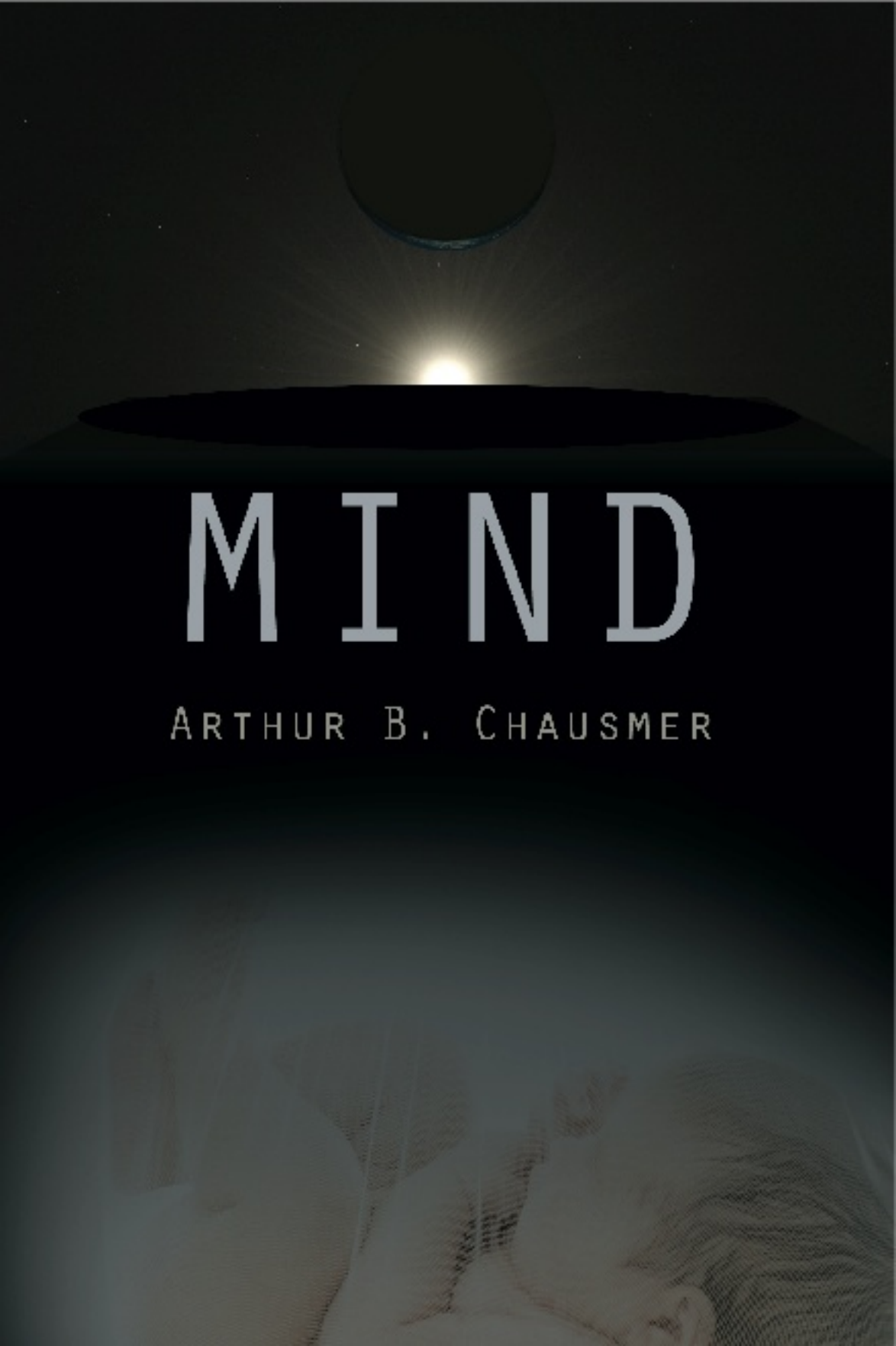
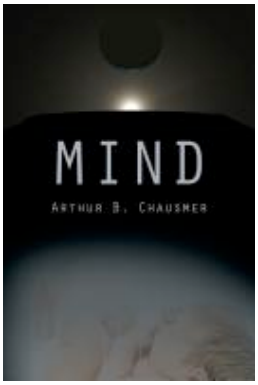

