

Tolva

by Jerry Levy

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The young couple sitting in front of me has that typical look, part nervous anticipation and part naughty child. They are here to pick out traits for the baby they hope to conceive based on an analysis of their own genomes. To some it is a marvelous advance in technology. The crowd that waved signs at me this morning in front of our office building thinks it is sinful and an abomination. Most are members of the Founding Terra Party, more commonly known as Terra-ists.

“Good morning, I am Tim Tolva, senior director of Gnometric Architects. Thank you for coming to see us. We understand that planning a child’s future is exciting, but also that it can be a bit overwhelming. I have some basic information you provided in the application, but I want to get to know you better if you want to talk about why you are here.”

It’s usually the woman who speaks first. She was petite, probably five feet, four inches tall if you subtracted three inches of spiked heels that tick-ticked on the wood parquet floor as she walked into my office. Her heels were red like the handle and stitching on her leather purse. She wore a sun dress with an attractive print of roses in various colors surrounded by green leaves. I keep my office cool in the summer and she adjusted a loosely crocheted red sweater over her shoulders and arms before speaking. “I am Maria Martinez and this is my husband, Marco. We have been married for three years. We want to start a family. We have friends who have used your services. They are very happy with, how should I say?”

Maria looked uncertain of how to continue and turned to her husband. He was a few inches taller and from his bare arms I guessed he knew his way around the weight room. He wore glossy dark brown loafers, chinos with some type of lizard belt, and a fitted robin egg blue shirt with the logo of a health club. He smiled and said, “They are happy with how their children turned out. But, honestly, we are very nervous about this. We are not religious people although our parents are. To be honest, we are very concerned that this will be perceived as something unnatural.”

I nodded my head and looked sympathetic. “That is a very common concern and one that you will have to discuss between you and come to agreement. Let me provide some background. I am a Fellow of the Society of Actuarial Genomics and follow their code of ethics. We do not introduce third-party DNA which is a violation of the Human Genome Act. The legal distinction as decided by the Supreme Court in *Dawe vs. Shad* is that altering the human genome by genetic modification is a serious crime against humanity. However, influencing the sequencing of DNA provided by each parent is a scientific enhancement that attempts to be more selective than what occurs randomly in nature. So designing GMO children can get you locked up, but helping parents select the color of a child’s eyes is fine as long as that color is based on what is already inherent in each parent’s genetic make-up.”

What I did not add is that in a famous dissenting opinion, a Supreme Court justice accurately predicted that unscrupulous companies would proliferate, allowing hopeful parents to genetically engineer their children with borrowed DNA in the hope of creating genius or physical superiority. Every country on the globe has agreed to the same restrictions in theory, but renegade labs exist in areas where supervision is lax. Ethics are pushed aside when fortunes can be made. In elite sports, DNA testing has become more common than drug testing. Even then there are ways of evading the test. The biological parent of a suspected cheater cannot be found or has mysteriously disappeared.

Maria rubbed her palms and her deep brown eyes showed a tangle of skepticism and anxiety. “We do not want a super baby. We want to make sure our child is healthy, has handsome features, but

retains our Hispanic heritage, has our body-type and intelligence, and is happy and well-adjusted.”

I was pleased with Maria’s initial requirements and noted that she put ethnicity at the top of her list. When intelligence and physical prowess are highlighted, that’s usually an early indication that the prospective parents have unrealistic expectations. “We agree that those are all important traits and we can talk about what is possible to influence and what is not. The first priority, however, is to make you comfortable with the process. I handed them our disclaimer. It was a couple paragraphs when the company was first formed. After a few high profile malpractice suits, none of them successful, it has grown to five pages. “Please take some time to read this material and I will answer any questions you may have.”

They looked unsure, but picked up the copies and started reading. I glanced at the picture on my desk of great grandfather Tim Tolva, the founder of this company and my namesake. The actual history of the company goes back to when he was an undergraduate at the University of Illinois. He came to the campus with proficiencies in life sciences and math. The interest in science grew out of his experiences growing up on a dairy farm where our ancestors had emigrated from Scandinavia to post-bellum Minnesota in the late 1800s. But math was always his favorite subject. Some family members say it is a birthright as Tolva is Norse for “prophet of numbers. “

He settled on an actuarial science major that was guided more by necessity than any other consideration. There simply were more recruiters roaming the campus looking for actuarial science students and he needed to find employment as soon as possible after graduation. That’s when the student loans would come due and he was reluctant to ask his aging parents for support. Years of milking cows twice a day with no time off had worn out their bodies. They had recently sold the farm and moved to an assisted living complex in Minneapolis comforted by ersatz children, an extensive collection of Hummel figurines. The couple also collected elephants, which were artfully placed among the smiling statuettes to form miniature parades. They were very patriotic people and attached American flags to the tiny porcelain hands and threaded them through the curled elephant trunks. One of my prized possessions is a photograph of my great grandfather lying behind the figurines, chin cupped between his hands, smiling at the parade. I keep a framed copy on the wall behind my desk.

