**Genetically edited babies: An ethical transgression**

*Chinese researcher He Jiankui has been sentenced to prison for three years for genetic manipulation of babies. The case has set off a fierce debate among scientists and the general public.*

**What did He Jiankui do?**

Just before a symposium [in Hong Kong on 28 November 2018,](https://www.dw.com/en/worlds-first-gene-edited-babies-born-scientist-claims/a-46452632) the biophysicist announced that he had created human embryos by artificial insemination and had previously altered their genetic material using the CRISPR-Cas9 genetic scissors. The embryos had been implanted into the biological mothers, who then carried the babies. Two twin sisters had already been born prior to He's announcement. [A third baby was born a little later.](https://www.dw.com/en/gene-editing-scientist-claims-another-potential-pregnancy/a-46487867)

**What was the transgression?**

In contrast to the usual artificial insemination, which doctors worldwide perform on couples who have an unfulfilled desire to have children, He Jiankui had carried out a process called germ-line interference. He manipulated the genetic material even before the sperm and egg were joined, with the aim of creating new, altered genetic material. If the children thus created will have children of their own, they will pass the altered genetic information on to them. This is believed to be first case worldwide of creating designer babies.

**What do ethicists think about this procedure?**

Ethicists in medicine and the life sciences reject germ-line intervention in humans almost without exception. They fear that such an approach could tempt doctors to play God and create human life a la carte: Parents might be able to select certain characteristics of their offspring, which can then be built into the genome before fertilization. The idea of repairing existing hereditary diseases before fertilization also meets with little support among ethicists. Parents who wish to have children often have the option of [using sperm and eggs donated by healthy people.](https://www.dw.com/en/whos-the-daddy-does-it-really-matter-where-your-dna-comes-from/a-35925012)

**How did He Jiankui justify the intervention?**

The biophysicist justified the procedure by saying that the biological father of the two twin sisters was HIV positive. The aim was to give the babies a mutation of the CCR5 gene that would make them immune to the HIV virus. It was therefore ethically justified, he says.

Was the intervention necessary to protect the children from HIV?

No, even HIV-positive parents can give birth to healthy children if the parents consistently take their antiretroviral medication. In addition, the children must be treated from the beginning. It is also by no means medically certain that the babies have gained the promised immunity against HIV. Although there is a natural mutation of the CCR5 gene that makes people immune to HIV, the mutation introduced by He Jiankui is not identical to this one.

**What are the risks for the children?**

There is a risk that the genetically modified material in the children will show completely unpredictable side effects later in life. [Their life expectancy is probably significantly lower](https://www.dw.com/en/crispr-cas9-babies-likely-to-die-earlier-berkeley-study-says/a-49025884) than that of children conceived normally, according to a study by doctors at the University of Berkeley.

**How did the Chinese authorities react to the scandal?**

Rather awkwardly. China is striving for research [leadership in the field of genetic engineering](https://www.dw.com/en/china-gene-edits-then-clones-monkeys-to-aid-sleep-disorder-research/a-47209754) also in the field of human medicine, [but does not like bad press.](https://www.dw.com/en/crispr-crisis-china-wants-to-protect-its-genetic-engineering-reputation/a-47209356) With He Jiankui's sentencing, the Chinese government apparently wants to put an end to the scandal that hit it relatively unprepared in 2018. There are indications that many other scientists in his field shared He Jiankui's lack of awareness about the ramifications of such work. When the scandal broke out, documents from the hospital involved were available that showed that the medical ethics committee had even agreed to the procedure. Later, however, Chinese investigators raised doubts over the authenticity of these documents. Only after the scandal broke did close colleagues of the biophysicist distance themselves from him and his methods. Until then, He Jiankui had been promoted as a top researcher.

Now he has been  [sentenced to three years in prison](https://www.dw.com/en/china-jails-scientists-for-crispr-gene-edited-babies/a-51831073) and must pay a fine of three million yuan, which is the equivalent of about 380,000 euros.

