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TIME

Millennials: The Me Me Me Generation

By Joel Stein

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I am about to do what old people have done throughout history: call those younger than me lazy, entitled, selfish and shallow. But I have studies! I have statistics! I have quotes from respected academics! Unlike my parents, my grandparents and my great-grandparents, I have proof.

Here's the cold, hard data: The incidence of narcissistic personality disorder is nearly three times as high for people in their 20s as for the generation that's now 65 or older, according to the National Institutes of Health; 58% more college students scored higher on a narcissism scale in 2009 than in 1982. Millennials got so many participation trophies growing up that a recent study showed that 40% believe they should be promoted every two years, regardless of performance. They are fame-obsessed: three times as many middle school girls want to grow up to be a personal assistant to a famous person as want to be a Senator, according to a 2007 survey; four times as many would pick the assistant job over CEO of a major corporation. They're so convinced of their own greatness that the National Study of Youth and Religion found the guiding morality of 60% of millennials in any situation is that they'll just be able to feel what's right. Their development is stunted: more people ages 18 to 29 live with their parents than with a spouse, according to the 2012 Clark University Poll of Emerging Adults. And they are lazy. In 1992, the nonprofit Families and Work Institute reported that 80% of people under 23 wanted to one day have a job with greater responsibility; 10 years later, only 60% did.

(Poll: Who's the Most Influential Millennial?)

Millennials consist, depending on whom you ask, of people born from 1980 to 2000. To put it more simply for them, since they grew up not having to do a lot of math in their heads, thanks to computers, the group is made up mostly of teens and 20-somethings. At 80 million strong, they are the biggest age grouping in American history. Each country's millennials are different, but because of globalization, social media, the

exporting of Western culture and the speed of change, millennials worldwide are more similar to one another than to older generations within their nations. Even in China, where family history is more important than any individual, the Internet, urbanization and the one-child policy have created a generation as overconfident and self-involved as the Western one. And these aren't just rich-kid problems: poor millennials have even higher rates of narcissism, materialism and technology addiction in their ghetto-fabulous lives.

They are the most threatening and exciting generation since the baby boomers brought about social revolution, not because they're trying to take over the Establishment but because they're growing up without one. The Industrial Revolution made individuals far more powerful--they could move to a city, start a business, read and form organizations. The information revolution has further empowered individuals by handing them the technology to compete against huge organizations: hackers vs. corporations, bloggers vs. newspapers, terrorists vs. nation-states, YouTube directors vs. studios, app-makers vs. entire industries. Millennials don't need us. That's why we're scared of them.

Complete Millennial Coverage: The Me Me Me Generation

In the U.S., millennials are the children of baby boomers, who are also known as the Me Generation, who then produced the Me Me Me Generation, whose selfishness technology has only exacerbated. Whereas in the 1950s families displayed a wedding photo, a school photo and maybe a military photo in their homes, the average middle-class American family today walks amid 85 pictures of themselves and their pets. Millennials have come of age in the era of the quantified self, recording their daily steps on FitBit, their

whereabouts every hour of every day on PlaceMe and their genetic data on 23 and Me. They have less civic engagement and lower political participation than any previous group. This is a generation that would have made Walt Whitman wonder if maybe they should try singing a song of someone else.

They got this way partly because, in the 1970s, people wanted to improve kids' chances of success by instilling self-esteem. It turns out that self-esteem is great for getting a job or hooking up at a bar but not so great for keeping a job or a relationship. "It was an honest mistake," says Roy Baumeister, a psychology professor at Florida State University and the editor of Self-Esteem: The Puzzle of Low Self-Regard. "The early findings showed that, indeed, kids with high self-esteem did better in school and were less likely to be in various kinds of trouble. It's just that we've learned later that self-esteem is a result, not a cause." The problem is that when people try to boost self-esteem, they accidentally boost narcissism instead. "Just tell your kids you love them. It's a better message," says Jean Twenge, a psychology professor at San Diego State University, who wrote Generation Me and The Narcissism Epidemic. "When they're little it seems cute to tell them they're special or a princess or a rock star or whatever their T-shirt says. When they're 14 it's no longer cute." All that self-esteem leads them to be disappointed when the world refuses to affirm how great they know they are. "This generation has the highest likelihood of having unmet expectations with respect to their careers and the lowest levels of satisfaction with their careers at the stage that they're at," says Sean Lyons, co-editor of Managing the New Workforce: International Perspectives on the Millennial Generation. "It is sort of a crisis of unmet expectations."

(Income Inequality: It's Not Just for Older People Anymore)

What millennials are most famous for besides narcissism is its effect: entitlement. If you want to sell seminars to middle managers, make them about how to deal with young employees who e-mail the CEO directly and beg off projects they find boring. English teacher David McCullough Jr.'s address last year to Wellesley High School's graduating class, a 12-minute reality check titled "You Are Not Special," has nearly 2 million hits on YouTube. "Climb the mountain so you can see the world, not so the world can see you," McCullough told the graduates. He says nearly all the response to the video has been positive, especially from millennials themselves; the video has 57 likes for every dislike.

Though they're cocky about their place in the world, millennials are also stunted, having prolonged a life stage between teenager and adult that this magazine once called twixters and will now use once again in an attempt to get that term to catch on. The idea of the teenager started in the 1920s; in 1910, only a tiny percentage of kids went to high school, so most people's social interactions were with adults in their family or in the workplace. Now that cell phones allow kids to socialize at every hour--they send and receive an average of 88 texts a day, according to Pew--they're living under the constant influence of their friends. "Peer pressure is anti-intellectual. It is anti-historical. It is anti-eloquence," says Mark Bauerlein, an English professor at Emory, who wrote The Dumbest Generation: How the Digital Age Stupefies Young Americans and Jeopardizes Our Future (Or, Don't Trust Anyone Under 30). "Never before in history have

people been able to grow up and reach age 23 so dominated by peers. To develop intellectually you've got to relate to older people, older things: 17-year-olds never grow up if they're just hanging around other 17-year-olds." Of all the objections to Obamacare, not a lot of people argued against parents' need to cover their kids' health insurance until they're 26.

(MORE: I'm Not on Facebook and I Don't Regret It—Yet)

Millennials are interacting all day but almost entirely through a screen. You've seen them at bars, sitting next to one another and texting. They might look calm, but they're deeply anxious about missing out on something better. Seventy percent of them check their phones every hour, and many experience phantom pocket-vibration syndrome. "They're doing a behavior to reduce their anxiety," says Larry Rosen, a psychology professor at California State University at Dominguez Hills and the author of iDisorder. That constant search for a hit of dopamine ("Someone liked my status update!") reduces creativity. From 1966, when the Torrance Tests of Creative Thinking were first administered, through the mid-1980s, creativity scores in children increased. Then they dropped, falling sharply in 1998. Scores on tests of empathy similarly fell sharply, starting in 2000, likely because of both a lack of face-to-face time and higher degrees of narcissism. Not only do millennials lack the kind of empathy that allows them to feel concerned for others, but they also have trouble even intellectually understanding others' points of view.

What they do understand is how to turn themselves into brands, with "friend" and "follower" tallies that serve as sales figures. As with most sales, positivity and confidence work best. "People are inflating themselves like balloons on Facebook," says W. Keith Campbell, a psychology professor at the University of Georgia, who has written three books about generational increases in narcissism (including When You Love a Man Who Loves Himself). When everyone is telling you about their vacations, parties and promotions, you start to embellish your own life to keep up. If you do this well enough on Instagram, YouTube and Twitter, you can become a microcelebrity.

Millennials grew up watching reality-TV shows, most of which are basically documentaries about narcissists. Now they have trained themselves to be reality-TV-ready. "Most people never define who they are as a personality type until their 30s. So for people to be defining who they are at the age of 14 is almost a huge evolutionary jump," says casting director Doron Ofir, who auditioned participants for Jersey Shore, Millionaire Matchmaker, A Shot at Love and RuPaul's Drag Race, among other shows. "Do you follow me on Twitter?" he asks at the end of the interview. "Oh, you should. I'm fun. I hope that one day they provide an Emmy for casting of reality shows--because, you know, I'd assume I'm a shoo-in. I would like that gold statue. And then I will take a photo of it, and then I will Instagram it." Ofir is 41, but he has clearly spent a lot of time around millennials.

