

樹仁
簡訊

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New Game Theory Paradigm from HKSYU

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A New Game Theory Paradigm from HKSYU

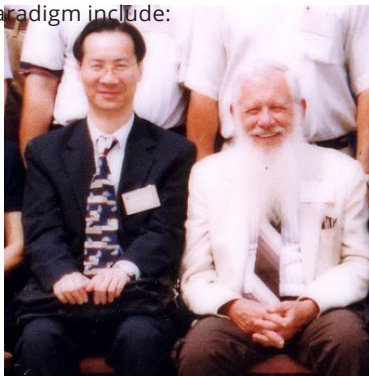
By: Lubanski Lam, Aloysius Lui and Cynthia Zhang

Photo: Courtesy of SRS Consortium

Professor David Yeung and Professor Leon Petrosyan of the SRS Consortium of Advanced Study in Dynamic Cooperative Games have developed a novel game theory paradigm – Cooperative Dynamic Games with Durable Controls¹. In existing dynamic game theory, the controls do not have durable effects. However, durable controls that have effects lasting over a certain period of time are prevalent in real-life situations. Revenue generating investments, toxic waste disposal, durable goods, emission of pollutants, regulatory measures, coalition agreements, diffusion of knowledge, advertisement and investments to build up physical capital are vivid examples of durable controls.

Professor David Yeung is currently Head of Department of Business Administration, Hong Kong Shue Yan University (HKSYU), and Executive Director of SRS Consortium of Advanced Study in Dynamic Cooperative Games; and Professor Leon Petrosyan is an internationally renowned game theorist, Professor of the Faculty of Applied Mathematics and Control Process of St. Petersburg State University and Co-director of SRS Consortium for Advanced Study in Dynamic Cooperative Games.

The “Petrosyan-Yeung Cooperative Dynamic Games with Durable Controls” presents a novel game theory framework in which durable controls of different lag durations affecting both the players’ payoffs and the state dynamics exist. The definitive contributions of this new game theory paradigm include:



From left to right: Professor David Yeung and Nobel laureate Robert Aumann 羅伯特·奧曼(右)與楊榮基教授。



From left to right: Professor David Yeung, Nobel Laureate John F. Nash Jr. and Professor Leon Petrosyan 楊榮基教授(左)、約翰·拿殊教授(中)和彼得羅相教授(右)於2011年3月出席香港樹仁大學舉辦的博弈論研討會。

(1) Theoretically, cooperative dynamic games with durable controls provided a novel and realistic game paradigm. Subgame consistent cooperative solutions are given to ensure that no participants will choose to opt out the scheme.

(2) Mathematically, a novel dynamic optimization theorem involving durable controls is developed. The derived dynamic optimization technique predominates the classic dynamic programming by providing a more comprehensive solution mechanism.

(3) Application-wise, given that durable controls would be involved in most real-life situations, the game paradigm yields a wide scope of applications. These applications include many practical scenarios, such as: public goods provision under technology diffusion, long-lasting pollution-generating effects in global environmental management, advertising race with lagged effects, oligopoly competition with investments requiring several stages to be converted into productive physical capital, dynamic games involving payment by instalments. In addition, the paradigm also sheds lights on the analyses of current cooperation schemes like Brexit, the Paris climate agreements, cyber security

and trade negotiations where durable controls prevail.

(4) In addition, cooperative dynamic games with durable controls produces crucial novel results which cannot be generated by any of the existing analytical frameworks and techniques. For an illustrative application given in the paper, the emission of environmentally damaging industrial waste (like toxic and chemical wastes and deforestation) could continue for many years, hence it is possible that pollution would persist or exacerbate even after the operation stops completely.

In sum, cooperative dynamic games with durable controls represents a significant advancement in the field of game theory. Its profound contributions include a milestone prototype for the future development of dynamic games, a novel solution mechanism and original mathematical techniques. Scholars having this kind of seminal contributions in game theory include Nobel laureates John F. Nash Jr., Lloyd Shapley and Robert Aumann. Last but not least, it signifies the pioneering role of HKSYU research in this area of study.

