

# The Yijing as a Symbolic Language for Abstraction

## *Extended Abstract*

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The symbols of the Book of Change present an astonishing enigma. Their origins lie deep in China's past, born from the divinatory practices of the Zhou dynasty – but the patterns of open and closed lines resonate down through the millennia to the present day. In today's digital world, bit-wise representation has become the dominant means of recording and processing information.<sup>1</sup> A bit, the distinction between 1 and 0, is the smallest unit of information and this provides tremendous representational versatility. Binary representation makes it possible to render sound, vision, and text in the same medium; modern computer animation applies this as a technology to create dynamic virtual worlds of ever more realistic appearance. This, and a myriad of other examples, is only possible because of the ability to computationally manipulate patterns of bits.

Jeffery Long of the Notational Engineering Laboratory<sup>2</sup> said that “notational systems do not merely represent abstractions, they discover and then tokenize them.” That is, the language of abstraction that we use to describe our reality can offer us the chance of new insights into that reality. Mathematics is the primary example of this in the West. It has proven itself as the cornerstone of the physical sciences and, on many occasions, understanding the mathematics of a problem has sparked a resulting material science and an eventual technological product.

Good notation is vital in all domains of study. Enumerating all the possible combinations of open and closed lines over six places, the 64 hexagrams can be seen as the first systematic, symbolic language for Boolean categorization. The natural and historical domain of application for this language could be described in modern terminology as the study of the interaction between human consciousness and its environment. That is, the hexagrams provide us with a binary notation for describing the interactions of the various forces that are at work in the Universe, and our place relative to them. The narratives attached to the symbols records the traditional interpretations of those interactions.

It is clear that the Yijing has been understood as being about the entokening of abstractions since early in its history. Successive generations of sages have been reflecting on its nature, and the opening chapters of the *Da Zhuan*<sup>3</sup> speak to this theme directly: Chapter 1 says “Events are grouped to type. Things are divided into classes.” This is abstraction at work. Further, the symbolic means through which these groupings are described are the *gua*, and Chapter 2 goes on to say “the sages devised the *gua* so that images could be seen therein.” Wang Bi<sup>4</sup> expands on this in the following way: “since the words are the means to express the images, once one gets the images, he forgets the words, and, since the images are the means to allow us to concentrate on the ideas, once one gets the ideas, he forgets the images.” Thus, we see that the Yijing presents us with a related series of abstractions at different levels, each level serving as the point of entry to the next.

This paper looks at the symbolic language of the Book of Change, applying techniques from Boolean algebra to generate and analyze the structures created by the

relationships between the symbols. This process is part of an intellectual lineage that began well before the Yijing had contact with the West. Shao Yung's work on the binary sequence of the gua and the various diagrams in the *Zhouyi Tuishi Dadian* make this clear. More recently this thread was continued in Z. D. Sung's geometric characterizations from the 1930s.<sup>5</sup> At each point of expansion, new orders of pattern unfold from the old. Thus, the Boolean lattice emerges as an algebraically defined crystal, each hexagram forming a vertex in the multi-dimensional lattice. If Wang Bi's analogy is followed through, if the textual components associated with the symbols are descriptions of images, and those images represent ideas, then the structural relationships between the gua should also find some meaning in this context. The role of the Boolean lattice is to define the space in which ideas exist. The structural relationships between the gua then express the relationships between the ideas. These structural relationships create subspaces within the lattice, and are themselves open to a narrative description. I shall give some examples, showing how the symbols of the Yijing can be used like words in a language of structure, opening up new ways of thinking about situations and the connections between them.

It is important that the new techniques made available through an algebraic approach are in harmony with the cosmological underpinnings of the Yijing. To this end I shall explore the philosophical implications of applying Boolean analysis to the gua by comparing some of the formal properties of the resulting structures with ideas and statements from the texts of the *Shou Gua* and *Da Zhuan* and other traditional sources drawing parallels where appropriate. In conclusion, this paper suggests that the Yijing is constantly developing and expanding. As each new culture encounters and embraces it, it absorbs new aspects whilst retaining its core principles. The current phase, incorporating various formal-structural analysis, arises as a natural step – part of the continuous existence of the book through into the age of our contemporary computational representations.

## End Notes

<sup>1</sup> The formal background for the work presented here was initially presented in my paper "Boolean Algebra and the Yi Jing" which appeared in *The Oracle: the Journal of Yijing Studies*, Volume 2, Number 7, Summer 1998, pp19–34.

<sup>2</sup> The Notational Engineering Laboratory used to be part of the School of Engineering and Applied Science at George Washington University. The website for this research group was based at <http://www.seas.gwu.edu/seas/institutes/nel> – this is now unfortunately defunct. However, an archive of most the NEL material is available at [http://www.cs.vu.nl/~mmc/tbr/content\\_pages/repository/nel/index.html](http://www.cs.vu.nl/~mmc/tbr/content_pages/repository/nel/index.html)

<sup>3</sup> Quotes from the *Da Zhuan* come from the translation of the Yi Jing by Wu, Jing-Nuan, published in 1991 by The Taoist Center, Washington D.C.

<sup>4</sup> Quotes from Wang Bi come from Richard John Lynn's 1994 translation *The Classic of Changes: A New Translation of the I Ching as Interpreted by Wang Bi*. Published by Columbia University Press, New York.

<sup>5</sup> Sung's work was originally published in 1934 as *Symbols of the Yi King or The Symbols of the Chinese Logic of Changes*. The version that I have seen is from Paragon Print Reprint Corp. 1969.