None So Blind

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It all started when Cletus Jefferson asked himself "Why aren't all blind people geniuses?" Cletus was only 13 at the time, but it was a good question, and he wouldwork on it for 14 more years, and then change the world forever.

Young Jefferson was a polymath, an autodidact, a nerd literally without peer. He hada chemistry set, a microscope, a telescope, and several computers, some of thembought with paper route money. Most of his income was from education, though: teaching his classmates not to draw to inside straights.

Not even nerds, not even nerds who are poker players nonpareil, not even nerdish pokerplayers who can do differential equations in their heads, are immune to Cupid's darts and the sudden storm of testosterone that will accompany those missilesat the age of 13. Cletus knew that he was ugly and his mother dressed himfunny. He was also short and pudgy and could not throw a ball in any direction. None of this bothered him until his ductless glands started cooking upchemicals that weren't in his chemistry set.

So Cletus started combing his hair and wearing clothes that mismatched according

tofashion, but he was still short and pudgy and irregular of feature. He was alsothe youngest person in his school, even though he was a senior--and the onlyblack person there, which was a factor inVirginia in 1994.

Now if love were sensible, if the sexual impulse was ever tempered by logic, you wouldexpect that Cletus, being Cletus, would assess his situation and go off in searchof someone homely. But of course he didn't. He just jingled and clanked downthrough the Pachinko machine of adolescence, being rejected, at first glance, by every Mary and Judy and Jenny and Veronica in Known Space, going from theravishing to the beautiful to the pretty to the cute to the plain to the "greatpersonality," until the irresistable force of statistics brought him finallyinto contact with Amy Linderbaum , who could not reject him at first glancebecause she was blind.

The other kids thought it was more than amusing. Besides being blind, Amy was abouttwice as tall as Cletus and, to be kind, equally irregular of feature. She wasaccompanied by a guide dog who looked remarkably like Cletus, short and blackand pudgy . Everybody was polite to her because she was blind and rich, but shewas a new transfer student and didn't have any actual friends.

So along came Cletus, to whom Cupid had dealt only slings and arrows, and what mightotherwise have been merely an opposites-attract sort of romance became an emotionaland intellectual union that, in the next century, would power a social tsunamithat would irreversibly transform the human condition. But first there wasthe violin.

Her classmates had sensed that Amy was some kind of nerd herself, as classmates will, but they hadn't figured out what kind yet. She was pretty fast with a computer, but you could chalk that up to being blind and actually needing the damnedthing. She wasn't fanatical about it, nor about science or math or

historyor Star Trek or student government, so what the hell kind of nerd was she? It turns out that she was a music nerd, but at the time was too painfully shyto demonstrate it.

All Cletus cared about, initially, was that she lacked those pesky Y-chromosomes anddidn't recoil from him: in the Venn diagram of the human race, she was the onlymember of that particular set. When he found out that she was actually smartas well, having read more books than most of her classmates put together, romancebegan to smolder in a deep and permanent place. That was even before the violin.

Amy liked it that Cletus didn't play with her dog and was straightforward in his curiosityabout what it was like to be blind. She could assess people pretty wellfrom their voices: after one sentence, she knew that he was young, black, shy, nerdly , and not fromVirginia . She could tell from his inflection that eitherhe was unattractive or he thought he was. She was six years older than himand white and twice his size, but otherwise they matched up pretty well, and theystarted keeping company in a big way.

Among the few things that Cletus did not know anything about was music. That the otherkids wasted their time memorizing the words to inane top-40 songs was proofof intellectual dysfunction if not actual lunacy. Furthermore, his parents hadalways been fanatical devotees of opera. A universe bounded on one end by peurilemumblings about unrequited love and on the other end by foreigners screamingin agony was not a universe that Cletus desired to explore. Until Amy pickedup her violin.

They talked constantly. They sat together at lunch and met between classes. When theweather was good, they sat outside before and after school and talked. Amy

askedher chauffeur to please be ten or fifteen minutes late picking her up.

So after about three weeks' worth of the fullness of time, Amy asked Cletus to comeover to her house for dinner. He was a little hesitant, knowing that her parentswere rich, but he was also curious about that life style and, face it, wassmitten enough that he would have walked off a cliff if she asked him nicely. He even used some computer money to buy a nice suit, a symptom that causedhis mother to grope for the Valium .

The dinner at first was awkward. Cletus was bewildered by the arsenal of silverwareand all the different kinds of food that didn't look or taste like food. But he had known it was going to be a test, and he always did well on tests, even when he had to figure out the rules as he went along.

