

# The big question of 'how physics makes us free'

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Can it really be that everything you do is determined by facts that were in place long before you were born?

This is the question tackled by Jenann Ismael's book "How Physics Makes Us Free," published recently by Oxford University Press.

Ismael, a professor in the University of Arizona Department of Philosophy, said she is drawn to philosophical problems that interest the general public—hence the allure of free will, which has been discussed by academics and armchair philosophers for centuries.

When Isaac Newton wrote "The Principia" in 1687, he ushered in a new scientific era in which laws of nature could be used to predict the movements of matter. Newton argued that if we know the positions and momenta of particles that constitute any system, and we know all the forces that are impinging on them from the outside, we can predict with certainty what that system will do.

Newton's physics poses a challenge to our self-understanding, however, for the same laws that keep airplanes in the air tell us that in principle it is possible to predict what each of us will do every second of our entire lives, given the early conditions of the universe.

"There is an apparent clash between determinism and our sense of ourselves as guiding our lives," Ismael said. "The reason you stay up all night when you have a really difficult decision to make is because you

have this conviction that it is all decided in the here and now. It's not a done deal."

Even though Ismael rejects the idea that human freedom really is incompatible with determinism, she says it isn't for the reasons usually cited, such as the complexity of humans.

"When it comes to more complex systems, predictability is out the window," Ismael said. "It is not just that these systems have too many parts, and the influences on them in the past are too many and varied to account for. It's that at every point, new influences from different sources come into play."

According to Ismael, the fact that predicting [human behavior](#) would be impossible is beside the point. In theory it would still be possible, which violates most people's notions of being in charge of their fate.

Some people are not worried by the apparent clash between free will and determinism because they think that we are not just physical things, so those laws don't apply to us. Ismael disagrees with this rationale: "Our bodies are surely material beings subject to natural laws."

A third reason that one might not be troubled by determinism is that physics has progressed since Newton.

"Those who know something about physics will wonder why I'm talking about the problem at all," Ismael said. "Newtonian mechanics is outmoded physics, and our best current microscopic theory—quantum mechanics—is not deterministic. But those who actually know a little quantum mechanics will see that the sort of indeterminism that quantum mechanics incorporates does not seem to help."

Ismael said the indeterminism introduced by [quantum mechanics](#) seems

to be effective at scales too small to make a difference to human behavior and involves random and [unpredictable events](#). And anyway, the fact that our behavior may be partly determined by random and unpredictable events does not get at the heart of what we mean when we say we have free will.

In her book, Ismael tries to describe what it means to be free and to break down the arguments that attempt to establish that it is impossible. The first part of the book examines how humans fit into the natural order. The second part turns to human actions.

Ismael shows how it is possible for [complex systems](#) to emerge in a deterministic setting that regulates the effect of the environment on their behavior, and suggests that the way in which human beings do that gives them a special kind of freedom. The key is to see that a human being is not simply responding in a fixed way to an external stimulus, but making decisions. And every time a human being makes a decision, she brings to bear on her behavior a set of beliefs, memories and goals that have been built up over a lifetime of experience and that are uniquely her own.

Ismael uses the word "soul" in her book, but steers clear of suggesting it implies that "we are spiritual nonphysical beings."

"We tend to think of the soul as the bearer of a person's identity," Ismael said. "I think that is compatible with a purely physical conception of oneself. Look at how magical nature is and physics is that it can produce a rich mental life with all of the autonomy of control that we have over our behavior."

Provided by University of Arizona

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