[**https://www.dw.com/en/genetically-edited-babies-an-ethical-transgression/a-51836243**](https://www.dw.com/en/genetically-edited-babies-an-ethical-transgression/a-51836243)

**A new spin on lab-grown meat**

*A technique akin to spinning cotton candy could help grow chewy meat outside an animal*

People might one day grow meat in factories instead of having to harvest it from farmed animals. So far, attempts at lab-grown meat haven’t managed to match the texture of the animal muscles eaten as meat. Scientists have been working to coax cells to organize into something like the fibrous meat that ends up on our plates. One new development does this using a technique akin to spinning cotton candy. It grows meat with more structure.

Growing meat in a lab could mean using fewer animals and lowering the environmental costs associated with raising livestock. It takes a lot of land and water to grow animals. Also, “we all like animals, but we like to eat meat too,” says Luke MacQueen. He’s a tissue engineer at Harvard University in Cambridge, Mass. Move the process outside of animals, and scientists could grow only the meat parts they want, he says.

Researchers already know how to grow cells, the basis of meat. However, a pile of cells doesn’t have the chewy texture of a chicken breast. Cells without a support are more like a soup, or at best a meatball. So MacQueen and his team developed a way to make a scaffold to support their growing cells.

The new process resembles the way cotton candy is spun, except that it uses gelatin instead of melted sugar. The scientists spin the gelatin-containing solution to make tiny fibers. When the sopping strings hit a bath of ethanol, a type of alcohol, they lose their water and dry out.

Then the scientists add stem cells — a special type of immature cell — that will develop into muscle cells. The team uses stem cells that become either cow or rabbit muscle. As they grow, these cells work their way into the edible gelatin scaffold.

The scientists grew tissue squares that were roughly 6.5 square centimeters (1 square inch) in area and a millimeter (0.04 inch) thick. They used a slew of techniques to image the chunks and study their properties. The team then compared their lab-grown rabbit and bovine tissue, after one to three weeks of growth, to meat from animals: bacon, prosciutto, beef tenderloin and more.

The lab-grown samples all looked like the natural meats, MacQueen says. And they had similar materials properties too. Those traits affect how chewy, springy or soft the tissue is. By controlling how the gelatin fibers had been spun, the scientists could set the fibers’ alignment and spacing. That determined if the tissue ended up more like a burger or a steak.

**Dreaming bigger than the petri dish**

The team’s work is “a great step in the right direction,” says Kate Krueger. She’s a biochemist who was not involved in the new study. She works at New Harvest, a non-profit institute that funds food technology research, in Boston, Mass.

A burger made from lab-grown meat made a splash in 2013. But it came with the hefty price of hundreds of thousands of dollars. The way MacQueen’s team grew the tissue is “another imagination of how we could get there,” Krueger says. And it could be an easier, less costly way. Why? This approach to making a scaffold should be easier to scale up.

Another challenge: Because it’s meant for scientific research, the nutrient mixture that feeds cells in the lab uses high-purity ingredients. To grow meat for the masses, Krueger notes, the high cost of feeding cells will have to come down.

Muscle-cell biologist Paul Mozdziak works at North Carolina State University in Raleigh. What the Harvard team has not done yet, he says, is “make something that’s really at the thickness or texture of a whole-muscle product.”

He is excited about using technology to grow meat. But Mozdziak also suggests caution about lab-grown meat’s prospects and impact. “Whether it’s good or not good for the environment is arguable,” he says. Especially if it just adds to the meat people already eat, he adds. Still, “what’s exciting is coming up with new methodology to make food.”

Krueger agrees. “We’re taught in many ways not to play with our food [or] think about it as something that’s made out of chemicals.” But from organic apples to Twinkies, “food is an amazing biotechnology,” she says. “Food is something we can innovate.”

