Book Review

A review of *The Tree of Knowledge: The Biological Roots of Human Understanding*, by Humberto R. Maturana and Francisco J. Varela, 1998 [1987]. Revised Edition. Boston and London: Shambhala Publications, 269 pp. ISBN 0877736421. $29.95 USD.

Reviewed by:

YVES LABERGE
Independent Scholar (Canada)

The groundbreaking book *The tree of knowledge: The biological roots of human understanding*, by Chilean scholars Humberto Maturana and Francisco Varela (1946–2001), has a long and celebrated history. It was first published under the title *El arbol del conocimiento*, in 1987. It has since been translated from Spanish into English, and then French (*L'Arbre de la connaissance*), German, and four other languages.

From the first pages, we see that *The Tree of Knowledge* was meant to develop an innovative way to (re)conceive the foundational roots of the philosophy of science. The authors undertake this task by articulating an original understanding of the connections and linkages between biology and cognition. In their preface, Maturana and Varela clearly articulate how they desire to create nothing less than a revolution in our way of observing and understanding the deep connection between living systems and how we should fundamentally conceive knowledge. As the authors boldly state: "We will propose a way of seeing cognition not as a representation of the world 'out there,' but rather as an ongoing bringing forth of a world through the process of living itself" (p. 11). Thus the subtitle of this book, the biological roots of human understanding, can be illustrated with a metaphor, in this case, the tree as the symbol of a living and evolving network.

The opening chapter brings a few basic insights and raises some interesting epistemological questions centring on what we do not know and how we know that we do not know, or as the authors describe: "we do not see what we do not see" (p. 19). The authors explain their aim: "Our objective is then

Complicity: An International Journal of Complexity and Education
Volume 4 (2007), Number 1 • pp. 139–142 • www.complexityandeducation.ca

clear; we wish to examine the phenomenon of cognition by considering the universal nature of 'doing' in cognition" (p. 28). In the following chapters, the reader is introduced to the author's perspectives on how nature works and evolves through reproductive heredity (p. 67), life cycles (p. 80), and the organization of metacellulars (p. 87). Oddly, *The tree of knowledge* is not the kind of book that reveals its main thesis in the first few chapters. Instead, the readers must follow the authors with faith and confidence. However, readers should not be tempted to overlook the first half of the book as simplistic. In fact, far from being merely descriptive, Maturana and Varela narrate some of the fundamentals of the history of life and organic evolution with thought provoking observations, comments, and questions. All of which lay the foundation for their later sophisticated and nuanced arguments.

In the pivotal Chapter 5, the authors focus on epistemology and cognition, using previous cited examples as in-depth case studies. For example, they posit, "The key to understanding the origin of evolution lies in something which we noted in the earlier chapters: the inherent association between differences and similarities in each reproductive stage, conservation of organizations, and structural change" (p. 94). Taking us beyond Darwin, the author's illustrate the many ways in which the complex processes of the conservation of organization, adaptation, and structural change move beyond what we have simply understood as evolution (p. 101). Here, evolution is presented with a key metaphoric formula: as "a natural drift, a product of the conservation of autopoiesis and adaptation" (p. 117).

Chapter 6, which focuses on behaviour, presents, among others, the strange case of the two Bengali girls who were found living with wolves, in the absence of any human presence, in 1922. This case, like the Mowgli character imagined by Rudyard Kipling (and later adapted by Disney), is also similar to the experiences described in France by Dr. Jean Itard (1774–1838). Itard described the case of the young Victor de l'Aveyron, who was another teenager found living in the woods, in 1798, as shown in the film *L'Enfant Sauvage* (*The Wild Child*, directed by François Truffaut, 1970) (p. 129). Although the Itard case and the Truffaut film are not mentioned in this book, Maturana and Varela refer to this first case (the two girls found in India) in order to confirm that for these two girls, aged five and eight years-old, who had lived their entire childhood outside human civilization, they had found it almost impossible to enter and integrate themselves into a human world with other human beings, trades, and ways of living (p. 131). It was more than just a new way of living that they could not learn or adapt to. Ultimately, they could not "fit" or adapt to so many of the changes that were imposed on them with such speed and complexity.

