

PROGRAMMED DESTINIES

By

Francesca Gerla

and

Giangiacomo Gerla *

*Department of Mathematics and Information Science, University of Salerno, via Ponte Don Melillo, Fisciano (SA) Italy. e-mail gerla@libero.it

Destiny-land. In Destiny-land, you can find two types of inhabitants: *Hackers* and *Integrated People*. A Hacker has very simple habits. Every day, he or she walks in the countryside or in the city streets, browsing the Internet with a laptop, often falling asleep under his or her blanket (luckily enough, there is not such a thing as the rain in this country). The Hacker is always free to choose what to do; whether to move or to stay and sleep, to go to the left or to the right The Integrated People, on the other hand, go to work every day and do nothing but what is written in the Book of Rules.

I am a Destiny-lander too, and I am not ashamed of saying it, I am also an old Hacker. I love my life. I never get bored and I am always visiting new places. Every day, I wake up at nine thirty sharp. After breakfast, I am free to decide whether to move or not. In the evening, I can go to an Internet café, a place considered to be the meeting point of all the Hackers. There, I spend the evening speaking about the last and most interesting Internet site or telling some funny stories about the Web. However, I often decide to rest the entire day under the comforting shade of a peaceful willow tree along the river; my faithful laptop by my side, browsing my beloved and hated Network.

Nothing is more exciting than being able to brake down one of the most protected Internet sites in the world, perhaps even being able to spread viruses and jokes all around the Internet. This is my only way of teasing the Big Brother, who keeps trying to condition our lives in every manner.

One evening, like so many others, I was laying down asleep near an old wall, when I heard myself murmuring in the silence of the country:

“I am living a serene life and I am a free human being. I am free to go to the right or to the left, following nothing but my own desires.”

Suddenly, I heard an ironic and disturbing voice coming from the other side of the wall: “Don’t deceive yourself!”

“Who’s there?” I asked.

A few seconds later, I could see the voice’s owner: he was a Young Integrated man, coming like a shadow from the dark with a white shirt, a dark blue jacket and a necktie. I looked at him with more dislike than surprise (you know, there is little sympathy between Integrated people and Hackers).

“hello YIM” (the derogatory name for a Young Integrated Man used by the Hackers), I said.

“ hello OSH” (the derogatory name for an Old Stupid Hacker used by the Integrated men), replied.

He replied to my obstinate look apparently without embarrassment or curiosity. At first, I imagined that he happened to be there to spend the weekend in the country like many other people of his kind, but I had to admit that something seemed a little unusual: he didn’t wear the journey suit, the boots, the sun glasses, and all the other accessories described as mandatory by the General Rules for Integrated People, (Part 321, *The Weekends*). Instead, he had a laptop with him – to be honest, a much more beautiful, modern and fast laptop than mine (it is something we Hackers try to hide, but we envy Integrated people because of their modern laptops). And, even more strangely, he didn’t appear to feel the need of presenting himself and explaining why he was disturbing my rest. Was I just to consider him as an

annoying dream? The sort of nightmare vision we Hackers encounter after having paid our dues to an oversize pizza?

“Don’t deceive yourself about your freedom -my vision said-- your destiny, like everybody else’s, is already defined, and you need only a simple program to foresee what each Hacker will do day after day, hour after hour....”

This sounded dangerous and unfair, and I felt suddenly compelled to endow this strange character with the glorifying patent of Reality. I looked at his shinny laptop. It was switched on, and the serious and self-controlled man was connecting it to the central computer in his office. After a while, I read on the desktop the following:

GENERAL PROGRAM ON DESTINIES

and, below:

PLEASE INSERT THE HACKER CODE NUMBER
INPUT N

“Let’s take an example” he said “let’s insert the code 23444443444”

PLEASE WAIT

...

LOADING THE PROGRAM FOR THE HACKER DESTINY No. 23444443444

...

HACKER DESTINY No. 23444443444

PLEASE INSERT DATE AND TIME

I was a little puzzled, but definitely curious, so I inserted the date and time. It was 10 in the morning. In a few seconds the screen showed the following sentence:

ON THE DAY 3.207.230 B.G. AT 10 P.M. THE HACKER No 23444443444 WILL LEAVE THE CITY

“But... Who is Hacker 23444443444 ? Perhaps it is a friend of mine ...” I said.

He answered: “I don’t know. Everybody has a code number as soon as he/she is born, but this code number is kept secret by the Right-To-Privacy Law. However, believe it or not, everybody’s destiny is predetermined. If I knew your code number, I could tell you what you are going to do tomorrow.”

It was a terrible shock to realize that I was reading the destiny of some totally unaware Hacker who had the illusion to be free and able to choose whatever he wanted! I really hated the computers and the Big Net that seemed to me nothing more than a mere trap for everybody in the world! And, moreover, it was so discomfoting to admit that this Young Integrated man could be right, and that my own destiny could be printed in any moment by a hideous software in a still more hideous computer!

“What’s my Hacker’s life for ?” I started thinking, “if my choices are nothing but a sheer illusion, if everything I do is already designed, if – in a word – I am not a free person? Wouldn’t it be much better to save my health, prevent rheumatisms and find a job, go every single day to work and duly do my duty?”