樹仁大學發展的嶄新博弈論範式

文：林昊輝、雷慧青、張映旋

照片：SRS 動態合作博弈高研平台提供



Professor David Yeung
楊榮基教授。

國際博弈理論研究機構「SRS 動態合作博弈高研平台」的楊榮基教授和彼得羅相教授（Professor Leon Petrosyan），研發了一個嶄新的博弈論範式——「具持久控制的合作動態博弈」。在現有的動態博弈論中，控制均不具持久的效果。但是，在現實生活中，普遍存在著具有持續一段時間效應的持久控制。如創收投資、有害的廢品處置、耐用物品、污染物排放、監管措施、聯盟協議、知識傳播、廣告效應和為建立有形資本而進行的投資，都是持久控制的活生生例子。

楊榮基教授是香港樹仁大學工商管理學系系主任及「SRS 跨國動態合作博弈高研平台」執行總監，而彼得羅相教授是彼得堡大學應用數學及過程控制學院教授

及「SRS 跨國動態合作博弈高研平台」聯席總監。

楊教授和彼得羅相教授的「具持久控制的合作動態博弈」是一個嶄新的博弈論框架，為因不同滯後時間所影響的博弈狀態提供了持久控制的解式。「具持久控制的合作動態博弈」的始創貢獻包括：

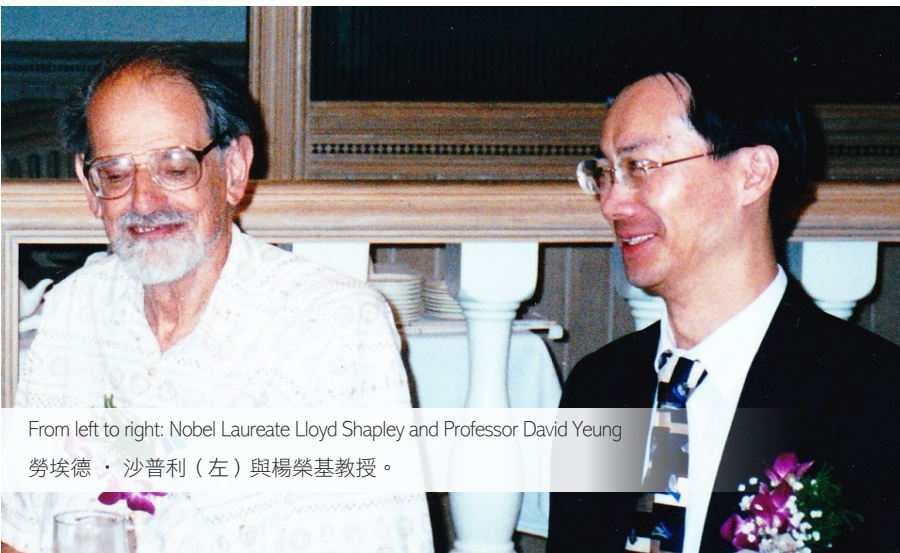
（一）在理論層面，持久控制是具現實意義的博弈新思維。它提供了「子合作博弈一致」的解決方案，以確保沒有參與者選擇退出該計劃。

（二）在數學上，它開發了一種涉及持久控制的新型動態優化定理。通過提供更全面的解決方案機制，衍生的動態優化技術主導了經典的動態編程。

（三）在應用方面，鑑於在大多數現實情況下均須用上持久控制，因此，此博弈範式具廣泛的應用範圍。現實生活中的例子包括：在技術擴散情況下的公共物品供應，在持久污染衍生效應下的全球環境管理，具滯後效應的廣告宣傳，具多階段性的企業投資，和涉及分期付款的動態博弈等。此外，此範式還闡明了以持久控制為主導的當前合作計劃的分析，例如脫歐、巴黎氣候協議、網絡安全和貿易談判等。