Amy had told him that her father was a self-made millionaire; his fortune had comefrom a set of patents in solid-state electronics. Cletus had therefore spenta Saturday at the University library, first searching patents and then readingselected texts, and he was ready at least for the father. It worked very well. Over soup, the four of them talked about computers. Over the calimari cocktail, Cletus and Mr. Linderbaum had it narrowed down to specific operating systemsand partitioning schemata. With the Beef Wellington, Cletus and "Call-me- Lindy"were talking quantum electrodynamics; with the salad they were onan electron cloud somewhere, and by the time the nuts were served, the two nutsat that end of the table were talking in Boolean algebra while Amy and her motherexchanged knowing sighs and hummed snatches of Gilbert and Sullivan.

By the time they retired to the music room for coffee, Lindy liked Cletus very much, and the feeling was mutual, but Cletus didn't know how much he liked Amy, reallyliked her, until she picked up the violin.

It wasn't a Strad --she was promised one if and when she graduated from

Julliard--but it had cost more than the Lamborghini in the garage, and she was notonly worth it, but equal to it. She picked it up and tuned it quietly while hermother sat down at an electronic keyboard next to the grand piano, set it to "harp," and began the simple arpeggio that a musically sophisticated person wouldrecognize as the introduction to the violin showpiece Méditation from Massenet'sThaïs.

Cletus had turned a deaf ear to opera for all his short life, so he didn't know theback-story of transformation and transcending love behind this intermezzo, buthe did know that his girlfriend had lost her sight at the age of five, and thenext year--the year he was born!--was given her first violin. For thirteen yearsshe had been using it to say what she would not say with her voice, perhapsto see what she could not see with her eyes, and on the deceptively simpleromantic matrix that Massenet built to present the beautiful courtesan Thaïs gloriously reborn as the bride of Christ, Amy forgave her Godless universe fortaking her sight, and praised it for what she was given in return, and she saidthis in a language that even Cletus could understand. He didn't cry very much, never had, but by the last high wavering note he was weeping into his hands, and he knew that if she wanted him, she could have him forever, and oddly enough, considering his age and what eventually happened, he was right.

He would learn to play the violin before he had his first doctorate, and during alifetime of remarkable amity they would play together for ten thousand hours, butall of that would come after the big idea. The big idea--"Why aren't all blindpeople geniuses?"--was planted that very night, but it didn't start to sproutfor another week.

Like most 13-year-olds, Cletus was fascinated by the human body, his own and

others, but his study was more systematic than others' and, atypically, the organthat interested him most was the brain.

The brain isn't very much like a computer, although it doesn't do a bad job, consideringthat it's built by unskilled labor and programmed more by pure chancethan anything else. One thing computers do a lot better than brains, though, is what Cletus and Lindy had been talking about over their little squids intomato sauce: partitioning.

Think of the computer as a big meadow of green pastureland, instead of a little darkbox full of number-clogged things that are expensive to replace, and that pasturelandis presided over by a wise old magic shepherd who is not called a macroprogram. The shepherd stands on a hill and looks out over the pastureland, whichis full of sheep and goats and cows. They aren't all in one homogeneous mass, of course, since the cows would step on the lambs and kids and the goats wouldmake everybody nervous, leaping and butting, so there are partitions of barbedwire that keep all the species separate and happy.

This is a frenetic sort of meadow, though, with cows and goats and sheep coming inand going out all the time, moving at about 3 x 108 meters per second, and if thepartitions were all of the same size it would be a disaster, because sometimesthere are no sheep at all, but lots of cows, who would be jammed in therehip to hip and miserable. But the shepherd, being wise, knows ahead of timehow much space to allot to the various creatures and, being magic, can move barbedwire quickly without hurting himself or the animals. So each partition windsup marking a comfortable-sized space for each use. Your computer does that, too, but instead of barbed wire you see little rectangles or windows or filefolders, depending on your computer's religion.

The brain has its own partitions, in a sense. Cletus knew that certain physical

areasof the brain were associated with certain mental abilities, but it wasn't asimple matter of "music appreciation goes over there; long division in that corner." The brain is mushier than that. For instance, there are pretty well-definedpartitions associated with linguistic functions, areas named after French and German brain people. If one of those areas is destroyed, by stroke or bulletor flung frying pan, the stricken person may lose the ability--reading or speakingor writing coherently--associated with the lost area.

That's interesting, but what is more interesting is that the lost ability sometimescomes back over time. Okay, you say, so the brain grew back--but it doesn't! You're born with all the brain cells you'll ever have. (Ask any child.) What evidently happens is that some other part of the brain has been sitting aroundas a kind of back-up, and after a while the wiring gets rewired and hookedinto that back-up. The afflicted person can say his name, and then his wife'sname, and then "frying pan," and before you know it he's complaining abouthospital food and calling a divorce lawyer.

