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## Old Verse, New Idea: Why Artificial Is Real

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**W**elcome to our AI Space Odyssey! I would like to thank this special issue's guest editors for their time and great efforts in this undertaking. Of course, this issue is not an adventurous voyage in physical space, but rather a great intellectual quest: a discovery of AI in space.

The term odyssey immediately calls to mind Homer's Greek epic *The Odyssey* as well as its companion piece, *The Iliad*. To me, our exploration in space is more akin to the march to conquer as described in *The Iliad* rather than the suffering journey home told in *The Odyssey*. But these are only my own musings; the important fact is that ancient Greek literature has inspired such western revolutions as the Renaissance and the Enlightenment, eventually leading to today's creation and application of scientific knowledge in a high-tech society.

At times it is necessary to reach back into history for new ways of thinking. My exploration of ancient Chinese classic literature has helped me in my own research. For example, complexity is a problem I have been investigating over the past two decades. For a long time, my investigation was centered mostly on the use of laws and models in "hard sciences" such as physics, but I made little progress along this direction. It was by chance I stumbled across an ancient Chinese verse that completely shifted my way of thinking (see Figure 1a).

This verse was written by the Chinese realist philosopher Zhang Zai of the Song dynasty, a pioneer in neo-Confucianism, giving it a metaphysical and epistemological foundation. The verse, which appears in his seminal work *Correcting Youthful Ignorance*, can be translated as

For every position there must be a contrary one,  
Which inevitably leads to conflict,  
Conflict produces hatred,  
Which can only be solved by harmony.

The last line is a departure from conventional reasoning that conflict and hatred should be resolved with war and the destruction of your enemy. Instead, Zhang asserts that such problems can only be solved by mutual love and compassion, a harmonious coexistence between conflicting societies.

While reading this poem, I realized that by simply changing a few words (five Chinese characters, see Figure 1b), the verse can be reinterpreted as a new idea in forming a computational theory to conduct the modeling, analysis, control, and management of complex systems in a quantitative fashion.

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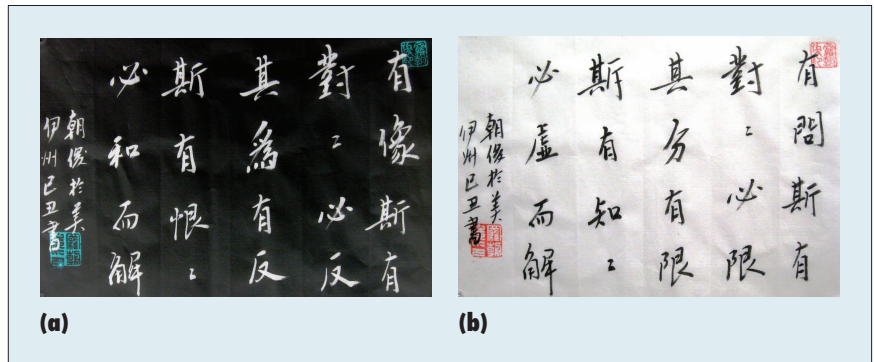
[www.computer.org/intelligent/author.htm](http://www.computer.org/intelligent/author.htm).

The revised verse translates as follows:

For every problem there must be an answer,  
 Which is only meaningful within a limited scope,  
 Limitation produces scientific knowledge,  
 Which is useful only when augmented with the artificial.

Although, the Chinese revised verse retains much of the original's style and format, its English translation is much less elegant. Oh well, I am not a poet.

As many of you know, my approach toward solving problems in complex systems has changed much over the past decade. I started by seeking help from the "soft sciences," such as social studies and psychology, and then developed the ACP theory that uses



**Figure 1. Ancient verse by the Chinese realist philosopher Zhang Zai of the Song dynasty. (a) The original verse asserts that problems can only be solved by mutual love and compassion. (b) With just five changed Chinese characters, the revised verse can be reinterpreted as a new idea in forming a computational theory.**

artificial societies for modeling, computational experiments for analysis, and parallel execution for the control and management of complex systems. I am happy to say that this new direction has brought about tremendous progress over the past few years.

It seems that artificial is real and vice versa, at least in complex systems. Perhaps in a future issue we should discuss AI in cyberspace, where real

human intelligence is alien, while AI is the native intelligence. ■



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