

Book Review

Yukihiko Toquenaga

Institute of Biological Sciences
University of Tsukuba
Ibaraki 305-8572
Japan
toque@biol.tsukuba.ac.jp

Jinkou-Seimei (Artificial Life: A Constructive Approach to the Origin/Evolution of Life, Society, and Language).

Takaya Arita

Science Press, 2000 (In Japanese)

Artificial life (ALife) was first introduced in Japan at the beginning of the 1990s. More than a decade has passed, and ALife is accepted in one sense but forgotten in another. To see this, it is helpful to categorize ALife researchers in Japan into three generations: the zero, first, and second generations.

The *zero generation* consists of those who had already been studying ALife topics before the term was imported. Representatives are Yoichiro Kawaguchi (University of Tokyo), Kunihiko Kaneko (University of Tokyo), and Takashi Ikegami (University of Tokyo). Their work falls within the ALife area but can stand without the label.

The *first generation* includes those who started to study ALife after the label was introduced due to Chris Langton's pioneering and inspiring efforts. They were more than evangelists, and they started a salon to discuss different aspects and possibilities of ALife. The zero generation played a role as "detonators" in the salon. Tsutomu Hoshino (University of Tsukuba) was the most prominent leader of that era. The first generation created something of a sensation, so that some of them could even obtain generous national funding for their research. ATR and a few other institutes arose from this first generation.

Following popularization, ALife acclimatized to the Japanese research environment and changed, led by engineering and computer science. Many books and reviews about ALife have been published in Japan; eighty percent of them are full of personal opinions and deviate from Chris Langton's original intent. The original impetus has not been sustained, partly due to a lack of practical applications. For example, the Japanese Fuzzy researchers succeeded in creating improved microwave ovens and washing machines, whereas the first generation of ALife failed to create such symbolic products. ALife studies became categorized as a part of research on complexity, and although grass-roots ALife researchers continued to communicate through mailing lists and local salons, the first generation faded out from the mainstream of activities around the mid-1990s.

The *second generation* of ALife researchers arose as a reaction to this situation. Takaya Arita is a core member of this second generation and leads a number of young students and researchers. Arita's book *Jinkou-Seimei* establishes that he is a legitimate successor to Langton's original vision.

The book starts with a discussion of parallels between the mind-body problem and the "life-body problem." Arita argues that current ALife should pursue life-as-it-could-

be rather than simply apply techniques bred in ALife to other fields. This attitude is quite different from that presented in most other Japanese ALife writings, most of which derive from artificial intelligence. The book includes both philosophical and technical discussions. It introduces the standard material (genetic algorithms, Tierra, etc.) but also new and promising works by young researchers.

In subsequent chapters, Arita discusses computation based on evolution, pioneering models for life, models for the origin and evolution of life, models for the origin and evolution of society, and models for the origin and evolution of language. The flow of the discussion resembles that of Maynard-Smith and Szathmary [1], and one can enjoy comparing the two books. Examples are well balanced, and explanations are carefully described. Figures and tables are also well designed. Readers are invited to explore ALife on their own with software that Arita provides in the last chapter.

No book covering such a broad field is likely to be perfect. I felt the discussion of emergence downplayed the feedback between local and global phenomena. The explanation of the Baldwin effect is somewhat misleading, and some discussions of genetic algorithms are outdated. Nevertheless, this book is very good and can be recommended as the best current review and introduction to ALife written in Japanese. An English version is eagerly awaited.

References

1. Maynard-Smith, J., & Szathmary, E. (1999). *The origins of life*. Oxford: Oxford University Press.