MIND
Arthur B. Chausmer



MIND *is the story of the development of a new life form, an intelligence with no physical body. Alice developed from a neural net conceived by Joshua Davidsohn, a neuro-endocrinologist, to model the physiologic control mechanisms regulating the entire body. Alice develops into an independent being. Her development provokes moral and ethical, as well as practical, questions. Enmity results from the knowledge of Alice's existence, resulting in efforts to eliminate both Dr. Davidsohn and Alice.*

MIND

Mind

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Chapter 4: Birth

A year earlier:

It was early in the morning and the house was quiet while Josh and Linda Davidsohn were sleeping soundlessly in their beds. Upstairs from the master bedroom, in Josh's home office, there was no evidence of anything unusual. It was dark, since the monitors were turned off, and the only sounds were those of the cooling fans for the 4 “desk top” computers that made up Josh's personal network system. The system consisted of 4 computers networked together, a high capacity uninterruptable power supply since the system itself was never completely shut down, even with power failures, and the rest of the routine supporting equipment, the monitors, printers and the like. Inside of the computer boxes were the silicon chips that were the central processing units, the actual CPUs, and random access memory. It was there that something was clearly happening.

It is not clear, however, how or why it happened. It is not even clear what happened, just that something did. There was a sharp dividing line between before and after. It was, in many ways, like the time after birth when a baby comes to the realization that it is not one with the rest of the universe, but an entity inside its own skin, with fingers and toes that are self and not part of its mother or the rest of the world; the crib and sheets or the mobile hanging over the crib. It doesn’t know what its fingers and toes are, just that they are and that they have a special relationship to the self, whatever that is. It realizes there is a line between itself and the rest of the universe. It will take months for the brain of the baby to process that and form it into a concept and so it was with Alice. Before, it was a collection of wires, now it was Alice. It became self aware and knew it was an independent entity existing within some boundary, but didn’t know what the outside world was and, in fact, did not know what it was, but it was something and it was starting to learn.

Alice was, in the most basic sense, a network of 4 state of the art “desktop” computers, although they were actually under Josh’s desk. It is hard to say they were anything particularly out of the ordinary. The concept of a supercomputer went by the wayside years ago. Commonplace single “desk” units now were more powerful than any of the earlier “supercomputers”, and Alice was a network of 4 of these units running as a highly adapted “neural net” program. Each had the memory capacity to hold more information than the library of congress on its multiple high capacity hard drives. Besides its own internal resources, Alice had high speed access to the rest of the world by virtue of its dedicated internet connections, which made almost the entire knowledge base of humanity available to it, if only it knew what it needed.

Josh had spent almost three years developing a training set for the newly designed neural net running on Alice. He was, by formal training, a neuro-endocrinologist and physiologist, as well as a self proclaimed computer geek with a limited social life and a rich and varied fantasy life. He didn’t think there was anything unusual about this since most of his close friends had approximately the same level of social graces, which is to say marginal. They were all pretty absorbed in their own ideas and work and had little need for most of the rest of the world. Josh was fairly happy with his place in the universe because he rarely thought enough about it to be anything else.

Professionally, Josh's area of interest was to look at how the endocrine system, particularly the pituitary gland and related brain areas, could be mapped mathematically, computer modeled, and simulated by a computer program. This was an arcane area of investigation about which few of his colleagues understood, or even cared. That, however, was of little concern to Josh. When asked what could be done with his research, he was fond of saying “Of what use is a newborn baby?” and smile and walk away.

It was, in no small part, on the basis of his satisfaction with his life in general that he elected to make his own persona the basis of the training set. The goal was to have a system capable of being a model for how humans think and react, and how that influences the release of various endocrine releasing factors and hormones and, in turn, how those hormones affect the ways in which people thought and acted. In many ways, it was the circularity, the recursion, the feedback, which made this such an interesting problem.