The science professors appreciated having a math student with experience in actuarial probabilities. He had no problem finding a part-time job as a lab assistant at the Institute for Genomic Science. Professor Henry “Hap” Lloyd was attempting to develop a process for selectively sequencing DNA in lab rats to produce specific markings in the color and pattern of the coats of their offspring.

Tim’s job was working with the stochastic probability models that narrowed the search for the key sequence of DNA for a particular marking. It was a good fit for an actuarial science student. Tim was able to use his classes on Monte Carlo testing to improve the model. He also helped develop a catalog system as DNA sequences for specific markings were identified.

My daydream was interrupted by the prospective father’s hesitant question, “I understand that the results are not guaranteed, but it says here in the opening paragraph that the historical success rate is 90%. That sounds like pretty good odds to me.”

I wondered how happy he would be if the disclaimer was re-worded to state that every tenth time was a flat-out failure. Instead, I gave him the official response. “We are very proud of our

success rate, but please understand that 90% is not 100 so that there is a possibility that your choices may not work out as planned.”

That dampened the mood. For a few moments I caught a glimmer of grim determination in their eyes that softened to hopeful anticipation as they continued to read.

Professor Hap’s initial success rate was a lot lower than 90%. In the early days it was barely 15%. The research indicated that the number of DNA triggers was much more extensive than anticipated and the specific role of each was hard to determine. That’s where Tim’s catalog system had an important role. He looked at the information as if it were data used to predict complex enterprise risks and then developed probabilities for each desired characteristic or marking. The results were staggering and the success ratio soon climbed to 75%.

That creative spark launched a new field of study and career path, actuarial genomics. The technical part of mapping each parent’s genome is handled by the scientists. Once the maps are available and the data collected, the actuarial gnomist develops the combinations of DNA that are most likely to result in success. That information is passed back to the labs where the in vitro fertilization and actual sequencing are processed.

Maria rustled the papers and looked at me. I noticed her earrings were two strands of silvery metal; each formed a spiral with one suspended slightly below the other. They twisted slowly when she moved her head and the effect reminded me of a DNA double helix. The glint of the metal was like a signal to me, a call to action. These are superior people, I thought. Their child will grow up to make a difference.

I looked into her beautiful brown eyes and smiled reassuringly. “Maria, you’re child is going to be exceptional,” I said. “If Marco agrees, Gnometric Architects would be delighted to help you realize your child’s full potential.”

Marco took Maria’s hand and leaned closer. “If we decide to go forward, what is the next step?”

That question is usually an indication that they have made a favorable decision. “First, we will map each of your genomes. Although we have made improvements, it still takes a few months to get an adequate picture of the 25,000 or so genes that make up your chemical identities. While we are waiting for the lab results, I will interview you to determine what attributes you want to pass on to your child. These can be physical as well as behavioral but the latter are much more difficult and therefore more costly.”

Marco put a hand on my desk, a sign that he was challenging my statement. “What exactly do you mean by a behavioral attribute?”

“It’s a new development in our process and you’re right to be skeptical. Through our proprietary research we have determined that some characteristics are inherited. For example, you may decide that you want your child to be more of an extrovert than an introvert, more outgoing than inwardly focused. This assumes of course that one parent already has the DNA that will transfer the desired temperament. I have to caution you, though, that the characteristics come in packages and include a broad array of behaviors. It’s a bit tricky and we want to be careful if you

go down this path so that you fully understand the implications. We have a child psychologist on staff that can help you see how this might affect the child's learning and growth, but it can be somewhat unpredictable."

Marco sat back in his chair with a puzzled expression. "Why would any reasonable parent want to do that? "

"They want their children to succeed. They believe that certain behaviors are essential to achieving that success."

Marco picked up a glass paperweight shaped like an elephant from my desk. He polished the sides with his fingers and peered into the glass as if looking for imperfections. "Like they want a Stepford child or something?"

I sat back in my chair and tented my fingers to look thoughtful. "Not consciously, but a parent's aspirations can be unrealistic and harmful to the child. As part of our process we have the parents complete an attitudinal questionnaire. The results are then used to determine if additional counseling is needed before we will go further in the process. So we look for situations that may be troublesome."

Marco waved one hand in the air dismissively. "You mean you weed out the nut cases like those people outside?"

"We make sure our clients have realistic expectations and will be loving, supportive parents no matter how the child turns out." I looked out the window. The angry crowd waving signs and chanting slogans had moved on. "Some people are quite zealous, some might say fanatical, about passing on their core beliefs to their children. They fervently hope their children will continue to uphold their views and feel it is their legacy to future generations."

"I don't think we want to do anything like that," said Maria. She sat up straight and put her hands on the arms of the chair. Her eye color now seemed like burnished copper. "We want our child to study hard, to go to college and become a professional. But I do not want to create a robot."

"Of course not," I said. "We've just met, but you impress me as well adjusted, responsible people who will make wonderful parents."