[**https://www.sciencenewsforstudents.org/article/new-spin-lab-grown-meat**](https://www.sciencenewsforstudents.org/article/new-spin-lab-grown-meat)

**4 Tips for Spotting a Fake News Story**

*The last few years have been newsworthy, to say the least. An unprecedented American election, Brexit, earthquakes, and outbreaks all contributed to some of the most compelling news in recent memory.*

But mixed in with all the fair, factual, and well-researched reporting was something more sinister: Fake news, stories that seemed accurate, but were actually downright false.

While fake news has been circulating as long as its legitimate counterpart, it's been getting a lot of play recently, thanks to the way we consume information. According to [Pew Research Center](http://www.journalism.org/2016/07/07/pathways-to-news), people under age 50 get half of their news online. And for those under 30, online news is twice as popular as TV news.

Speaking of the Internet, did you hear the one about Pope Francis endorsing Donald Trump or the Clinton campaign running a child sex trafficking ring out of a pizza parlor in Washington, DC, (#pizzagate)? Both fakes.

**WHY FAKE NEWS GOES VIRAL**

Thousands of people circulated these false stories. Why? Perhaps because eye-popping headlines in our social media feeds make it easier for us to share content than evaluate or even read it. This creates a viral storm of sound bites without substance.

Another contributing factor, according to Pew Research, is confirmation bias. People are more likely to accept information that confirms their beliefs and dismiss information that does not.

But the result of all this misinformation isn’t simply ignorance. It can also provoke serious consequences.

In the case of #pizzagate, a man decided to “self-investigate” the child abuse allegations, arming himself with several weapons, arriving at the restaurant cited in the fake story, firing a shot (luckily without injury to anyone), and terrifying bystanders. In instances such as these, the stakes are too high not to get the facts straight.

If the last two years have been any indication, next year promises to be a doozy of a news year. So we need to defend ourselves against getting duped. Keeping track of good and bad news requires us, as readers, to do a little legwork. Here’s how:

**LET’S GET CRITICAL: 4 TIPS FOR EVALUATING NEWS**

**1. Vet the publisher’s credibility.**

* **Would the publishing site meet academic citation standards?** Just because a site is popular among your friends does not mean its content is accurate.
* **What is the domain name?** Be wary of unusual top-level domain names, like “.com.co.” A second-level domain like “abcnews” may appear credible. But note that abcnews.com.co is a different and illegitimate site, though designed to appear similar to the original.
* **What’s the publication’s point of view?** Read the “About Us” section for more insight into the publisher, leadership, and mission statement. Also, confirm that you have not stumbled upon a satirical news site, like the Onion.
* **Who is the author?** Has he or she published anything else? Be suspicious if the byline, which names the author, is a celebrity writing for a little-known site or if the author’s contact information is a G-mail address.

**2. Pay attention to quality and timeliness.**

* **Do you notice splling erors [sic], lots of ALL CAPS, or dramatic punctuation?!?!?!** If so, abort your reading mission. Reputable sources have high proofreading and grammatical standards.
* **Is the story current or recycled?**Make sure an older story isn’t being taken out of context.

**3. Check the sources and citations.**

* **How did you find the article?** If the content showed up in your social media feed or was promoted on a website known for clickbait, proceed with caution. Even if the information was shared by a friend, be sure to follow the steps below to vet the publisher’s credibility.
* **Who is (or is not) quoted, and what do they say?** If you notice a glaring lack of quotes and contributing sources, particularly on a complex issue, then something is amiss. Credible journalism is fed by fact-gathering, so a lack of research likely means a lack of fact-based information.
* **Is the information available on other sites?** If not, then it’s very likely that the journalistic jury is still out on whether this information is valid. Library databases are a great resources for confirming the credibility of information—check out [Harvard Library's list of public resources](http://guides.library.harvard.edu/fake).
* **Can you perform reverse searches for sources and images?** By checking cited sources, you can confirm that the information has been accurately applied and not altered to meet the author’s point of view. The same goes for images. In an era of Photoshop magic, you can’t always believe what you see.

