

## Life and Language Beyond Earth

Have you ever wondered whether we are alone in the universe, or if life forms on other planets might exist? If they do exist, how might their languages have evolved? Could we ever understand them, and indeed learn to communicate with them? This highly original, thought-provoking book takes us on a fascinating journey over billions of years, from the formation of galaxies and solar systems, to the appearance of planets in the habitable zones of their parent stars, and then to how biology and, ultimately, human life arose on our own planet. It delves into how our brains and our language developed, in order to explore the likelihood of communication beyond Earth and whether it would evolve along similar lines. In the process, fascinating insights from the fields of astronomy, evolutionary biology, palaeo-anthropology, neuroscience and linguistics are uncovered, shedding new light on life as we know it on Earth, and beyond.

**Raymond Hickey** is Adjunct Professor at the University of Limerick, Ireland and former Professor at the University of Duisburg and Essen, Germany. His main research interests are varieties of English, language contact, variation and change and issues in phonology. Some of his recent publications include *Listening to the Past* (2017), *The Cambridge Handbook of Areal Linguistics* (2017), *English in Multilingual South Africa* (2020) and *The Handbook of Language Contact* (2020).

‘This book is a great read that grips you from the start – it’s an absolute Wunderkammer of enthralling facts and informed speculations that build the case around possible life and language on planets beyond our Solar System.’

**Kate Burridge, Professor of Linguistics at Monash University, Australia**

‘Raymond Hickey offers fascinating surveys of two very different fields: astronomy and linguistics. But his book is specially valuable and farsighted because these two topics may some day be linked: rapid advances in exobiology lead optimists to conjecture that extraterrestrials could be discovered this century.’

**Lord Martin Rees, Astronomer Royal**

‘This fascinating book discusses the question of the nature of the languages spoken by possible intelligent extraterrestrials in an engaging and interesting way. The book is impressively wide-ranging, covering cosmology, evolution, biology, linguistics and many other fields. This is the most thorough treatment of these issues I am aware of and it will certainly be of interest to anyone curious to find out more about these fascinating questions.’

**Ian Roberts, Professor of Linguistics at the University of Cambridge and IUSS Pavia**

‘Ray Hickey’s work has always surprised me in the ever-widening range of complex topics he’s tackled, but this book is a quantum leap beyond his earlier work. The story he tells here is amazing and along the way offers a crisp introduction to how linguists understand human language and our cognitive capacity for it.’

**Joe Salmons, Professor of Linguistics at the University of Wisconsin-Madison, USA**

‘This book takes us on a wondrous tour of the universe, as we explore exotic worlds and the alien civilizations that might flourish throughout our galaxy. By pondering the evolution of intelligence and language in a cosmic context, we are forced to rethink what it means to be human.’

**Douglas Vakoch, President of METI International, editor of *Xenolinguistics: Towards a Science of Extraterrestrial Language***

# Life and Language Beyond Earth

Raymond Hickey



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## Preface

The working title for this book, which as a linguist I had for a number of years, was ‘Language beyond Earth.’ But it became clear to me after a while that it would not be possible to discuss language without also considering life, the framework in which it is embedded. If one is looking beyond Earth then any questions about language can only be sensibly addressed after one has ascertained if life on planets elsewhere might be possible, what this life might be like and at what degree of development. Hence the present title, ‘Life and Language Beyond Earth.’

This book contains information from five large branches of science: astronomy/astrophysics, evolutionary biology, palaeoanthropology, neuroscience and linguistics. My area of academic expertise, my professional comfort zone, if you like, is the last of these but the goal of the interdisciplinary approach I have adopted here has meant that these other areas have had to be afforded roughly equal weight. So, this book can be seen to be about life beyond Earth and language beyond Earth, with a clear link between the two. The rise of human language, and hence speculation about similar systems of communication on other planets, is closely linked to the story of evolution on our planet and the appearance of our species, *Homo sapiens*. Our knowledge of this story is constantly changing as new fossils are found and techniques for genetic analysis are developed. No doubt, this will render many things said here out of date before too long, meaning that what the book offers is a snapshot of what we know now (mid-2022) and how our knowledge might develop in future.

Not written primarily for scientists, this book avoids technical discussions of scientific matters as much as possible while providing enough information to understand the issues at hand. However, a certain amount of terminology is unavoidable. The scientific terms used in the book are explained



## Preface

throughout (with pointers to the relevant pages in the index) and many are also given short definitions in the glossary at the end. That way it is hoped that readers can understand all the issues and concepts discussed here even if they have had no contact with them before.

Some readers may wish to pursue matters dealt with in this book at a later stage. To this end, a list of general and of linguistic references is given at the back to help them on their way. The notes for each chapter contain additional information which might be of interest to some readers but which would interrupt the flow of the text if included in the latter.

A book like this, and the literature on exoplanets and possible life on them in general, is about scenarios which are at present completely hypothetical. There is a lot of speculation here, but it is worth asking questions, even though one does not yet have answers – the questions themselves can set us thinking in directions which could well be insightful, indeed beneficial, at a future date. Whether the hypothetical situations described here will change in the near to mid-term future it is not possible to say. Whether intelligent life elsewhere will be discovered is currently unknown and this book is not about making predictions concerning that issue. Rather it is a realistic consideration of how life and language arose on Earth and how this might happen or have happened on exoplanets. It is something which cannot be ruled out and hence it is, in my opinion, a rewarding enterprise to think about what life forms beyond our Earth might be like and whether we could in principle communicate with them. What I am submitting here is input from a linguist, providing a perspective on the issue of exo-life which to date has not been offered in this form and which colleagues in other sciences will hopefully find useful as a complement to their own research.

