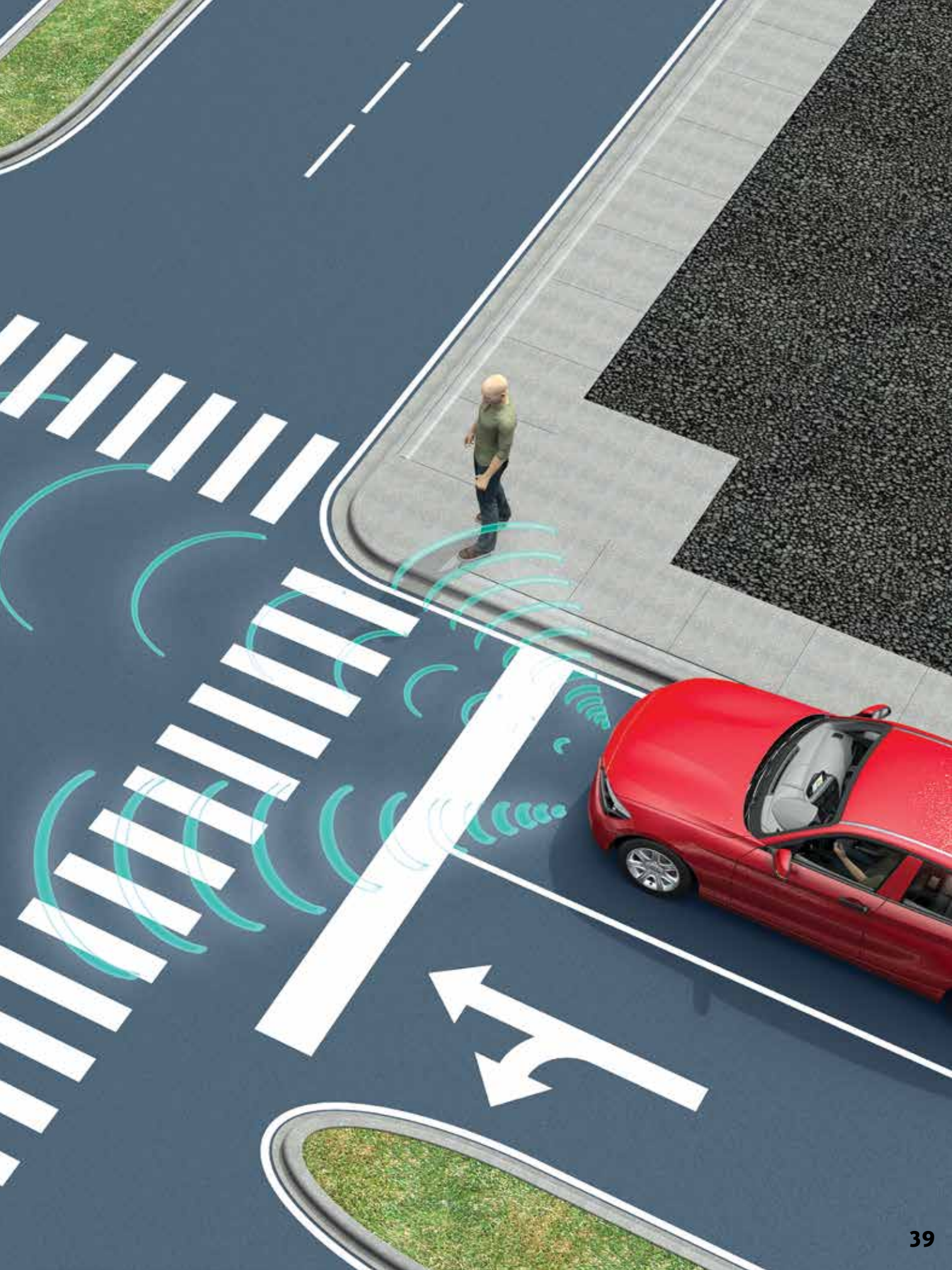# Moral Machines

*by Fiona Young-Brown*

## TOUGH QUESTIONS ABOUT SELF-DRIVING CARS

**H**ave you ever heard of the trolley problem? It is a set of imaginary scenarios used by ethicists—people who ask questions about right and wrong.

