**General Content Learning Goals and Objectives of**

***Big History and the Future of Humanity, Second Edition***

**by Fred Spier (Wiley Blackwell 2015).**

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This is the first version of this document, in which all learning goals and objectives are purposefully formulated in terms of questions asked and addressed. By formulating the learning goals and objectives in such a way, it becomes immediately clear why certain aspects of big history are discussed. It also allows teachers and students to question these questions. This approach connects very well to the academic enterprise as a whole, which consists of questions asked and addressed in scholarly ways, based on the best available empirical evidence.

Any feedback that you may have that is helpful to improve this document will be greatly appreciated.

**General Learning Objectives**

1. How can we understand the history of big history as well as salient aspects of studying it, including its history? (Chapter 1)

2. How can we understand the proposed simple theoretical model underlying all of big history? (Chapter 2)

3. How can we understanding all of big history using this theoretical model? (Chapters 3-7)

4. What might this mean for the future of the universe, our solar system, Earth, life, and humanity? (Chapter 8)

5. What is the empirical evidence supporting all of this?

**A few remarks about discussing empirical evidence**

The more complex the universe becomes over time, the greater the variety of empirical evidence is that supports our scholarly interpretations. This makes it increasingly difficult to discuss specific empirical evidence in the book.

While it is comparatively easy to explain the empirical observations supporting big bang cosmology explained in Chapter 3, providing such detailed evidence and explaining for more complex situations soon becomes more difficult, because doing so would quickly overwhelm the story. This is especially, but not exclusively, the case for human history.

In consequence, while discussing big history, such empirical evidence is increasingly referenced to in the bibliography or the endnotes instead of discussing it in the main text. This inevitably implies that the story as told in the book is increasingly based on academic authority rather than on explicitly-discussed empirical evidence.

Yet because all aspects of big history are based on empirical evidence and scholarly interpretations, it is always possible to examine them as soon as doubts creep it. The references to books and articles in the bibliography are hopefully facilitating this, while also the Internet offers a great variety of such information.

These sources could be consulted as soon as the need makes itself felt to examine both empirical evidence, including the methods that were used to obtain it, and the scholarly interpretations that have come as a result.

**LEARNING GOALS PER CHAPTER**

**CHAPTER ONE**

This chapter offers an introduction to big history while describing some of the important aspects of how to study it. Big history is contrasted with current academic history by describing their respective histories.

The central questions discussed are:

* How do we study history? What are some of the implications?
* Which important questions have been asked, and answered, in all-encompassing traditional histories? What is this genre called in the textbook, and why?
* How can we understand the emergence of modern academic history?
* How can we understand the emergence of modern big history, and who were its major pioneers?
* What are little big histories?

**CHAPTER TWO**

In this chapter, a novel theoretical model for big history is presented that appears to be underlying all of history, in fact, every aspect of it.

The central questions discussed are:

* What are the characteristics of process-based history accounts?
* What are the central aspects of the theoretical model proposed?
* How, and to what extent, can this model help to explain big history?
* Can we measure these central aspects, and if so, how can the results be interpreted?
* What are possibilities and limitations of this model?

*As a result, major questions discussed in the subsequent chapters are:*

* Which forms of greater complexity did emerge and decline over time, ranging from the tiniest particles to the cosmos as a whole?
* How can we understand their dynamics, including the relatively autonomous theories explaining all of this?
* Which matter and energy flows were involved?
* What were the Goldilocks circumstances that made this possible?
* How does all of this relate to the Second Law of Thermodynamics, most notably the inevitable increasing disorder (entropy)?
* What were important aspects, and effects, of these processes?
* Which empirical evidence is supporting all these scholarly interpretations?
* What are major current problems in describing and explaining all of this?

**CHAPTER THREE**

In this chapter, major aspects of the emergence and change over time of the universe are examined, based on our most careful scholarly observations and interpretations.

The most important questions discussed are:

* Why do scientists think that the universe has a history?
* How old is the universe?
* When and how did the universe emerge according to the latest insights?
* How and when would the first particles and chemical elements have emerged? What are they, and what do they consist of?
* What is the empirical evidence supporting this big bang scenario?
* What are current major problems?
* How did the universe change over time?
* When and how would the first stars and galaxies have emerged? What did they consist of?
* How do stars work?
* How are the heavier chemical elements thought to have emerged that are major building blocks of our planet and ourselves? What are they, and what do they consist of?
* How did stars and galaxies develop over billions of years?
* What is the empirical evidence supporting all these views?

**CHAPTER FOUR**

In this chapter, the emergence and change over time of our solar system are examined, with increasing emphasis on planet Earth compared to its neighbors Venus and Mars. Also the emergence of life is discussed.

The most important questions discussed are:

* What is special about the position of our solar system within the Milky Way galaxy?
* How is our solar system thought to have emerged, and how did it change over time? What does it consist of now?
* How did Earth emerge and change over time? What did the very early Earth consist of, and what did it look like?
* What is special about Earth’s position within the Solar System, compared to the other planets?
* What is powering the rise of complexity on, or near, Earth’s surface?
* What is special about life?
* When may life have emerged, where, and how?
* What is the empirical evidence supporting all these views?

**CHAPTER FIVE**

In this chapter, the geological and biological changes over time on Earth’s surface are examined, interacting with its cosmic surroundings, all the way up until the emergence of humans.

The most important questions discussed are:

* What are the most important energy sources of Earth, and how did they change over time?
* How did Earth, and the moon, change over billions of years?
* How did, as a result, the biosphere change over billions of years?
* How have cosmic effects influenced Earth’s climate?
* Why do scientists think there is still liquid water on the surface of our planet?
* Which important changes of Earth’s surface happened over billions of years, and how does that process work?
* Which important changes can be discerned in the history of life, and how did that happen?
* How might brains and consciousness have emerged?
* What is the major empirical evidence supporting all these views?

**CHAPTER SIX**

In this chapter, the emergence and development of early humans are examined.

The most important questions discussed are:

* Where, and how, did the first early humans emerge?
* Which ecological circumstances appear to have favored their emergence and change over time?
* How did early humans make a living?
* How did humans change, over millions of years, into modern humans (*Homo sapiens*)?
* Which major changes in this process can be discerned? Which major inventions appear to have influenced this process, and how?
* When, and how, did humans migrate into new areas over millions of years, and where did they go?
* What happened to the rest of nature as a result of these changes?
* What is the major empirical evidence supporting all these views?

**CHAPTER SEVEN**

In this chapter, the last 10,000 years of human history are examined, linked to its biological, geological, and cosmic environment.

The most important questions discussed are:

* How did humans change from hunter-gatherers into the societies they form with each other today?
* What were major steps of this overall process of change in the ways humans harvested their matter and energy while changing their cultural regimes?
* Which ecological circumstances appear to have played a major role in these changes?
* What have been major changes that came as a result of each of these major developments?
* What happened to the biosphere as a result?
* What is the major empirical evidence supporting all these views?

**CHAPTER EIGHT**

In this chapter, the future of the universe, our planet, life, and, most notably, humanity are examined using the theoretical model put forward in the book.

The most important questions discussed are:

* What are the currently most likely scenarios of the future of the universe, our solar system, Earth, life, and humanity?
* Which major changes can we expect for humanity to take place in the near future?