So on that evidence, it would appear that the brain has a shepherd like the computer-meadowhas, moving partitions around, but alas, no. Most of the time whensome part of the brain ceases to function, that's the end of it. There may beacres and acres of fertile ground lying fallow right next door, but nobody in chargeto make use of it--at least not consistently. The fact that it sometimes didwork is what made Cletus ask "Why aren't all blind people geniuses?"

Of course there have always been great thinkers and writers and composers who wereblind (and in the twentieth century, some painters to whom eyesight was irrelevant), and many of them, like Amy with her violin, felt that their talent wasa compensating gift. Cletus wondered whether there might be a literal truth

tothat, in the micro-anatomy of the brain. It didn't happen every time, or else allblind people would be geniuses. Perhaps it happened occasionally, through a mechanismlike the one that helped people recover from strokes. Perhaps it could bemade to happen.

Cletus had been offered scholarships at both Harvard and MIT, but he opted for Columbia, in order to be near Amy while she was studying at Julliard.Columbia reluctantlyallowed him a triple major in physiology, electrical engineering, andcognitive science, and he surprised everybody who knew him by doing only moderatelywell. The reason, it turned out, was that he was treating undergraduatework as a diversion at best; a necessary evil at worst. He was racingahead of his studies in the areas that were important to him.

If he had paid more attention in trivial classes like history, like philosophy, thingsmight have turned out differently. If he had paid attention to literature hemight have read the story of Pandora.

Our own story now descends into the dark recesses of the brain. For the next ten yearsthe main part of the story, which we will try to ignore after this paragraph, will involve Cletus doing disturbing intellectual tasks like cutting updead brains, learning how to pronounce cholecystokinin , and sawing holes in peoples' skulls and poking around inside with live electrodes.

In the other part of the story, Amy also learned how to pronounce cholecystokinin, for the same reason that Cletus learned how to play the violin.

Their love grew and mellowed, and at the age of 19, between his first doctorate andhis M.D., Cletus paused long enough for them to be married and have a whirlwindhoneymoon inParis , where Cletus divided his time between the musky charmsof his beloved and the sterile cubicles of Institute Marey , learning how squidslearn things, which was by serotonin pushing adenylate cyclase to

catalyzethe synthesis of cyclic adenosine monophosphate in just the right place, but that's actually the main part of the story, which we have been trying toignore, because it gets pretty gruesome.

They returned toNew York , where Cletus spent eight years becoming a pretty good neurosurgeon. In his spare time he tucked away a doctorate in electrical engineering. Things began to converge.

At the age of thirteen, Cletus had noted that the brain used more cells collecting, handling, and storing visual images than it used for all the other sensescombined. "Why aren't all blind people geniuses?" was just a specific caseof the broader assertion, "The brain doesn't know how to make use of what it'sgot." His investigations over the next fourteen years were more subtle and complexthan that initial question and statement, but he did wind up coming rightback around to them.

Because the key to the whole thing was the visual cortex.

When a baritone saxophone player has to transpose sheet music from cello, he (fewwomen are drawn to the instrument) merely pretends that the music is writtenin treble clef rather than bass, eyeballs it up an octave, and then playswithout the octave key pressed down. It's so simple a child could do it, ifa child wanted to play such a huge, ungainly instrument. As his eye dances alongthe little fenceposts of notes, his fingers automatically perform a one-to-onetransformation that is the theoretical equivalent of adding and subtractingoctaves, fifths, and thirds, but all of the actual mental work is donewhen he looks up in the top right corner of the first page and says, "Aw hell.Cello again." Cello parts aren't that interesting to saxophonists.

But the eye is the key, and the visual cortex is the lock. When blind Amy

"sight-reads" for the violin, she has to stop playing and feel the Braille notes withher left hand. (Years of keeping the instrument in place while she does thishas made her neck muscles so strong that she can crack a walnut between her chinand shoulder.) The visual cortex is not involved, of course; she "hears" themute notes of a phrase with her fingertips, temporarily memorizing them, and thenplays them over and over until she can add that phrase to the rest of the piece.

Like most blind musicians, Amy had a very good "ear"; it actually took her less timeto memorize music by listening to it repeatedly, rather than reading, even withfairly complex pieces. (She used Braille nevertheless for serious work, so shecould isolate the composer's intent from the performer's or conductor's phrasingdecisions.)

She didn't really miss being able to sight-read in a conventional way. She wasn'teven sure what it would be like, since she had never seen sheet music beforeshe lost her sight, and in fact had only a vague idea of what a printed pageof writing looked like.

