According to Lessing, the first step is to listen to the fable and to understand the underlying idea. As the example of the fable "The Donkeys" shows [SEE Box, page 13], the idea is not so easily expressible in words. What is Lessing getting at? Did old Aesop have the same intention? Here a whole universe of historical, political, and ironical relationships opens up. But this little fable encompasses them and makes them articulate, so that the mind of the listener is excited to grasp the idea which is intended.

The second step would be to let the children invent fables themselves, so they would practice giving their own general ideas—for example, about human character traits such as jealousy, greed, power, and opportunism, or about the fine line between being clever and sly, between arrogance and pride, between being honest and being a denouncer of others—in a fable they compose themselves, to give these ideas concrete shape.

The purpose of this elementary training, the way Lessing recommended it and the way Wilhelm von Humboldt later introduced it in his educational reform in Germany, is the practice of the capacity to discover the underlying idea in everything, the hidden assumptions and axioms, and never to be satisfied with the surface of particular pieces of information. The human being is best equipped to that naturally, but can forget. But if this capacity is trained from the time when students are young, then it is possible to develop it.

The human mind is not constituted to perceive merely simple differences, but differences of higher orders of simple differences. Cantor's transfinite numbers are the best illustration of this idea; they generate an infinity of other ideas as ordinal types, or "guiding ideas," which then constitute their "essential idea" (Inbegriff). Cantor showed that these infinite manifolds ("*Mengen*") can have different "powers" ("*Mächtigkeiten*").[27] Cantor was bitterly maligned by his adversaries for these ideas, and Bertrand Russell was one of the most vehement, long after Cantor's death.

But Cantor's concept of an ascending ordering of infinite idea-*Mengen* of increasing power remains, as especially LaRouche has shown, the most promising approach for a realistic "science of the human mind." For it brings in the old paradox of the One and the Many, which Plato made the subject of his *Parmenides* dialogue (among others), and which appears again and again in poetry and philosophy when creativity is at stake. Leibniz addressed the issue of the One and the Many in his *Monadology,* and LaRouche presented the most rigorous representation of his solution in his work, *In Defense of Common Sense.*[28] The fundamental characteristic of Leibniz's "monads" and LaRouche's "singularity," is that the unity of the creative idea, or the unity of the individual human mind, demonstrably does not stand in insoluble contradiction to the multiplicity of particular, more-or-less conscious thoughts, or physiological processes of the brain, as Minsky claims (and not only he). It is only necessary to understand that this one idea, out of which a scientific discovery or a great composition is born, has a *higher quality* than the many ideas which flow from it as from a wellspring.

That is nothing for a fundamentally linear computer program, where everything has to be reducible to the basic elements of 0 and 1, and in which such singularities really do not exist. But they do exist in the human mind, and if AI research prefers to ignore this fact, it has no one to blame but itself. AI researchers can no longer credibly claim that AI methods are the only way to achieve insights into human thinking processes. The avoidance of the singularity of creative ideas will inevitably prove to be the constraint against further progress in the computer sciences, if AI ideology does not get rid of this bug.

What is the goal of progress in science and society? According to Minsky, it is "artificial intelligence," the super-fast, all-encompassing network, which is crammed full of all the information in the world, and is far superior to human beings in its speed, storage memory, memory capacity, etc.—and which will ultimately consign human beings to Hell. Or, is the primary goal not, the education of the largest number of universally educated human beings, who—as real universal geniuses—supported by better computers—can keep their overview over the immense and growing knowledge of humanity, and develop it further in a way which serves mankind? To the degree that this is successful, people can be called wise. This wisdom, or the emotion which accompanies it, *agapē,* has the characteristic of singularity: It cannot be encompassed in dogmas or positive laws; it must even be reexamined from one moment to the next, asking what is right and what is wrong—but it is knowable in principle for human beings.

The context for this wisdom can only be the general welfare of mankind, which includes those who lived before us, those who live now with us, and those who will come after us. Since Minsky's AI cult leaves this framework behind, he reduces himself to absurdity. Nevertheless, the Platonic-Christian *agapē* is oriented to something higher than mankind, for it is also the love of God—an idea which Minsky thinks is utterly absurd. This is our final argument against the anti-progress mindset of the AI cult: How is anyone supposed to understand what creativity is, if the idea of the Creator and everything similar to this idea, is rejected axiomatically?

