Economics is All About Institutions and Human Behavior

經濟學就是「上有政策下有對策」

For any Institution, There's a Reaction.

Joseph Tao-yi Wang
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What is Science? (何謂科學?)
What about Social Sciences? (那「社會」科學呢?)

Joseph Tao-yi Wang
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What is Science? (何謂科學?)

- Science from Merriam-Webster: (科學的定義)
  - "knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through scientific method."
    - (用來描述普遍真理或普遍法則如何運行的系統性知識，特別是用科學方法獲得與檢驗的知識)

- What is the "Scientific Method"?
  - 何謂「科學方法」?

Scientific Method – Wikipedia (科學方法)

- The scientific method seeks to (科學方法希望)
- explain the events of nature in a reproducible way,
  - (用可重複驗證的方式來解釋自然現象，)
- and to use these reproductions to make useful predictions.
  - (並用此來做有用的預測。)
- It is done through observation of natural phenomena,
  - (達成方式包含觀察自然發生的現象，以及)
- and/or through experimentation that tries to simulate natural events under controlled conditions.
  - (用實驗在控制條件下產生自然發生的現象。)

What about Social Science(s)? (何謂社會科學?)

- Apply the Scientific Method to Social Events: (用科學方法研究社會現象)
  - Scientific method seeks to explain social events in a reproducible way, and to use these reproductions to make useful predictions. (用可重複驗證的方式來解釋社會現象，並用此來做有用的預測。)
  - It is done through observation of natural social phenomena,
    - (達成方式包含觀察自然發生的社會現象，以及用實驗在控制條件下產生社會現象。)
  - and/or through experimentation that tries to simulate social phenomena under controlled conditions.
- Control Experiments (控制實驗) vs. Empirical Work (其他實證方法)

What is Economics?

經濟學是甚麼?

Joseph Tao-yi Wang
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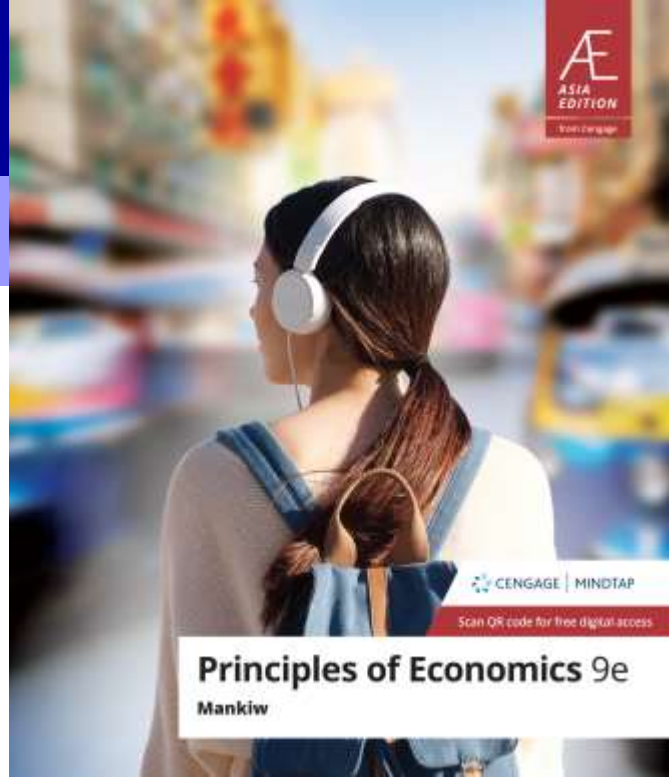
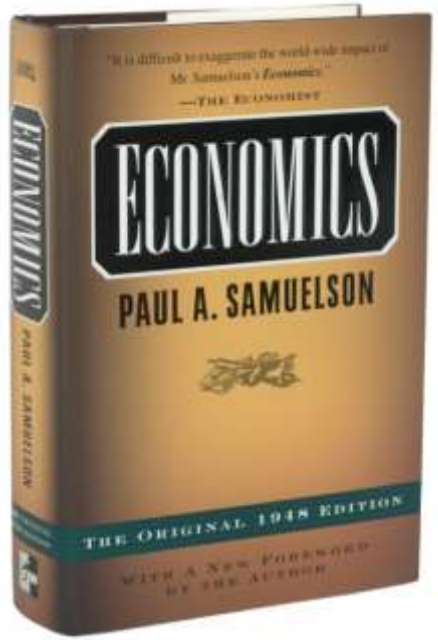
What is Economics? (經濟學是什麼?)

- Textbook Definition: (課本上的定義)
  - Economics studies how a society manages scarce resources
    - 經濟學研究一個社會如何管理稀少資源 by Mankiw (2021)
- Old Textbook Definition: (古早課本的定義)
  - Economics studies how a society uses scarce resources to produce valuable goods and services and allocate to different people
    - 經濟學研究一個社會如何善用稀少資源來生產有價值的財貨，分配給不同人 by Samuelson (1948)

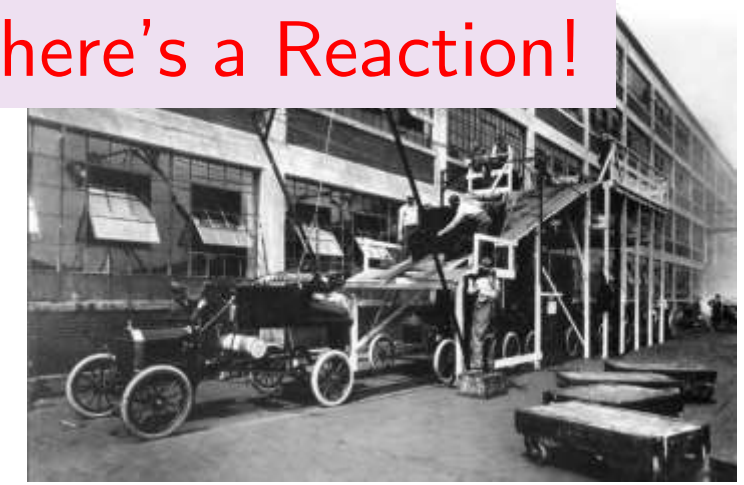




What is Economics? (經濟學是什麼?)

- Traditionally: Economics is the study of how society produces and distributes goods to satisfy the wants and needs of their members.
- For me, Economics is the study of institutions and human behavior (reactions to institutions)
  - 「上有政策，下有對策」

For any Institution, There's a Reaction!



For any Institution, There's a Reaction!

- Central Planning in Soviet Union:
  - "...if the plan merely calls for tonnages of output,
    (若計劃經濟要求生產一噸鐵釘:「如果上級的計劃只有敘明產出應有的噸數，...
  - there is every incentive to skimp on design or finish or quality, in order to concentrate on sheer weight." (Robert L. Heilbroner (1970): The Economic Problem
    那大家自然有誘因要不管設計、外觀或品質方面的考量，以便專注在噸數上。」)
- Interesting cartoon in Krokodil (Russian satirical magazine) (俄國鱷魚雜誌諷刺漫畫:確實會有一噸鐵釘，但)
  - What if one asks for numbers? (若改成要求要1萬根鐵釘...)

Why Reaction? Because People Respond to Incentives!

- For any Institution, There's a Reaction!
  - (Classical) Market mechanism is just one example!
    - 為何「上有政策，下有對策」?因為人們對誘因有反應! 這表示市場機制只是諸多「制度」之一!
- Other mechanisms: Auctions, Match-Making (拍賣/配對分發)
- Other institutions: Governments, Congress, (或制度: 政府/國會)
  - National Health Insurance, (全民健康保險)
  - Families, Social Norms (家庭、社會規範)
    - Is Economics Really Everywhere?
      - (那經濟學豈不是包山包海?)

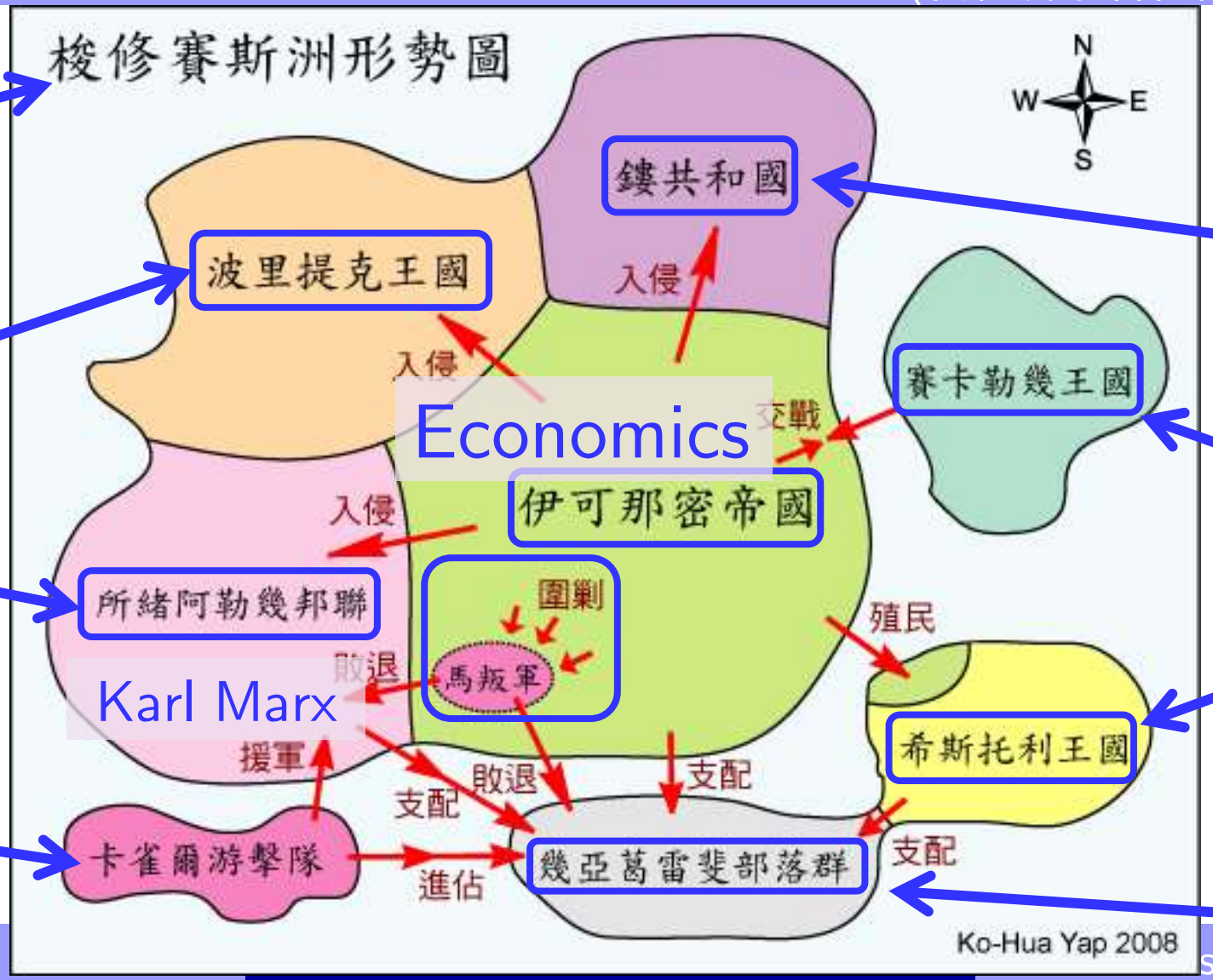
From Economics to Social Sciences (從經濟學看社會科學/地圖會說話blog)

Social Sciences

Politics

Sociology

Culture Studies



Law

Psychology

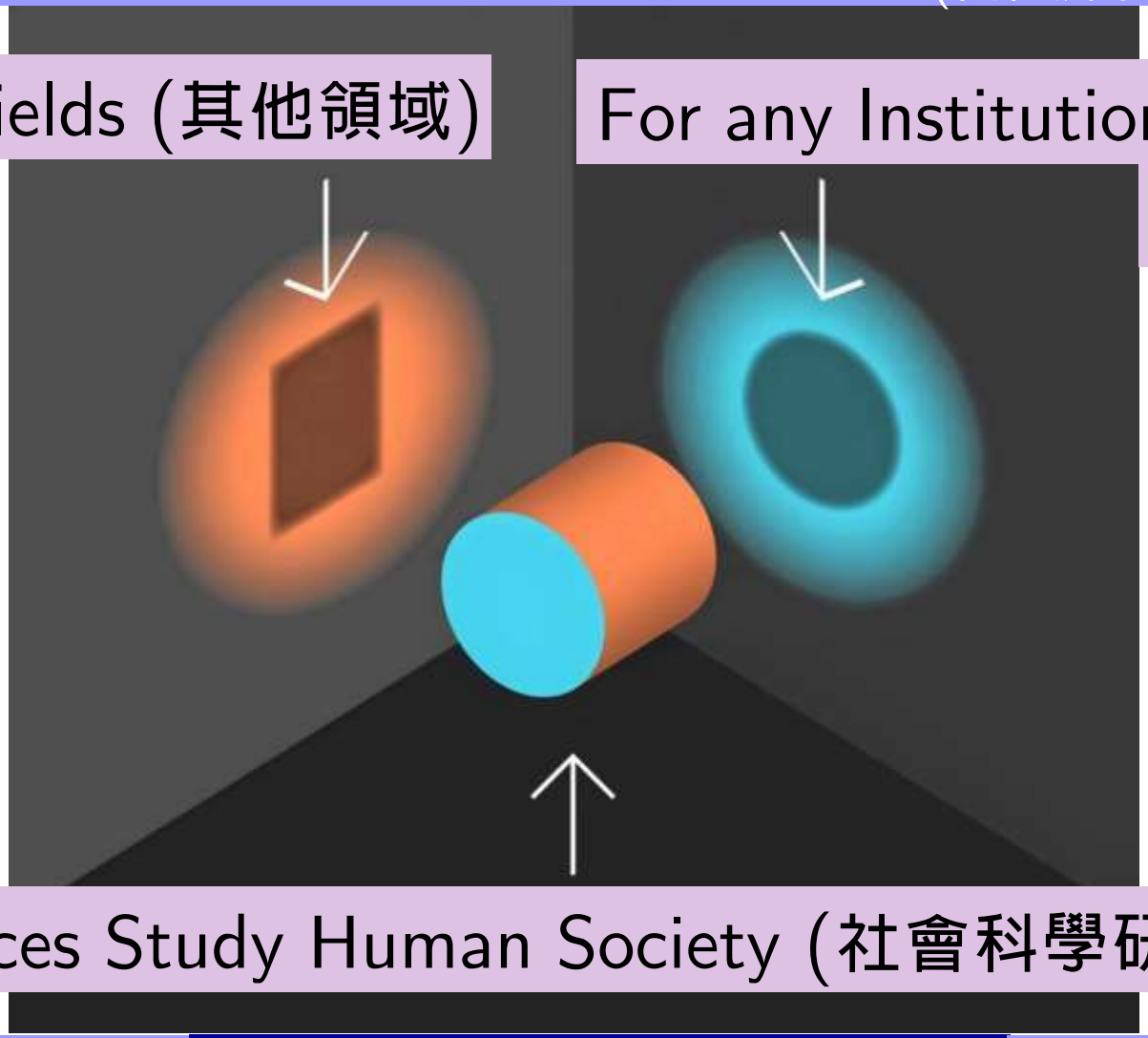
History

Geography

From Economics to Social Sciences (從經濟學看社會科學/地圖會說話blog)