四）此外，至為重要的是此博弈範式解決了現有分析框架和技術均無法破解的實質問題。作為應用的說明，兩位教授列舉了工業的排放物（如有毒化學廢料和森林砍伐）可造成持續多年的污染排放，即使工業生產完全停止，全球污染也可能持續加劇。

總體來說，此新的博弈論範式是博弈論領域的重大跨越。它的貢獻包括為動態博弈未來的發展提供了一個新的框架，新的解決機制和始創的數學技術。在博弈論中，具有這種開創性貢獻的學者包括諾貝爾獎得獎者約翰·拿殊（John F. Nash Jr.）、勞埃德·沙普利（Lloyd Shapley）和羅伯特·奧曼（Robert Aumann）。最難得者，這項研究結果標誌著樹仁大學在這一研究領域中的世界領先地位。



From left to right: Nobel Laureate Lloyd Shapley and Professor David Yeung
勞埃德·沙普利（左）與楊榮基教授。



From left to right: Prof. Catherine SUN Tien-lun, Dr. SO Kwok-sang, Prof. Toru IYOSHI, Prof. Thomas F. LUSCHEI and Prof. Janet CLINTON

HKSJU Evidence-Based Practice Conference: What Works for Learning and Teaching

The Centre of Interdisciplinary Research in Evidence-Based Practice (CEBP) organized an international conference with a series of activities at Shue Yan University last October. The conference themed “Evidence Matters: What Works for Learning and Teaching” was held on 25th October 2019. Four overseas scholars delivered keynote speeches, followed by a panel discussion with three local scholars joining on the conference day. Near twenty latest evidence-based practice (EBP) studies were presented in discussion of new teaching and learning technology and advance education intervention. There was also a demonstration to showcase the EBP facilities and equipment in our University.

Dr. SO Kwok-sang, Secretary General of Hong Kong Examinations and Assessment Authority, was invited to be the officiating guest for the opening ceremony. He remarked the conference gathered the leading minds among local and international educators and researchers and created an excellent opportunity to exchange ideas and views on the best strategy and practice in the promotion of EBP in education.

In the keynote sessions, Prof. Janet CLINTON, the Director of Centre for Program Evaluation of Melbourne



Keynote speakers and committee members of the conference

Graduate School of Education from The University of Melbourne, was the first speaker. Her presentation promoted evidence as a key to improving long-term societal outcomes in education and other sectors. The second keynote speaker, Prof. Thomas F. LUSCHEI who is the Professor of School of Educational Studies from Claremont Graduate University, addressed key questions which ensured every classroom could be staffed with a qualified teacher under. Afterward, the Deputy Vice President for Education and the

Director and the Professor of Center for the Promotion of Excellence in Higher Education from Kyoto University Prof. Toru IYOSHI explored how educational ecosystems could support and sustain a more personalized, flexible, and lifelong learning for educators. The last keynote was conducted by Dr. Victor CHEN, the Associate Professor and the Acting Head of Curriculum, Teaching and Learning from National Institute of Education at Nanyang Technological University. He presented a webcast lecture in discussing how educators

viewed evidences as interpretive actions based on a holistic framing of what learning should be.

The conference day was ended by the panel discussion with Dr. Amy CHAN, the Associate Academic Vice-President (Teaching and Learning Development) of our University as the facilitator. This session invited Dr. Victor CHEN, Dr. Samuel CHU Kai-wah (Associate Professor, Teacher Education and Learning Leadership of Faculty of Education from The University of Hong Kong), Dr. Theresa KWONG (Assistant Director of Centre for Holistic Teaching and Learning from Hong Kong Baptist University) and Mr. David WATSON (Instructional Design Specialist of Educational Development Centre from The Hong Kong Polytechnic University)



Prof. Janet CLINTON's keynote speech "Promoting Evidence Informed Practice at System Level"



▲ Prof. Thomas F. LUSCHEI's keynote speech "What works for learning and teaching: A qualified teacher in every classroom"

to elaborate on the topic "Gamification in Evidence-Based Teaching and Learning" with latest innovative games which implicated the best practice of EBP in learning for the new generation.

