CHEONG SIEW ANN
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Cheong Siew Ann was born in Singapore in 1969. After getting through his primary, secondary, and junior college education in Ama Keng Primary School, the Chinese High School, and Hwa Chong Junior College respectively, and thereafter a contract service with the Singapore Armed Forces, he studied physics at the National University of Singapore. He graduated in 1997 with a BSc (Hons) degree in physics, and went on to obtain his PhD in theoretical condensed matter physics from Cornell University in 2006. He then spent a year and a half as a postdoctoral associate with the Cornell Theory Center, working on biological sequence segmentation, before joining the Nanyang Technological University as an Assistant Professor in Physics and Applied Physics in August 2007.

His main research interest is in developing data analysis methods and toy models for understanding the dynamics of complex systems such as biological macromolecules, the brain, earthquakes, financial markets, and infectious diseases. In particular, he works extensively with high-frequency, large-volume time series data, to cluster them, segment them, and also to estimate complex networks based on significant events in such data. His other research interests are in the areas of computational physics and condensed matter physics.

How Might a Complexity Lens be Like, and How Might We Use It?

By calling it a complexity lens, Jan Vasbinder picked an apt name to call the tool with which we may use to understand complex systems. In this three-part talk, I will explain why I feel the choice of name was appropriate.

In the first part of my talk, I will explain how an optical lens acts on the light rays and present the information they contain in a form that is convenient for its user. Basically, an optical lens is a device for separating light rays from different sources (or different parts of a source), and at the same time group light rays from the same source (or same part of a source) to form an image. However, we are mostly incapable of comprehending new information (the image formed), unless it is expressed in terms of knowledge we already understand. I will explain this concept of a knowledge template, before going to describe two useful knowledge templates for understanding complex systems. The first such template is that of chemical reactions, where reactants come together to form intermediates before giving the products.

The second such template is that of brain dynamics, where neurons fire in groups to trigger other groups of neurons in turn. I will explain why these templates are suitable for complex systems, and use examples from my own work to show how these templates allow policy makers and industry leaders to gain insights that tools not inspired by complexity theory will never give.

Finally, I will discuss the challenges complex data poses, and how the complexity lens can be designed to overcome these challenges. In particular, because the complexity lens is effectively data mining algorithms combined with data

visualization strategies, the tasks of resolving and aggregating data can be done separately. I will then explain the regime shift template for understanding sociopolitical mood swings, and describe how this template has actually guided the design of a complexity lens that could detect a regime shift that was aborted by the 2011 Singapore General Election.