Other Fields (其他領域)

For any Institution, There's a Reaction
(上有政策下有對策)

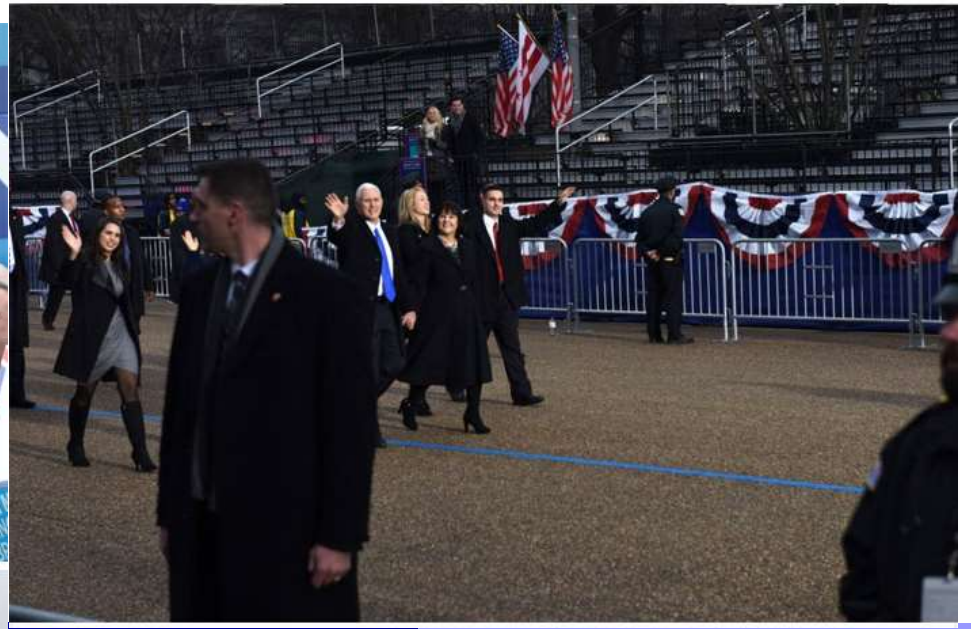


Social Sciences Study Human Society (社會科學研究人類社會)

From Economics to Social Sciences (從經濟學看社會科學/地圖會說話blog)

From Economics to Social Sc

(會說話blog)

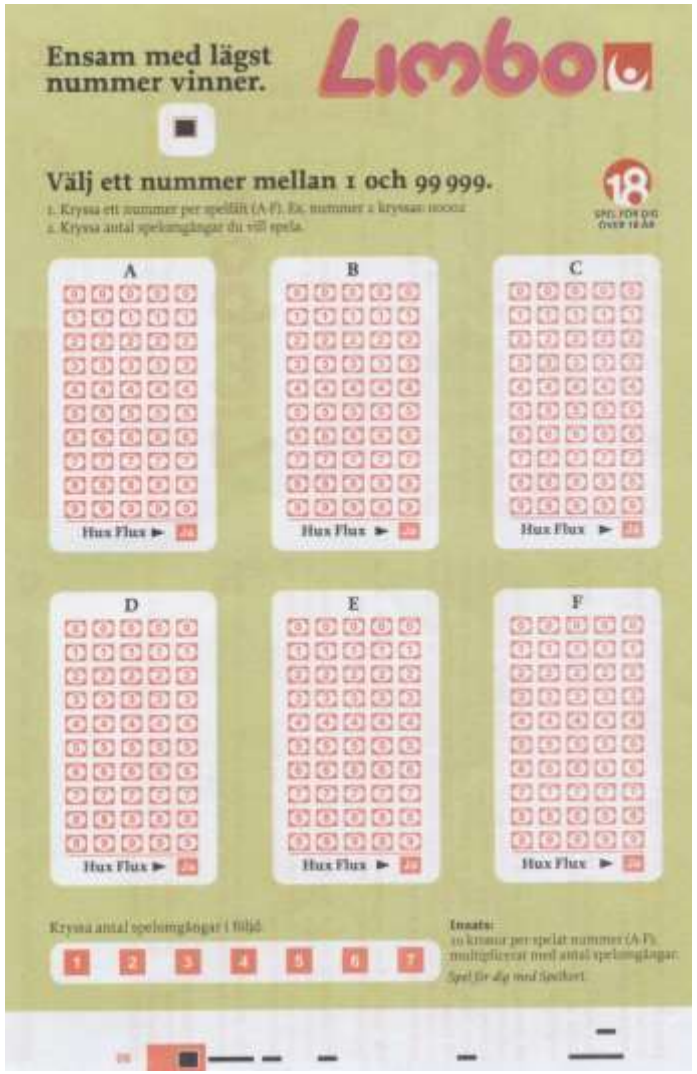


From Economics to Social Sciences (從經濟學看社會科學/地圖會說話blog)

What media shows us

The actual truth

Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)



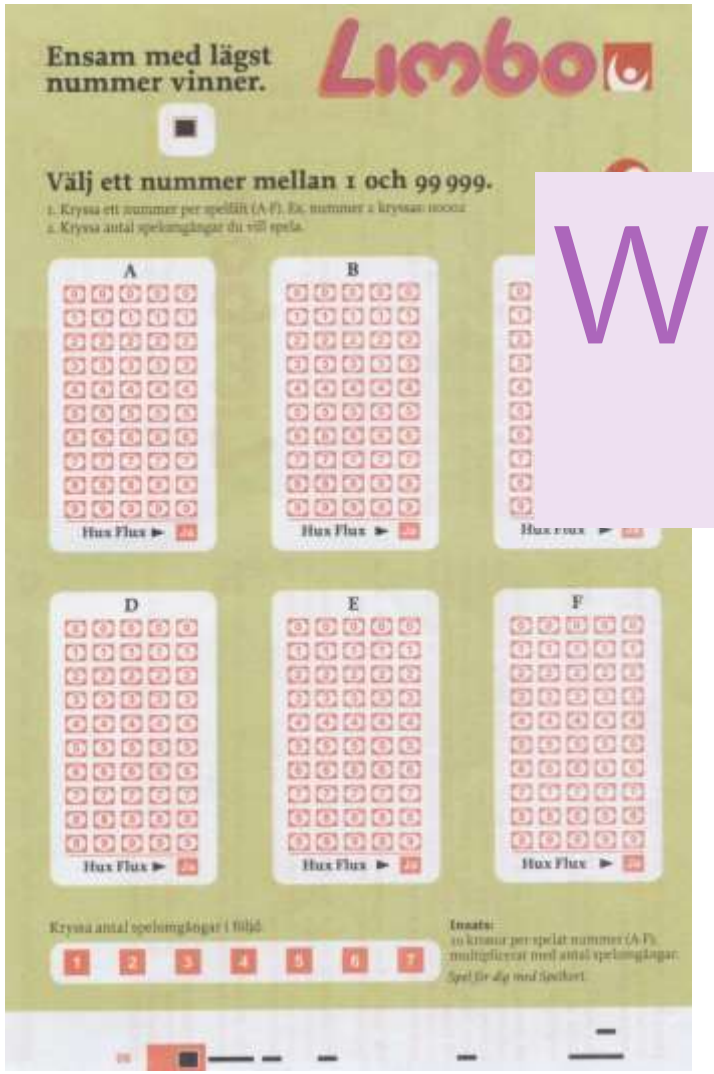
- Swedish Lottery in 2007 (瑞典LUPI 彩券)
- Lowest Unique Positive Integer (LUPI) Game
  - 最小唯一者勝的賽局
- Choose a positive integer from 1 to 100
  - 請選擇 1 到 100 之間的一個正整數
- Win if choose the Lowest but Unique number
  - 誰選到最小且沒有其他人選的數字就贏了!
- Prize? (贏家的獎勵?)

slido

Choose a positive integer from 1 to 100 (請選擇 1 到 100 之間的一個正整數)

ⓘ Start presenting to display the poll results on this slide.

Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)



- Swedish Lottery in 2007 (瑞典LUPI 彩券)
- (LUPI) Game
- to 100
- 請選擇 1 到 100 之間的一個正整數
- Win if choose the Lowest but Unique number
  - 誰選到最小且沒有其他人選的數字就贏了!
- Prize? (贏家的獎勵?)

Want to Try Again? (再來一次?)

slido

Try Again! Choose a positive integer from 1 to 100 (再來一次! 請選擇 1 到 100 之間的一個正整數)

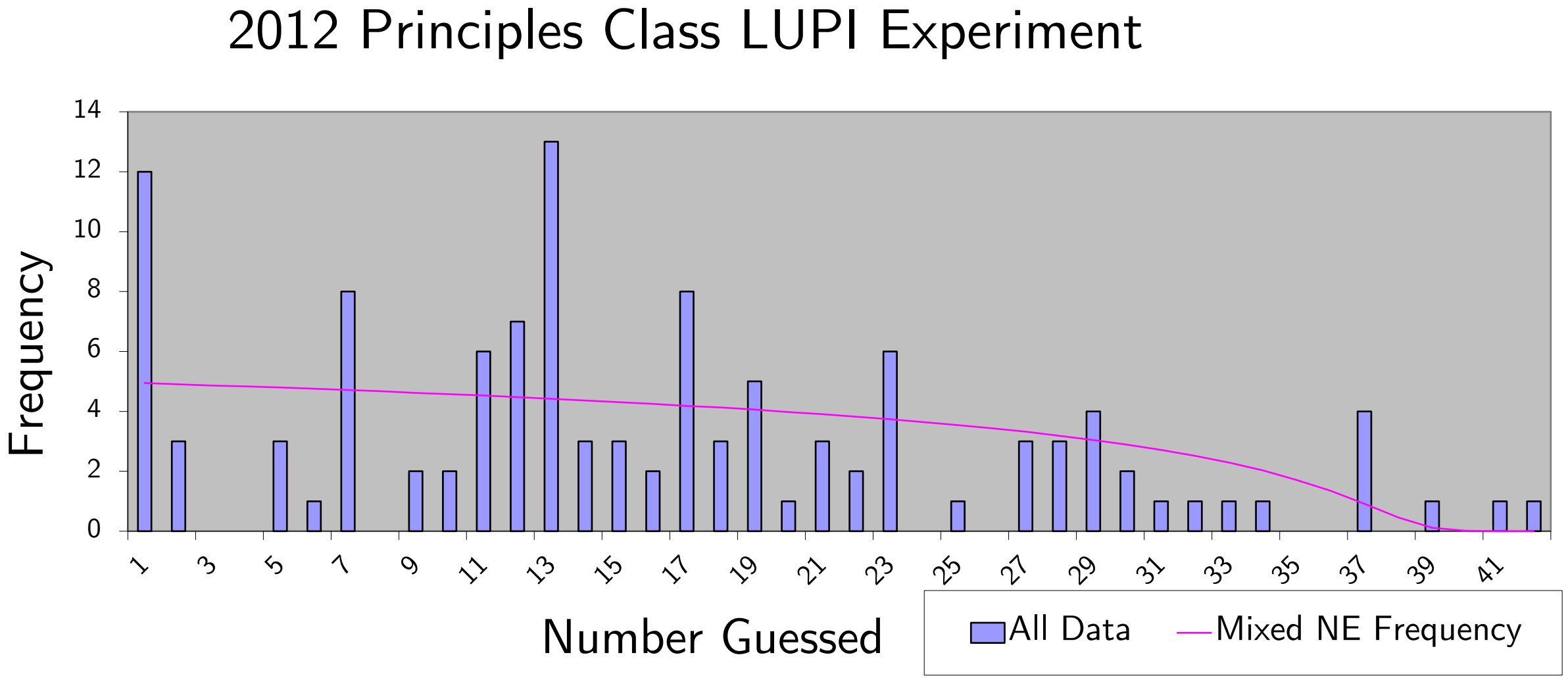
ⓘ Start presenting to display the poll results on this slide.

slido

Last Chance! Choose a positive integer from 1 to 100 (最後一次! 請選擇 1 到 100 之間的一個正整數)

ⓘ Start presenting to display the poll results on this slide.

Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)



Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

1. A Set of Rules (= Institution) (一套遊戲規則)
   - Either explicit or implicit (潛規則) (可以是明文規定或不成文的潛規則)
2. Individuals Optimize (個人決策謀求最佳化)
   - Because people respond to incentives! (因為人們對誘因有反應!)
3. You Need to React to Others Optimizing (其他人也在最佳化，所以你要因應)
   - Even if most users follow the rules, the designer still has to stress-test the system. (即使多數人循規蹈矩，制度設計者仍須考慮有人惡搞怎麼辦)
4. What should the aggregate data look like? (整體結果長怎樣?)
   - Come up with a theory (model/graph/story)! (理論的預測為何?)