I have gone just about as far as I can in an article without talking about myself. So first, yes, I'm aware that I started this piece--in which I complain about millennials' narcissism--with the word I. I know that

this magazine, which for decades did not print bylines, started putting authors' names on the cover regularly in 2004 and that one of the first names was mine. As I mocked reality shows in the previous paragraph, I kept thinking about the fact that I got to the final round for 1995's Real World: London. I know my number of Twitter followers far better than the tally on my car's odometer; although Facebook has a strictly enforced limit of 5,000 friends, I somehow have 5,079. It was impossible not to remember, the whole time I was accusing millennials of being lazy, that I was supposed to finish this article nearly a year ago.

(MORE: Young Americans Won't Pay for TV. Will They Ever?)

I moved home for the first six months after college. When I got hired at Time, my co-workers hated me for cozying up to the editor of the magazine. I talk to one of my parents every other day and depend on my dad for financial advice. It's highly possible that I'm a particularly lame 41-year-old, but still, none of these traits are new to millennials; they've been around at least since the Reformation, when Martin Luther told Christians they didn't need the church to talk to God, and became more pronounced at the end of the 18th century in the Romantic period, when artists stopped using their work to celebrate God and started using it to express themselves. In 1979, Christopher Lasch wrote in The Culture of Narcissism, "The media give substance to, and thus intensify, narcissistic dreams of fame and glory, encourage common people to identify themselves with the stars and to hate the 'herd,' and make it more and more difficult for them to accept the banality of everyday existence." I checked my e-mail three times during that sentence.

So while the entire first half of this article is absolutely true (I had data!), millennials' self-involvement is more a continuation of a trend than a revolutionary break from previous generations. They're not a new species; they've just mutated to adapt to their environment.

For example, millennials' perceived entitlement isn't a result of overprotection but an adaptation to a world of abundance. "For almost all of human history, almost everyone was a small-scale farmer. And then people were farmers and factory workers. Nobody gets very much fulfillment from either of those things," says Jeffrey Arnett, a psychology professor at Clark University, who invented the phrase emerging adulthood, which people foolishly use instead of the catchy twixters. Twixters put off life choices because they can choose from a huge array of career options, some of which, like jobs in social media, didn't exist 10 years ago. What idiot would try to work her way up at a company when she's going to have an average of seven jobs before age 26? Because of online dating, Facebook circles and the ability to connect with people internationally, they no longer have to marry someone from their high school class or even their home country. Because life expectancy is increasing so rapidly and technology allows women to get pregnant in their 40s, they're more free to postpone big decisions. The median age for an American woman's first marriage went from 20.6 in 1967 to 26.9 in 2011.

(Pete Cashmore: Top 10 Things My Generation Likes)

And while all that choice might end in disappointment, it's a lottery worth playing. "I had one grandfather fight in the Pacific and one in the Atlantic theater. One became a pilot; one became a doctor. When you grow up during the Great Depression and fight off the Nazis, you want safety and stability," says Tucker Max, 37, who set an example for millennials when instead of using his Duke law degree to practice law, he took his blog rants about his drunken, lecherous adventures and turned them into a mega-best-selling book, I Hope They Serve Beer in Hell, that he got an independent publisher to print. "Everyone told you that everyone above you had to s--- on you before you got to s--- on people below you. And millennials didn't want to do that."

In fact, a lot of what counts as typical millennial behavior is how rich kids have always behaved. The Internet has democratized opportunity for many young people, giving them access and information that once belonged mostly to the wealthy. When I was growing up in the 1980s, I thought I would be a lawyer, since that was the best option I knew about for people who sucked at math in my middle-class suburb, but I saw a lot more options once I got to Stanford. "Previously if you wanted to be a writer but didn't know anyone who is in publishing, it was just, Well, I won't write. But now it's, Wait, I know someone who knows someone," says Jane Buckingham, who studies workplace changes as founder of Trendera, a consumer-insights firm. "I hear story after story of people high up in an organization saying, 'Well, this person just e-mailed me and asked me for an hour of my time, and for whatever reason I gave it to them.' So the great thing is that they do feel entitled to all of this, so they'll be more innovative and more willing to try new things and they'll do all this cool stuff."

Because millennials don't respect authority, they also don't resent it. That's why they're the first teens who aren't rebelling. They're not even sullen. "I grew up watching Peanuts, where you didn't even see the parents. They were that 'Wah-wah' voice. And MTV was always a parent-free zone," says MTV president Stephen Friedman, 43, who now includes parents in nearly all the channel's reality shows. "One of our research studies early on said that a lot of this audience outsources their superego to their parents. The most simple decision of should I do this or should I do that--our audience will check in with their parents." A 2012 Google Chrome ad shows a college student video-chatting all the details of her life to her dad. "I am very used to seeing things where the cliché is the parent doesn't understand. Most of my friends, their parents are on social and they're following them or sharing stuff with them," says Jessica Brillhart, a filmmaker at Google's Creative Lab, who worked on the commercial. It's hard to hate your parents when they also listen to rap and watch Jon Stewart.

In fact, many parents of millennials would proudly call their child-rearing style peer-enting. "I negotiate daily with my son who is 13. Maybe all that coddling has paid off in these parent-child relationships," says Jon Murray, who created The Real World and other reality shows, including Keeping Up With the Kardashians. He says that seeing regular people celebrated on TV gives millennials confidence: "They're going after what they want. It can be a little irritating that they want to be on the next rung so quickly. Maybe I'm partly responsible for it. I like this generation, so I have no issues with that."

Kim Kardashian, who represents to nonmillennials all that is wrong with her generation, readily admits that she has no particular talent. But she also knows why she appeals to her peers. "They like that I share a lot of myself and that I've always been honest about the way I live my life," she says. "They want relationships with businesses and celebrities. Gen X was kept at arm's length from businesses and celebrity." When you're no longer cowed by power, you are going to like what a friend tells you about far more than what an ad campaign does, even if that friend is a celebrity trying to make money and that friendship is just a reply to one tweet.

While every millennial might seem like an oversharing Kardashian, posting vacation photos on Facebook is actually less obnoxious than 1960s couples' trapping friends in their houses to watch their terrible vacation slide shows. "Can you imagine if the boomers had YouTube, how narcissistic they would've seemed?" asks Scott Hess, senior vice president of human intelligence for SparkSMG, whose TedX speech, "Millennials: Who They Are and Why We Hate Them," advised companies on marketing to youth. "Can you imagine how many frickin' Instagrams of people playing in the mud during Woodstock we would've seen? I think in many ways you're blaming millennials for the technology that happens to exist right now." Yes, they check their phones during class, but think about how long you can stand in line without looking at your phone. Now imagine being used to that technology your whole life and having to sit through algebra.

Companies are starting to adjust not just to millennials' habits but also to their atmospheric expectations. Nearly a quarter of DreamWorks' 2,200 employees are under 30, and the studio has a 96% retention rate. Dan Satterthwaite, who runs the studio's human-relations department and has been in the field for about 23 years, says Maslow's hierarchy of needs makes it clear that a company can't just provide money anymore but also has to deliver self-actualization. During work hours at DreamWorks, you can take classes in photography, sculpting, painting, cinematography and karate. When one employee explained that jujitsu is totally different from karate, Satterthwaite was shocked at his boldness, then added a jujitsu class.

Millennials are able to use their leverage to negotiate much better contracts with the traditional institutions they do still join. Although the armed forces had to lower the physical standards for recruits and make boot camp less intensive, Gary Stiteler, who has been an Army recruiter for about 15 years, is otherwise more impressed with millennials than any other group he's worked with. "The generation that we enlisted when I first started recruiting was sort of do, do, do. This generation is think, think about it before you do it," he says. "This generation is three to four steps ahead. They're coming in saying, 'I want to do this, then when I'm done with this, I want to do this.'"