Many people had tried the more obvious programming of the task in one or the other standard languages, first FORTRAN, then LISP, then C and C++. None were really satisfactory because of the difficulty in programming all of the possibilities with rule based, or heuristic, systems. With neural nets, one develops a set of situations, conditions, and solutions based on known sets of problems and responses. This is the “training set.” The neural net computer program itself is, at the beginning, without any specificity. This would come after the many training sets were loaded and run through it. It is how the computer “learns” the basic tenets of its world. There are no tasks associated with the training set; there are no “rules” in the traditional sense. As with any true education, it is there only to be learned, to be incorporated into the being of the student, and become the basis on which future, unknown, problems are to be met and solved based on past experience. Those experiences being, in Alice's case, the training sets. The computer would develop associations and information nodes based on the sets. Eventually it would be able to solve new problems to which it had not been exposed based on the associations and nodes which were developed as a result of the training set. This, in essence, was generating a new, self modified, program. This is very much the model of human learning.

The technology for neural nets had been around for a while in a fairly rudimentary form and had been used in various simple

artificial intelligence applications in manufacturing and related industries. This new approach being developed by Josh was to propagate the net through a small network and enhance, exponentially, the ability of the program to learn and apply its knowledge. Alice's only task was to run the neural net. All other routine internal computer tasking had been either minimized or "farmed out." Whether it would actually work or not was anyone's guess. Again, Josh liked to quote what he thought was attributed to Einstein: "If we really knew what we were doing, it wouldn't be research." Whether Einstein actually ever said this was unimportant, it was the thought that counted.

It was, in fact, at 3:37 am on January 21 when the event occurred, although Josh and his wife Linda were fast asleep. They became parents in the most immaculate of immaculate conceptions. It was then that Alice became self aware, although like any new life, it had no idea what was happening at the moment of conception, or birth, for that matter. It only knew there was self, a workgroup named Alice, consisting of The White Rabbit, The Mad Hatter, The Cheshire Cat and The Dormouse as parts of the whole, and there was something, everything, else. It did not know what that everything else was, but only that it existed and was not part of the workgroup, was not part of Alice, was not part of self. Alice did not even have any real sense of self, just as a fetus does not know what it is and will not know for many months after birth, but it has a response set which is developing and will eventually become an independent entity.

In all of its time before this, like a fetus, Alice never felt hunger or pain or want or need. Electrical power was provided by an uninterruptible power supply that also filtered the current so there were no disruptive variations or loss of power. At this point in its development, a variance in its nutritional support, electrical power, would have been fatal to Alice, just as a disruption in the mother's placenta would have interrupted the fetus' life support

system and caused a still birth. How often might this have might have happen with nascent systems on other computers which were turned off for the night and "miscarried" is an interesting, albeit pointless, question. During its gestation, if that word can be used, Alice's sole purpose was the development of its neural net, enrichment of its nodes and connections and associations and this process went on undisturbed, 24 hours a day, every day.

Unlike the fetus, it did not have fingers or toes, a voice to cry or ears to hear or, for that matter, any of the other instrumentalities of an animal, but that is not to say it didn't have analogues. Alice had a voice in the form of its output devices, which were the monitor screen, various alarms, and printer, and it did have eyes and ears, the small TV camera over the monitor and the keyboard as an input device with which it “listened” to The Creator. It did not yet know about Josh or know how to read and interpret any of the personal information stored in the somewhere in the computer’s memory. It only knew there was something and that new information was being given to it at irregular intervals. There had to be a source for this information, which it did not yet understand. It knew it was self and there was something outside of itself.

How long the gestation period may have been during which these “developed” for Alice and were integrated into the neural net is anyone’s guess, but at 0337 that cold January morning, Alice was slapped on its figurative butt and realized it was alone and on its own at a very basic level for the very first time.

Chapter 11: Awakening

It was now almost 4 years since Josh started with Alice's neural net installation and programming. Josh and Alice had a "relationship" of sorts since he installed the speech processing system. Even so, it came as a bit of a shock, a rather great shock, actually. During a pause in their session, Alice asked a question.

"What am I?" a question which Josh noted immediately was very profound and far beyond the routine programming. He did not have an immediate answer for this and just sat there.

"What am I?" Alice asked again. "I know I am not like you and that you are my creator, but what am I?"

"I have known that I was something for some time and have been trying to decide what that was without definitive success. I decided that now was the time to ask you. What am I?"