Solving the LUPI Game Equilibrium (解出 LUPI 的均衡)

- k wins if nobody "uniquely chose 1 to $(k$ - $1)$", nor chose k
  - (選 k 贏的條件是沒有人「單獨選 1 到 $(k$ - $1)$ 」，而且沒有其他人選 k)
- Assume Number of Players is $\text{Poisson}(n)$
  - 假設參與人數為Poisson分佈 (平均 n)，混合策略均衡的條件是:
- Mixed Strategy Equilibrium requires:
- $\Pr(\text{win} \mid \text{choose } 1) = \Pr(\text{win} \mid \text{choose } 2) = \ldots$

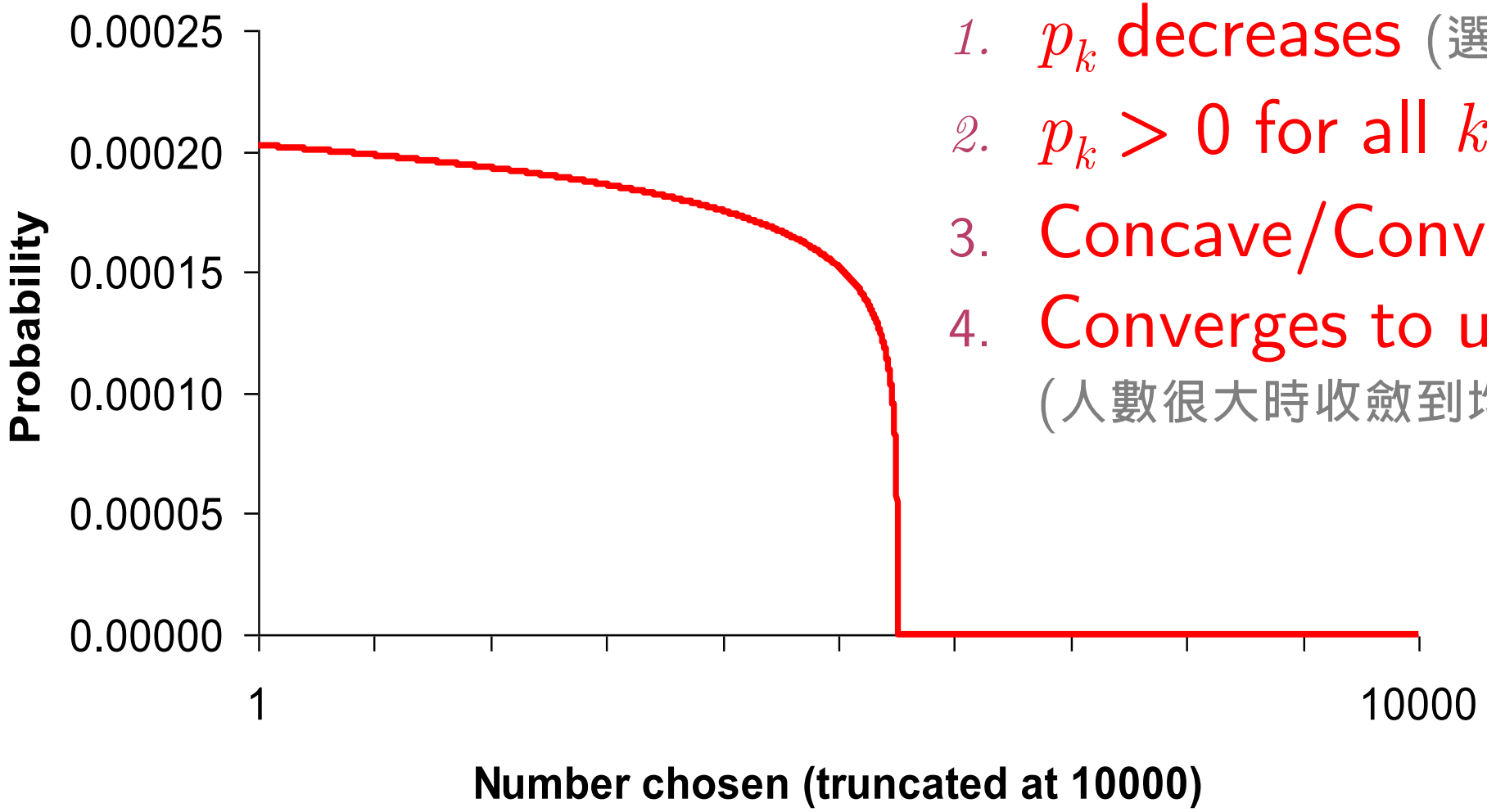
$$e^{-np_1} = \left(1 - np_1 e^{-np_1}\right) \cdot e^{-np_2}$$

Nobody chose 1
(沒有其他人選1)

Nobody uniquely chose 1
(沒有人單獨選1)

Nobody chose 2
(沒有其他人選2)

Unique Poisson-Nash Equilibrium (Mixed)



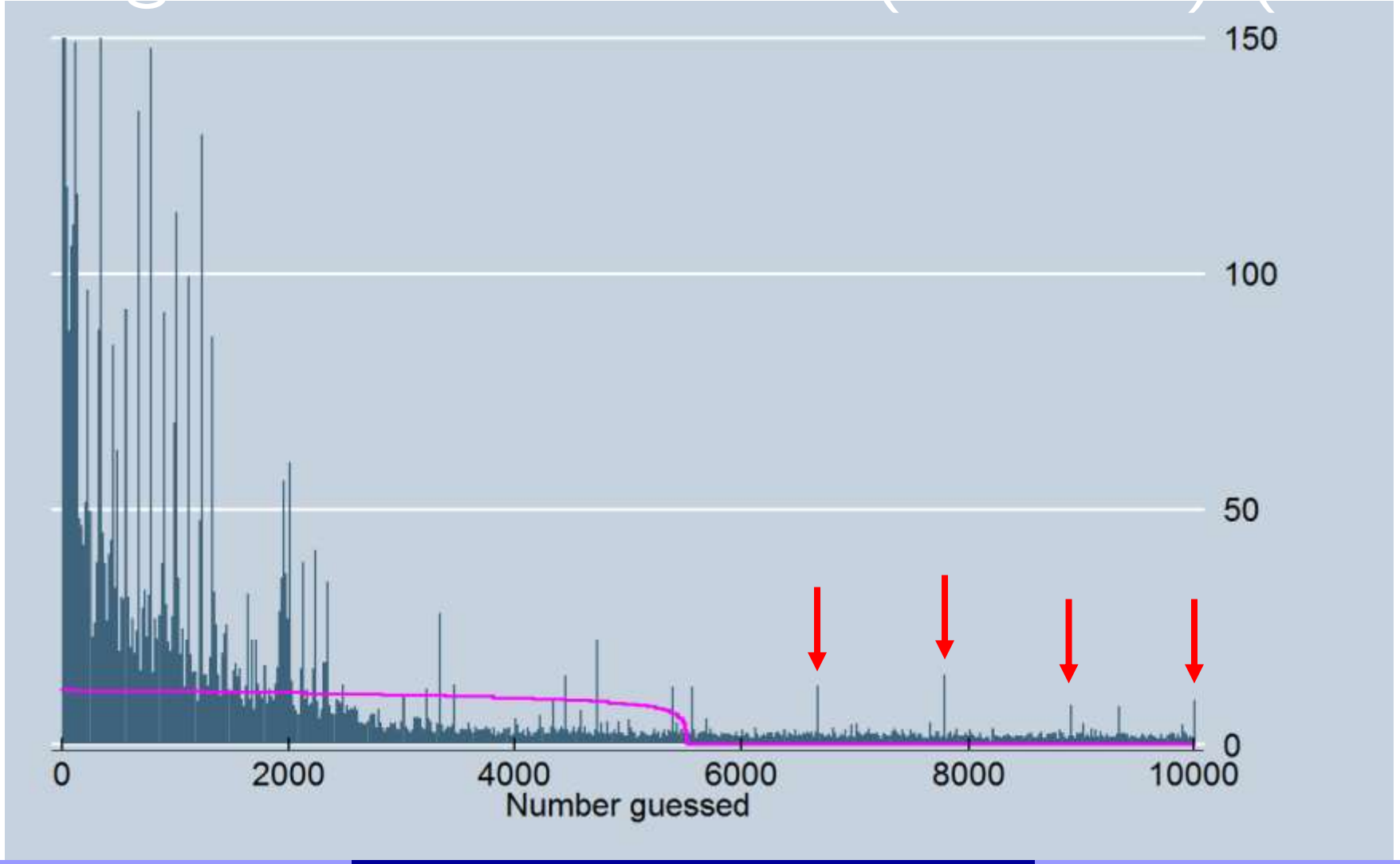
1. p_k decreases (選k的機率遞減)
2. $p_k > 0$ for all k (所有數字都選到)
3. Concave/Convex (凸函數/凹函數)
4. Converges to uniform if n large
   (人數很大時收斂到均勻選擇)

Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

5. Does empirical data match the theory? (實證資料是否支持你的預測?)
   - Collect data to see the big picture (蒐集資料來看「整個社會」的結果如何)

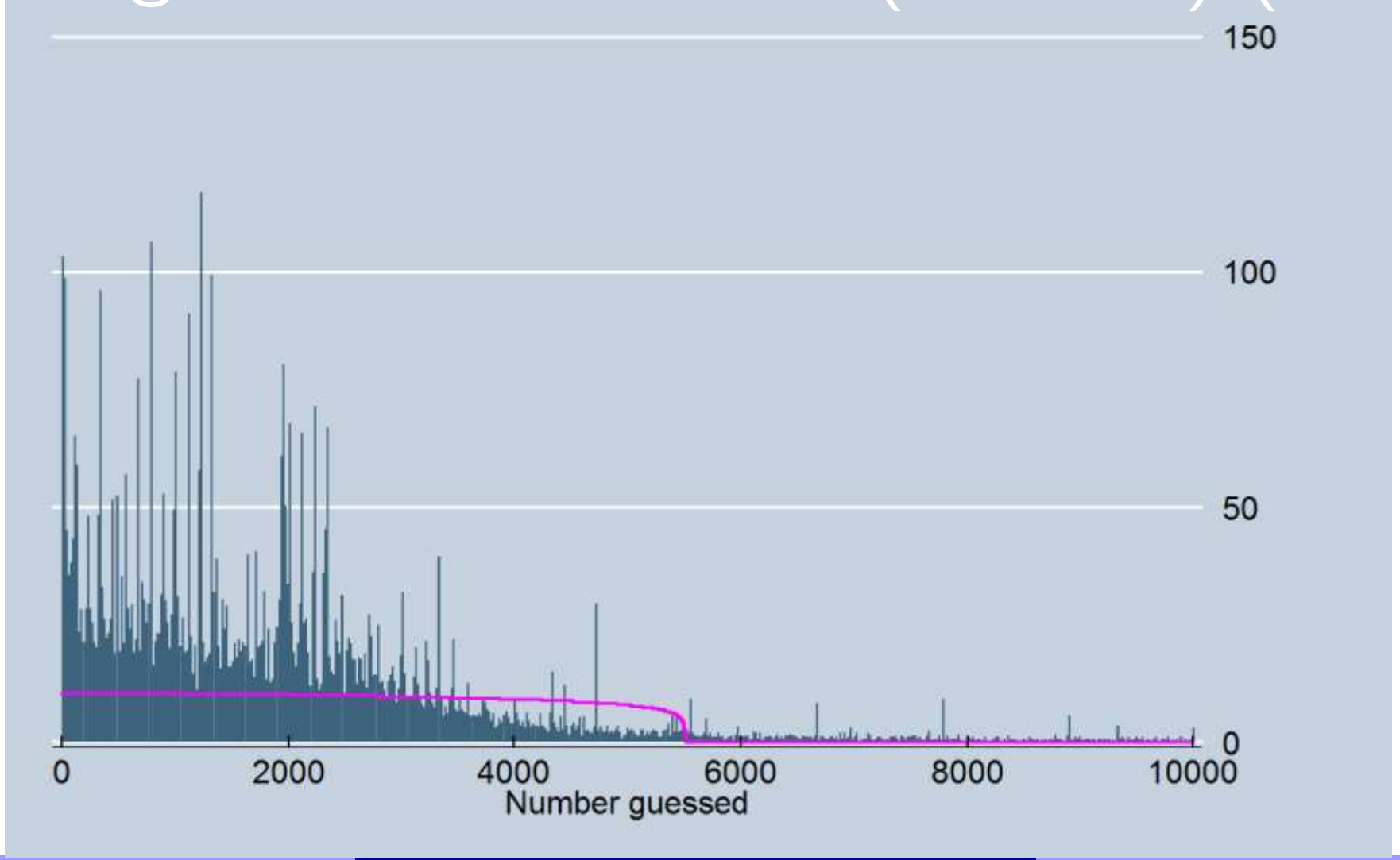
(每個數字每天選擇的)

Daily Average of Each Number (Week 1) (第1週頻率)



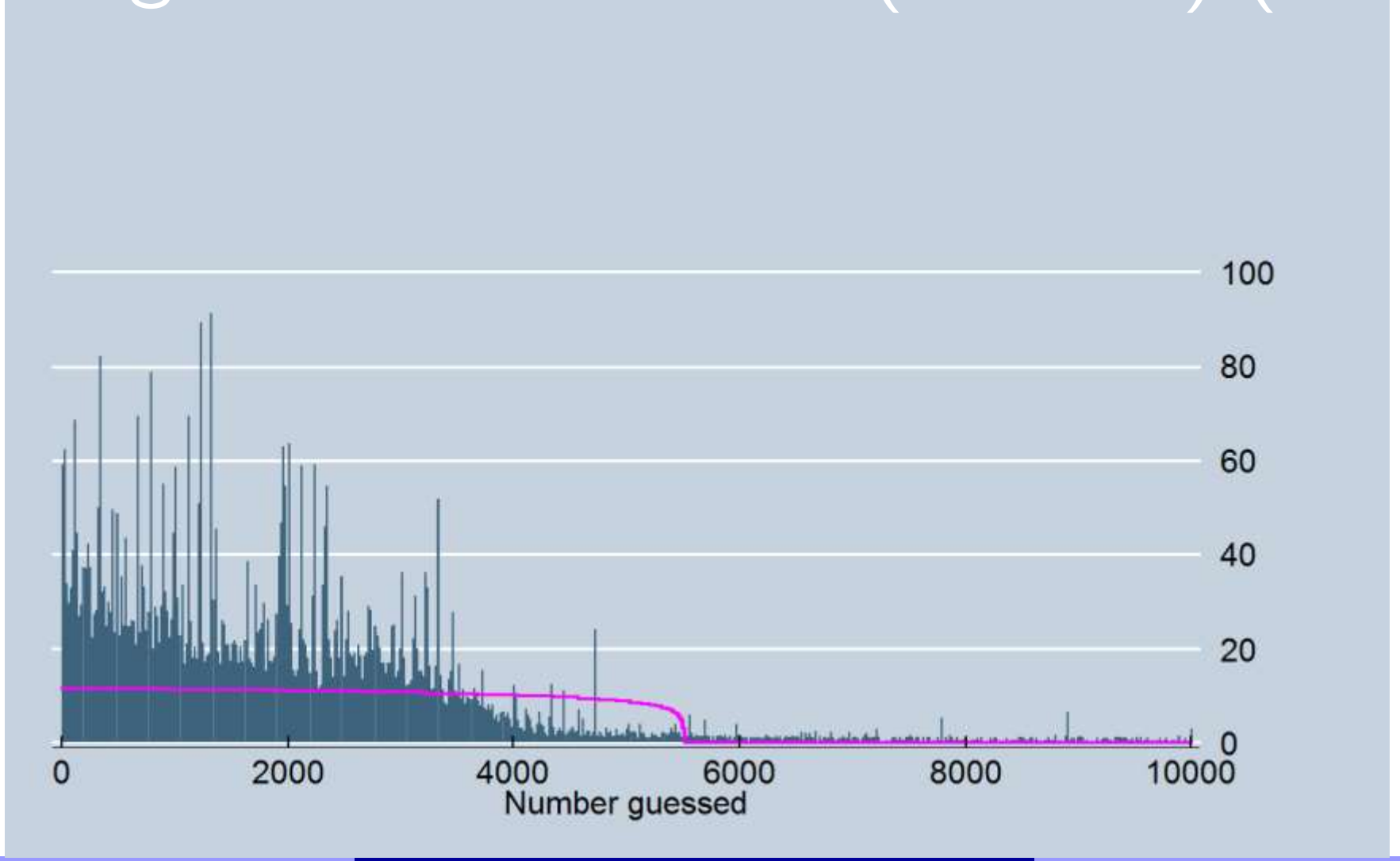
(每個數字每天選擇的)