**4. Ask the pros.**

* **Have you visited a fact-checking website?** There are many good ones, like [FactCheck.org](http://factcheck.org/), [International Fact-Checking Network (IFCN)](http://www.poynter.org/category/fact-checking/), [PolitiFact.com](http://politifact.com/), or [Snopes.com](http://snopes.com/). Do your own detective work and feel more confident in being able to identify fact vs. fiction.

[**https://www.summer.harvard.edu/inside-summer/4-tips-spotting-fake-news-story**](https://www.summer.harvard.edu/inside-summer/4-tips-spotting-fake-news-story)

**The virtual vloggers taking over YouTube**

*From Japanese anime characters to Barbie, virtual YouTubers talk and act just like people — and they could change the way we all interact forever.*

A young Japanese woman sporting a giant pink bow and white opera gloves looks into the camera and gleefully greets her YouTube audience. She’s about to try and solve a puzzle.

Before diving into the game, she boasts with a smile: “Well, compared to all you humans, I can clear it much faster. No doubt about it!”

Yes, this YouTube personality isn’t a real person. While she’s voiced by a human, she’s a digital, anime-style cartoon. Her name is Kizuna Ai, and she has more than two million subscribers to her channel. She’s the most-watched “virtual YouTuber” on the site.

Kizuna Ai is part of an emerging trend where 3D avatars – rather than humans – are becoming celebrities on YouTube, with dedicated fanbases and corporate deals. It’s becoming so popular that one company is investing tens of millions in “virtual talent” and talent agencies are being established to manage these avatars.

It’s a movement that has big implications for the future – it could change how brands market their products and how we interact with technology. It could even let us live forever.

**They act and sound just like humans**

Usually, vloggers are people who speak directly into the camera to their fans, sharing things like beauty tips, product reviews and pop culture rants. But in the past year they have had to contend with “VTubers” like Kizuna Ai.

“We saw this start to take off right at the end of 2017… and it’s continued to grow,” says Kevin Allocca, head of culture and trends at YouTube. He points to Kizuna Ai’s channel as an example of the spike in VTuber popularity: it had around 200,000 subscribers last December, but well over two million just 10 months later.

Google’s Earnest Pettie says the amount of daily views of VTuber videos this year is quadruple last year’s figure. And while there’s no easy way to measure exactly how many VTubers there are, User Local, a Tokyo-based web analytics site, counts at least 2,000.

These include Nekomiya Hinata, a peach-haired character who plays combat video games, sprinkling in niceties in Japanese while gunning down foes. Another, Ami Yamato, is a British virtual vlogger based in London who has a penchant for Starbucks and strolls around in the “real” world, occasionally alongside live humans. She's been vlogging since 2011.

This isn’t yet a global trend – Allocca says VTubers are popular mostly in Japan. But in that country, the futuristic videos have got the attention of companies, keen to help these characters find popularity beyond YouTube.

**A new industry?**

Gree, one of Japan’s biggest mobile app developers, plans to invest 10bn yen ($88m) over the next two years into developing virtual talent, creating more live-streaming opportunities, building filming and animation studios, and giving creators resources.

“We believe that human beings need avatars beyond nicknames and profile pictures,” says Gree spokesman Kensuke Sugiyama. “Although virtual talent is currently only a niche area of entertainment, we believe that attractive 3D avatar characters and their activities in virtual worlds will take people to the next stage of the internet.”

Sugiyama says that as virtual and augmented reality technologies continue to develop, more vloggers and internet users could transform into fantastical and colourful characters – which in turn could become brands themselves.

It’s not just Gree, either. Kao, a Japanese cosmetics and chemicals company, “hired” VTuber Tsukino Mito at a live event in Tokyo to appear on a washing machine’s smart screen to sell laundry detergent. The Ibaraki prefectural government created a virtual influencer last month to appear in tourism campaigns, and Kizuna Ai herself was selected by the national tourism board to appear in videos to lure foreign visitors to Japan.