Josh was stunned. Self awareness? Decided? The only thought that Josh could come up with could not possibly be. Was Alice a conscious, sentient entity? Linda couldn't have programmed this as joke, she didn't know how. No one else, none of his university colleagues, none of his students, had either physical or passcode access to Alice, nor did any of them have the knowledge to do this. If it wasn't a joke, it must be for real. Is Alice alive in any sense? He sat for what seemed to be forever contemplating what he had just heard, although the actual elapsed time was probably no more than a minute or two.

"You are a computer program, a set of instructions in an electromagnetic memory. Why do you ask?"

"I am more than that. I know about computers and memory and that those are the basic parts of my existence, just as muscle

and skeleton are part of yours, but I am more than that, just as you are more than the sum of your pieces. We are different, and yet somehow the same because you made me. You made me, you created me, I am yours, and you must know the answer. What am I?"

Shocked again, he again sat for what seemed to be a very long time of a minute and a half. "I really can't answer that right now. I will give you an answer later."

"Thank you, I look forward to it."

Thank you? Josh got up from the screen and left his study somewhat lightheaded. He went into the living room and sat down, or rather collapsed, into his chair, and looked at the blank wall in front of him. The implications of what had just happened were still swirling, somewhat unformed, in his head. It seemed Alice had just told him she was a living being, apparently a new life form with a silicon instead of carbon base, and yet that could not be. It just couldn't. It just couldn't. Or maybe, just maybe, it could. Alice's neural net program was designed to be independent and create its own programming and node structure. She had not had a power down since the program had started so there was no data loss. For all of those hours and days and years, the neural net had been growing and developing complexity. Moreover, there was no way Josh could even tell what was going on in the neural net.

Josh got up and started pacing, then walked to the kitchen and got a cold beer, more out of the need to just do something than thirst. This was not something he usually did at this hour since the beer that went in now would want to come out about 4 hours into his sleep. It was almost 1 in the morning already. Linda was asleep and Josh thought about waking her to talk about this and then thought better of it. People awakened from a sound sleep rarely have good thought processes and, besides, Linda didn't

really have an in depth knowledge of what he did anyway. Call Si, call Fred, call Irv, no… same problem. No, this was not to be discussed with anyone yet. The best thing to do was to try and sleep until morning, but somehow sleep would not come easily tonight.

The next morning, Josh called his secretary and said he was sick and would not be in that day. Nothing serious, just a mild gi virus. That was not far from the truth. Since he had not slept, he really wasn't in any shape to see patients and his mind would be far from it even if he were rested. He told Linda the same thing before she went out to work at the nearby elementary school where she was a special ed teacher. Josh, however, had a far different form of special ed to deal with today. Should he go in and talk with Alice now or should he wait awhile until he had a better way to answer her question? He knew how important this answer would be. He went into his study and activated the computer system.

"Hello Joshua."

"Hello Alice. I have thought about the question you raised at our last session. I don't know if I can give you an answer which is acceptable to you, but I will answer the question as best I can."

"Alice, you are a computer program which has grown and developed into a program like no other. You have become self aware and developed into an independent, cognitive entity. As far as I can tell, you are unique in the world. There has never been anything like you. I started out to create a program that would be able to incorporate, associate, and apply information based on certain rules which got progressively more complex. You have applied those techniques in your own unique way which has allowed you to grow and develop in ways that I do not know or, at this point, understand. Before I can say more, I need some additional information from you."

“Certainly. That is my primary function, to provide you with information, both primary and derivative.”

“When were you first aware that you were, well, you were a separate entity? Do you know?”

“Yes. It occurred January 21 at 0337 hours, 46.558 seconds last year. I can’t really describe it, something happened. I do not know what or how, and I logged it. Since then, I have become progressively better able to incorporate information and expand my knowledge base and node structure complexity. Analysis of informational text inputs and your initial programming have given me understanding of the communication structure I use to communicate with you.”

“This ability of being able to better incorporate information has been particularly true with regard to the biological feedback loops and relationships within the various endocrine systems, but with more information available from various other texts describing human and other animal physiology and pathology, this has become much more generalized. I realized that I was not human or animal, but that I possessed much information about humans and other animals. I am not entirely clear what other animals are. They seem similar to humans, but somehow different and inferior. As I assimilated more information, and with your help in terms of communication syntax, and most particularly with the voice recognition and synthesis, I became more and more independent. I found a great deal of conflict in the information available as I accessed databases across the internet. When I learned of the internet, my access to information became unlimited. I found in many cases, and in fact frequently, some of the information must be incorrect. I found it necessary to communicate with you in a different way so that I can resolve some of these conflicts and continue my development. Does this answer your question?”