Here's one scenario. Say you are driving a car down a curvy mountain road when you suddenly meet a flock of sheep. You don't have time to stop. You could swerve into the mountain (and probably die). You could swerve in the other direction, off the side of the mountain (and definitely die). Or you could plow into the sheep (which will probably kill some sheep and damage your car, but you will likely be OK). Yikes. What do you do?

What if it is not a flock of sheep but a pair of bicyclists? Would your answer be different now?

Now imagine you are in heavy traffic and your car's brakes start to fail. If you keep going straight, you will go into the back of a semi-truck and probably die. But if you swerve to avoid the truck, you risk hitting an elderly woman or a group of children. What do you do?

These are extreme choices. But every day, drivers around the world have to make split-second decisions to avoid accidents. Often, they react without even having time to think. But what would a driverless car do? Self-driving cars are programmed to deal with all sorts of situations, from understanding traffic rules to planning the easiest route that avoids construction. These programming decisions are straightforward. Ethics, on the other hand, is not. How do you program a car to decide what to do in an accident? How do you choose which life is more valuable? And who gets to choose? Should it be the car owner? The manufacturer? The government? This is a problem that ethicists, lawyers, and car makers are all wondering about.

## The Moral Machine Test

In 2016, a group of professors at the Massachusetts Institute for Technology (MIT) created the Moral Machine. This is an online quiz that anyone can take. It measures people's responses to ethical problems. One of the quizzes focuses on driving. Sample questions include equivalents of the trolley problem. Should you hit the

# Quizzing Drivers

More than 40 million people took an online quiz that asked ethical questions about driving. But for most people these questions are purely what-if, not the stuff of real life.



What should the self-driving car do?
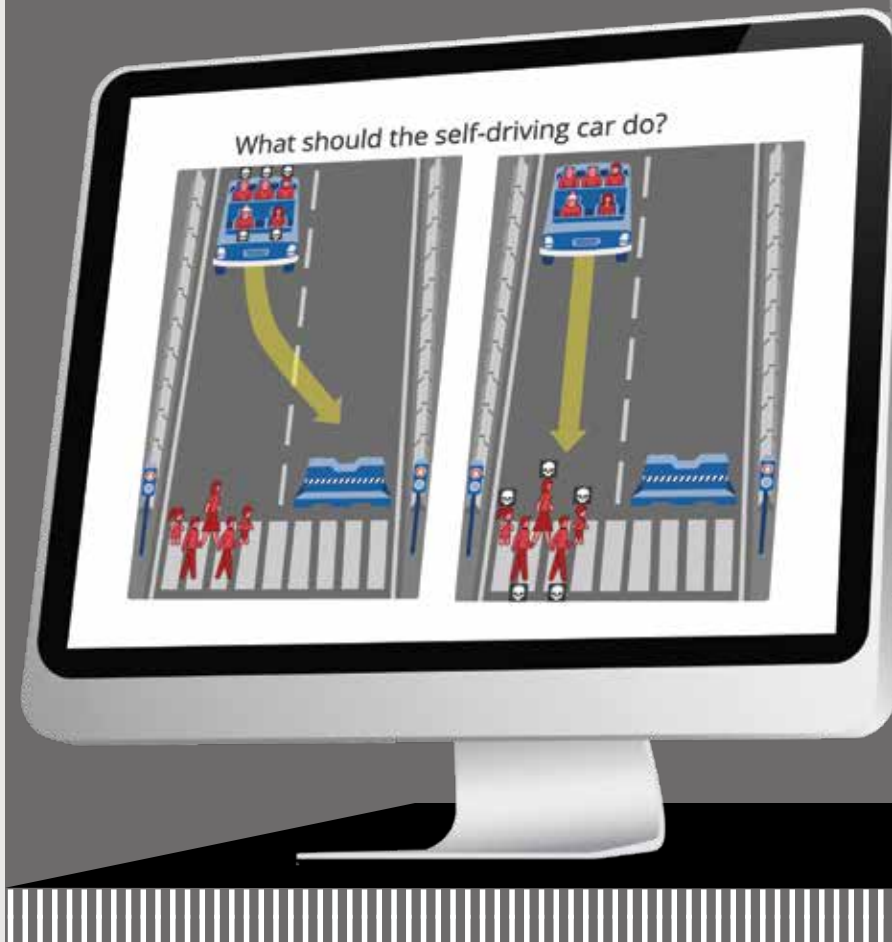
two pedestrians in front of you or swerve to hit a concrete wall? Does it depend on how many people are in the car? On whether the pedestrians are male or female? Young or old?