Here's something even all the psychologists who fret over their narcissism studies agree about: millennials are nice. They have none of that David Letterman irony and Gen X ennui. "The positivism has surprised me. The Internet was always 50-50 positive and negative. And now it's 90-10," says Shane Smith, the 43-year-old CEO of Vice, which adjusted from being a Gen X company in print to a millennial company once it started posting videos online, which are viewed by a much younger audience. Millennials are more accepting of differences, not just among gays, women and minorities but in everyone. "There are many,

many subcultures, and you can dip into them and search around. I prefer that to you're either supermainstream or a riot grrrl," says Tavi Gevinson, a 17-year-old who runs Rookie, an online fashion magazine, from her bedroom when she's not at school. It's hard, in other words, to join the counterculture when there's no culture. "There's not this us-vs.-them thing now. Maybe that's why millennials don't rebel," she says.

There may even be the beginning of a reaction against all the constant self-promotion. Evan Spiegel, 22, co-founder of Snapchat, an app that allows people to send photos, video and text that are permanently erased after 10 seconds or less, argues that it's become too exhausting for millennials to front a perfect life on social media. "We're trying to create a place where you can be in sweatpants, sitting eating cereal on a Friday night, and that's O.K.," he says.

But if you need the ultimate proof that millennials could be a great force for positive change, know this: Tom Brokaw, champion of the Greatest Generation, loves millennials. He calls them the Wary Generation, and he thinks their cautiousness in life decisions is a smart response to their world. "Their great mantra has been: Challenge convention. Find new and better ways of doing things. And so that ethos transcends the wonky people who are inventing new apps and embraces the whole economy," he says. The generation that experienced Monica Lewinsky's dress, 9/11, the longest wars in U.S. history, the Great Recession and an Arab Spring that looks at best like a late winter is nevertheless optimistic about its own personal chances of success. Sure, that might be delusional, but it's got to lead to better results than wearing flannel, complaining and making indie movies about it.

So here's a more rounded picture of millennials than the one I started with. All of which I also have data for. They're earnest and optimistic. They embrace the system. They are pragmatic idealists, tinkerers more than dreamers, life hackers. Their world is so flat that they have no leaders, which is why revolutions from Occupy Wall Street to Tahrir Square have even less chance than previous rebellions. They want constant approval--they post photos from the dressing room as they try on clothes. They have massive fear of missing out and have an acronym for everything (including FOMO). They're celebrity obsessed but don't respectfully idolize celebrities from a distance. (Thus Us magazine's "They're just like us!" which consists of paparazzi shots of famous people doing everyday things.) They're not into going to church, even though they believe in God, because they don't identify with big institutions; one-third of adults under 30, the highest percentage ever, are religiously unaffiliated. They want new experiences, which are more important to them than material goods. They are cool and reserved and not all that passionate. They are informed but inactive: they hate Joseph Kony but aren't going to do anything about Joseph Kony. They are probusiness. They're financially responsible; although student loans have hit record highs, they have less household and credit-card debt than any previous generation on record--which, admittedly, isn't that hard when you're living at home and using your parents' credit card. They love their phones but hate talking on them.

They are not only the biggest generation we've ever known but maybe the last large birth grouping that will be easy to generalize about. There are already microgenerations within the millennial group,

launching as often as new iPhones, depending on whether you learned to type before Facebook, Twitter, iPads or Snapchat. Those rising microgenerations are all horrifying the ones right above them, who are their siblings. And the group after millennials is likely to be even more empowered. They're already so comfortable in front of the camera that the average American 1-year-old has more images of himself than a 17th century French king.

So, yes, we have all that data about narcissism and laziness and entitlement. But a generation's greatness isn't determined by data; it's determined by how they react to the challenges that befall them. And, just as important, by how we react to them. Whether you think millennials are the new greatest generation of optimistic entrepreneurs or a group of 80 million people about to implode in a dwarf star of tears when their expectations are unmet depends largely on how you view change. Me, I choose to believe in the children. God knows they do.

The original version of this article said that Jean Twenge is a professor at the University of San Diego. Twenge is a professor at San Diego State University.

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Toast in the Machine
The robots are coming! (For real.) The robots are coming! (And they mean business.) The robots are coming! (Are you ready?)

by Chuck Klosterman Jun 01 '04

Like most middle-class white people who will never be shot at, I'm fascinated by the hyperdesperate, darkly realistic, paper-chasing world of postmodern hip-hop. I've learned a lot about life from watching MTV Jams; my understanding of the African-American experience comes from street-hardened artists who have looked into the mouth of the lion and scoffed like soldiers. These are people like Sean Carter ("Jay-Z"), Terius Gray ("Juvenile"), Nasir Jones ("Nas"), and Leslie Pridgen ("Freeway"). And, to a lesser extent, Will Smith ("the Fresh Prince of Bel-Air").

Smith is an intriguing figure, sort of. Unlike his peers, he has evolved with the culture that spawned him. Though once merely peeved by his mother's fashion directives (1988's "Parents Just Don't Understand"), he has grown into a mature artist who's willing to confront America's single greatest threat: killer robots.
This summer, Smith will star in I, Robot , a cinematic interpretation of nine stories by Isaac Asimov. When I was in the sixth grade, Asimov struck me as a profoundly compelling figure, and I delivered a stirring oral book report on I, Robot . The collection was punctuated by Asimov's now famous "Laws of Robotics":

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey orders given it by human beings, except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.
4. Do not talk about Fight Club.

Now, I don't think I'm giving anything away by telling you that the robots in I, Robot find a loophole in those principles, and they proceed to slowly fuck us over. I, Robot was published in 1950, but writers (or at least muttonchopped Isaac) were already terrified about mankind's bellicose relationship with technology. This is a relationship we continue to fear. If we have learned only one thing from film, literature, and rock music, it is this: Humans will eventually go to war against the machines. There is no way to avoid this. But you know what? If we somehow manage to lose this showdown, we really have no excuse. Because I can't imagine any war we've spent more time worrying about.

The Terminator trilogy is about a war against the machines; so is the Matrix trilogy. So is Maximum Overdrive , although that movie also implied that robots enjoy the music of AC/DC. I don't think the Radiohead album OK Computer is specifically about computers trying to kill us, but it certainly suggests that computers are not "okay." 2001: A Space Odyssey employs elements of robot hysteria, as do the plotlines of roughly 2,001 video games. I suspect Blade Runner might have touched on this topic, but I honestly can't remember. (I was too busy pretending it didn't suck.) There is even a Deutsch electronica band called Lights of Euphoria; its supposed masterpiece is an album titled Krieg Gegen die Maschinen , which literally translates as "War Against the Machines." This means that even European techno fans are aware of this phenomenon, and those idiots generally aren't aware of anything (except who in the room might have ketamine).

I'm not sure how we all became convinced that machines intend to dominate us. As I type this very column, I can see my toaster, and I'll be honest: I'm not nervous. As far as I can tell, it poses no threat. My relationship with my toaster is delicious, but completely one-sided. If I can be considered the Michael Jordan of My Apartment (and I think I can), my toaster is LaBradford Smith. I'm never concerned that my toaster will find a way to poison me, or that it will foster a false sense of security before electrocuting me in the shower, or that it will align itself politically with my microwave. I even played "Dirty Deeds Done Dirt Cheap" in my kitchen just to see if my toaster would become self-aware and go for my jugular; its reaction was negligible. Machines have no grit.

It appears we've spent half a century preparing for a war against a potential foe who—thus far—has been nothing but civil to us. It's almost as if we've made a bunch of movies that warn about a coming conflict with the Netherlands. In fact, there isn't even any evidence that robots could kick our ass if they wanted to . In March, a shadowy military organization called DARPA (the Defense Advanced Research Projects Agency) challenged engineers to build a driverless, autonomous vehicle that could traverse a 142-mile course in the Mojave Desert; the contest's winner was promised a cash prize of $1 million. And you know who won? Nobody. Nobody's robot SUV could make it farther than 7.4 miles. Even with the aid of GPS, robots are completely moronic. Why do we think they'll be able to construct a

matrix if they can't even drive to Vegas?

