6. The Determinist Question and Modern Science

Many people wonder why worries about determinism persist today, when universal determinism is no longer accepted even in the physical sciences, which were once the strongholds of determinism. In the eighteenth

century, a great physicist, the Marquis de Laplace, imagined that a superintelligent being (often called Laplace's Demon), knowing all the physical facts about the universe at one moment and applying Newton's laws of motion, could know everything that is going to happen in the future, down to the minutest detail.

This Laplacian or Newtonian vision of universal physical determinism was taken for granted by many scientists and philosophers until the end of the nineteenth century, but it can no longer be taken for granted today. You are probably familiar with the claim that modern quantum physics has introduced indeterminism or chance into the physical world. Much of the behavior of elementary particles, it is said, from quantum jumps in atoms to radioactive decay, is not precisely predictable and can be explained only by statistical, not deterministic, laws. We are also told that the uncertainty and indeterminacy of this world of quantum physics, according to the standard view of it, is not due to our limitations as knowers, but to the unusual nature of elementary particles themselves, such as protons and electrons, which have both wavelike and particle-like properties. No superintelligence (not even God perhaps) could know the exact positions and momenta of all the particles of the universe at a given moment because the particles do not *have* exact positions and momenta at the same time (the Heisenberg uncertainty principle); hence their future behavior is not precisely predictable or determined.

One might think these indeterministic developments in modern physics would have disposed of philosophical worries about free will. Why be concerned that free will conflicts with determinism if determinism is not even true in the physical world? But the interesting fact is that despite these developments in physics, worries about free will did not go away in the twentieth century. Concerns about determinism of human behavior persist to this day, and debates about free will have become more heated than ever. Why is this so? There are four reasons why indeterministic developments in modern physics have not disposed of traditional concerns about free will and determinism.

First, the new quantum world of elementary particles is as mysterious as free will itself, and there is still much debate about how to interpret it. Standard views of quantum physics hold that the behavior of elementary particles involves chance and is undetermined. But these standard views have been challenged; and there exist alternative interpretations of quantum theory that are deterministic.[1] These alternative interpretations are the minority view among physicists at present, and they are controversial. But they cannot be ruled out. There is also the possibility that modern quantum physics will one day be superseded by a more comprehensive theory that

is deterministic. So the question of determinism in the physical world is not finally settled. But it is true that modern physics does gives us more reason to believe that indeterminism and chance might have a more significant role to play in the physical universe than did the classical physics of Newton and Laplace. So there may be more room for free will in nature, though this is not guaranteed.

But there is a second problem. Suppose it were true that the behavior of elementary particles is not always determined? What would this have to do with *human behavior*? Contemporary determinists often point out that, while quantum indeterminacy may be significant for elementary particles, such as electrons and protons, its indeterministic effects are usually insignificant in large physical systems such as the human brain and body.[2] Complex physical systems involving many particles and higher energies tend to be regular and predictable in their behavior, according to quantum physics itself. Thus, modern deterministic, such as Ted Honderich, argue that we can continue to regard human behavior as determined "for all practical purposes" or "near-determined," whatever the truth may be about electrons and protons. And this is all that matters in free will debates.

A third point complicates matters even further. Suppose for the sake of argument that quantum jumps or other undetermined events in the brain or body *do* sometimes have large-scale undetermined effects on human behavior. How would this help with free will? Suppose a choice was the result of a quantum jump or other undetermined event in a person's brain. Would this be a *free* or responsible choice? Such undetermined effects in the brain or body would happen by chance and would be unpredictable and uncontrollable, like the sudden occurrence of a thought or the jerking of an arm that one could not predict or control. Such an effect would be quite the opposite of what we take free and responsible actions to be.

A similar objection was made against the ancient Epicurean philosophers, who had argued that the atoms must "swerve" in chance ways if there was to be room in nature for free will. How, asked the critics, would chance swerves of the atoms help to give us free will? It seems that undetermined events happening in the brain or body would occur spontaneously and would be more of a nuisance, or a curse, like epilepsy, than an enhancement of our freedom. If free will is not compatible with *determinism,* it does not appear to be compatible with *indeterminism* either, since indeterminism would seem to be mere chance.

To these considerations, we can add a fourth and final reason why indeterministic developments in modern physics have not disposed of worries

about free will and determinism. At the same time that determinism has been in retreat in the physical sciences in the past century, developments in sciences other than physics—in biology, biochemistry, and neuroscience, in psychiatry, psychology, and other social and behavioral sciences—have been moving in the opposite direction. These other sciences have convinced many persons that more of their behavior than previously believed is determined by causes unknown to them and beyond their control.

Developments in sciences other than physics that suggest determinism have been many, but they surely include a greater knowledge of the influence of genetics and heredity on human behavior. (Note the controversy caused by the recent mapping of the human genome, which naturally arouses fears of future control of behavior by genetic manipulation.) Other relevant scientific developments have raised more questions. We now have a greater awareness of biochemical influences on the brain: hormones, neurotransmitters, and the susceptibility of human moods and behavior to different drugs that radically affect the way we think and behave. The advent of psychoanalysis and other theories of unconscious motivation have proposed new ways of thinking about the human brain, no less than the development of computers and intelligent machines that can do many of the things we can do even though they are preprogrammed (like Deep Blue, the chess master computer). Comparative studies of animal and human behavior have further enriched our understanding, suggesting that much of our motivation and behavior is a product of our evolutionary history, and helping us to see the influences of psychological, social, and cultural conditioning upon upbringing and subsequent behavior.

It is difficult not to be influenced by these scientific developments, which we can read about in the newspapers every day. To be sure, these newly discovered influences on our behavior do not prove definitively that we lack free will. There may still be some leeway for us to exercise our free will in the midst of all the biological, psychological, and social influences upon us. But these new scientific developments in fields other than physics do show why worries about the determinism *of human behavior* persist in contemporary debates about free will, despite indeterministic developments in physics. And continuing worries about determinism of human behavior make the second pivotal question we are going to address (in the next chapter) all the more important, namely, the Compatibility Question: does determinism really conflict with free will, or are the two compatible? If there really is no conflict between free will and determinism, as many modern thinkers believe, then we do not have to worry about all these new scientific threats to our freedom. For we could still be free and responsible, even if determinism should turn out to be true.

Notes

Chapter 1

1. For discussion of various interpretations of quantum physics in relation to free will, see essays by Robert Bishop and David Hodgson in Robert Kane, ed., *The Oxford Handbook of Free Will* (Oxford: Oxford University Press, 2002).
2. For example, Ted Honderich, *How Free Are You?* (Oxford: Oxford University Press, Clarendon Press, 1993).