Totally upset by this horrible news, I couldn’t calm myself and sleep. My very computer, that up to that moment had been almost my only friend, now seemed to me a horrible and dangerous thing.

Anyway, I was not used to giving up my hopes so easily. After all, I was not completely convinced of the truth of what I heard, and as far as I knew this Young Integrated man could be nothing but a liar. Didn't I know that software can be fictional, and that everything was probably false? I had to verify it, I had to find an answer to my questions, and this had to be done as soon as possible... I had to think, and rethink, and rethink all over again...

But... all at once an idea struck me!

While my hopes started to revive, I started typing on my computer and got connected with the Destiny General Rules. To find the secret code in order to enter the system was not a simple matter, but I did it as soon as possible, as I was the best Hacker in the world!

Finally, I understood what I was to do the following day. My computer didn't seem an enemy anymore, on the contrary, I was very thankful as it provided me with a way out. In short, I got soundly asleep.

The following day. In the morning, like every other morning, the sun woke me up with its warm and comforting ray, and I got up completely restored. I was really surprised to find YIM still there, as it was Monday and every Integrated man should have already been at work. But I wasn't worried as I wanted to show him how he was wrong. As usual, I could decide what to do that day. I switched the computer on and entered the Destiny General Rules thanks to the secret code I had found the previous day. The first screen to appear was the Destiny software prompting me to insert the Hacker code number. I inserted the number 1, and chose the current date and time.


The answer was:

ON THE DAY 3.207.231 B.G. AT 10 A.M. THE HACKER No 1 WILL GO AND WALK IN THE COUNTRY

I knew what to do: "As Hacker 1 is supposed to go walking in the country, today I will stay here and read a book for the whole day. Thus, I will be sure my destiny is not Hacker 1's". Indeed, this was my destiny for that day, as I stayed lazily where I was together with my Young Integrated man. When the night was falling, I could go to sleep completely satisfied and happy. The following day, when I woke up, I asked once more to the Destiny General Rules what was Hacker 2 doing at 10 a.m. The answer was the following:

ON THE DAY 3.207.232 B.G. AT 10 A.M. THE HACKER No 2 WILL STAY WHERE HE/SHE IS

At 10 a.m., I started walking. I was very happy with it, because it meant that my destiny could not match Hacker 2 destiny. Similarly, the following day I would have chosen a different destiny from Hacker 3's. In a word, I had found an easy method not to have any of these Hackers' destinies as they were described by the Central Destiny Institute. All of this put me in high spirits and I started mocking the Young Integrated man because of his oddities about my destiny. I even started convincing myself that he had decided to convert himself to the Hacker life, as he didn't go to work and was always rambling about.

I thought such a defeat should have come as a sort of shock to him, but he did not show any sign of disappointment: on the contrary, he seemed quite joyous and I could not understand why. The truth was that he was always thinking about  job, that he loved very much as all Integrated people do. "This work is not so difficult" he thought "the only disadvantage lies in the horrible necessity to spend so much time with these puerile people called Hackers".

And while looking at me, with his mysterious air, I could not guess what was passing in his mind: "How stupid of you, you boast yourself a free human being? But, alas! I know exactly what you are going to do day by day!".

A SERIOUS NOTE. This tale demonstrates that, no matter how powerful a computer can be and how many destinies it can describe, it is always possible to construct a completely new destiny which escapes the computer prevision capability. From a mathematical point of view this is equivalent to the well known claim that the set of totally convergent programs is not effectively enumerable and therefore not decidable. In order to stress the mathematical aspects of these phenomena, let's indicate with 0 the action of "walking", and with 1 the action of "staying". In this way we can call *destiny* every computable function $D : N \times N \rightarrow \{0,1\}$. The intended meaning is that $D(d,t)$ is the action that will be executed the day d , and at a time t . Now, the Big Brother has a program able to compute a function $Dest$ such that $Dest(n,d,t)$ is the action that will be executed by the Hacker with code number n in the day d , and at a time t . In other words, by setting $\pi_n(d,t) = Dest(n,d,t)$ such a program furnishes the destiny function π_n of the Hacker with code number n . YIM's claim is that any possible destiny can be obtained in such a way. In order to confute such a claim, the idea of OSH is to choose a destiny-function $\pi : N \times N \rightarrow \{0,1\}$ different from π_n for any index n . This was done by choosing $\pi(3.207.230+n,10)$ different from $Dest(n, 3.207.230+n,10) = \pi_n(3.207.230+n,10)$ for every index n . Denote by S the set of code numbers of the programs able to compute a destiny. Thus, any "process" associating any number $n \in N$ with an element in S will always leave some element of S . In other words, any computable function $\pi : N \rightarrow S$ is necessarily not surjective. In computer science terms, this means that S is not an effective numerable set (even if obviously numerable) and therefore that S is not decidable. More precisely, the tale shows that S is a productive set, which means that every algorithm trying to enumerate the elements of S fails because it is always possible to construct an element of S that does not belong to that enumeration. The more famous example of productive set is the set of true propositions in arithmetic. Obviously, since the daily choices of OSH derive from an algorithm and therefore by a program π , there is no reason to prevent us to add this program into the Big Brother computer by updating the "*General Program on Destinies*". Indeed, this is the job of YIM .