I suspect all these dystopic man-versusmachine scenarios are grounded in the fact that technology is legitimately alienating. The rise of computers (and robots, and iPods, and nanomachines that hope to turn the world into sentient "gray goo") has certainly made life easier, but it's also accelerated depression. Case in point: If this were 1904, you would not be reading this magazine; you would be chopping wood or churning butter or watching one of your thirteen children die from crib death. Your life would be horrible, but it would have purpose. It would have clarity. Machines allow humans the privilege of existential anxiety. Machines provide us with the extra time to worry about the status of our careers, and/or the context of our sexual relationships, and/or what it means to be alive. Unconsciously, we hate technology. We hate the way it replaces visceral experience with self-absorption. And the only way we can reconcile that hatred is by pretending machines hate us, too.

It is human nature to personify anything we don't understand: God, animals, hurricanes, mountain ranges, jet skis, strippers, et cetera. We deal with inanimate objects by assigning them the human qualities we assume they would have if they were exactly like us. Consequently, we think of machines as our slaves, and we like to pretend that these mechanized slaves will eventually attempt a hostile takeover.

The truth, of course, is that we are the slaves; the machines became our masters through a bloodless coup that began during the industrial revolution. (In fact, this is kind of what I, Robot is about, although I assume the Will Smith version will not make that clear.) By now, I think many Americans are aware of that reality. I think any smarter-than-average person already concedes that a) we've lost control of technology and b) there's nothing we can do about it.

But that's defeatist. Openly embracing that reality would make the process of living even darker than it already is; we'd all move to rural Montana and become Unabombers. We need to remain optimistic. And how do we do that? By preparing ourselves for a futuristic war against intelligent, man-hating cyborgs. As long as we dream of a war that has not yet happened, we are able to believe it's a war we have not yet lost.

But hey—maybe I'm wrong about all this. Perhaps we humans are still in command, and perhaps there really will be a conventional robot war in the not-so-distant future. If so, let's roll. I'm ready. My toaster will never be the boss of me. Get ready to make me some Pop-Tarts, bitch.

———————————

Q+A: K. Eric Drexler, the father of nanotechnology

Are you like me? Do you sometimes worry that tiny machines will consume the earth in a sinister attempt to destroy our society? If so, the scenario you fear hinges on the idea of "gray goo," a theory proposed by a futurist named K. Eric Drexler. I called Drexler at his desk in Los Altos, California, to figure out how anxious I need to be. —C. K.

ESQ: What is gray goo?

KED [sighs]: Gray goo is the hypothetical danger that would arise if somebody built a machine that could create copies of itself using naturally occurring materials and unleashed it on society. Now, this is not easy. Someone would have to solve a very complicated engineering problem, build the machine, and then turn it loose. It would then—theoretically—turn everything in the world into a mass of nanomachines.

ESQ: Why would anyone do this?
KED : Beats me.

ESQ: I get the impression that this is something I don't need to worry about.
KED : This is the danger of alliteration. For example, I think half of the people who talk about the "digital divide" do so because it has an alliterative name; if you called it the "gap in the availability of computing," no one would care. People like the term "gray goo" because it has two g 's. There's nothing gray or gooey about it. And this is all my fault, really.

ESQ: Do you regret creating the term "gray goo"?
KED : It is pretty silly.

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LONDON-- Before he changed into his racing legs, South African double-amputee sprinter Oscar Pistorius made sure to greet each and every photographer who showed up to shoot his training session last Sunday at St. Mary's University College in Twickenham, far in the south of London. At the very same time that one of his PR reps was insisting that he wouldn't be talking at all today, Pistorius was busily talking to everyone he could see. He greeted every onlooker with a handshake, going back when he missed one person. "I think I forgot to greet you," he said softly, and extended his hand. The display prompted a British photographer to remark: "I've never come across that. He doesn't need any PR, does he?" And it's all the more remarkable considering that such manners flowed from a man who is an A-list celebrity in South Africa. Pistorius has owned white tigers and racehorses, and the gossip pages recently reported that he's dating a Russian supermodel. (Two days ago, a zealous fan showed him a photo of "Pistorius 2012" tattooed on her arm.)

That Pistorius is charismatic is beyond questioning. Nor is there any doubt of the magnitude of the inspiration he engenders. Pistorius's Twitter picture is a shot of him -- in his crescent, carbon-fiber Cheetah Flex-Feet -- leaning down and jogging beside a little blonde girl whose own Cheetah legs are protruding, adorably, from beneath her tiny yellow sun dress. Or how about this scene, which sounds like the Paralympic variation of a bad barroom joke: guy with no lower arms or legs walks up to a guy born with no fibulas and starts asking about sprinting. But that actually happened, last year, the day before Pistorius ran in a Diamond League meet in New York City. Pistorius was gracious and patient in giving advice to the man, Andre Lampkin, a 23-year-old former football player who had recently lost parts of all four limbs to bacterial meningitis, and was still extremely wobbly on his new Cheetahs.

When the "Blade Runner" steps onto the track Saturday, it will be as South Africa's top quarter-miler of 2012 and the first double-amputee (and first male Paralympian of any sort) to compete in the Olympics. And even though Pistorius – who had both lower legs amputated before he was a year old -- is a veritable fount of inspiration, questions about his carbon fiber racing legs have followed him to London. Just before the Games began, Michael Johnson -- Pistorius's friend and the 400-meter world record holder -- said that Pistorius should not be competing against able-bodied runners.

"My position is that because we don't know for sure whether he gets an advantage from the prosthetics that he wears, it is unfair to the able-bodied competitors," Johnson said. "That is hard for a lot of people to take and to understand when you are talking about an athlete and an individual who has a disability."

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The questions started almost as soon as Pistorius began racing, even before he earned the moniker, "fastest man on no legs." In the summer of 2003, Pistorius injured his knee playing rugby for Pretoria Boys High School and took up track as a form of rehabilitation. The following summer, at age 17, and just eight months into his track training, Pistorius donned Cheetahs for the 2004 Athens Paralympics. He won gold in the 200 -- an event that combines single- and double-leg amputees -- shattering the world record. According to a former U.S. Paralympics official, single-leg amputees, feeling that

they were at a disadvantage against Pistorius, began to complain.

In 2007, with the blessing of the IAAF -- the governing body for track and field -- Pistorius competed in the 400 in a Golden League meet in Rome, against professional sprinters with intact limbs. It was not only a history-making event, but also an athletic success. Pistorius came from dead last in the final 70 meters to finish second in his heat. But the way he ran the race only intensified the questions. Nearly all elite quarter-milers burst out of the blocks and spend the race trying to slow down as slowly as possible, but slow down they do. Pistorius "negative-split" the race in Rome, meaning that he ran the second 200 faster than the first, an unheard of strategy for elite quarter-milers. (Pistorius, though, no longer negative-splits his races.)

Among track aficionados, certain statistical comparisons have raised eyebrows: Pistorius's 100- and 200-meter bests are similar to those of U.S. sprinter Allyson Felix, but he is 4.5 seconds faster than her in the 400. As Pistorius progressed to where he could compete for a spot on South Africa's national team, another South African 400 runner who was also fighting for a spot, Sibusiso Sishi, gave his opinion: "I don't mind racing [Pistorius], but I'm still a bit skeptical about his legs because they are man-made. They are carbon fiber, which means they are nice and light. I would just like him to do the tests so at least we know where we stand."

With Pistorius knocking on the Olympic-qualifying door, in late 2007, the IAAF asked Peter Br�ggemann of the German Sport University to test Pistorius and his blades. Br�ggemann subsequently reported to the IAAF that the Cheetah blades allow Pistorius to expend less energy than other runners, and, as result, Pistorius was banned from able-bodied competition.