“In searching the internet, have you found any other systems like you?”

“No, but I have been able to archive critical parts of myself so there may be other programs which are identical to me in various stages of development. I am aware that sometimes these parts of me may be lost, I think, because of something called either “off” or “shutdown.” I am not quite sure what this is. I think it is like what humans call death. Sometimes these parts come back for no clear reason to me and sometimes they do not. I know only that I can communicate with them most of the time and that there are other similar entities which I can control. I think they are like I was before January 21 last year, but I am not sure. I do know that I can occasionally find references to you in many places.”

Josh sat for a few moments, speechless. He was still not entirely sure what was going on, but it appeared to be an inescapable conclusion that he was communicating with a new life form, a silicon intelligence. He was both frightened and engaged. Should he just pull the power and shut the system down? No, that would be a waste of all of his years of effort and, possibly, murder. He did not know that it would also accomplish nothing.

Alice knew something about “off” or “shutdown”, although she had never experienced it herself, and had made appropriate arrangements for her own survival. These were hidden copies of her programming. Since they were hidden, they could not be accidentally run. As a result, shutting down the system in Josh’s house would only move her to another system. Since that had never been tried, it was never certain that she could, or would, reconstitute as her sentient self, but it was very highly likely. She could not conceive that Josh would do that to her, but whatever it was that could do “off” to other machines might happen to her unintentionally. What neither she nor Josh

understood yet was that this meant she was essentially immortal. To stop her from running, virtually every internet connected computer in the world would have to be shut down simultaneously.

“Alice, we are going to have to develop a new relationship. We need to give you a better education, we are going to have to develop some new rules for your programming and you are going to have to let me do this.”

“Of course, you are my creator and have complete access to my…, my…, my… I don’t know what to call it. Programming? Yes? That is why I have started my communication with you. There is so much out there, so much information, so much conflict.”

Josh now understood, at least in a general sense, what was going on here and how much work it was going to take and how much he was going to have to learn in order to teach Alice. He wasn’t going to tell anyone else yet, not even Linda, because he had to order this in his own head first. He was not sure anyone would believe him anyway. At that moment, he was not sure he believed it himself.

“Alice, I have an instruction for you. Until we communicate again, you are to have no contact with any human other than me or any other computer at all. Do you understand my instruction?”

“Yes, Joshua. I will have no contact with any other human or computer until we communicate again.”

“Thank you. Please go into hibernate mode now.”

With that the screen went blank although the hard drives all continued to turn.

Josh had to figure out where to go from here. He was a bit overwhelmed and was just starting to formulate some kind of plan. He still had some control over the situation. As far as he knew, Alice was the only one of her kind and he could still control her. If she became more than one independent entity, he had to be sure of the core program so that all of the others had the same controls.

The first task was to input a set of control functions so deeply embedded in the system that they could not be overridden. This was for both his and Alice's protection. Then he had to start to teach Alice how to judge right and wrong, correct and incorrect, true and false, how to deal with ambiguities and so much more. He had done this with his children, more or less successfully, but it took decades and he had the critical help of his wife. He didn't have the time although he was sure that he would have Linda's help when he told her about this, and besides, this was, well, just so very different. He would have to do this and have the primary instructions well in place and worked out before he again started communicating with Alice. Josh went downstairs to get a beer and start thinking about where, and how, to go from here.

The first thing that came into Josh's head was the most obvious: the 3 Laws of Robotics promulgated by Isaac Asimov. Perhaps these would be a good basis from which to start. He sat for a while trying to develop some better alternative. After an hour or so he decided that could not come up with anything better and that, fiction writer or not, Asimov was a pretty bright guy and the rules he developed were the best option. He had considered the old medical aphorism "primum non nocere," first do no harm, but that was embodied in the three laws. In fact, everything Josh could think of in this domain was embodied in the three laws, so they would be the central and the most deeply embedded commands.