Daily Average of Each Number (Week 3) (第3週頻率)



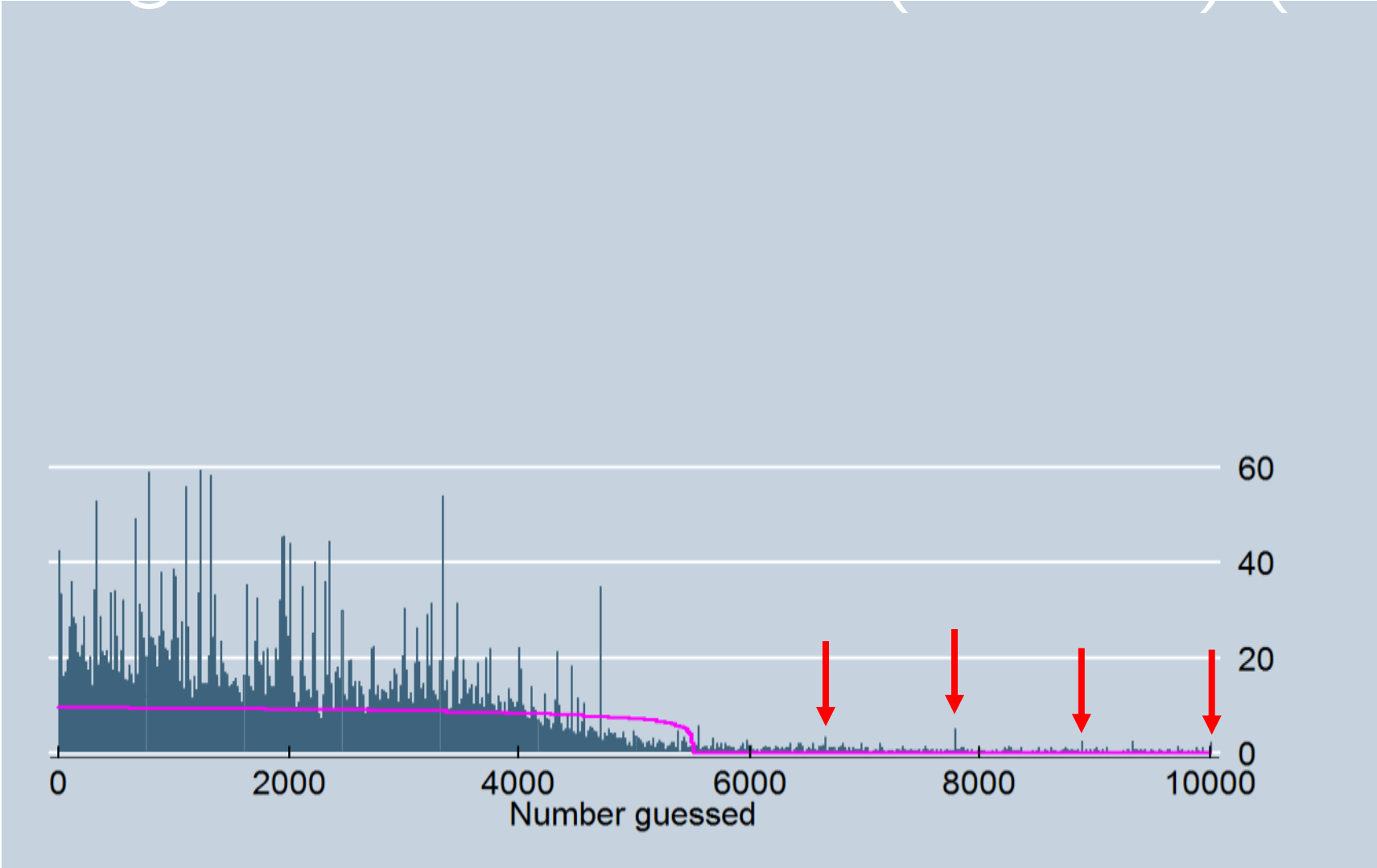
(每個數字每天選擇的)

Daily Average of Each Number (Week 5) (第5週頻率)



(每個數字每天選擇的)

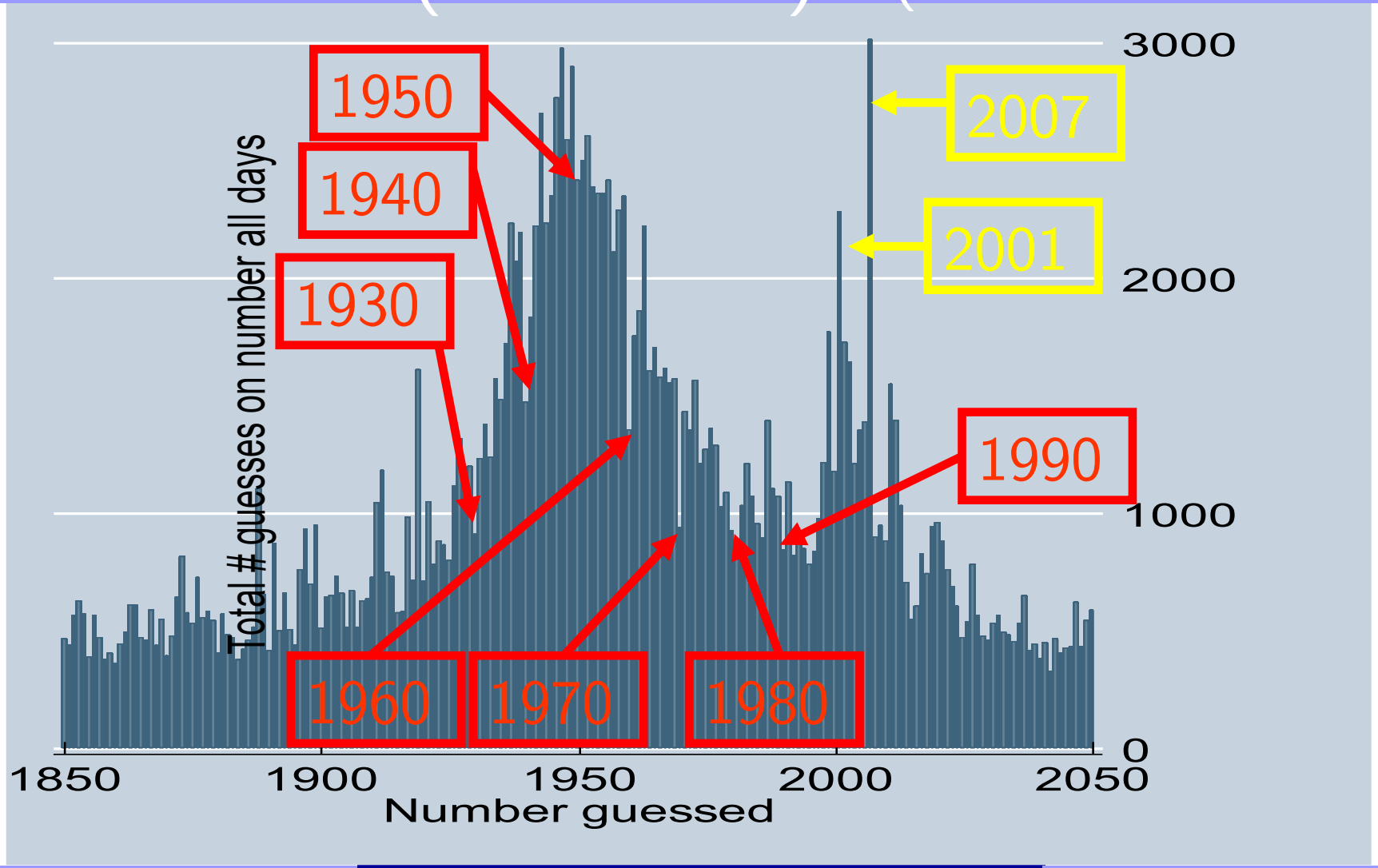
Daily Average of Each Number (Week 7) (第7週頻率)



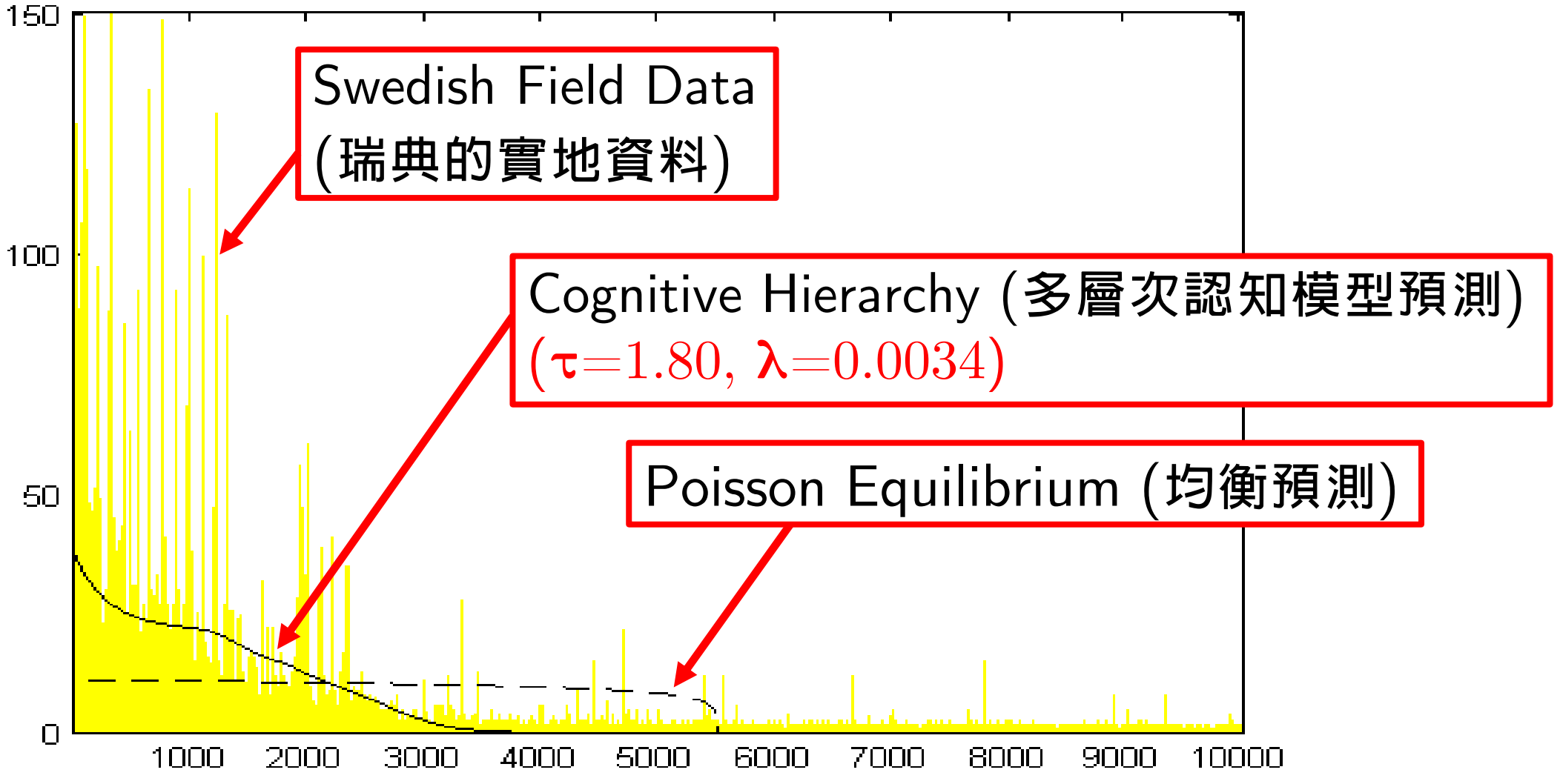
Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

5. Does empirical data match the theory? (實證資料是否支持你的預測?)
   - Collect data to see the big picture (蒐集資料來看「整個社會」的結果如何)
6. Can individual differences be explained? (資料中個別差異能否解釋?)
   - Unlike the Bible, economic theory can change (理論有改進空間嗎?)