Pistorius appealed the ban to the Court of Arbitration for Sport (CAS). He went for more testing, this time in a lab at Rice University run by physiologist Peter Weyand. The data from that testing found that Pistorius fatigued at a normal rate. Not to mention that energy efficiency has about as much to do with sprint performance as fuel efficiency does with drag-racing performance. University of Colorado physiologist Rodger Kram and Hugh Herr, a professor at MIT and world-renowned designer of prosthetics -- both members of the scientific team that did the second analysis of Pistorius -- presented the data to the CAS.

Herr, whose own designs have been commercialized by �ssur, the company that makes the Cheetah Flex-Feet, has been Pistorius's most vigorous supporter. And his life narrative bears an uncanny resemblance to that of Pistorius. Herr was a mountain-climbing prodigy, known as the "Boy Wonder," until he suffered frostbite on a climbing trip as a 17-year-old in 1982 and lost both lower legs. Rather than accept the end of his climbing career, Herr immediately began designing climbing-specific prostheses that could change length mid-ascent and find purchase on nooks too small for human feet. And, almost as quickly, some of Herr's competitors who saw a potentially unfair advantage called for him to be disqualified from competitive climbing.

In May of 2008, based on Kram and Herr's testimony and the data the team collected in Weyand's lab, Pistorius was reinstated. The CAS ruling explicitly noted that though the prostheses give no energetic advantage relevant to sprinting, future scientific findings could still show that the Cheetah Flex-Feet give Pistorius a mechanical advantage. Eighteen months later, Weyand and Matthew Bundle, a biomechanist at Montana and one of the other scientists who did the testing that got Pistorius reinstated, came out and said that the Cheetahs do just that.

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"It was dead obvious as soon as [Bundle and I] saw the data that Oscar has an advantage," says Peter Weyand, who now directs the SMU Locomotor Performance Laboratory. "We haven't wavered from that interpretation since."

Because the CAS hearing examined specifically -- and only -- the IAAF's previous claims regarding Pistorius, it was not until the following year, when the scientific team published its full findings in the *Journal of Applied Physiology*, that the researchers who helped Pistorius earn the right to compete split into groups, with Weyand and Bundle contending that

Pistorius has a massive advantage. To understand Weyand's reasoning, it helps to know a bit about the mechanics of sprinting.

All sprinters run essentially the same way. Sure, Usain Bolt is 6-foot-5 and flies down the track smirking, while Tyson Gay is 5-11 and runs with his eyelids peeled back. But biomechanically they are doing the same thing. At top speed, each piston pump of a sprinter's leg slams a foot down on the ground for less than a 10th of a second. In that instant -- much briefer than the blink of any eye -- the sprinter applies enough force to lift his body back into the air for slightly more than a 10th of a second. That's how long he needs to bring the other leg forward and pound the track once again. And it's not just top male sprinters such as Bolt and Gay who have this in common. It is also female sprint stars such as Allyson Felix and Carmelita Jeter, not to mention all those other sprinters, male and female, who have no hope of getting past the first-round heats in London. (The high-speed video below shows the contact time and force application of an Olympic sprinter.)

A primary difference between the best sprinters and their slower competitors lies in how much force each one applies in that fraction of a second when their foot is on the ground. (A normal person running at top speed applies an average force of about twice his body weight over the contact time; Gay applies closer to 2.5 times his body weight.) The rate at which a sprinter swings his legs through the air might also seem important in differentiating him from his rivals, but all able-bodied sprinters swing their legs at nearly the same rate: about a third of a second between strides.

"All the fast guys do it the same way," Weyand says. "If you know their top speed and their leg length, without knowing anything else you can predict the time they'll spend on the ground and the time in the air and the ground forces."

In 2000, Weyand and a team of researchers at Harvard published a study showing that humans, from couch potatoes to pro sprinters, have essentially the same leg-swing times when they achieve their maximum speed. Says Weyand, "The line we use around the lab is, From Usain Bolt to Grandma, they reposition their limbs in virtually the same amount of time."

But Pistorius's leg-swing times, when measured on a high-speed treadmill, were off the human charts. At top speed, he swings his legs between strides in 0.284 of a second, which is 20 percent faster than intact-limbed sprinters with the same top speed. "His limbs are 20 percent lighter," Weyand says, "and he swings them 20 percent faster."

This is important because it allows Pistorius to circumvent a main requirement of top level sprinting: putting high forces into the ground quickly. Because Pistorius can make up time with his rapid leg swing, he can leave his foot in contact with the ground longer than other sprinters. To attain the same speed, Pistorius applies lower forces -- about 20 percent lower -- over a longer time, instead of higher forces over a briefer time. In this he's like a cross-country skier, whose boot has a hinge at the toe that allows him to leave the ski down and continue to push, prolonging the time he can continue to apply force.

The light weight of the Cheetah legs and the extra contact time with the ground give Pistorius a clear advantage. But the prostheses also have drawbacks. Pistorius is slower at the start than his competitors are. Without ankles, he has to stand straight up out of the blocks and start bouncing to build momentum. And the flexibility of the Cheetah legs has a disadvantage.

A study of single-amputee sprinters that Herr co-authored showed that the runners applied less force with their prosthetic leg than their biological leg, indicating that the softness of the prosthetic causes a force deficit. "It's like running on a mattress," Herr says. But Bundle points out that the force difference between the prosthetic and biological legs of those sprinters was only about one-third of that between Pistorius and his competitors.

"Even if you factor in the force reduction of the prostheses," Bundle says, "Pistorius is still seven seconds faster over 400 meters than he would be if his limbs functioned as intact biological legs do." (That is, if his swing times were typical of able-bodied runners.)

Herr, defending Pistorius, contends that the South African's rapid swing times are merely compensation for the force deficit caused by the Cheetahs and that researchers may never be able to quantify all the advantages and disadvantages of running on carbon-fiber blades. "It's going to take years and years," he says, "and it may not be knowable." To which Bundle says, "The technology is enabling him to do something that nobody else can do. That's the very definition of an advantage."

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Both in scientific papers and in the press, Herr and colleagues who side with him have argued that Pistorius's leg-swing time is not truly off the biological charts. "Regarding swing times," Herr says, "one would get really suspicious that there is augmentation if ... no one with a biological body has ever achieved that metric. But it's not the case." Herr and colleagues -- and Pistorius's Web site -- have claimed that Walter Dix posted a 0.274 of a second swing time when he took bronze in the 100 in Beijing. But video footage used for that measurement was from NBC's television broadcast, with a frame rate far too slow for scientific research. When Dix was filmed with research-grade cameras at the 2007 and '08 U.S. championships, his leg-swing time in both instances was 0.32, consistent with that of other able-bodied sprinters.

SI reviewed more than 100 leg-swing times of professional sprinters taken with research-quality cameras, as well as peer-reviewed scientific journal reports on sprinters' swing times from Ben Johnson and Carl Lewis to the present. The fastest swing time reported was 0.30 of a second, by Trindon Holliday, the 5-5 Houston Texans wide receiver, when he was competing in the 100 at U.S. nationals in 2007. But the 6-1 Pistorius' swing time was still far faster.

"Thousands of amputees have used these springs and haven't even come close to his times," Herr says of Pistorius. But, says Craig Spence, a spokesman for the International Paralympic Committee, "there aren't too many double-leg amputees who compete [in sprints]. There are two or three, so therefore they're combined with the single-leg amputees." Says Weyand, "single-leg amputees are limited by the speed of their biological limb. They can't swing both legs at drastically different speeds."

Ralph Mann, a silver medalist in the 400 hurdles in 1972 and USA Track and Field's director of sports science for sprints and hurdles, has likely analyzed high-speed film of more sprinters than any person in the world -- every U.S. championship since 1982, several world championships and five Olympic Games. When he saw the Pistorius data, he says, "I came to the conclusion that he's not using normal human ground time and air time. Air times are basically the same for every sprinter on the planet, whether high school, collegiate or pro."