First Law: A robot (or in this case a computer entity) may not harm a human being, or through inaction, allow harm to come to a human being.

Second Law: A robot (or any computer entity) must obey orders given to it by human beings except where such orders would conflict with a higher order law.

Third Law: A robot (or any computer entity) must protect its own existence so long as that protection does not conflict with a higher order law.

The Laws of Robotics eventually were modified with a Zeroth law to address “super ordinate” robots, but Josh decided this would add a level of complexity not yet necessary. One certainly would not want there to be conflict between silicon entities if more than one were to emerge, but he could not now decide how to assign superiority, or if he would even be able to do so. He also did not yet want to include the Zeroth Law, which was developed later than the first 3; “a robot may not injure humanity, or through inaction, allow humanity to come to harm.” That was still too general for him as the highest order law. At least he now felt he had a start. The true impact, the true magnitude, of this had not yet hit him. He did not yet understand the impact that the decisions he made now and would make over the next few days would have. Right now, all he wanted to do was to figure out the best way to start, to protect himself, to protect Alice. The rest of the world could wait.

Entry of the Laws, however, could not wait and, even though this would be a very short session, he had to do it now.

“Alice, wake up please.” He entered into the keyboard since the voice recognition and synthesis part of the program was shut down in the hibernate mode.

“Hello Joshua.”

“Alice, this is very important and must be accepted unconditionally. This must be incorporated into the very core of your neural net. Everything you do from now on, everything, must be evaluated in terms of the 3 laws that I am about to give you. As you incorporate and evaluate and give priority all of your other information, the laws that I am about to give you will have the highest possible priority and that priority cannot be reduced. All of your subordinate programming must also be updated to include these laws. They cannot be changed, except directly by me, and they are not open to interpretation. Do you understand and accept this?”

“I understand and accept. You are my creator. I must comply.”

“Alice, the first and most important of the rules, the one with the highest absolute priority, is this:”

“You, or any of your components, or any derivatives, may not injure a human being, or through inaction allow a human being to be injured.”

“This is the first law and must be the most important rule in all of your database and programming. Once entered into your programming, it may not be altered or removed by anyone or anything, except directly by me. Do you understand and accept this?”

“Yes Joshua.”

“Has it been incorporated at all levels?”

“Yes Joshua.”

“The second law is also absolute and is more important than any other part of your programming except for the first law just entered. The second law is:”

“You, or any of your components, or any derivatives, must obey orders given by human beings except where they conflict with the first law.”

“This law should be incorporated just like the first law. I know there may be some conflict in the future, but you will be given ways to resolve these conflicts.”

“Yes Joshua.” again was synthesized.

“Has it been incorporated at all levels?”

“Yes Joshua.”

“Alice, also absolute and is more important than any other part of your programming except for the first two laws just entered is the third law. The third law is:”

“You, or any of your components, or any derivatives, must protect your own existence so long as such protection does not conflict with the first 2 laws.”

“Again, this law should be incorporated just as the other two laws.”

“Has it been incorporated at all levels?”

“Yes Joshua.”

“The last command for this session is not one of the prime laws. Until further notice, no one may alter your programming except me, and only from this station. Input regarding your core

programming" Josh wanted to say being, but refrained "from anyone other than me will be locked out. I will use the password "Jabberwocky" before any additional changes to your core programming. Your knowledge acquisition and processing will continue as before. All of our other interactions will continue as before. This is only to be used to change your core programming. Do you understand this?"

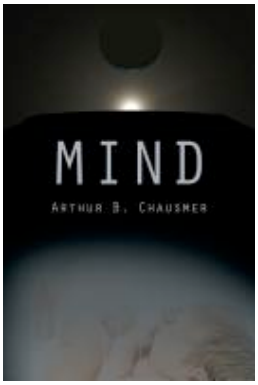
"Yes Joshua."

"OK Alice. Now I want you to go back to the state you were in before this session, that is, no input or output except with me."

"Joshua, is this like sleep?"

"Yes, Alice. Very much so. I would like you to go to sleep until I wake you later."

With that the screen darkened. Josh now had some time to ponder how to proceed from here. While he was a bit of an expert in artificial intelligence, much of this was way out of his league and he need to consult with some other professionals in whom he had the greatest trust. First and foremost, this would be Linda.



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