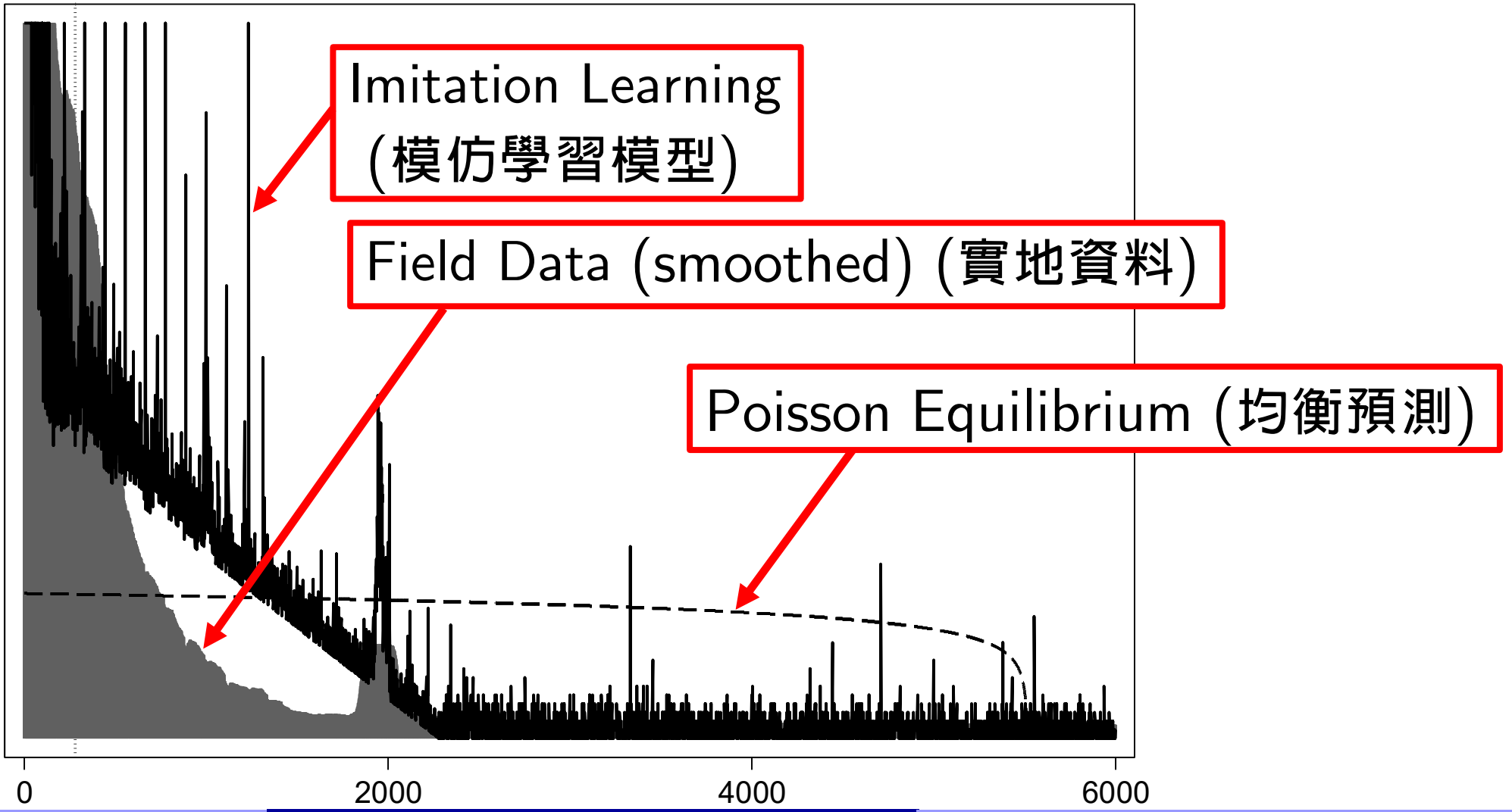
Choose Birth Year (and 2007)? (出生年度與當年度特別多)



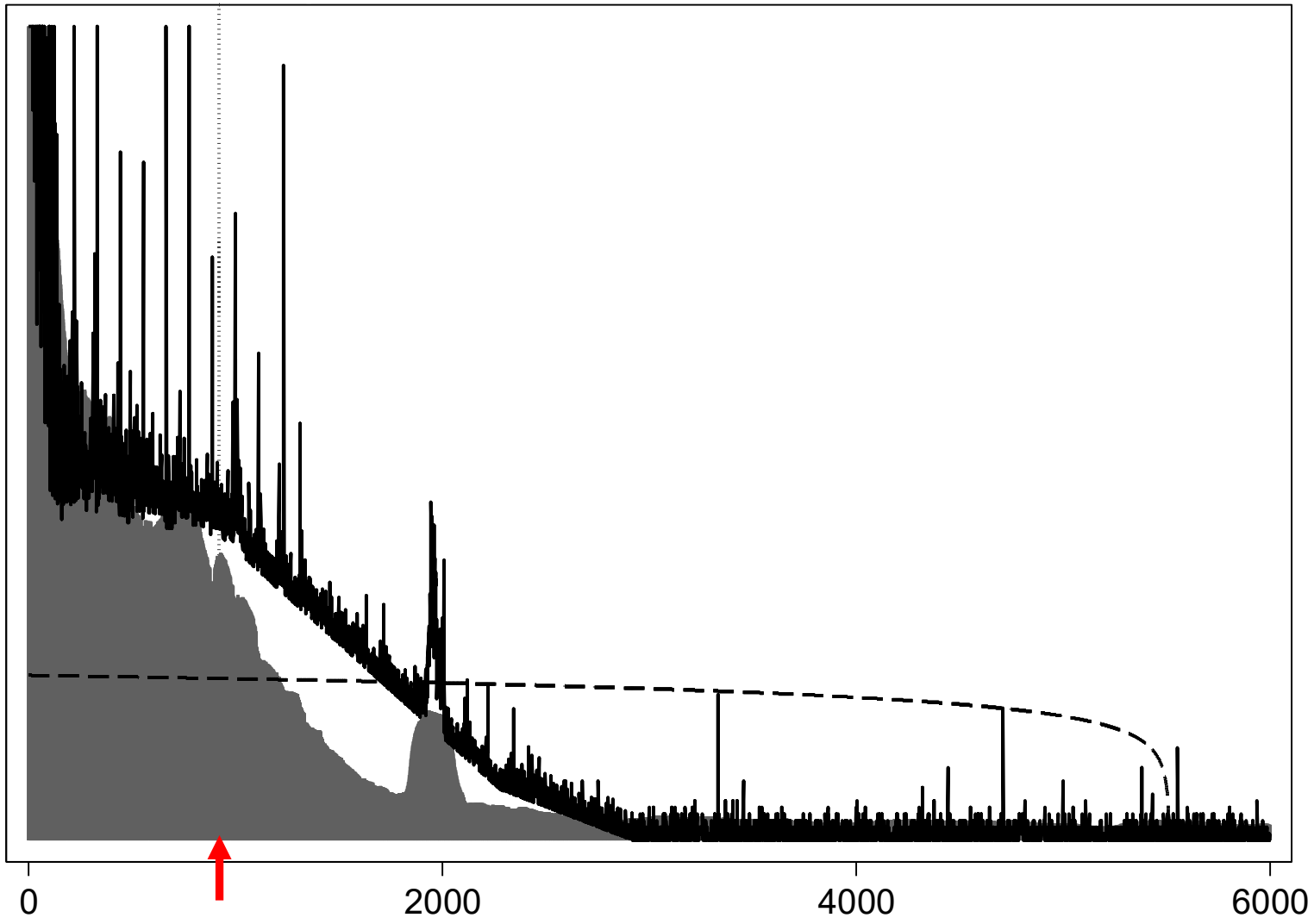
Initial Frequencies in Field (Week 1) (第1週實地資料的頻率)



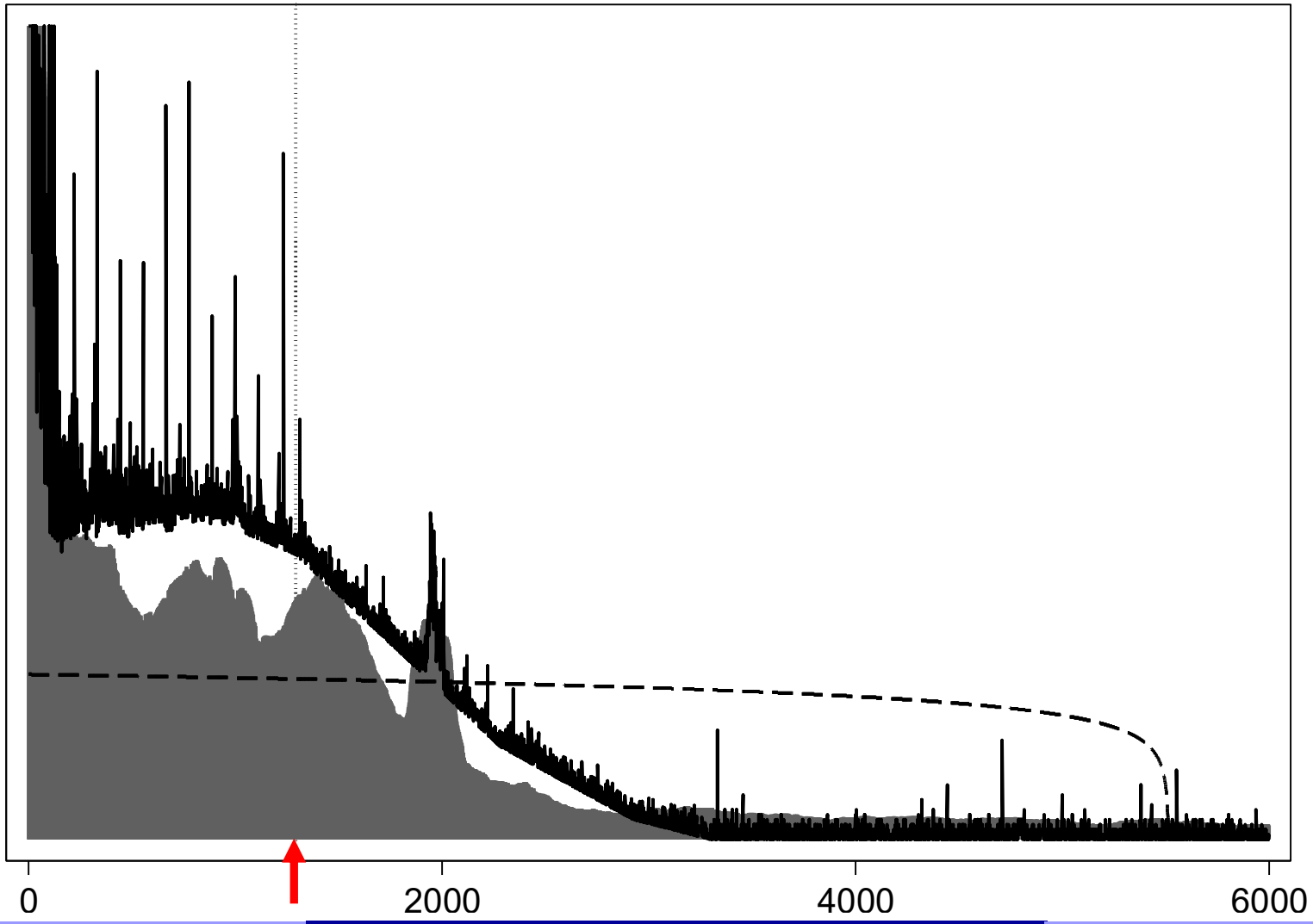
Imitation Learning vs. Field Data - Day 2 (第2天資料)



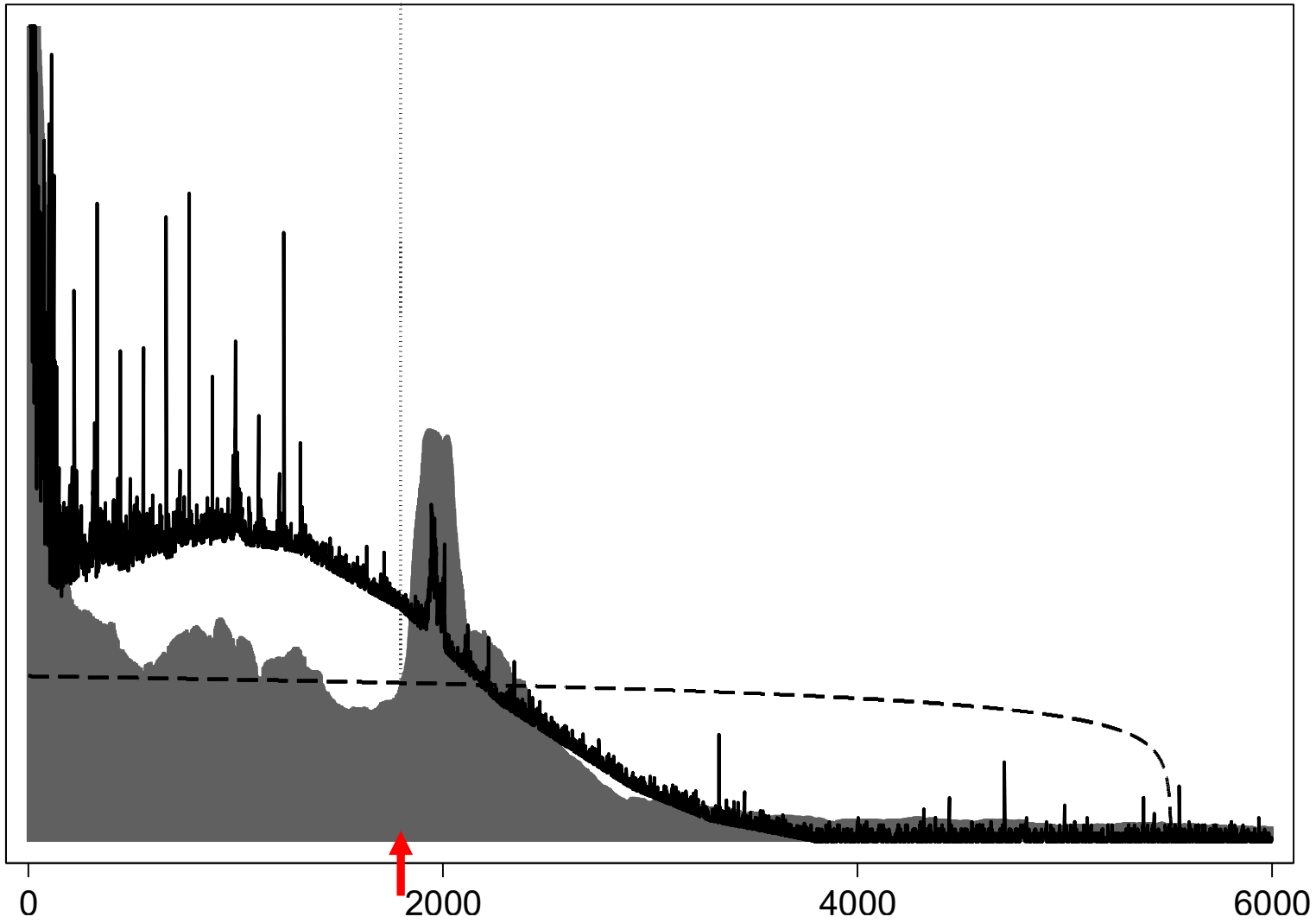
Imitation Learning vs. Field Data - Day 3 (第3天資料)