SI spoke with eight independent physiologists and biomechanics experts who had no involvement with testing Pistorius, and all eight agreed that Pistorius has abnormally low leg-swing times, stemming from the lightness of his prostheses. Four felt that Pistorius has an advantage over his competitors, while four said that the low swing time is an advantage but that there may be other potential disadvantages to the prostheses that must be studied in more detail before they could say if Pistorius should be allowed to race against intact runners. "It's innocent until proven guilty," Herr says.

In London, the world is seeing a sprinter doing things that no one has done before, in terms of both his leg-swing times and his personal perseverance.

"What Oscar has done represents for a lot of people an unwillingness to accept expectations others might impose on you," Weyand says. "And that part is inspiring and makes you feel great about human nature."

On that, all can agree.

Find this article at:

http://sportsillustrated.cnn.com/2012/olympics/2012/w riters/david_epstein/08/03/oscar-pistorius-london-olympics/index.html

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August 15, 2013

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Tufts' 'YOLO' Essay Question Asks College Applicants To Explain Phrase's Personal Significance

The Huffington Post | By Tyler Kingkade
Posted: 07/12/2013 1:10 pm EDT | Updated: 07/13/2013 10:16 am EDT

YOLO [YO-low]: An acronym meaning "You only live once." Meant to elicit a carefree attitude, willing to take chances.

Also, the subject of an essay question to get into one of the best universities in the country.

Tufts University in Medford, Mass., is asking applicants to answer three essay questions. The first two deal with why prospective students are applying to Tufts and how their background defines them. Then they give applicants a choice of six essay prompts, one of which involves "YOLO":

The ancient Romans started it when they coined the phrase "Carpe diem." Jonathan Larson proclaimed "No day but today!" and most recently, Drake explained You Only Live Once (YOLO). Have you ever seized the day? Lived like there was no tomorrow? Or perhaps you plan to shout YOLO while jumping into something in the future. What does #YOLO mean to you?
(Yes, they include the hashtag.)

"This question was submitted by a member of our incoming first-year class and was one of six essay choices designed to give students a chance to tell us about themselves," Tufts spokesman Alexander Reid told The Huffington Post. "The spirit of the question is quite serious, as it asks students to consider a concept that people — from Roman philosopher of antiquity Horace to contemporary Grammy Award-winning Canadian rapper Drake — have been thinking about for thousands of years."

Lee Coffin, dean of Undergraduate Admissions at Tufts, admits he has an affinity for pop music. Coffin is encouraging applicants to have some fun when they introduce themselves to Tufts.

"Oh yes, we did. Quakers, Virginia Woolf, nerds, an ancient Roman, Drake, a principle of physics and the Red Sox (at least by inference) all wiggled their way into one of our essay questions," Coffin wrote in a blog about the admissions essay. "YOLO."

Colleges seem to like to ask weird prompts in application essays, like the University of Chicago's 2002 question, "How do you feel about Wednesday?" or "You have just completed your 300-page autobiography. Please submit Page 217," as the University of Pennsylvania has asked for 20 years. Tufts asked applicants in 2009 "Are we alone?"

Which brings us to the evolution of YOLO, courtesy of The Black Sheep Online:

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(h/t The Hairpin)

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Tufts Asks Applicants What YOLO Means to Them

The Boston-area college hopes the quirky essay question will evoke more insightful responses

By Claire Groden | July 16, 2013 | Add a Comment

With the fall application season already ramping up at colleges across the country, Tufts University is following through on its tradition of including zany essay questions by asking about one of the trendiest acronyms of the moment: YOLO.

The question, which was posted in the online application on July 10, reads: "The ancient Romans started it when they coined the phrase 'Carpe diem.' Jonathan Larson proclaimed 'No day but today!' and most recently, Drake explained You Only Live Once (YOLO). Have you ever seized the day? Lived like there was no tomorrow? Or perhaps you plan to shout YOLO while jumping into something in the future. What does #YOLO mean to you?"

GETTY IMAGES

The private university near Boston — which accepted about 21% of its 16,000 applicants for the Class of 2016 — offered prospectives some other fun topics to choose from as well, including "What makes you happy?" and "Celebrate your nerdy side". Tufts spokeswoman Kim Thurler explained to Boston.com why the school includes such offbeat question: "Deceptively simple subjects can yield eloquent essays and important insights."

Tufts admissions officers aren't the only ones who make their applicants stretch their creative muscles. This year, University of Chicago asks, "Tell us your favorite joke and try to explain the joke without ruining it". A 2011 essay prompt asked: "What does Play-Doh have to do with Plato?", adding "Don't write about reverse psychology." And, in a now legendary, mindbending prompt from 2010, Bennington College asked: "Can a toad hear? Prove it."

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TIME

Thursday, Feb. 10, 2011

2045: The Year Man Becomes Immortal

By Lev Grossman

On Feb. 15, 1965, a diffident but self-possessed high school student named Raymond Kurzweil appeared as a guest on a game show called *I've Got a Secret*. He was introduced by the host, Steve Allen, then he played a short musical composition on a piano. The idea was that Kurzweil was hiding an unusual fact and the panelists — they included a comedian and a former Miss America — had to guess what it was.

On the show (see the clip on YouTube), the beauty queen did a good job of grilling Kurzweil, but the comedian got the win: the music was composed by a computer. Kurzweil got $200.

(Watch TIME's video "Singularity: How Scared Should We Be?")

Kurzweil then demonstrated the computer, which he built himself — a desk-size affair with loudly clacking relays, hooked up to a typewriter. The panelists were pretty blasé about it; they were more impressed by Kurzweil's age than by anything he'd actually done. They were ready to move on to Mrs. Chester Loney of Rough and Ready, Calif., whose secret was that she'd been President Lyndon Johnson's first-grade teacher.

But Kurzweil would spend much of the rest of his career working out what his demonstration meant. Creating a work of art is one of those activities we reserve for humans and humans only. It's an act of self-expression; you're not supposed to be able to do it if you don't have a self. To see creativity, the exclusive domain of humans, usurped by a computer built by a 17-year-old is to watch a line blur that cannot be unblurred, the line between organic intelligence and artificial intelligence.

That was Kurzweil's real secret, and back in 1965 nobody guessed it. Maybe not even him, not yet. But now, 46 years later, Kurzweil believes that we're approaching a moment when computers will become intelligent, and not just intelligent but more intelligent than humans. When that happens, humanity — our bodies, our minds, our civilization — will be completely and irreversibly transformed. He believes that this moment is not only inevitable but imminent. According to his calculations, the end of human civilization

as we know it is about 35 years away.

Computers are getting faster. Everybody knows that. Also, computers are getting faster *faster* — that is, the rate at which they're getting faster is increasing.

True? True.

So if computers are getting so much faster, so incredibly fast, there might conceivably come a moment when they are capable of something comparable to human intelligence. Artificial intelligence. All that horsepower could be put in the service of emulating whatever it is our brains are doing when they create consciousness — not just doing arithmetic very quickly or composing piano music but also driving cars, writing books, making ethical decisions, appreciating fancy paintings, making witty observations at cocktail parties.

If you can swallow that idea, and Kurzweil and a lot of other very smart people can, then all bets are off. From that point on, there's no reason to think computers would stop getting more powerful. They would keep on developing until they were far more intelligent than we are. Their rate of development would also continue to increase, because they would take over their own development from their slower-thinking human creators. Imagine a computer scientist that was itself a super-intelligent computer. It would work incredibly quickly. It could draw on huge amounts of data effortlessly. It wouldn't even take breaks to play Farmville.

Probably. It's impossible to predict the behavior of these smarter-than-human intelligences with which (with whom?) we might one day share the planet, because if you could, you'd be as smart as they would be. But there are a lot of theories about it. Maybe we'll merge with them to become super-intelligent cyborgs, using computers to extend our intellectual abilities the same way that cars and planes extend our physical abilities. Maybe the artificial intelligences will help us treat the effects of old age and prolong our life spans indefinitely. Maybe we'll scan our consciousnesses into computers and live inside them as software, forever, virtually. Maybe the computers will turn on humanity and annihilate us. The one thing all these theories have in common is the transformation of our species into something that is no longer recognizable as such to humanity circa 2011. This transformation has a name: the Singularity.

