

There was a time when people believed that mathematics had an objective, outer existence: that it was the very foundation of the universe, transcending the existence of human beings and all other beings except God. That belief began to be eroded in the 19th century when Carl Friedrich Gauss and other leading mathematicians started to doubt that the traditional geometry of Euclid – which since Greek times had been regarded as the true geometric description of space – was anything more than a construct of the human mind. Some of those mathematicians devised new and equally valid systems of geometry. Later, in the 20th century, the Austrian mathematician, Kurt Gödel, showed that within any logical mathematical system there are propositions that it can neither prove nor disprove.<sup>3</sup> Even in arithmetic, we cannot be certain that the basic principles will not give rise to contradictions. Finally, at the turn of the millennium, the cognitive scientists George Lakoff and Rafael Núñez demonstrated that all theorems proved by human mathematicians are part of a human mathematical conceptual system, and there is no way of knowing whether they have any objective truth.<sup>4</sup> This applies not only to mathematics, of course, but to logic generally.