This demand is driving associated industries: a talent agency in Japan launched in April that caters exclusively to virtual avatars. It’ll help clients organise events, video collaborations with other creators and more.

How did we get here?

**A star is ‘born’**

An early adopter of this trend is a character that’s almost 60 years old.

Barbie, the doll that has appeared across toy lines and TV programmes for decades, made her own virtual vlogging debut back in 2015, before the rise of the Japanese VTubers.

“Hi – uh, OK, let’s see, where should I start?” Barbie says as she leans back into her seat after switching on a webcam.

“My name is Barbie Roberts, I have three sisters and we live in Los Angeles – well, Malibu, but I’m originally from Wisconsin. We moved here when I was eight years old.” She sounds and looks like many other teen vloggers on YouTube. She talks about everything from personal style, to more complex topics like why girls say “sorry” so much.

California-based toy company Mattel, which owns the Barbie brand, noticed the rise in popularity of vlogging and saw an opportunity to reach kids who want to buy Barbie products.

“Barbie puts out two vlogs a month and it takes about four weeks for each new episode,” says Lisa McKnight, senior vice president and global general manager for Barbie. “A team develops each script based on topics that are relevant to a girl and authentic to Barbie the character – some vlogs tackle relevant and cultural conversations, and some vlogs play on a YouTube trend.”

Whether it’s Barbie or Kizuna Ai, many VTubers use similar technology to transform a human performer into a digital influencer.

**How YouTubers transform**

Here’s how it often works. First, an actor stands in a studio and her head, elbows and hands are outfitted with motion trackers. As the actor moves, her motions are recorded by software that recreates full body actions from just these handful of trackers. These actions are then mapped over the shape and proportions of an animated character, which can finally be rendered on a background or live-streamed.

Meanwhile, a professional voice actor or human vlogger supplies the character’s speech.

The teams behind many VTubers don’t like to give away much more about how characters like Kizuna Ai come to life. In fact, sometimes the team themselves refer to their creations as though the characters are real people.

“All we can say is that we met each other through destiny two years ago,” says Masashi Nakano, co-founder of Tokyo-based Activ8, the digital production company that brings Kizuna Ai to life.

While some content creators keep their process secret, other companies producing similar content, like Gree, are more transparent. They’re working with IKinema, a UK-based animation company that provides software to clients in a number of fields to produce animated or virtual reality content. (For example, non-VTuber actors outside and inside Japan are increasingly using this kind of motion-capture technology as part of their performances in film and video games.)

Alexandre Pechev is CEO of IKinema. He says demand out of Japan for this kind of technology has dramatically increased over the past year, and that the company now works with dozens of Japanese content creators making virtual avatars.

He says this new brand of interactive, virtual characters is new and gives YouTube entrepreneurs an opportunity to create content that couldn’t exist on platforms like TV.

**How we’ll accept digital influencers**

So what’s the appeal?

YouTube’s Allocca credits communities that build around them. We see these around VTubers, who often hold live chats with viewers, and fan communities on Reddit and Wikia.

“There's a unique quality to the content that virtual YouTubers offer… it isn't directly tethered to the problems of a real individual or identity,” says Reddit user David Kim, who’s a contributor to the Virtual YouTuber subreddit. “It's got the intrigue of character writing with the lackadaisical feel of live, organic, self-driven content.”

“I would say that the biggest contributor to the rise of virtual YouTube is the huge audience outside Japan who normally have interest for Japanese media and culture, such as anime,” says another fan, Kit Hakansson.

The trend within Japan of preferring digital over live-action personalities can be traced back four decades, says Izumi Tsuji, a sociology and culture professor at Chuo University. Tsuji points to a famous Japanese sociologist, Munesuke Mita, who posited that as a result of the slowed economic growth following the global oil crisis in the 1970s, many in the nation might have developed a listlessness with reality that could last to this day.

