

Preface

“If one tries to discover something new in science, one should avoid following well-worn paths. Along them there is nothing to be gained. Instead, one has to leave the road and to cross untrodden spaces”.

This advice was given in the Age of Enlightenment by the German physicist Georg Christoph Lichtenberg. It contains a valuable nugget of truth about the nature of scientific progress. In fact, the ascendance of science in modern times has only been possible because science, again and again, has crossed borderlines to abandon its well-trodden paths.

Such border crossings are also the subject of this book. It asks the provocative question of the computability of the world. This is done by reference to the all-embracing phenomena that—in the traditional view—seem to lie beyond rigorous scientific computability: life, time and history. Behind this hides the deeper question of whether the complex phenomena of our world, which are often loaded with sense and meaning, can become the subject of an abstract science that is based on experiments and mathematics.

How far can the existence and the colourful variety of living beings, the unique character of information and language, the compelling beauty of Nature, the mysterious essence of temporality and the singular historicity of the world be explained and understood within the framework of the exact sciences—which by their very nature are designed to investigate comparatively simple phenomena of our world? It is obvious that the philosophical question of the possibilities and limits of human perception and knowledge will always resonate throughout this set of problems.

The chapters of this book are based upon lectures that I have given on various occasions for interdisciplinary audiences. Each chapter has been thoroughly revised and attuned to the others, with further material added, to make up (I hope) a unified whole. Nevertheless, one has to regard this book, to use another phrase of Lichtenberg, as an “experiment with ideas”. As is characteristic of any true

experiment in science, the outcome will ultimately only teach us which of our ideas was wrong. This also must be seen as the consequence of an open-minded science, which is permanently changing and progressing.

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