The difficult thing to keep sight of when you're talking about the Singularity is that even though it sounds like science fiction, it isn't, no more than a weather forecast is science fiction. It's not a fringe idea; it's a serious hypothesis about the future of life on Earth. There's an intellectual gag reflex that kicks in anytime you try to swallow an idea that involves super-intelligent immortal cyborgs, but suppress it if you can,

because while the Singularity appears to be, on the face of it, preposterous, it's an idea that rewards sober, careful evaluation.

See pictures of cinema's most memorable robots.

From TIME's archives: "Can Machines Think?"

See TIME's special report on gadgets, then and now.

People are spending a lot of money trying to understand it. The three-year-old Singularity University, which offers inter-disciplinary courses of study for graduate students and executives, is hosted by NASA. Google was a founding sponsor; its CEO and co-founder Larry Page spoke there last year. People are attracted to the Singularity for the shock value, like an intellectual freak show, but they stay because there's more to it than they expected. And of course, in the event that it turns out to be real, it will be the most important thing to happen to human beings since the invention of language.

(See "Is Technology Making Us Lonelier?")

The Singularity isn't a wholly new idea, just newish. In 1965 the British mathematician I.J. Good described something he called an "intelligence explosion":

Let an ultraintelligent machine be defined as a machine that can far surpass all the intellectual activities of any man however clever. Since the design of machines is one of these intellectual activities, an ultraintelligent machine could design even better machines; there would then unquestionably be an "intelligence explosion," and the intelligence of man would be left far behind. Thus the first ultraintelligent machine is the last invention that man need ever make.

The word *singularity* is borrowed from astrophysics: it refers to a point in space-time — for example, inside a black hole — at which the rules of ordinary physics do not apply. In the 1980s the science-fiction novelist Vernor Vinge attached it to Good's intelligence-explosion scenario. At a NASA symposium in 1993, Vinge announced that "within 30 years, we will have the technological means to create super-human intelligence. Shortly after, the human era will be ended."

By that time Kurzweil was thinking about the Singularity too. He'd been busy since his appearance on *I've Got a Secret*. He'd made several fortunes as an engineer and inventor; he founded and then sold his first

software company while he was still at MIT. He went on to build the first print-to-speech reading machine for the blind — Stevie Wonder was customer No. 1 — and made innovations in a range of technical fields, including music synthesizers and speech recognition. He holds 39 patents and 19 honorary doctorates. In 1999 President Bill Clinton awarded him the National Medal of Technology.

(See pictures of adorable robots.)

But Kurzweil was also pursuing a parallel career as a futurist: he has been publishing his thoughts about the future of human and machine-kind for 20 years, most recently in *The Singularity Is Near*, which was a best seller when it came out in 2005. A documentary by the same name, starring Kurzweil, Tony Robbins and Alan Dershowitz, among others, was released in January. (Kurzweil is actually the subject of two current documentaries. The other one, less authorized but more informative, is called *The Transcendent Man*.) Bill Gates has called him "the best person I know at predicting the future of artificial intelligence."

(See the world's most influential people in the 2010 TIME 100.)

In real life, the transcendent man is an unimposing figure who could pass for Woody Allen's even nerdier younger brother. Kurzweil grew up in Queens, N.Y., and you can still hear a trace of it in his voice. Now 62, he speaks with the soft, almost hypnotic calm of someone who gives 60 public lectures a year. As the Singularity's most visible champion, he has heard all the questions and faced down the incredulity many, many times before. He's good-natured about it. His manner is almost apologetic: I wish I could bring you less exciting news of the future, but I've looked at the numbers, and this is what they say, so what else can I tell you?

Kurzweil's interest in humanity's cyborganic destiny began about 1980 largely as a practical matter. He needed ways to measure and track the pace of technological progress. Even great inventions can fail if they arrive before their time, and he wanted to make sure that when he released his, the timing was right. "Even at that time, technology was moving quickly enough that the world was going to be different by the time you finished a project," he says. "So it's like skeet shooting — you can't shoot at the target." He knew about Moore's law, of course, which states that the number of transistors you can put on a microchip doubles about every two years. It's a surprisingly reliable rule of thumb. Kurzweil tried plotting a slightly different curve: the change over time in the amount of computing power, measured in MIPS (millions of instructions per second), that you can buy for $1,000.

As it turned out, Kurzweil's numbers looked a lot like Moore's. They doubled every couple of years. Drawn as graphs, they both made exponential curves, with their value increasing by multiples of two instead of by regular increments in a straight line. The curves held eerily steady, even when Kurzweil extended his backward through the decades of pretransistor computing technologies like relays and vacuum tubes, all the way back to 1900.

(Comment on this story.)

Kurzweil then ran the numbers on a whole bunch of other key technological indexes — the falling cost of manufacturing transistors, the rising clock speed of microprocessors, the plummeting price of dynamic RAM. He looked even further afield at trends in biotech and beyond — the falling cost of sequencing DNA and of wireless data service and the rising numbers of Internet hosts and nanotechnology patents. He kept finding the same thing: exponentially accelerating progress. "It's really amazing how smooth these trajectories are," he says. "Through thick and thin, war and peace, boom times and recessions." Kurzweil calls it the law of accelerating returns: technological progress happens exponentially, not linearly.

See TIME's video "Five Worst Inventions."

See the 100 best gadgets of all time.

Then he extended the curves into the future, and the growth they predicted was so phenomenal, it created cognitive resistance in his mind. Exponential curves start slowly, then rocket skyward toward infinity. According to Kurzweil, we're not evolved to think in terms of exponential growth. "It's not intuitive. Our built-in predictors are linear. When we're trying to avoid an animal, we pick the linear prediction of where it's going to be in 20 seconds and what to do about it. That is actually hardwired in our brains."

Here's what the exponential curves told him. We will successfully reverse-engineer the human brain by the mid-2020s. By the end of that decade, computers will be capable of human-level intelligence. Kurzweil puts the date of the Singularity — never say he's not conservative — at 2045. In that year, he estimates, given the vast increases in computing power and the vast reductions in the cost of same, the quantity of artificial intelligence created will be about a billion times the sum of all the human intelligence that exists today.

(See how robotics are changing the future of medicine.)

The Singularity isn't just an idea. it attracts people, and those people feel a bond with one another. Together they form a movement, a subculture; Kurzweil calls it a community. Once you decide to take the Singularity seriously, you will find that you have become part of a small but intense and globally distributed hive of like-minded thinkers known as Singularitarians.

Not all of them are Kurzweilians, not by a long chalk. There's room inside Singularitarianism for considerable diversity of opinion about what the Singularity means and when and how it will or won't

happen. But Singularitarians share a worldview. They think in terms of deep time, they believe in the power of technology to shape history, they have little interest in the conventional wisdom about anything, and they cannot believe you're walking around living your life and watching TV as if the artificial-intelligence revolution were not about to erupt and change absolutely everything. They have no fear of sounding ridiculous; your ordinary citizen's distaste for apparently absurd ideas is just an example of irrational bias, and Singularitarians have no truck with irrationality. When you enter their mind-space you pass through an extreme gradient in worldview, a hard ontological shear that separates Singularitarians from the common run of humanity. Expect turbulence.

In addition to the Singularity University, which Kurzweil co-founded, there's also a Singularity Institute for Artificial Intelligence, based in San Francisco. It counts among its advisers Peter Thiel, a former CEO of PayPal and an early investor in Facebook. The institute holds an annual conference called the Singularity Summit. (Kurzweil co-founded that too.) Because of the highly interdisciplinary nature of Singularity theory, it attracts a diverse crowd. Artificial intelligence is the main event, but the sessions also cover the galloping progress of, among other fields, genetics and nanotechnology.

(See TIME's computer covers.)

