

An article written for MSNBC.com about the truth and the exaggerations behind the futuristic technology seen in movies like "Iron Man" and "Tron"

The real science behind your favorite sci-fi films

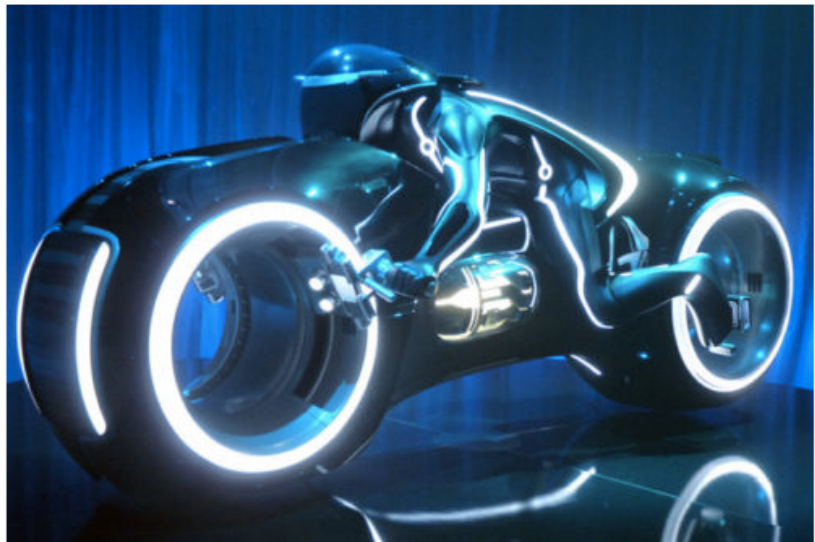
By Christopher Bahn

When it comes to science-fiction movies, the fiction tends to trump the science. And that can be just fine — movies are supposed to be entertaining, and nothing saps the joy out of them more quickly than complaining that there's no sound in space, so the Death Star should've exploded in total silence. You've got to meet the movie halfway. But it's also hard to do that unless the filmmakers give you some plausible reason to believe that tyrannosaurs could be resurrected, or Captain Kirk could beam himself up.

We looked at a half-dozen recent movies — including the new thriller "Limitless," out March 18 — to see how their science stacked up, and whether their near-future inventions would be anything we'd actually want to see in real life.

Brain enhancement, as seen in 'Limitless'

In "Limitless," Bradley Cooper (from "The Hangover") plays a down-on-his-luck writer who stumbles on an illegal mind-enhancing drug that activates 100 percent of his brain. Soon he's finished his novel, made millions on the stock market, and no longer needs to sleep. On the downside, he attracts the hostile attention of mogul Robert De Niro — and the side effects might be even bloodier.



A lightcycle from "Tron:Legacy"



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The basic idea that medical science might someday make us smarter "isn't quite so crazy," said University of Minnesota physics professor James Kakalios, author of "The Physics of Superheroes" and "The Amazing Story of Quantum Mechanics."

"We have a variety of chemicals that can indeed affect the functioning of the brain. Look at drugs such as Prozac," which improve mood and concentration by changing the brain's electrochemistry, Kakalios said.

As for what's in "Limitless," though? "Taking a pill and becoming a supergenius? Mmmm, that's kinda crazy. That

understanding of neurochemistry far eludes us at this stage," he says.

Also, forget boosting your brainpower by using 100 percent of it — because you already do that. "It's not actually true that we use only 10 or 20 percent of our brains," says Kakalios. "We use all of our brains. We don't understand a lot about how the brain works, but evolutionarily, everything in the three-pound hunk of meat on the top of your head is there for a reason."

Cooper's character would also need to watch out for a rebound effect if he stops taking his pill, which might leave him worse than when he started. "You can

really overshoot. So Bradley Cooper might become really stupid once his pill supply runs out," Kakalios said.

Dream-sharing, as seen in 'Inception'

Could Leonardo DiCaprio and crew really burrow four levels deep into someone's dream, folding imaginary cities along the way?

Nah. It's almost pure fantasy.

But don't let it stop you from enjoying the movie. "I try not to just be Professor Grump," said Kakalios. "I thought 'Inception' was the coolest movie of the year. They provided just enough technobabble. I was kind of glad that they didn't try to overexplain it. And what was my reward? A zero-gravity fight in a hotel hallway! How often do I get to see that?"