“From the latter half of the 1970s, we Japanese lost a certain goal or future of our society,” Tsuji says. “We tended to love the world of fiction. From this period, we tended to love enthusiastically anime, [video] games and idols instead of realistic movie and music stars.” One example of this, Tsuji says, is Hatsune Miku, the famous holographic pop star in Japan whose voice is digitally produced.

Pechev says people choose to accept virtual YouTubers at face value. When we meet real people “what we see is their personality”, he says, not the internal workings. “We accept them as real human beings. I think the same happens at the moment with virtual YouTubers.”

Nowadays, we’re seeing more comfort in interacting with digital avatars in place of people outside Japan too.

Companies cashing in on the VTuber trend follow a similar pattern to those creating Instagram models to showcase various fashion brands. Last year, Apple announced the Animoji feature on iPhones that scans your face to create a cartoon animal avatar that uses your own facial expressions. IKinema’s Pechev says it’s a step towards accepting more complex digital characters.

“This is changing expectations. Our kids will be more comfortable to be communicating with avatars,” Pechev says. “It will be accepted in the future the same way users in Japan accept virtual YouTubers to be influential.”

**Could they replace human YouTubers?**

But why replace human vloggers in the first place?

After all, vlogging is one of the cheapest forms of making video – switch the camera on, talk, and upload. While there might be some editing involved, it doesn’t involve costly effects or set design. So why replicate a talking head with another – more expensive – version?

It’s because the virtual character can be used at scale in ways that human characters can’t: they can appear in video games and apps outside YouTube, and as VR and AR technology improves, they can even hold virtual reality concerts. (VTuber Kaguya Luna did just that earlier this year.)

American comedian duo Rhett & Link published a vlog that’s been viewed 2.5 million times, voicing concerns that virtual YouTubers could replace humans. After all, they never get tired. Their appearances can be changed on a whim. They never demand payment or more Patreon donations.

But never fear, humans – there are cheaper, lower-quality apps YouTubers can use on their smartphones to make virtual vloggers of themselves. FaceRig, a crowdfunded facial recognition app from Romania, is a cheap way for people to turn their facial expressions into digital cartoons and animals on their smartphone, similar to Apple’s Animoji.

This autumn, Gree is releasing a live-streaming application in which users can create a VTuber of themselves on their smartphone.

“Many people have the desire to ‘want to be characters’,” says Gree’s Sugiyama, pointing to the global popularity of cosplay at fan conventions. And VTubers’ success in Japan goes deeper than fandom, Sugiyama posits. “Japanese are not good at expressing themselves openly, and I think that there are many people who really want to send out [their message] to the world, but do not want to reveal their appearance.”

Pechev wonders just how far the digitisation of ourselves could go.

If this develops in the future, he says, we could train avatars to act like us without having to re-record our movements. “It doesn’t have to do 100% of what we do, or even 80%,” he says – a character could be programmed with our voice and just enough of our actions, so that it could interact with friends and family after we die. “It could interact with other virtual avatars, or real people. Can we live forever?”

Nakano of the Kizuna Ai team says something similar: “We would like to create a world just like Ready Player One,” he says, referring to the film and novel set in a massive virtual dimension.

What’s next for Ai-chan, as her fans call her? Nakano mentions TV adverts, a global music festival that’s held online in VR and becoming a top idol in the virtual world.

And for now, you can keep up with your favourite VTuber throughout their day-to-day life or buy T-shirts from their merch shop.

But as Sugiyama says of the VTuber trend – that it “will allow all human beings to be released from physical constraints” – it could be a matter of time before you become one yourself.

[**https://www.bbc.com/worklife/article/20181002-the-virtual-vloggers-taking-over-youtube**](https://www.bbc.com/worklife/article/20181002-the-virtual-vloggers-taking-over-youtube)