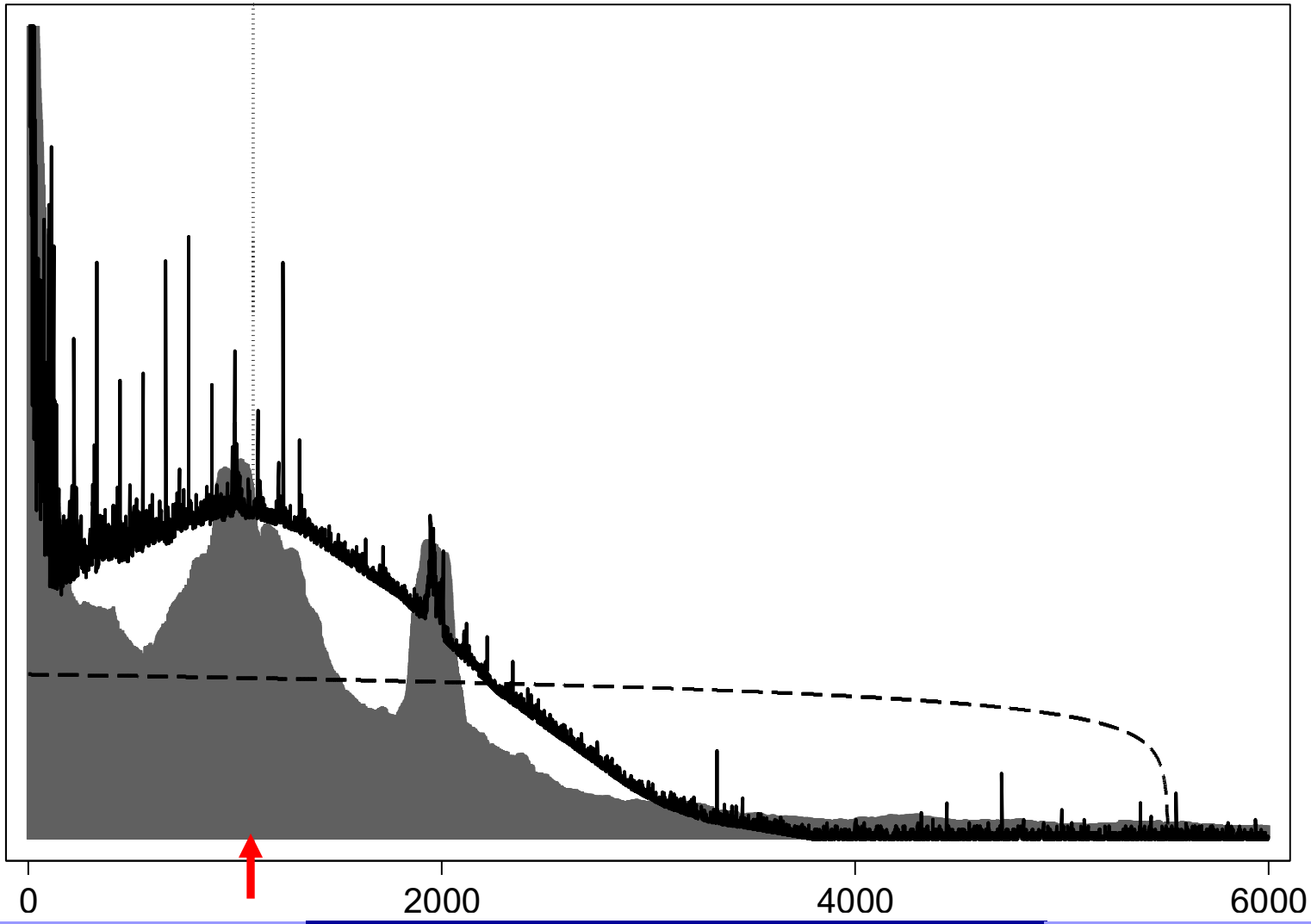
Imitation Learning vs. Field Data - Day 4 (第4天資料)



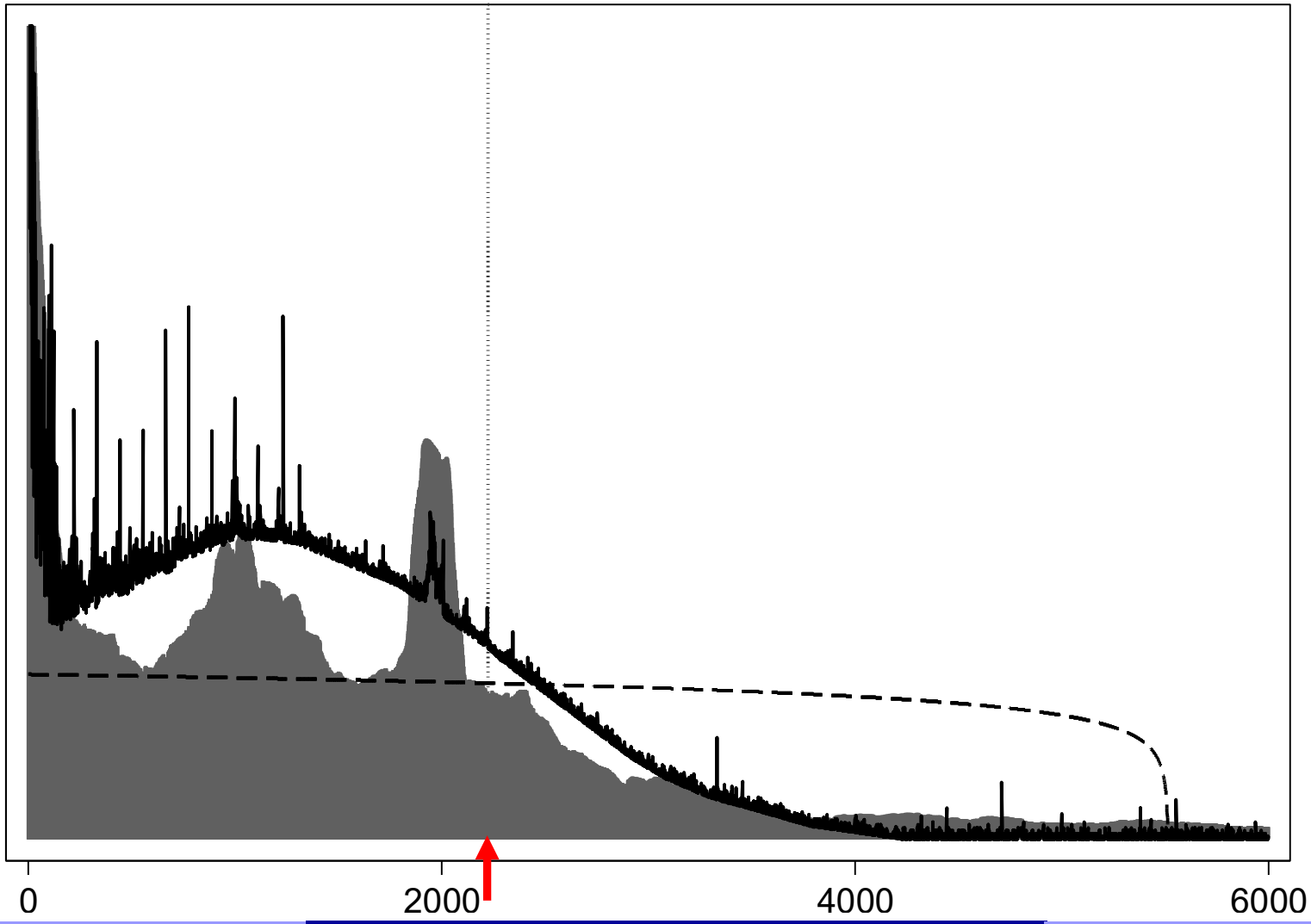
Imitation Learning vs. Field Data - Day 5 (第5天資料)



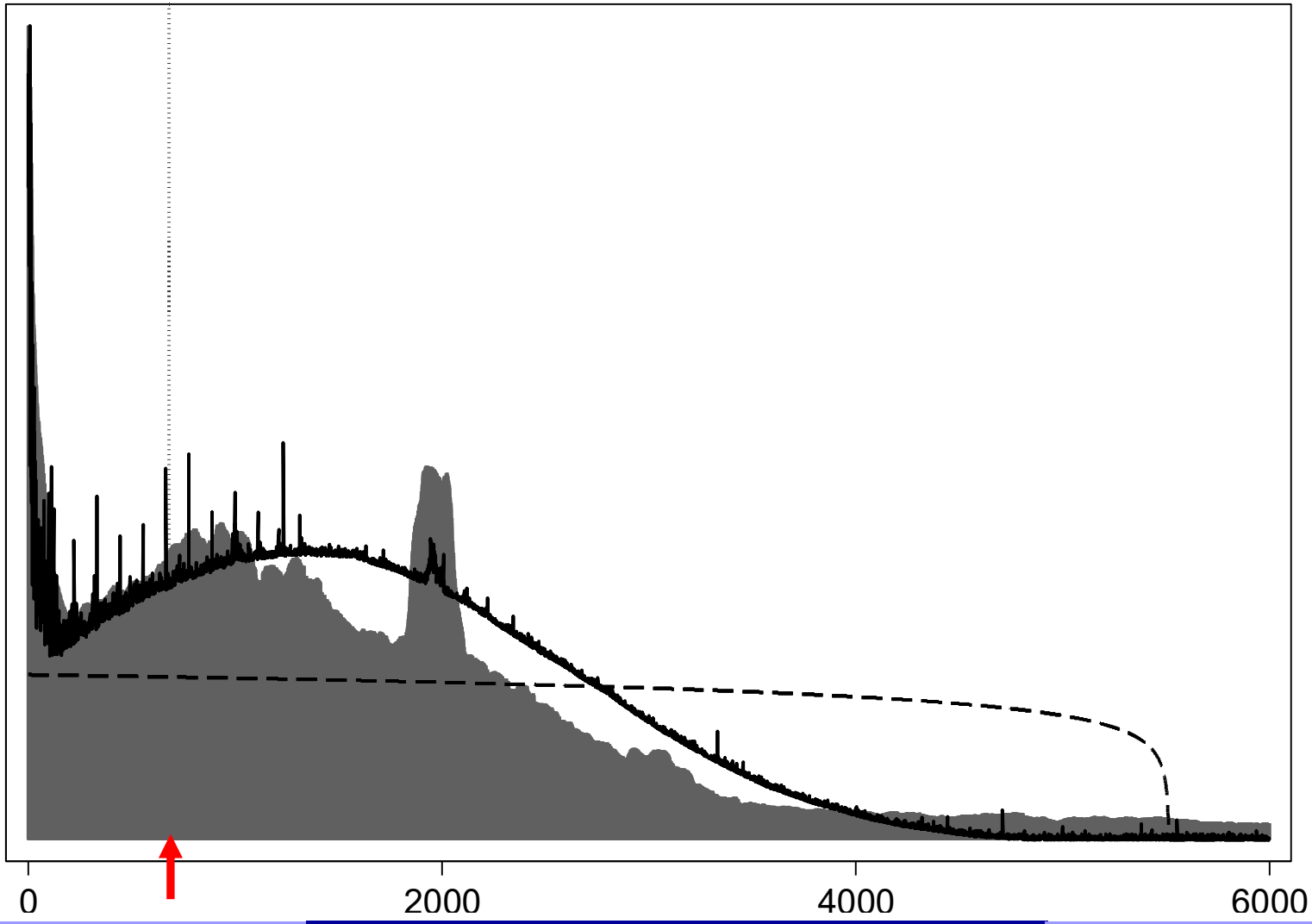
Imitation Learning vs. Field Data - Day 6 (第6天資料)



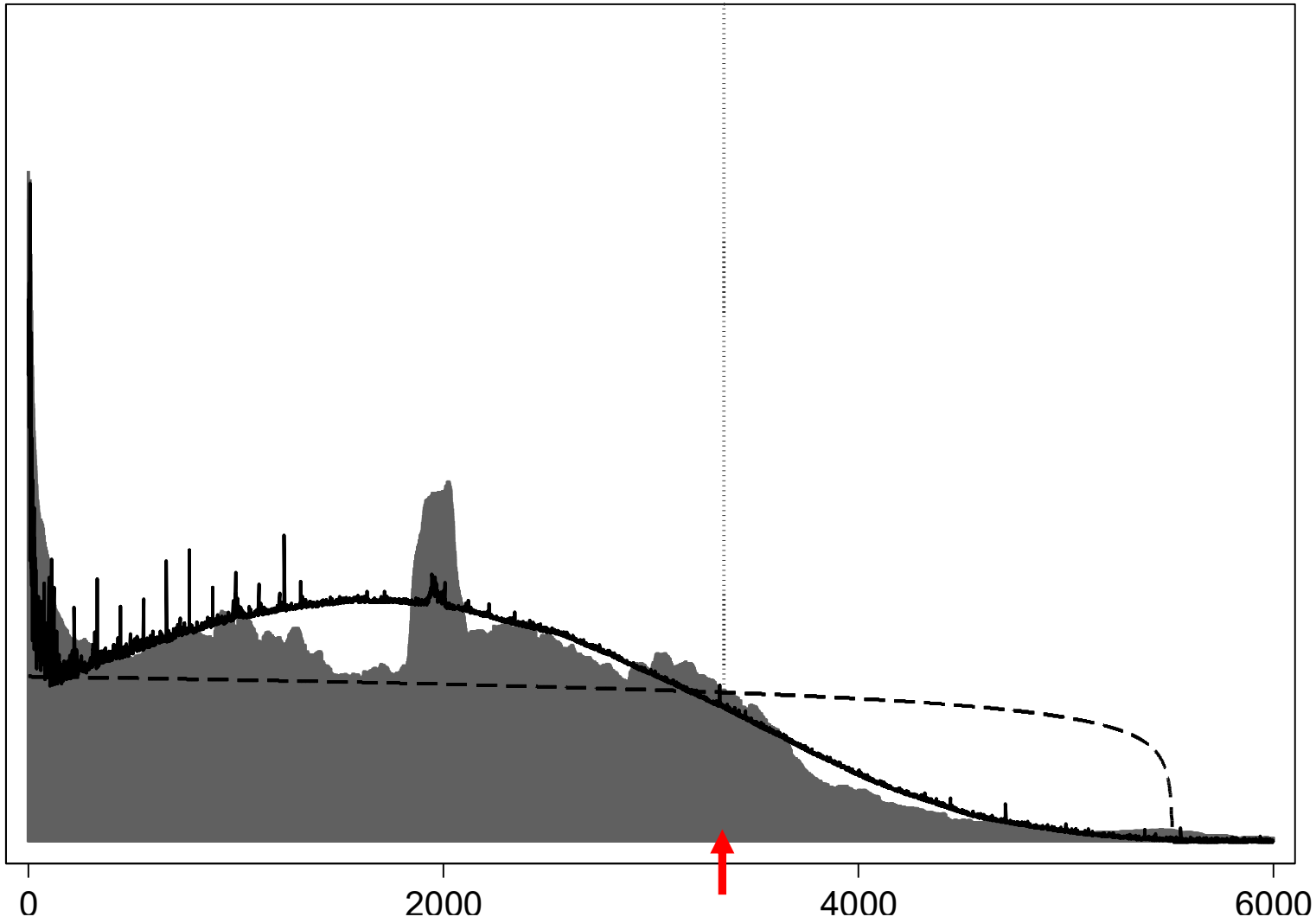
Imitation Learning vs. Field Data - Day 7 (第7天資料)



