Olga Pombo, **Juan Manuel Torres**, **John Symons**, and **Shahid Rahman**, eds.
Special Sciences and the Unity of Science.
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This volume collects a number of papers on the topic of special sciences and reduction and is the second in a series of two volumes. The first one dealt in important measure with the concept of unity of science as developed by Neurath; in this second volume, the scope widens to include more general reflections on the nature of the unity of the sciences. The volume at hand contains contributions from philosophers as well as scientists: it covers a wide range of special sciences from astronomy and physics to Freudian theory and the cultural sciences.

The unity of the sciences is gaining renewed attention in the philosophy of science, with a number of recent papers arguing for a re-evaluation of Nagelian reduction, as well as recent work arguing for a Neurathian concept of unity. The re-evaluation of Nagelian reduction, and the concurrent revival of a Neurathian approach to the unity of science, has consequences for the unity of science as well as for ontology. Thus the essays collected in this volume are of interest to philosophers working in these areas.

The approach taken in this book fits within the broader context of bringing fresh ideas to an old debate. The book contains a collection of critical essays as well as case studies from the special sciences meant to assist in determining what makes the special sciences 'special'. In addition, some papers provide refreshing new perspectives on how these interrelationships between the sciences, scientific theories, and philosophy might work by incorporating an approach that gives due weight to actual scientific practice.

With some of the chapters written by scientists rather than philosophers, there is the opportunity to bring the philosophical debate up to date with the actual science. Some indeed do, as for example chapter 5, on 'water', by Perera and Sokolic. This is rather light on philosophy but updates a philosophical audience with some recent recent research on mesoscopic structures in complex interactions between water molecules and their environment as well as on the chemical effects of dynamical structures that are somewhat unique to water. For philosophers of chemistry who can grasp the science, the exposition on offer may open new avenues of research.

The essays in this book also have the potential to open up new philosophical perspectives by taking the discussion beyond the somewhat stale debate between 'reduction' and 'plurality' and by creating new approaches to the topic of unity. In this vein, the contribution by Beggs, Costa, and Tucker (chapter 4) argues that the capability for computation that is inherent in many physical theories has a unifying effect: the theory of computation abstracts from the actual 'implementation' of the physical system, and the characteristics of the computational system that characterises a physical system can be studied in isolation. As the authors note, this area is currently studied by computer scientists, mathematicians, and physicists as well as philosophers. Philosophers thus find themselves part of a multivaried endeavour, which is a welcome trend, as

it tends to run counter to unproductive ovespecialisation.

Another example is J. R. Croca's contribution (chapter 3) on Eurythmy – the principle of the right path – in which Croca argues that this principle is a unifying principle in physics. This is indeed true, although the principle is better known under its more common name 'principle of least action'. As such, the principle is an example of a 'law of nature' – a generic principle from which a variety of theories ranging from Snell's law of refraction through to quantum mechanics may be developed. Croca's article leaves open the question of whether this principle is part of the 'science unity' or 'science unification' (one suspects the latter).

Other contributions that fall in this category are the ones in chapters 6 through 9, which focus on examples from biology. This section of the book is one of the stronger ones, with a unifying topic and a wide range of philosophical viewpoints, ranging from evolutionary epistemology to the interaction between computer science and biology. Being no biologist, I find it hard to critique the scientific aspects of this section, but as a philosopher, I welcome the viewpoints of multiple sciences, and the entry of relatively new philosophical viewpoints such as evolutionary epistemology into this discussion.

The 17 chapters in this book thus provide a number of refreshing viewpoints – in important measure, ones that arise from actual science – to an old philosophical debate. Having said that, the freshness of some of the contributions could be bolstered by enhanced philosophical rigour. According to the introduction, a key to the material is provided by the distinction between 'science unity' and 'science unification'. The first aims at identifying factors common between the sciences, such as objects and methods, whereas the latter is concerned with the determination of the factors that allow us to construct connections between theories.

It is somewhat unfortunate that this distinction is not followed in the papers that follow. The authors of the contributions rarely engage with the theme in any explicit manner, and the relatively light editing done by the editors does not bring much further elucidation to this 'sharp' distinction, as the editors call it in their introduction. It makes it hard to discover a common thread in the papers in this collection. This omission is focused even sharper because in the introduction to the volume the editors float an interesting idea: that the *appearance* of scientific disunity (3) 'is an unavoidable consequence of the scientific gradual integration process'.

A useful addition to this volume would have been a closing essay which tied together the strands of the different chapters and which could also have put some flesh on the bare bones of this last idea. Such a closing chapter could moreover have mapped the various contributions in the overall field of discussion and provided a defence for the very interesting philosophical thesis regarding scientific unity and unification. I regret that the editors have not taken that opportunity. As it stands, the lack of such a chapter leaves the entire subject somewhat open and the various contributions in this volume disconnected.

The light editing is also in evidence in significant disconnects in style and in the presence of a number of grammatical and typographical errors in some of the contributions. Overall, these prove something of a distraction.

Because the book is lacking a strong overall coherence, it is likely that most readers will find only some of its contributions appealing. That is an expected side-effect of edited collections, although in the present case the appeal of even a few chapters merits a look at the rest. Overall, this varied volume should attract a broad audience. The papers contain an interesting balance between scientific depth and philosophical speculation on how the unity of the sciences might work in some actual cases, although it must be said concerning all of them that more philosophical work in this area is necessary.

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