Marco seemed impatient and kept crossing one leg and then another, clasping his hands just under the knee and flexing his foot. "Just exactly how does this work? I mean can you give us the big picture of the process?"

I liked Marco's sense of urgency. "I will write up the results of the interview I mentioned earlier, indicate your preferences for physical and behavioral attributes, and send them to the lab. The technicians will determine which attributes you selected are expected to have the highest degree of success based on your genomes and send back a detailed report. We will meet again to discuss the lab report so I can explain what is possible for your child, and what is not."

Marco unclasped his hands to let his raised foot fall loudly to the floor and leaned towards me. "This is sounding very complicated and expensive."

I nodded sympathetically. "It is a very deliberate process so that we can thoroughly discuss the options and opportunities. We do not want you to feel rushed. We understand that making these decisions can be quite traumatic. We purposely have built in some additional time so you can be quite comfortable at the end of the process that you are both in agreement. If one parent has

reservations, we will not go forward. In fact, there is a mandatory session with an experienced counselor who makes a judgment about your commitment and understanding of the risks."

This is the point in the discussion where one or both of the prospective parents have second thoughts. Only 25% make it past this juncture. After a long pause during which they played eye tag, Maria spoke first. "Please continue."

"During this discussion, I will help you decide your final choices for your child's profile based on the lab results and my extensive knowledge of past cases. Because we are dealing in probabilities, I will do my best to guide you toward attributes with the highest degree of success at the lowest cost. By the end of the meeting I am confident that we will have a profile that satisfies both of you and meets your budget."

Most couples that come to see me think the process is like selecting the color of a new car. They don't want to hear technical details. The discussion of "probabilities" is often internalized as "probably won't happen" by the doubtful, or completely discounted by the helicopter parent-in-training who has already decided to take control of their child's life even before conception. Maria held up her chin with quiet resolution, took Marco's hand and nodded at me to continue. I was quite pleased with her determination, but showed no emotion. That would be unprofessional.

"I will, of course, make sure you understand the risks. It's not like you want the baby to have brown eyes and they turn out red. However, it is possible that the child's eye color could be different than hoped for, but only what might have happened if we had not intervened. For example, Marco has blue eyes. So you might agree on brown eyes like Maria and the child is born with blue like Marco's."

"We have given you quite a lot to think about and we do not want to rush you through the process. I suggest you take some time to think about what you have heard and we can reconvene. Would you like to make a follow-up appointment now?"

They did want to make another appointment which gave me great personal satisfaction. I was a bit like a sculptor who has received a shipment of Roma Plastilina clay, the finest in the world, and was eagerly anticipating his next masterpiece. After they left I picked up the glass paperweight that Marco had worried idly like a magic talisman. I wasn't sure if he rubbed it for luck or to ward off demons. Not to worry, I thought, Maria will convince him. Now that they were gone I had to admit to being quite taken with Maria. She would produce beautiful children who might also be quite charismatic. That is the part of my job that was most rewarding, the opportunity to bring exceptional people into the world. Some might go on to be game-changers and I could claim a small but significant part in their development.

The next time I saw Maria and Marco they were smiling and seemed quite confident. Perhaps they had talked to the other parents we gave as references. Whatever the reason, they had the look of a couple who were ready to make some decisions. They had done their homework which helped immensely. I was able to help them reach consensus, with a minimal amount of squabbling, on physical characteristics that for the most part seemed probable based on their genomes. As they talked I had a mental image of their child as an adult, an androgynous blend of the parents who would captivate men and women.

When I asked about behavioral attributes, Maria put a hand on my arm and smiled as if I might take offense at what she was about to say. "There are some things that we think should be left to chance or divine will as some prefer to believe. In any event, we do not think it is right to try and influence our child's personality."

"That's perfectly fine," I told her. "Most of our clients agree with one of those perspectives."

After they left, I entered their choices in the gnotromme program that would be used for the DNA sequencing. This is the part of the process that I really love. I am a rock star on the gnotromme, banging the keyboard while the imaginary crowd yells encouragement. The gnotromme is an instrument, but not musical, and the song it produces has no notes, but is far more beautiful. It is a song of life. Instead of lyrics there is code—the genetic code of the human genome.

I had no doubt that the Martinez baby will be exceptional with physical charisma and superior intellect. There is one other attribute that I was confident the child would have because I programmed it into the genotromme. Based on the model that I have fine-tuned, there is a 95% chance that the Martinez child will grow up to have a conservative viewpoint. I picked up the elephant paperweight, the physical representation of the political party that I was born to love. We need young people of different backgrounds to bolster a group that is far too homogeneous, whose numbers are rapidly declining. I know this is wrong, but I cannot help myself. My mother and father selected certain behavioral characteristics for me. You might say that I was brain-washed at conception. There is a part of me that objects, yet any resistance is overwhelmed by genetic destiny and years of behavioral modification. I am a Tolva, a prophet of numbers.