Special workshops were also conducted before and after the conference day by Prof. Janet CLINTON, Prof. Thomas F. LUSCHEI and Prof. Toru IYOSHI. Deeply investigation on how evidenced-based approach could be practiced in the institutional sector was debated. Shue Yan staff from various disciplines participated to extend their networks

in research and practice with seeking collaborations with the speakers. All workshops together with the sessions from conference day shall be uploaded to YouTube channel "HKSJU IDS Projects" later.

The success of the EBP conference plays a key role in promoting EBP into the teaching and learning in Hong Kong. The Centre believes the prevalence of EBP in education increases for the better teaching strategy and learning experience.



Webcasting Panel Discussion between local three speakers and Dr. Victor CHEN from National Institute of Education at Nanyang Technological University

BA Department Academic Week 2019: Professionalism & Entrepreneurship

The Department of Business Administration held the Academic Week (Aweek) 2019 on October 21-24, 2019. The 2019 Aweek seminar and talk series was on the theme of "Professionalism & Entrepreneurship". The aim of Aweek is to give BA students a better understanding of the development and changes in the business environment and the requirements of the business sector.



▲ Ms. Flora Yeung (right) talked about cultivating innovators and entrepreneurs on October 21, 2019.

A total of 10 seminars and talks were organized by the Department and co-organized by other unit of the university. Prominent business leaders, business and management professionals, renowned entrepreneurs, government officials and Hong Kong Shue Yan University (HKSJU) alumni were invited to share their knowledge and experience with students.



▲ Ms. Veronica Hui (middle), Co-founder and Managing Director of PRise, spoke on the topic of "Financial PR, a new start-up".



The theme of 2019 Aweek was "Professionalism & Entrepreneurship".

The themes and guest speakers of the seminars and talks included:

October 21

Cultivating Innovators on Entrepreneurship

Speaker: Ms. Flora YEUNG (Cyberport, Entrepreneur Team)

Financial PR, a new start-up

Speaker: Ms. Veronica HUI (PRise Limited)

Financial Industry's Future with the Effects of Blockchain & FinTech

Speakers: Mr. Philip CHIU & Mr. Peter WOO (Financial Services Development Council)

October 22

Work Ethics

Speaker: Ms. Louisa LUI (ICAC)

Corporate Governance and Risk Management

Speaker: Ms. Louisa LAU (HK Institute of Chartered Secretaries, Registrar)

Digital transformation of HRM

Speaker: Ms. Christine CHOY (Choy's Human Resource Consultancy Ltd.)

October 23

The Future of HRM

Speakers: Mr. Leo MA & Ms. Christy WAN (eeVoices), and Mr. Keith FUNG & Ms. Monica CHEUNG (HKSJU Alumni)

Doing Marketing with Chatblog

Speaker: Mr. Jonathan TSE (Proactive)

October 24

Fair Trade and CSR

Speaker: Mr. Anthony CHIU (Hong Kong Fair Trade Power)

Fintech Fundamentals

Speaker: Mr. Gabriel CHAN (HK Blockchain Society)



▲ Ms. Christine Choy (right), guest speaker of the talk "Digital transformation of HRM".

工管系同學透過實習計劃接觸海運和航空業工作



劉雙文 Sherman。

工商管理學系四年級同學劉雙文 Sherman，在 2019 年暑假，透過「海運和航空業實習計劃」（Maritime and Aviation Internship Scheme），在一間物流公司實習 1 個多月。實習時間雖然不長，但讓她有機會認識物流公司的運作，特別有機會接觸財務覆核工作，對提升個人的視野、工作經歷和成長很有幫助。

Sherman 接受《樹仁簡訊》記者訪問時表示，她在去年初看到「海運和航空業實習計劃」的宣傳海報後，感到這個由政府推動、業界參與的實習計劃頗有特色，加上對海運和航空業有新鮮感，而個人也想多認識物流、供應鏈和倉儲業務，因此決定申請，結果獲得接納。