So when her father came to her in her 33rd year and offered to buy her the chanceof a limited gift of sight, she didn't immediately jump at it. It was expensiveand risky and grossly deforming: implanting miniaturized video cameras inher eyesockets and wiring them up to stimulate her dormant optic nerves. What ifit made her only half blind, but also blunted her musical ability? She knew howother people read music, at least in theory, but after a quarter-century of doingwithout the skill, she wasn't sure that it would do much for her. It might makeher tighten up.

Besides, most of her concerts were done as charities to benefit organizations forthe blind or for special education. Her father argued that she would be even

moreeffective in those venues as a recovered blind person. Still she resisted. Cletus said he was cautiously for it. He said he had reviewed the literature and talkedto the Swiss team who had successfully done the implants on dogs and primates. He said he didn't think she would be harmed by it even if the experimentfailed. What he didn't say to Amy or Lindy or anybody was the grisly Frankensteiniantruth: that he was himself behind the experiment; that it had nothingto do with restoring sight; that the little video cameras would never evenbe hooked up. They were just an excuse for surgically removing her eyeballs.

Now a normal person would have extreme feelings about popping out somebody's eyeballsfor the sake of science, and even more extreme feelings on learning thatit was a husband wanting to do it to his wife. Of course Cletus was far frombeing normal in any respect. To his way of thinking, those eyeballs were uselessvestigial appendages that blocked surgical access to the optic nerves, whichwould be his conduits through the brain to the visual cortex. Physical conduits, through which incredibly tiny surgical instruments would be threaded. But we have promised not to investigate that part of the story in detail.

The end result was not grisly at all. Amy finally agreed to go toGeneva , and Cletus and his surgical team (all as skilled as they were unethical) put her throughthree 20-hour days of painstaking but painless microsurgery, and when theytook the bandages off and adjusted a thousand-dollar wig (for they'd had to goin behind as well as through the eyesockets), she actually looked more attractivethan when they had started. That was partly because her actual hair hadalways been a disaster. And now she had glass baby-blues instead of the ratherscary opalescence of her natural eyes. No Buck Rogers TV cameras peering

outat the world.

He told her father that that part of the experiment hadn't worked, and the six Swiss scientists who had been hired for the purpose agreed.

"They're lying," Amy said. "They never intended to restore my sight. The sole intentof the operations was to subvert the normal functions of the visual cortexin such a way as to give me access to the unused parts of my brain." She facedthe sound of her husband's breathing, her blue eyes looking beyond him. "You have succeeded beyond your expectations."

Amy had known this as soon as the fog of drugs from the last operation had lifted. Her mind started making connections, and those connections made connections, and so on at a geometrical rate of growth. By the time they had finishedputting her wig on, she had reconstructed the entire microsurgical procedurefrom her limited readings and conversations with Cletus. She had suggestionsas to improving it, and was eager to go under and submit herself to furtherrefinement.

As to her feelings about Cletus, in less time than it takes to read about it, shehad gone from horror to hate to understanding to renewed love, and finally toan emotional condition beyond the ability of any merely natural language to express. Fortunately, the lovers did have Boolean algebra and propositional calculusat their disposal.

Cletus was one of the few people in the world she could love, or even talk to one-on-one, without condescending. His IQ was so high that its number would be meaningless. Compared to her, though, he was slow, and barely literate. It was nota situation he would tolerate for long.

The rest is history, as they say, and anthropology, as those of us left who read withour eyes must recognize every minute of every day. Cletus was the second

personto have the operation done, and he had to accomplish it while on the run frommedical ethics people and their policemen. There were four the next year, though, and twenty the year after that, and then 2000 and 20,000. Within a decade, people with purely intellectual occupations had no choice, or one choice: lose your eyes or lose your job. By then the " secondsight" operation was totallyautomated, totally safe.

It's still illegal in most countries, including theUnited States , but who is kiddingwhom? If your department chairman is secondsighted and you are not, do youthink you'll get tenure? You can't even hold a conversation with a creature whosesynapses fire six times as fast as yours, with whole encyclopedias of informationinstantly available. You are, like me, an intellectual throwback.

You may have a good reason for it, being a painter, an architect, a naturalist, ora trainer of guide dogs. Maybe you can't come up with the money for the operation, but that's a weak excuse, since it's trivially easy to get a loan againstfuture earnings. Maybe there's a good physical reason for you not to lie downon that table and open your eyes for the last time.

I know Cletus and Amy through music. I was her keyboard professor once, at Julliard, though now of course I'm not smart enough to teach her anything. They cometo hear me play sometimes, in this rundown bar with its band of ageing firstsightmusicians. Our music must seem boring, obvious, but they do us the favorof not joining in.

Amy was an innocent bystander in this sudden evolutionary explosion. And Cletus was, arguably, blinded by love.

The rest of us have to choose which kind of blindness to endure.