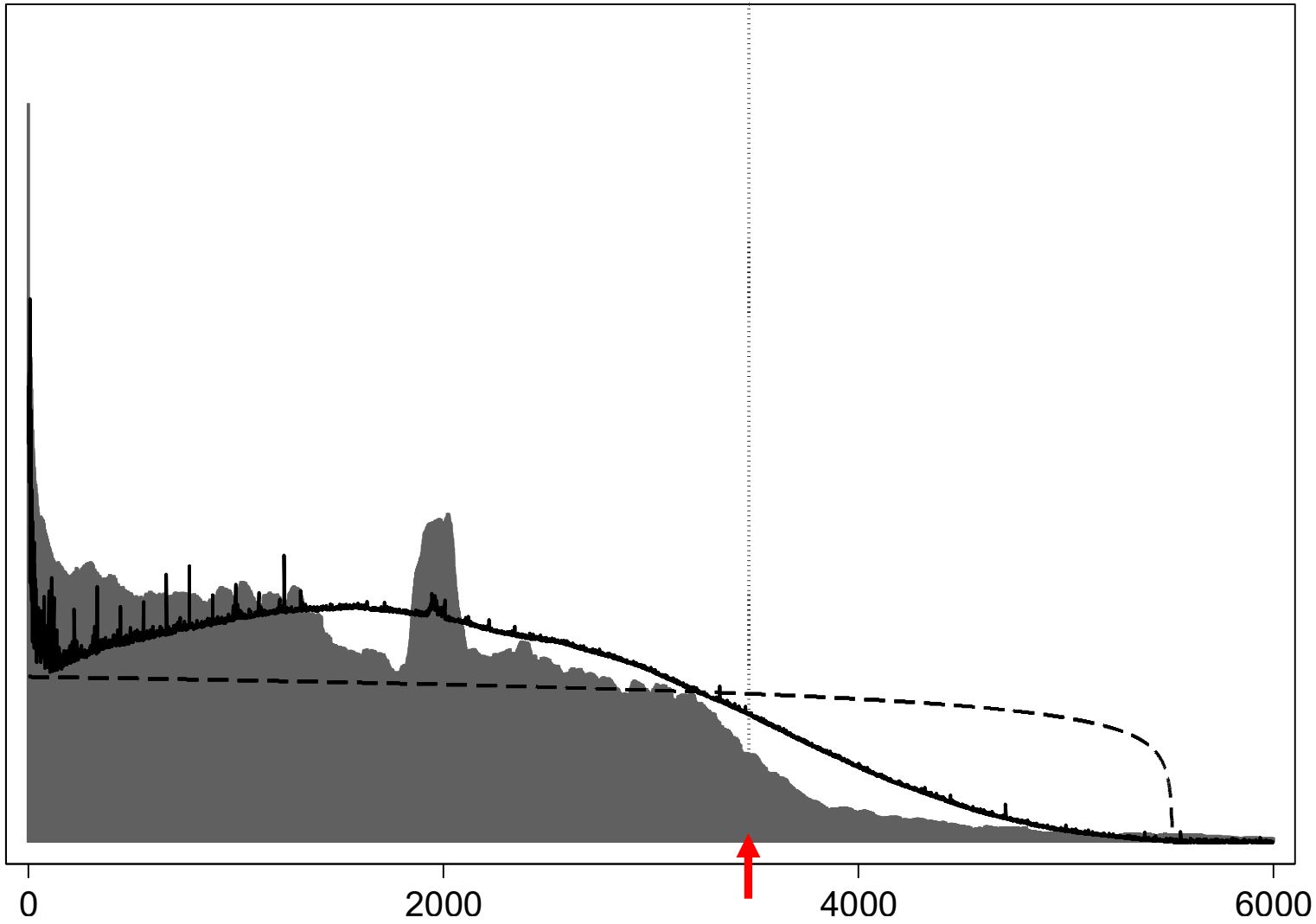
Imitation Learning vs. Field Data - Day 14 (第14天資料)



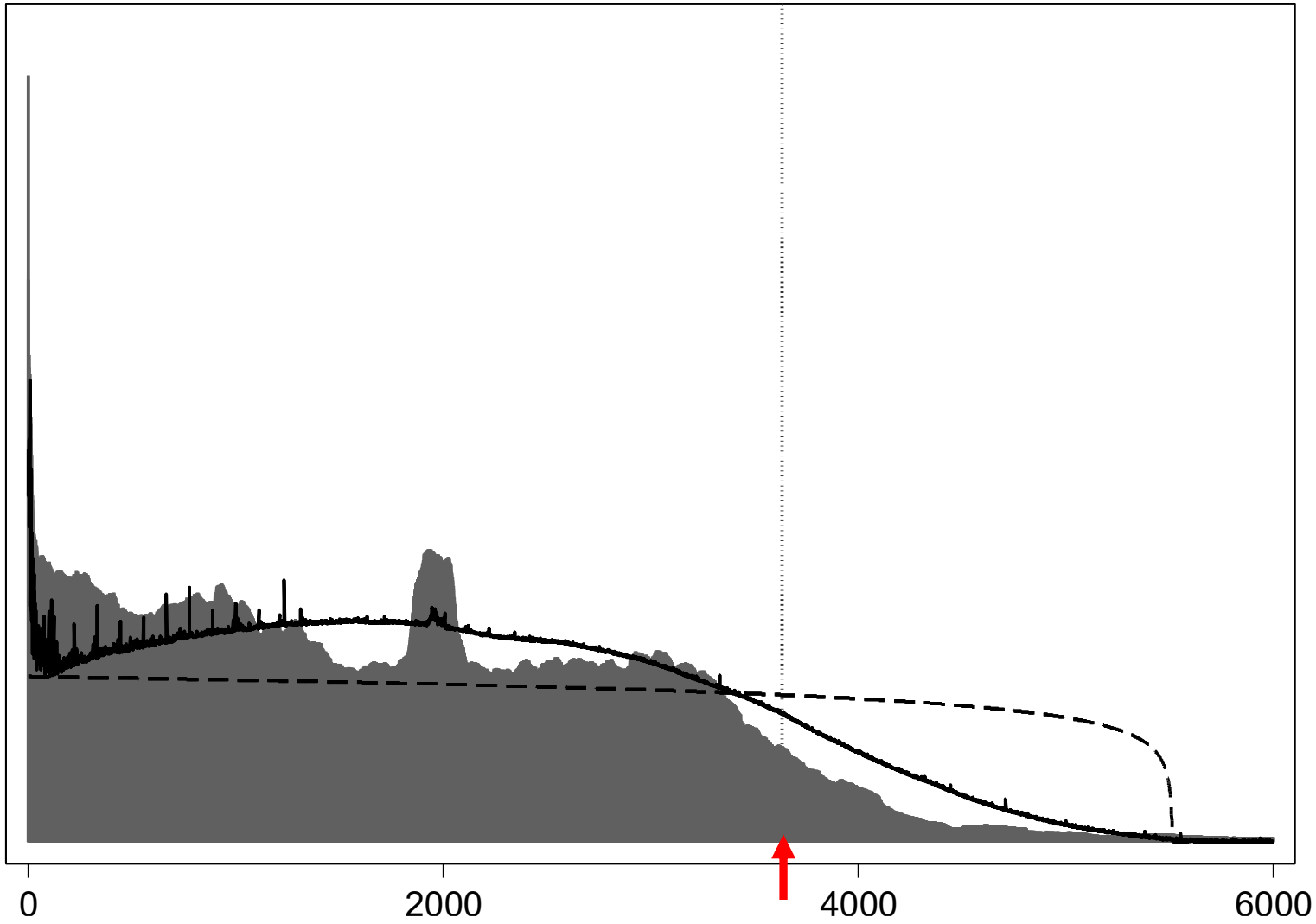
Imitation Learning vs. Field Data - Day 21 (第21天資料)



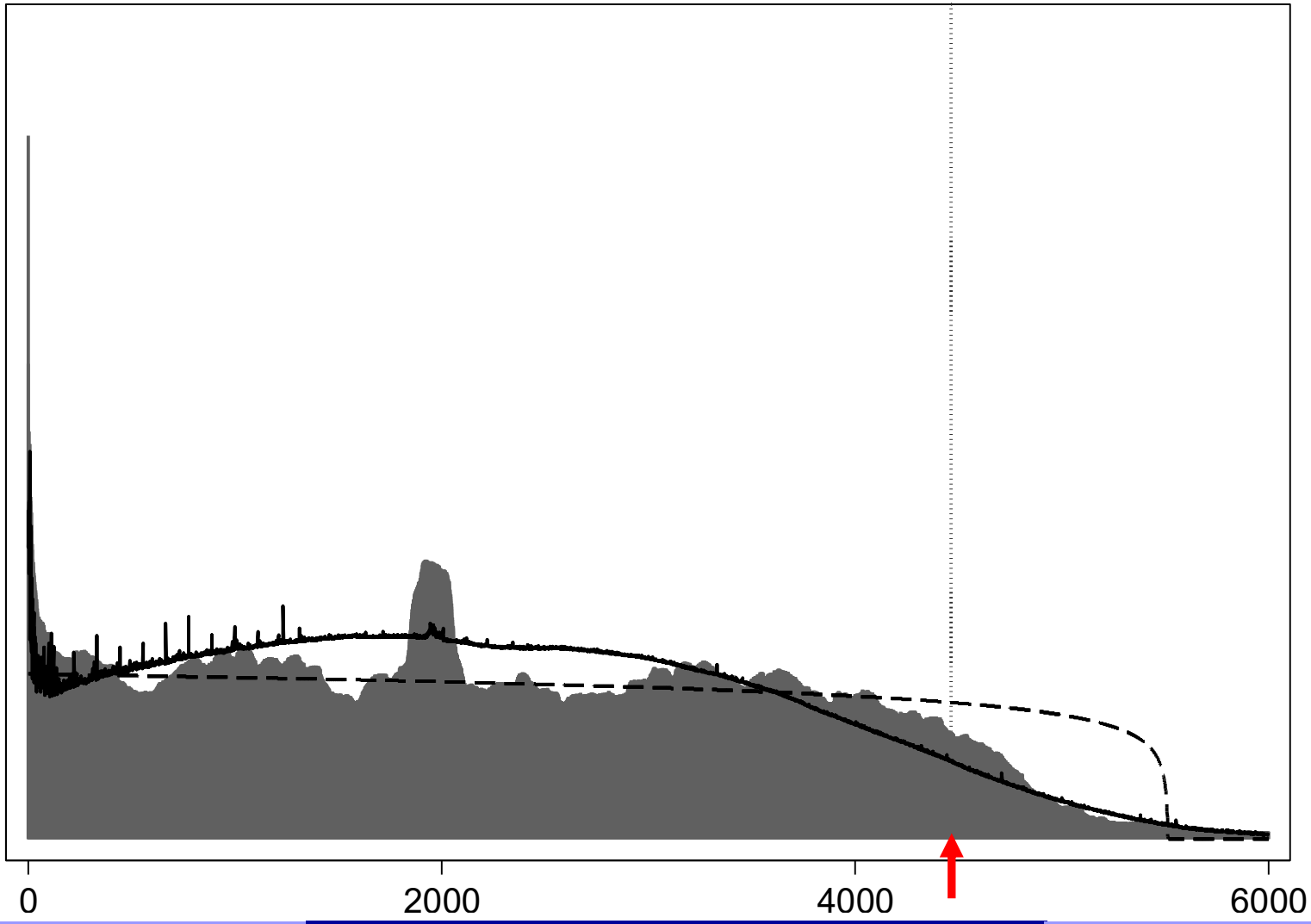
Imitation Learning vs. Field Data - Day 28 (第28天資料)



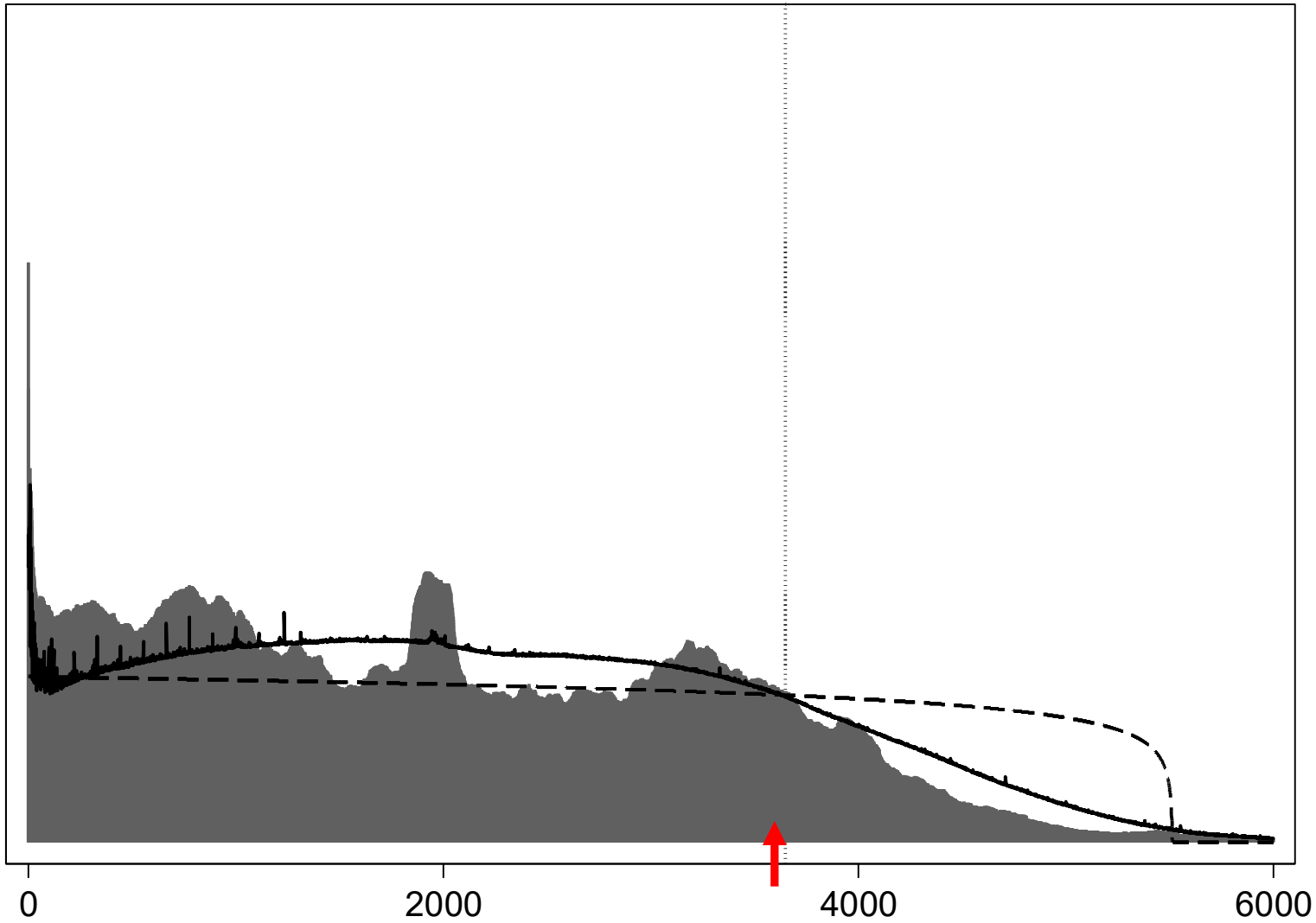
Imitation Learning vs. Field Data - Day 35 (第35天資料)