From a methodological point of view, Maturana and Varela discuss various matters in their book using a comparative approach. First, they

conclude that "that's the way life goes" when observing nature, organisms, and evolution; then, referring to humans, they concentrate on the behaviour and nervous systems, highlighting the similitudes between the two systems in their ever changing environment. What can we glean from these reflections? One suggestion might be that living systems must adapt in order to reproduce themselves and thus survive, while we conclude that most humans would rather learn, feel, sometimes remember, and understand the phenomena in which they are implied (p. 172). This remains a whole process. Many examples are given among animal species (like penguins) in the way they procreate and nurse their young. This is especially evident since the male/female roles can vary significantly according to the species (p. 184). Another demonstration comes with non-human communication, in this case with the spectrogram of African birds (p. 194).

In the last pages of their book, Maturana and Varela take their previous observations into another theoretical terrain: the social sciences (p. 206). They call for a "knowledge of knowledge" (p. 244), a concept that has been found as well in the writings of Edgar Morin (1977). In an after word written by Francisco Varela, the co-authors discuss their pedagogical approach using simple words and familiar examples as an invitation for the reader to follow their alternative way of reasoning, their specific method, and their original perspective in order to comprehend the life sciences and knowledge with different logics, instead of just learning plain facts (pp. 251-256). In a simplified (or non-complex) way, *The Tree of Knowledge* might appear to look like a book for beginners (like the "books for dummies" series). However, to the trained complexivist eye, its main contributions remain in the discourse that lies between the words, cases, and facts presented. With this reading in mind, we receive an impressive demonstration of how knowledge can be constructed and how systems can be understood. In other words: *Simple* does not translate into *simplistic*.

As I was re-reading this text, I was left wondering if this book would be relevant for undergraduate students, either in the fields of biology or education. Ultimately, I think it would be useful. However, it would take a devoted professor who could point out and unpack the book's real epistemological contribution. For example, when Maturana and Varela discuss cells, metabolism, evolution, and animals they want, in fact, to call forth a more fundamental reflection that is deeper than mere biology, rather they hope to engender a rich dialogue on representations, perceptions, and cognition.

Already a classic in its domain for more than two decades, *The Tree of Knowledge* remains a valuable book in three fundamental ways. First, it helps readers to understand how perception (and sometimes illusion) can work and why epistemology ought to question these matters. In this sense, the book will be helpful for students in science education that wish to learn

how evolution can be explained in theoretical terms that are drawn from the scientific tradition. Second, advanced academics in education might use these demonstrations to show how knowledge is constructed. Third, I believe this book will be valuable as well for academics in the philosophy of science, logics, epistemology, and the life sciences. Perhaps, the most difficult element of technical language the authors present is the concept of "autopoiesis organization" (p. 47), which is not explained in the glossary. However, *The tree of knowledge* should not be seen as some kind of esoteric essay by reified "academic gurus". Instead, the reader is presented with two experienced scholars who are attempting to understand human interactions, behaviour, and knowledge from a "scientific" perspective: Maturana is a biologist and Varela was a neuroscientist. Although they had a common interest in the life sciences, behaviour, and cognition, neither Maturana or Varela had training as social scientists, which is not bad *per se*—it just gives us another, much needed, perspective, which in fact is quite unique in terms of its contributions to our understandings of complexity and social epistemology.

For academics grounded in science education and teacher education, this book might seem unusual, especially since it shows how scientists teach and communicate their own discipline using epistemology, instead of having professional educators who decide at some point to pick up scientific topics with a minimal background in biology or life sciences. Highlighting this reverse approach can be valuable and rewarding in terms of the potential for interdisciplinary research. Overall, I would recommend this book for academics that are looking for a stimulating, sometimes challenging read.

References

Jean Itard, J. 1964 [1806]. *Les enfants sauvages*, Paris : UGE 10/18.
Kipling, R. 1995 [1894]. *The jungle book.* New York: Penguin.
Morin, E. 1977. *La méthode, six volumes*. Paris : Seuil.
Truffaut, F. [Director]. 1970. *L'enfant sauvage*. Paris : Les Films du Carrosse.