Sherman 實習的公司是嘉宏航運有限公司（Cargo Services Far East Ltd.），業務包括國際貨運、航空貨運、供應鏈解決方案、香港及中國服裝物流、國際倉儲服務等。她本想到營銷部門實習，但最後被公司安排到財務部門。

整理並核對 voucher

Sherman 的主要工作是檢查、核對和整理各類傳票（voucher）和相關文件，保證沒有出錯。她說，在檢查、核對收支傳票時，她需要翻查電腦中的記錄，打印相關文件，核對傳票的工作編號（job number）和款額，然後把所有文件排序。如發現金額不對，必須向上司報告。

「我當初不太明白某些工作和工序的運作，例如核對 job number，但經過上司細心講解後，我才明白它們在財務記錄和覆核中的重要性。公司每天有這麼多的交易，開出這麼多收款和支款傳票，如不核對清楚或沒有整理妥當，便會出現混亂。」Sherman 說。

除了財務覆核工作外，Sherman 有時候也會參與點貨，甚至與同事一起前往倉庫拆箱。

學會裝備自己

回憶實習初期，Sherman 說感到頗為吃力，因為她對財務記錄和覆核工作不太認識。今次實習不但增進了對海運和航空業的認識，也了解到公司財務部門的工作性質和運作。她表示，從實習中也認識到要裝備自己，以應付將來工作上的要求。

Sherman 說很感謝她的上司對實習生的支持，因為他很有耐心地向她講解財務覆核的重要性和工作流程。

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良師益友計劃昂然邁進十七載

由學生事務處籌劃的良師益友計劃 (Mentorship Programme) 已邁進十七載，本屆開幕典禮於2019年11月9日順利舉行，當天有超過30名校友、教職員和38位同學出席，在常務副校監胡懷中博士的見證下，大學管理層和學系教授代表一同主持氣球開幕儀式，隨著色彩繽紛的氣球升起，象徵發放夢想和希望，正式為今屆良師益友計劃揭幕。

今年良師益友計劃的主題為「色彩」，寓意人生是一個多姿多采的旅程，也是一個不斷學習和追求夢想的過程，期望同學 (mentees) 透過參與此計劃，能夠從學長 (mentors) 身上學習各方面的知識和經驗，包括學業、工作、家庭、人際網絡等，令人生旅途上增添更多色彩，也為將來投身社會作好準備。

協理副校長 (學生事務) 葉秀燕女士致詞時提到，在上一個學年，有較多同學希望了解人事管理及銀行的工作，而本學年則是有關金融科技、區塊鏈相關的領域較為熱門。因應同學的需要，學生事務處特別邀請在金融科技範疇有豐富經驗的司徒聖豪博士加入成為學長。



▲ 左起：區榮光博士、黃君良博士、張越華教授、常務副校監胡懷中博士、協理副校長 (學生事務) 葉秀燕女士、羅翠翠博士、謝宇瑩博士。



大學管理層、學系教授、學長和同學在開幕典禮後合照。



左起：司徒聖豪博士、協理副校長 (學生事務) 葉秀燕女士。

良師益友計劃繼續貫徹其跨學科 (Cross-disciplinary) 的特色，邀請從事不同行業的資深校友為同學提供不同行業的專業知識和就業的資訊。葉秀燕女士亦鼓勵

同學多接觸不同的行業，同學除了要了解自己就讀本科的前景，還需要認識其他行業的在職要求，好好裝備自己，保持個人競爭力。

另外，學生事務處特別為參與計劃的同學安排了「生涯規劃工作坊」，透過專業導師的引導，同學在積木堆疊的過程中，能夠更深認識自己和建立個人目標。同學不但玩得開心，也發揮了他們的想像力，對將來的人生方向有了清晰的構想。

有關計劃的更多詳情，請瀏覽學生事務處網站：
<https://osa.hksyu.edu/career/mentorship-programme/>。



一眾學長與同學在典禮後合照。