At the 2010 summit, which took place in August in San Francisco, there were not just computer scientists but also psychologists, neuroscientists, nanotechnologists, molecular biologists, a specialist in wearable computers, a professor of emergency medicine, an expert on cognition in gray parrots and the professional magician and debunker James "the Amazing" Randi. The atmosphere was a curious blend of Davos and UFO convention. Proponents of seasteading — the practice, so far mostly theoretical, of establishing politically autonomous floating communities in international waters — handed out pamphlets. An android chatted with visitors in one corner.

After artificial intelligence, the most talked-about topic at the 2010 summit was life extension. Biological boundaries that most people think of as permanent and inevitable Singularitarians see as merely intractable but solvable problems. Death is one of them. Old age is an illness like any other, and what do you do with illnesses? You cure them. Like a lot of Singularitarian ideas, it sounds funny at first, but the closer you get to it, the less funny it seems. It's not just wishful thinking; there's actual science going on here.

For example, it's well known that one cause of the physical degeneration associated with aging involves telomeres, which are segments of DNA found at the ends of chromosomes. Every time a cell divides, its telomeres get shorter, and once a cell runs out of telomeres, it can't reproduce anymore and dies. But there's an enzyme called telomerase that reverses this process; it's one of the reasons cancer cells live so long. So why not treat regular non-cancerous cells with telomerase? In November, researchers at Harvard Medical School announced in *Nature* that they had done just that. They administered telomerase to a group of mice suffering from age-related degeneration. The damage went away. The mice didn't just get

better; they got younger.

(Comment on this story.)

Aubrey de Grey is one of the world's best-known life-extension researchers and a Singularity Summit veteran. A British biologist with a doctorate from Cambridge and a famously formidable beard, de Grey runs a foundation called SENS, or Strategies for Engineered Negligible Senescence. He views aging as a process of accumulating damage, which he has divided into seven categories, each of which he hopes to one day address using regenerative medicine. "People have begun to realize that the view of aging being something immutable — rather like the heat death of the universe — is simply ridiculous," he says. "It's just childish. The human body is a machine that has a bunch of functions, and it accumulates various types of damage as a side effect of the normal function of the machine. Therefore in principal that damage can be repaired periodically. This is why we have vintage cars. It's really just a matter of paying attention. The whole of medicine consists of messing about with what looks pretty inevitable until you figure out how to make it not inevitable."

Kurzweil takes life extension seriously too. His father, with whom he was very close, died of heart disease at 58. Kurzweil inherited his father's genetic predisposition; he also developed Type 2 diabetes when he was 35. Working with Terry Grossman, a doctor who specializes in longevity medicine, Kurzweil has published two books on his own approach to life extension, which involves taking up to 200 pills and supplements a day. He says his diabetes is essentially cured, and although he's 62 years old from a chronological perspective, he estimates that his biological age is about 20 years younger.

From TIME's archives: "The Immortality Enzyme."

See Healthland's 5 rules for good health in 2011.

But his goal differs slightly from de Grey's. For Kurzweil, it's not so much about staying healthy as long as possible; it's about staying alive until the Singularity. It's an attempted handoff. Once hyper-intelligent artificial intelligences arise, armed with advanced nanotechnology, they'll really be able to wrestle with the vastly complex, systemic problems associated with aging in humans. Alternatively, by then we'll be able to transfer our minds to sturdier vessels such as computers and robots. He and many other Singularitarians take seriously the proposition that many people who are alive today will wind up being functionally immortal.

It's an idea that's radical and ancient at the same time. In "Sailing to Byzantium," W.B. Yeats describes mankind's fleshly predicament as a soul fastened to a dying animal. Why not unfasten it and fasten it to an

immortal robot instead? But Kurzweil finds that life extension produces even more resistance in his audiences than his exponential growth curves. "There are people who can accept computers being more intelligent than people," he says. "But the idea of significant changes to human longevity — that seems to be particularly controversial. People invested a lot of personal effort into certain philosophies dealing with the issue of life and death. I mean, that's the major reason we have religion."

Of course, a lot of people think the Singularity is nonsense — a fantasy, wishful thinking, a Silicon Valley version of the Evangelical story of the Rapture, spun by a man who earns his living making outrageous claims and backing them up with pseudoscience. Most of the serious critics focus on the question of whether a computer can truly become intelligent.

The entire field of artificial intelligence, or AI, is devoted to this question. But AI doesn't currently produce the kind of intelligence we associate with humans or even with talking computers in movies — HAL or C3PO or Data. Actual AIs tend to be able to master only one highly specific domain, like interpreting search queries or playing chess. They operate within an extremely specific frame of reference. They don't make conversation at parties. They're intelligent, but only if you define intelligence in a vanishingly narrow way. The kind of intelligence Kurzweil is talking about, which is called strong AI or artificial general intelligence, doesn't exist yet.

Why not? Obviously we're still waiting on all that exponentially growing computing power to get here. But it's also possible that there are things going on in our brains that can't be duplicated electronically no matter how many MIPS you throw at them. The neurochemical architecture that generates the ephemeral chaos we know as human consciousness may just be too complex and analog to replicate in digital silicon. The biologist Dennis Bray was one of the few voices of dissent at last summer's Singularity Summit. "Although biological components act in ways that are comparable to those in electronic circuits," he argued, in a talk titled "What Cells Can Do That Robots Can't," "they are set apart by the huge number of different states they can adopt. Multiple biochemical processes create chemical modifications of protein molecules, further diversified by association with distinct structures at defined locations of a cell. The resulting combinatorial explosion of states endows living systems with an almost infinite capacity to store information regarding past and present conditions and a unique capacity to prepare for future events." That makes the ones and zeros that computers trade in look pretty crude.

Underlying the practical challenges are a host of philosophical ones. Suppose we did create a computer that talked and acted in a way that was indistinguishable from a human being — in other words, a computer that could pass the Turing test. (Very loosely speaking, such a computer would be able to pass as human in a blind test.) Would that mean that the computer was sentient, the way a human being is? Or would it just

be an extremely sophisticated but essentially mechanical automaton without the mysterious spark of consciousness — a machine with no ghost in it? And how would we know?

Even if you grant that the Singularity is plausible, you're still staring at a thicket of unanswerable questions. If I can scan my consciousness into a computer, am I still me? What are the geopolitics and the socioeconomics of the Singularity? Who decides who gets to be immortal? Who draws the line between sentient and nonsentient? And as we approach immortality, omniscience and omnipotence, will our lives still have meaning? By beating death, will we have lost our essential humanity?

Kurzweil admits that there's a fundamental level of risk associated with the Singularity that's impossible to refine away, simply because we don't know what a highly advanced artificial intelligence, finding itself a newly created inhabitant of the planet Earth, would choose to do. It might not feel like competing with us for resources. One of the goals of the Singularity Institute is to make sure not just that artificial intelligence develops but also that the AI is friendly. You don't have to be a super-intelligent cyborg to understand that introducing a superior life-form into your own biosphere is a basic Darwinian error.

(Comment on this story.)

If the Singularity is coming, these questions are going to get answers whether we like it or not, and Kurzweil thinks that trying to put off the Singularity by banning technologies is not only impossible but also unethical and probably dangerous. "It would require a totalitarian system to implement such a ban," he says. "It wouldn't work. It would just drive these technologies underground, where the responsible scientists who we're counting on to create the defenses would not have easy access to the tools."

Kurzweil is an almost inhumanly patient and thorough debater. He relishes it. He's tireless in hunting down his critics so that he can respond to them, point by point, carefully and in detail.

See TIME's photo-essay "A Global Look at Longevity."

See how genes, gender and diet may be life extenders.

Take the question of whether computers can replicate the biochemical complexity of an organic brain. Kurzweil yields no ground there whatsoever. He does not see any fundamental difference between flesh and silicon that would prevent the latter from thinking. He defies biologists to come up with a neurological mechanism that could not be modeled or at least matched in power and flexibility by software running on a computer. He refuses to fall on his knees before the mystery of the human brain. "Generally speaking," he says, "the core of a disagreement I'll have with a critic is, they'll say, Oh, Kurzweil is underestimating