

## A scientific model for free will is impossible

In his reply (1) to the letter by Anckarsäter (2) commenting on his original article (3), Anthony Cashmore expresses the view that a belief in free will would require at least a molecular model as a justification. However, such a model cannot exist, as I will explain in the following.

The behavior of an agent possessing free will is by definition unpredictable. In contrast to stochastic phenomena, it is not even possible to predict all observable statistical properties of the behavior of such an agent. A molecular model for free will, or in fact any scientific model for free will, would thus have to contain some property labeled as unpredictable.

However, the scientific method that we apply today, which is based on the formulation of hypotheses that are then tested by observation and experiment, cannot accommodate unpredictability. The statement that “property X is unpredictable” cannot be tested by observation and is thus not a scientific hypothesis. Moreover, even if property X itself is observable, its supposed unpredictability makes it impossible to formulate scientific hypotheses about it. As a consequence, free will cannot be integrated into any scientific model.

The only way in which the scientific method could resolve the question of the existence of free will is by showing its nonexistence. This would require a scientific model that permits a complete prediction of human behavior, or at least of all its observable statistical properties. However, as Anckarsäter pointed out (2), we are very far from having such a model.

Cashmore goes on to claim that in the absence of a good reason to believe in free will, we should believe in its nonexistence. A pragmatically minded person would counter that, in the absence of solid evidence to the contrary, we should trust our perception, which tells us that we do have free will. However, neither point of view can claim science as its justification. For a believer in the scientific method, the only coherent point of view is agnosticism about the existence of free will.

### **Konrad Hinsén<sup>1</sup>**

*Centre de Biophysique Moléculaire, 45071 Orléans, France; and Synchrotron SOLEIL, Saint Aubin, 91192 Gif-sur-Yvette, France*

1. Cashmore AR (2010) Reply to Anckarsäter: A belief in free will is based on faith. *Proc Natl Acad Sci USA* 107:E115.
2. Anckarsäter H (2010) Has biology disproved free will and moral responsibility? *Proc Natl Acad Sci USA* 107:E114.
3. Cashmore AR (2010) The Lucretian swerve: The biological basis of human behavior and the criminal justice system. *Proc Natl Acad Sci USA* 107:4499–4504.

Author contributions: K.H. wrote the paper.

The author declares no conflict of interest.

<sup>1</sup>E-mail: research@khinsen.fastmail.net.