But no matter how mindblowing it looks in the movies, leaping into dreams is well beyond anything we can do in real life, and might be impossible. "It's such a vast and challenging problem," Kakalios says. "Before you can transfer your thoughts into a computer system, we have to understand exactly what a thought is, and identify it in the brain. And experts disagree

about such a basic question. We don't even understand fully how memory works."

Flying battle armor, as seen in 'Iron Man'

When Iron Man debuted in the comics in the 1960s, his high-tech suit, which can survive an artillery hit and flies at

supersonic speed, was almost ludicrously futuristic.

Today, not so much. Even some of the most outlandish aspects of Iron Man's armor are only exaggerations of current technology.

For example, Iron Man doesn't need buttons or voice commands to control his suit — instead, Stark's helmet reads his brainwaves, and does what he thinks. That sounds crazy, but it's already here. A team of scientists in Germany recently debuted "Brain Driver," a device that, as the name suggests, lets you drive a car using only your mind. You just have to be willing to wear a goofy-looking headset in public.

Nearly everything about Iron Man, says Kakalios, is "either existing technology or maybe six months away. Exoskeleton suits, those things exist. You can take a jetpack to work. The only problem is, you need to work just a few blocks from where you live, because it takes a lot of chemical energy just to lift a person up in the air."



In fact, the only truly unrealistic thing about Iron Man is his power supply. "The arc reactor in his chest is the size of a hockey puck and puts out the power of about three nuclear power plants," Kakalios said. "If we knew how to make things like that, superheroes would be the least of our problems."

Human cloning, as seen in 'Never Let Me Go'

In the somber love story "Never Let Me Go," three childhood friends discover that they're actually clones grown to provide transplant organs for "original" humans — and that they're expected to die in the process. It's a bleak look at the ethical issues raised by human cloning, which seems more possible than ever in this age of genetically modified food, 15 years after scientists successfully cloned a sheep. Luckily, human cloning isn't so easy. "I would have to defer to a biologist, but it's massively harder than cloning a sheep," says Kakalios. "But



A scene from "Inception"

moreover, I don't believe that anyone is actively working on this. If anyone is, they're doing it illegally and in private."

Artificial intelligence, as seen in 'Tron Legacy'

The world of "Tron Legacy" is populated by computer programs so sophisticated that they've become self-aware beings in their own right. Science fiction has long explored this idea both as a dream and a nightmare, and real science is starting to catch up.

No, we don't have pixellated Olivia Wildes yet — or Terminators either, on the plus side. But there are self-evolving computers that can learn from past mistakes, like IBM's Watson, the computer that recently beat four of the top human contestants on "Jeopardy." (Though it did think Toronto was a U.S. city, so there's hope for us yet).

"If you've got a computer that can play Jeopardy and actually win, it's getting very close" to genuine intelligence, says Kakalios. "A lot of this is dependent on what you consider to be intelligence, but even if the machines are doing it in a brute-force manner, they're doing it so much faster [than human brains] that it looks like it's the same as when we think about things." Now that they've conquered game shows, can the rest of the world be far behind?

Time travel, as seen in 'Hot Tub Time Machine'

Good news for anyone wanting to jump back to 1986 in a nuclear-powered jacuzzi — it's theoretically possible. Well, there's one tiny hurdle you'll need to overcome first. "It only requires one impossible thing," says Kakalios. "You just have to

have an infinitely long, massive cylinder rotating at high speed." So never mind the jacuzzi, then. What you'll need is called a Tipler cylinder — this theoretical machine warps space-time, so if you travel around it, you'll arrive earlier than you began.



A scene from "Never Let Me Go"

In fact, underneath the jokes, there's a solid theory of time travel at work in "Hot Tub Time Machine." Called the "many worlds" theory, it suggests that travelers from the future don't need to worry about changing events in the past and erasing themselves from history. If you jump back in time and shoot your grandfather — or if you're John Cusack, avoid being stabbed in the eye with a fork — you'll create a new, alternate timeline that exists alongside the one you left. This way, jokes Kakalios, "you can kill as many grandparents as you have bullets, and you don't have to worry about wiping your own existence out."