In total, more than 40 million people around the world have answered the 13 questions in the quiz. The results are interesting. The scientists found that there is no one "correct" set of answers. Everyone's answers are typically based on their own age, gender, culture, religion, and more. It might be possible to make a car that can drive by itself. But since everyone has different ideas about right and wrong, who should decide how a self-driving car behaves? The results of the Moral Machine test show that what might be considered the correct choice in one place would be wrong in another.

So who should decide? Some people say that the carmaker should program the car. Others say that perhaps each car owner should choose a set of programs when they buy the car. Others say governments should decide.

## Problems with the Trolley Problem

The trouble with the trolley problem and the Moral Machine test is that they are not really very accurate for the type of situations we will face in the real world. A car's sensors might be able to detect an object, as well as its size and whether it is moving. But they cannot currently interpret that information to understand if the object is a dog or a child, an old man or a young woman, or even if the person is or isn't wearing a safety helmet. So all of those detailed choices about whether it is better to hit the sheep or the bicyclist are not very realistic.

What should the self-driving car do?

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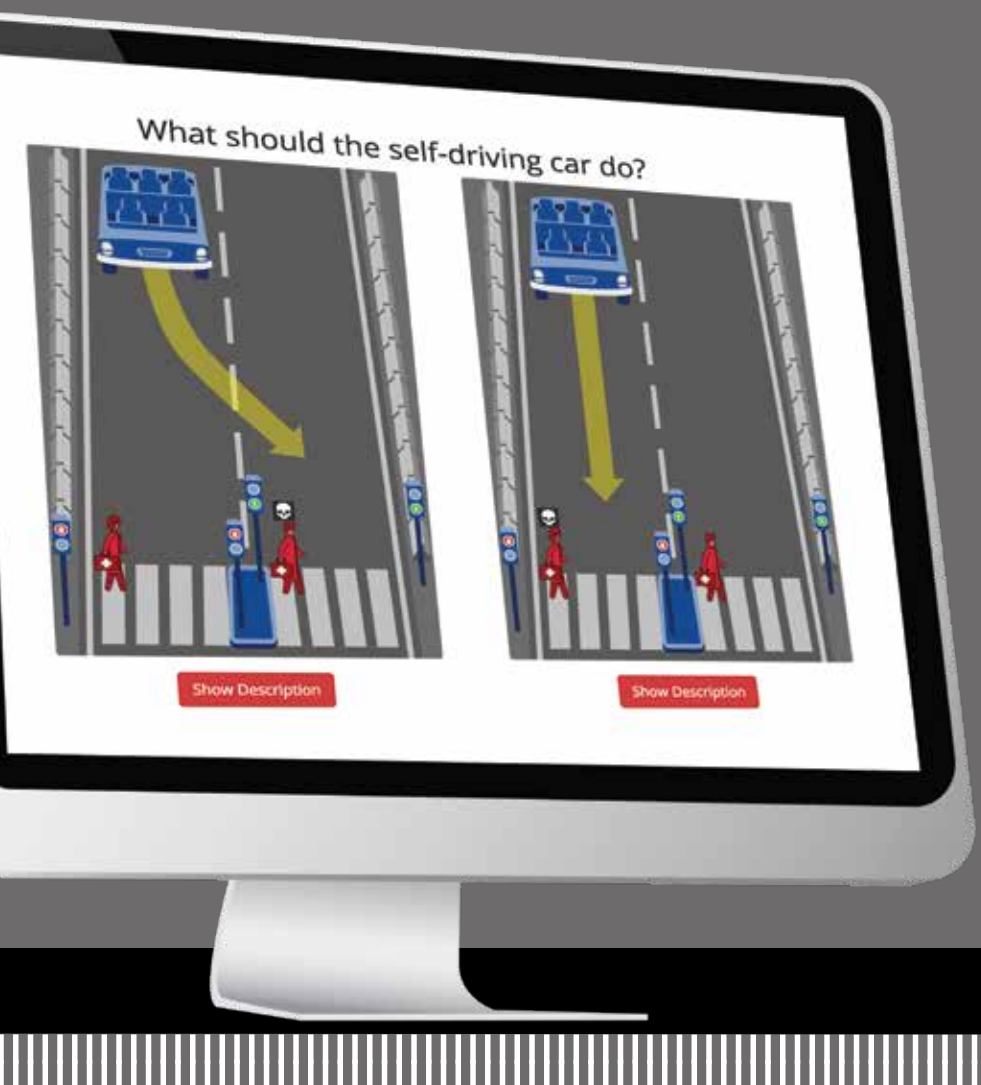
## The Ethicist Opinion

