

## 2005 "Herbert Simon 系列講座" 之四

### Agent-Based Computational Economics and Market Design

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Australian Graduate School of Management

主辦單位：政治大學社會科學學院、經濟系、暨人工智慧經濟學研究中心

高雄應用科技大學管理學院、全球運籌發展研究中心

協辦單位：中華民國人工智慧學會

各位先進：

2005 "Herbert Simon 系列講座"之四 - **Agent-Based Computational Economics and Market Design (HSSSS2005, Series #4)**即將於 **10月23日** 至 **10月29日** 在台北及**高雄**正式舉行，由國際知名學者澳洲新南威爾斯大學教授 **Dr. Robert Marks** 主講！期待您撥冗參加！

"Herbert Simon 系列講座" 乃為紀念 Herbert Simon 而設，Herbert Simon 為 1975 年電腦科學界中之殊榮 -- 杜林獎 (A. M. Turing Award) – 之得獎人暨 1978 年諾貝爾經濟學獎得主，並於 1993 年因對心理學的終生傑出貢獻而榮獲美國心理學會獎 (American Psychological Association's Award)，他率先於經濟學中建立「有限理性」的概念，並利用電腦演算來了解及測試「有限理性」的行為及決策模式，不但開啓了「行為經濟學」的大門，並為日後跨科際、跨學界的「計算智慧」奠定了先機。

計算智慧 (Computational Intelligence) 為一系列專門技術之統稱，包含了類神經網路、模糊邏輯、演化計算等，且為計算經濟學與計算財務學中最重要的工具之一。在過去的十年間，計算智慧已被廣泛地應用在各類經濟與財務之模型、預測、與分析上。其中最顯著的應用便是在財務資料探勘 (Financial Data Mining) 與代理人基計算經濟 (Agent-Based Computational Economics) 的研究域領中。

講座學者簡介：

Dr. Robert Marks 目前任教澳大利亞新南威爾斯大學，工商管理學院研究所 (University of New South Wales, Australian Graduate School of Management)，是目前將代理人基建模應用在市場設計 (market designs) 有卓越成就的經濟學家之一。他曾為即將發表的新書 *Handbook of Computational Economics, Volume 2: Agent-Based Computational*

*Economics* (由 Leigh Tesfatsion 主編，北荷蘭出版) 撰寫市場設計一章。市場設計是經濟學延伸到公共政策上最重要的議題之一，在公共政策經常面臨到複雜多變的環境，而公共政策本身，又不適於像自然科學一樣，來做實驗時，社會模擬 (social simulation) 變成是唯一可以了解政策不確定性與預估政策效果的工具。由代理人基模型為基礎的社會模擬，可以進一步的將人 (stock holder) 對政策可能有的反應，及他們彼此之間的互動，通盤的考慮進來，進而增加對政策效果評估的準確性。目前這樣的研究，已經廣泛地運用在競價法則的設定，交易規範的制定，具體的應用，像是股票、債券市場，及電力市場，金融業的給付系統 (payment system) 及清算系統 (settlement system)，金融秩序 (financial stability) 的維持上。而其應用的潛力，並不只限於經濟學上，在政治學上，諸如投票制度的設計，在社會語言學上，語言政策的制定，都是目前已經在進行研究的課題。Dr. Marks 的演講，將會對本國社會科學及公共政策之研究，帶來莫大的幫助，本次系列演講，我們十分榮幸能邀請到 Dr. Marks。

講座議程：

**主題: Agent-Based Computational Economics and Market Design**

場次	時間	地點	講題
1	10/23, 9am – 12 noon (Sunday)	政大綜合院 館	Using the computer to conduct experiments: simulation versus closed-form analysis.
2	10/23, 3:30pm – 6:30pm (Sunday)	政大綜合院 館	Agent-based models of simulation: what is an agent? how can they be modelled?
3	10/26, 7pm – 10pm (Wednesday)	政大綜合院 館	Models of learning: genetic algorithms, reinforcement learning, other models.
4	10/28, 9am – 12 noon (Friday)	高雄應用科 技大學	Market design.
5	10/28, 2pm – 5pm (Friday)	高雄應用科 技大學	Real-world applications: electricity and other markets.

茶會：

本次Herbert Simon系列講座，為拉近各位學員與 Dr. Marks之距離，提供與外國學者深度交流之機會，除上述正式議程外，主辦單位並將提供兩場茶會，歡迎任何對Dr. Marks之研究、澳洲留學或管理科學有興趣者，報名參加，茶會時間第一場定於10月21日晚間六點到八點，第二場訂於10月24日下午四點至六點。

#### 課程大綱：

Over the past twenty years, the use of simulation of the bottom-up emergence of markets has been developed by economists, engineers, and computer scientists. Indeed, there has been a convergence of interest in the application of simulation in general, and agent-based simulation in particular, to issues of analyzing and designing markets, both existing and newly invented.

Simulation of social interactions focuses on the complex adaptive behavior that emerges in social systems. To better understand the behavior of such complex adaptive social systems, “artificial worlds” composed of interacting adaptive agents can be created and analyzed. Such models often exhibit properties that are strikingly similar to the actual social world, e.g., cooperation, social norms, and social stratification into different classes, and provide a unique window into understanding such phenomena. Using simulation methods, previously inaccessible, yet fundamental, questions are now becoming amenable to analysis. There is much research to be done in this area—along with creating and understanding these types of complex systems, efforts need to be directed toward developing accessible versions of these models for the classroom.

The purpose of the course is to introduce research students to tools of simulation in the social sciences and some applications in economics and market design.

*Goals:* To acquaint students with simulation in the social sciences, in general, and agent-based simulation in particular; its strengths and weaknesses, and its appropriateness for particular kinds and areas of research.

“Simulation means driving a model of a system with suitable inputs and observing the corresponding outputs.” (Bratley, Fox & Schrage 1987, ix). While this definition is useful, it does not suggest the diverse purposes to which

simulation can be put. These purposes include: prediction, performance, training, entertainment, education, proof and discovery.

“Simulation is a third way of doing science. Like deduction, it starts with a set of explicit assumptions. But unlike deduction, it does not prove theorems. Instead, a simulation generates data that can be analyzed inductively. Unlike typical induction, however, the simulated data comes from a rigorously specified set of rules rather than direct measurement of the real world. While induction can be used to find patterns in data, and deduction can be used to find consequences of assumptions, simulation modeling can be used as an aid in intuition.”

“Simulation is a way of doing thought experiments. While the assumptions may be simple, the consequences may not be at all obvious. The large-scale effects of locally interacting agents are called *emergent properties* of the system. Emergent properties are often surprising because it can be hard to anticipate the full consequences of even simple forms of interaction.” (Axelrod, 2003)

This course is a series of five three-hour lectures on this topic. As well as lectures and discussions, the course will include demonstrations of available computer platforms suitable for agent-based applications; in-class computer experiments; student experience at simulations; and in-class presentation of student work.

參考書目：

Nigel Gilbert and Klaus G. Troitzsch, *Simulation for the Social Scientist*,  
Buckingham: Open University Press, 2nd edition, 2005.

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