1. Marvin Minsky, "Why People Think Computers Can't," (1992), in *The Computer Culture,* ed. by Dennis P. Donnelly (Rutherford.: Fairleigh Dickenson University Press, 1985); Internet: www.ai.mit.edu/people/minsky/papers/ComputersCantThink.txt.
2. Harry Harrison and Marvin Minsky, *The Turing Option* (New York: Warner Books, 1992).
3. Kirkus Reviews: Harry Harrison, Marvin Minsky, *The Turing Option,* Internet: www.amazon.com.
4. Marvin Minsky, "Will Robots Inherit the Earth?," *Scientific American,* October 1994; Internet: www.ai.mit.edu/people/minsky/papers/sciam.inherit.html
5. "Denn sie wissen nicht was sie tun" ("For they know not what they do") *GEO Wissen,* No. 3, 1992, p. 144. As reported in Hans P. Moravec, *Mind Children: The Future of Robot and Human Intelligence* (Cambridge, Mass.: Harvard University Press, 1990).
6. Marvin Minsky, "Alienable Rights," Internet: www.ai.mit.edu/people/minsky/papers/AlienableRights.html
7. Roger Penrose, *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics* (Oxford, New York: Oxford University Press, 1989); German edition: *Computerdenken* (Heidelberg: Verlag Spektrum der Wissenschaft, 1991).
8. Russell's "crowning achievement," the 1910-1913 *Principia Mathematica* he wrote with Alfred North Whitehead, was proven a hopeless failure by mathematician Kurt Gödel's 1931 "On formally undecidable propositions of *Principia Mathematica* and related systems I."
9. M. Minsky, "Why People Think Computers Can't," *op cit.*
10. Raymond Kurzweil, *The Age of Intelligent Machines* (Cambridge, Mass: MIT Press, 1990) German edition: *Das Zeitalter der Künstlichen Intelligenz,* (München-Wien: Carl Hanser Verlag, 1993).
11. *Ibid.* "Poem" No. 1 by Kurzweil's Cybernetic Poet; "Poem" No. 2 by T.S. Eliot. German edition, p. 375.
12. Lyndon H. LaRouche, Jr. "The Science of the Human Mind: A Treatise on Fundamentals," *The Campaigner,* Special Supplement, February 1984.
13. Marvin Minsky, "Jokes and the Logic of the Cognitive Unconscious," in *Cognitive Constraints on Communication,* ed. by Lucia Vaina and Jaakko Hintikka (Dordrecht, Boston: D. Reidel Pub. Co., 1981); Internet: www.ai.mit.edu/people/minsky/papers/jokes.cognitive.txt
14. Quoted in Penrose, *op. cit.,* German edition, p. 98.
15. Minsky, "Jokes," *op. cit.*
16. Marvin Minsky, "Music, Mind, and Meaning," *Computer Music Journal,* Fall 1981 (Vol. 5, No. 3); Internet: www.ai.mit.edu/people/minsky/papers/MusicMindMeaning.html
17. Minsky, "Will Robots Inherit the Earth?," *op. cit.*
18. *Ibid.*
19. Marvin Minsky, *The Society of Mind* (New York: Simon and Schuster, 1986).
20. Quoted in Penrose, *op cit.,* German edition, p. 408.
21. *Ibid.,* p. 208ff.
22. *Ibid.,* p. 410.
23. See Lyndon H. LaRouche, Jr., "Beyond Psychoanalysis," *The Campaigner,* Sept.-Oct. 1973; also "The Science of the Human Mind," *op. cit.*
24. Trans. by D.P. Goldman, in *Friedrich Schiller, Poet of Freedom,* Vol. I, ed. by William F. Wertz, Jr. (New York: New Benjamin Franklin House, 1985). The original text of this excerpt reads as follows:

   Die Gunst des Augenblicks
   . . .

   Zückt vom Himmel nicht der Funken,
   Der den Herd in Flammen setzt,
   Ist der Geist nicht feuertrunken,
   Und das Herz bleibt unergetzt.

   Aus den Wolken muss es fallen,
   Aus der Götter Schoss das Glück,
   Und der mächtigste von allen
   Herrschern ist der Augenblick.

   Von dem allerersten Werden
   Der unendlichen Natur,
   Alles Göttliche auf Erden
   Ist ein Lichtgedanke nur.

   Langsam in dem Land der Horen,
   Füget sich der Stein zum Stein,
   Schnell wie es der Geist geboren
   Will das Werk empfunden sein. . . .

   So ist jede schöne Gabe
   Flüchtig wie des Blitzes Schein,
   Schnell in ihrem düstern Grabe
   Schliesst die Nacht sie wieder ein.
25. See, for example, Lyndon H. LaRouche, Jr., "On the Subject of Education," *Executive Intelligence Review,* Dec. 17, 1999 (Vol. 26, No. 50).
26. Translated from Gotthold Ephraim Lessing, *Abhandlung über die Fabel,* in *Lessings Werke,* Vol. 2 (Frankfurt: Insel Verlag, 1967).
27. See Dino de Paoli, "Georg Cantor's Contribution to the Study of the Human Mind," *21st Century Science & Technology,* Summer 1991 (Vol. 4, No. 2).
28. Lyndon H. LaRouche, Jr., *In Defense of Common Sense* (1989), in *The Science of Christian Economy and Other Prison Writings* (Washington, D.C.: Schiller Institute, 1991).