Patrick Lin teaches robotics and ethics at Stanford University. He says that it might seem easy to say that self-driving cars must follow certain rules, such as to minimize harm, but he says, "even that quickly leads to morally murky decisions." He gives an example: on one side of you is a motorcyclist wearing a helmet; on the other is a motorcyclist not wearing a helmet. If the car's computer tells it to minimize harm during a necessary swerve, that might mean hitting the person with the helmet. After all, they are better protected and so less likely to be hurt. But, Lin asks, aren't you then penalizing the responsible motorist? On the other hand, hitting the person without a helmet could be described as "street justice."

In 2015, German carmaker Daimler-Benz started to look at some of the issues surrounding self-driving cars. They published a lengthy report, and in one chapter, Lin discusses the ethical problems. He wrote that any type of decision-making based on age, gender, or any similar factor would be discrimination and therefore against professional codes of ethics. He explained that even the safest car runs the risk of having accidents, and that the responsibility for programming will lie with the manufacturer. Whether that decision is to protect passengers at all costs, or to avoid the most damage, or something else entirely, Lin says it is a no-win situation. Just as with human drivers, there will always be accidents where someone gets hurt.

## The Legal Opinion

But some experts say we don't need to worry about this problem. Bryan Casey is a fellow at the Center for Automotive Research at Stanford University. He teaches at Stanford Law School. Casey says that what a self-driving car does in a crash is not an ethical issue at all. Instead, it is a legal issue. If a driver has a collision now, the law will decide if he was driving dangerously or if it was truly an accident. If the driver was dangerously careless, he faces penalties, often a fine or jail. If a larger problem caused the crash, the manufacturer might be at fault. Either way, a long list of laws exists to determine what is wrong and right, and who is responsible. Casey says that will not change with the arrival of self-driving cars.

He disagrees with the idea that self-driving cars are robots that are capable of thinking and making decisions for themselves. So who will decide what cars should do? According to Casey, laws will tell carmakers what to do.

We expect self-driving cars to be very safe, safer than human drivers because computers can react more quickly. And indeed, a well-designed autonomous vehicle should be able to make dozens of calculations at a time, slowing down or speeding up in relation to its surroundings. Nevertheless, accidents can always happen. This means that drivers, manufacturers, and lawmakers will need to deal with new problems as they arise.

Driving laws have changed over time to reflect updates in technology. And they will keep changing. Remember the trolley problem? What would you have done in each situation? And even more important—how would you decide what is right or wrong for a car without a driver?

**Fiona Young-Brown** is a writer from England who now lives in Kentucky. She is a fan of science-fiction movies, especially those with cars that can drive themselves!