When writing this book I got much valuable feedback from various people, especially from my colleague of long-standing, Prof. Laura Wright, who was interested in the project and supportive from the beginning. The publishers, Cambridge University Press, also commissioned several reviews, given the broad nature of the themes discussed. The anonymous reviewers were very helpful, especially ‘Reviewer D’, who read and commented on

two versions and whose detailed feedback was invaluable while moving towards the final version of the book. During the production of the book, Isabel Collins, Stephanie Taylor, Ruth Boyes and Zoë Lewin provided much assistance and expertise. Last but not least, my thanks go to Rebecca Taylor, Commissioning Editor in Linguistics at Cambridge University Press, for her unflagging patience and continuous encouragement.

# How to Use This Book

The current book has been written for anyone interested in the question of whether intelligent life forms beyond Earth exist and how such beings, if found on planets outside our Solar System, might engage in communication, namely what kind of language they might have.

If one were to ask what the narrative in this book is, what the common thread running through the various sections is, the answer would be assessing the likelihood that life forms beyond Earth exist and what they might be like in principle, going on what we know about how life and language evolved on our planet. To this end the book has been organised into six large sections, which strive to cover the main areas of overall relevance (see Table 0.1).

**Table 0.1 Structure of the book**

Part number	Part title	Intended readership
I	Introduction	All readers
II	The Universe We Live In	General readers, not necessarily for astronomers/astrophysicists
III	Our Story on Earth	General readers, not necessarily for evolutionary biologists and palaeoanthropologists
IV	The Runaway Brain	General readers, not necessarily for neuroscientists
V	Language, Our Greatest Gift	General readers, not necessarily for linguists
VI	Life and Language, Here and Beyond	All readers

Part I is an introduction in which I try to outline the basic questions about exolife, what we can justifiably assume about possible exobeings and what conclusions could be drawn from the detection of a signal from beyond our Solar System. The section closes with remarks on how science operates and how it comes to conclusions along with some thoughts on possible 'weird life.'

Part II is dedicated to recent astronomy and its technology, especially in relation to the discovery of exoplanets. This section is in a way the least speculative as the insights of astronomy are derived from concrete observations of extrasolar star systems and their planets. We know that there are thousands of exoplanets in our immediate galactic surroundings. The question is which of these, if any, could harbour life comparable to human life on Earth.

Part III is concerned with the evolution of life on Earth. This is important because obviously any life forms on other planets will have evolved from earlier, simpler forms, which will have evolved from simple, single-celled organisms. This holds no matter how far ahead of us exolife forms might be in any possible development away from their biological origins.

Part IV explores the assumption that, if there are beings on exoplanets, who are comparably intelligent to us and who could in theory contact us via some means of interstellar communication, the intelligence of such beings would have a physical substrate which is functionally and structurally comparable to our brains. But before we begin speculating about the brains of beings on exoplanets we should consider how ours developed, what consciousness is and how it may have arisen.

Part V is dedicated to the nature of human language. Here, general information is offered for readers who have not had any prior contact with linguistics. One of the essential issues addressed here is how the human language faculty – the ability to acquire and speak language – arose in the *Homo* species. How this compares with communication systems found in animals is also examined.

Part VI reviews all the major issues dealt with throughout the book. Just how similar might exobeings be to us – in their physique and physiology,



## How to Use This Book

in their sciences, in their societies, in their cultures – are questions which are examined critically. How likely is it that the pathways which we have taken in our evolution would be similar for beings on exoplanets, assuming that in some cases they will have developed languages, the precondition for any societies beyond Earth? And what are the chances that we might successfully communicate with such beings in the foreseeable future? This section is indeed quite speculative compared to the preceding ones. Many questions remain open, but it is important to ask them and start thinking about possible answers.

The discussions of language beyond Earth revolve around the issue of whether what we know about our world and the structure and origins of human language is likely to apply to beings on exoplanets as well. Depending on the answers presented to these questions readers can judge for themselves how likely beings with language are to exist beyond our Solar System. An essential distinction, which will appear repeatedly in this book, is that between the *language faculty*, the biological endowment all of us have which allows us to acquire language natively in early childhood, and *languages*, which are the outcomes of our using this language faculty.

For the discussions in this book I frequently talk about an exolanguage on an exoplanet, using the singular, as I am referring to a typical instance. But it is fair to assume that if there is an exoplanet with beings who have a language faculty then there would be many exolanguages on such a planet, assuming a large enough population with an attendant geographical distribution. Why can one assume this? The exoplanets, where we are likely to find intelligent exolife, would be so-called ‘rocky worlds’ with a mixture of land and sea. This would imply a complex geography on a planet, with continents, mountain ranges and large islands. In turn, this would suggest the existence of several societies in different parts of such a planet. Furthermore, the analogous history of societies on Earth would imply a similar diversification of languages arising on an exoplanet over time, comparable to the way languages split up and went their separate ways on Earth.

Many comments on life and language beyond Earth are embedded in the treatment of other topics throughout this book. These comments are contained in text boxes like the following whereas longer discussions have dedicated text sections.

### **WOULD LINGUISTICS EXIST AS A DISCIPLINE ON AN EXOPLANET?**

If exoplanets had highly structured societies in which branches of knowledge were dealt with in various disciplines, linguistics might well be one of these, though just what the discipline would be called and how it would be organised is completely unknown.

At the back of the book there is a glossary of the main terms used in discussions of life and language along with a comprehensive bibliography, which can be consulted when looking for further information about the issues discussed. The notes for each chapter offer more detailed information on individual points.

The topic of life beyond Earth has a long history to it. For anyone interested in this background I suggest consulting some literature on the matter; see the sections entitled Life beyond Earth and History of the Topic in the bibliography at the back of the book.