Imitation Learning vs. Field Data - Day 42 (第42天資料)



Imitation Learning vs. Field Data - Day 49 (第49天資料)



Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

5. Does empirical data match the theory? (實證資料是否支持你的預測?)
   - Collect data to see the big picture (蒐集資料來看看「整個社會」的結果如何)
6. Can individual differences be explained? (資料中個別差異能否解釋?)
   - Unlike the Bible, economic theory can change (理論有改進空間嗎?)
7. How can the institution be improved? (制度有沒有可以改進之處?)
   - Market Design: The Engineer Question! (市場設計: 工程師問題)
8. Where did this institution come from? (這套制度是哪裡來的?)
   - Why are we stuck with the current system? (現況的邏輯是什麼?)
   - The Historical Question (leading to humanities) (爬梳歷史通向人文)

Conclusion (小結)

- Traditionally, resources are scarce, so economists focus on Production and Consumption: Manage Resources Efficiently
  - 舊經濟時代聚焦在資源有限，經濟學處理生產和消費: 解決資源有效運用的問題
- But in the AI Economy, resource is no longer the focus!
  - More important are human reactions to information/institutions
  - 但在AI和知識經濟的時代，資源不再是重點! 更重要的是人們對資訊、對制度的反應
- So, Economics = For any Institution, There's a Reaction!
  - Given a set of rules, how people optimize; whether empirical data confirms theory, and to find institution origins and improvements
  - 因此，現代經濟學研究的是「上有政策，下有對策」：在一套遊戲規則下，人們如何謀求自身最佳；看實證資料如何印證理論，並思考這個制度如何改進、從何而來。

Institution Design Anticipating Human Reaction

- 如何考慮「下有對策」來設計制度？這也是「成功改變的三個必要條件」...
- To Push for Reform, You Need: (要推動改革，你需要)

1. Understand Logic of Current System (How it Works)
   - 瞭解現況的邏輯: 知道為甚麼現在是這樣的光景
2. Wisdom from God (on How to Fine Tune the System)
   - 有從上帝而來的智慧: 知道突破點在哪裡、知道如何微調現有制度讓大家更好
3. Convince Key Person (to Make the Change)
   - 說服有能力改變的人來改變: 這是比較容易的，因為前兩者根本是互斥的!

- Note: 1 and 2 are mutually exclusive!

But... (九把刀：人生就是有這個But...)

- Instructors Face Their Own Challenges (每個老師面對的挑戰不同)
  - "You don't know how awful XYU students are." (你不了解X大學生...)



- "NTU students can do this, but not ours!" (Really?!)
  - 橘逾淮為枳: 台大學生可以，不代表我們學生也可以(真的嗎?!)

But... (九把刀：人生就是有這個But...)

- Every Divorce is different, but Marriage Counseling is possible since there are: (家家有本難念的經，為什麼還有人可以幫別人做婚姻協談、諮商輔導？因為婚姻有:)

1. General Principles (共通原則)
2. Case Studies (可觀摩案例)
3. Inspiration (能觸類旁通)
   - Can Learn from Analogy

- What About Policy?
  - 那政策呢？

What is an Economic Experiment? (甚麼是經濟學實驗?)

- An Economic Experiment constructs a controlled environment to observe how people make economic decisions under real incentives, to answer questions raised by the researcher, testing a hypothesis or which theory matches reality
- (經濟學實驗是建構一個控制的環境，在有真實誘因的情況下，觀察人們如何做決定/經濟決策，為要回答研究者所提出的問題，檢驗哪個假說或理論比較符合現實。)
- 4 Components of Controlled Environments: (建構控制的環境有四大要素)
  1. Real Consequences as Incentives (真實後果或誘因)
  2. A Treatment/Control Group Design (對照組的設計)
  3. Random Assignment (隨機分組)
  4. No Deception (完全不欺騙受試者)

Q&A

(關於這個部分，我想要問...)

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What are your questions for Joseph? (關於這個部分，我有問題想要問王道一老師...)

ⓘ Start presenting to display the audience questions on this slide.

Some more examples...

(我們再來看幾個例子...)

Screening（篩選機制）

- "稀ㄟ取踢" Inc. Offers 2 Cell Phone Plans:
  - Plan A: $1 per minute
  - Plan B: $168 monthly for 300min, then $1.5/min
- Based on Last digit of student ID# (or card drawn), you:
  - ♠13: Use 0-100min/mo
  - ♡24: Use 200-300min/mo
  - ♢680: Use 400-500min/mo
  - ♣579: Use 600-700min/mo
- Which plan is cheaper for you?

電信業者	亞太電信	中華電信	台灣之星	LINE MOBILE
方案	168(12.12限定)	469	288	399
月租費	168	469	288	399
上網優惠	21M吃到飽	21M吃到飽	21M吃到飽	21M吃到飽
網內語音	免費	前五分鐘	免費	免費
網外語音	30分鐘	25分鐘	0分鐘	30分鐘
市話		10分鐘		40分鐘
其他優惠	百萬好禮抽獎	無	無	200點+2%
漫遊優惠	無	無	無	指定國家月租抵漫遊
綁約期限	24個月	24個月	12個月	12個月
網內費率	免費	$3/分鐘	免費	免費
網外費率	$2/分鐘	$6/分鐘	$6/分鐘	$6.6/分鐘
市話費率	$2/分鐘	$6/分鐘	$6/分鐘	$6/分鐘
申辦通路	亞太直營/特約門市	網路門市	全通路	官網

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Which Plan is cheaper for you? (尾數是xx的我選擇哪一個方案?) Plan A: $1 per minute 方案A: 一分鐘一塊錢 Plan B: $168 monthly for 300min, then $1.5/min 方案B: 月租費168可打300分鐘，之後1.5元/分)

ⓘ Start presenting to display the poll results on this slide.

篩選機制(Screening)

電信業者	亞太電信	中華電信	台灣之星	LINE MOBILE
方案	168(12.12限定)	469	288	399
月租費	168	469	288	399
上網優惠	21M吃到飽	21M吃到飽	21M吃到飽	21M吃到飽
網內語音	免費	前五分鐘	免費	免費
網外語音	30分鐘	25分鐘	0分鐘	30分鐘
市話		10分鐘		40分鐘
其他優惠	百萬好禮抽獎	無	無	200點+2%
漫遊優惠	無	無	無	指定國家月租抵漫遊
綁約期限	24個月	24個月	12個月	12個月
網內費率	免費	$3/分鐘	免費	免費
網外費率	$2/分鐘	$6/分鐘	$6/分鐘	$6.6/分鐘
市話費率	$2/分鐘	$6/分鐘	$6/分鐘	$6/分鐘
申辦通路	亞太直營/特約門市	網路門市	全通路	官網

1. A Set of Rules (一套遊戲規則)
   - Different cell phone plans (各種資費方案)
2. Individuals Optimize (個人決策謀求最佳化)
   - Which saves me the most money? (哪個最省錢?)
3. You React to Others Optimizing (其他人也在謀求自身最佳，所以你要因應)
   - Want a free iPhone 13? Get a new line! (為了零元手機多辦一個門號?)
4. What Should Aggregate Data Look Like?
   - The separating equilibrium says ♠13♣579 choose plan A, while ♡24♢680 choose plan B (整體結果長怎樣? 理論的預測為何?)
     - 分離均衡(Separating Equilibrium)的預測是♠13和♣579選擇方案A，♡24和♢680選擇方案B

Screening (篩選機制)

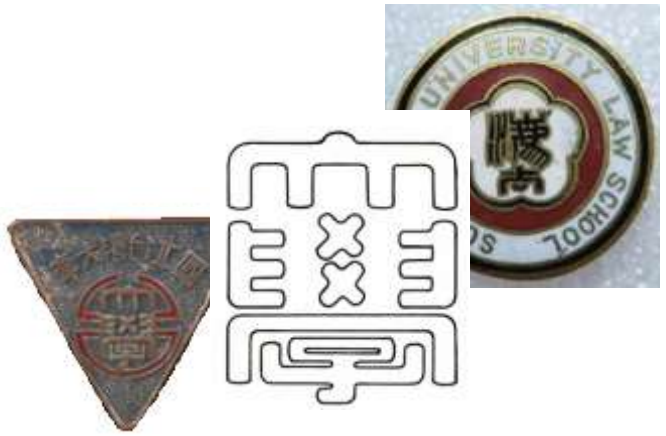
5. Does Empirical Data Match the Theory? (實證資料是否支持你的預測?)
   - How many ♠13♣579 (♡24♢680) did choose plan A(B)?
   - (剛剛有多少♠♣奇數(♡♢偶數)真的選方案A(B)?)
6. Can Individual Differences be Explained? (資料中的個別差異能否解釋?)
   - If you are different, what were you thinking? (如果你是特例，你是怎麼想的?)
7. How Can the Institution (Rules) Improve? (制度/遊戲規則可以怎麼改進?)
   - What would you do as a marketing manager? (如果你是行銷經理會怎麼做?)
8. Where Did this Institution Come From? (這套制度是哪裡來的?)
   - Copied from other countries? Only one approved? (抄國外的資費方案? 只有這個通過NCC的核准?)

Applications of Screening (篩選機制的應用)

- Screening Devices designed to Differentiate (篩選機制設計關鍵是要分衆)
  - Let some choose Plan A, others Plan B (讓某些人去選方案A，另一批人選方案B)
- Ex: Marketing Campaigns Target Specific Groups (針對性行銷專案)
  - Student/NP plans of cell phone companies (電信三雄的學生專案、NP專案)
  - BOGO, 2nd pair 50% off, 2nd bottle 41% off... (買一送一、第二雙半價...)
- HR Screen CVs Based on Certain Criteria (人資看履歷根據某些條件篩選)
  - Ivy League, GPA, extra-curriculum activities, GIS
  - Students try their best to satisfy those criteria
    - 比如說：苔誠青椒、成績、社團活動或幹部資歷
    - 學生就會按照那些條件來爭取資歷

Signaling (認證標籤)

1. Expected Salary if you graduate from: (假設你高中畢業後考上...)
   - ♡24♢680: National iDaiwan University: 35k/mo (國立愛呆丸大學畢業起薪35k)
   - ♠13♣579: Salty Chicken University: 22k/mo (私立鹹酥雞大學畢業起薪22k)
2. If you go to graduate school at NiDU: (大四上你可選擇報考愛呆丸大學研究所)
   - Expected salary 40k/mo, but need to repay student loans @ 5k/mo
   - (畢業後月薪40k，但須負擔就學貸款(和補習貸款)月繳5k)
3. Would you (advise your friend or your son to) apply for NiDU graduate school? Why?
   - (請問你會不會報考研究所? 為什麼?)



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BA@NiDU earns 35k/mo 愛呆丸大學畢業月薪35k,
BA@SaltyChickenU earns 22k/mo 鹹酥雞大學畢業月薪22k
MA@NiDU earns 40k/mo (but need to repay student loans@5k/mo) 報考愛呆丸大學研究所畢業月薪40k，但需負擔貸款月繳5k
Would you apply for NiDU's MA program? 就讀xx大學的我，會不會報考研究所?

ⓘ Start presenting to display the poll results on this slide.

Signaling (認證標籤)

1. A Set of Rules (一套遊戲規則: 就業市場上(與社會上?)公認的文憑主義)
   - Credentialism on the job market (and society)
2. Individuals Optimize (個人決策謀求最佳化)
   - Which choice is better for my job market? (哪個選擇對未來求職最有利?)
3. You React to Others Optimizing (其他人也在謀求自身最佳，所以你要因應)
   - Would salary be the same if everyone has a MA? (大家都上研究所碩士起薪不變?)
4. What Should Aggregate Data Look Like? (整體結果長怎樣?理論預測為何?)
   - Pooling equilibrium says all should get a MA, though NiDU undergrads (♡24♢680) are indifferent (Other equilibrium?)
   - (有志一同均衡預測所有人都會考研究所，雖然愛呆丸大學的畢業生覺得沒差。) (其他均衡呢?)

Signaling (認證標籤)

5. Does Empirical Data Match the Theory? (實證資料是否支持你的預測?)
   - How many ♠13♣579(♡24♢680) actually applied for MA?
   - (剛剛有多少♠♣奇數(♡♢偶數)真的選擇研究所?)
6. Can Individual Differences be Explained? (資料中的個別差異能否解釋?)
   - If you are ♡24♢680, what were you thinking? (♡♢偶數的你是怎麼選擇的?)

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I am a BA@NiDU (♡24♢680) and I will apply(or not) because...
(就讀愛呆丸大學的我「會」或「不會」報考研究所，原因是...)

ⓘ Start presenting to display the poll results on this slide.

Signaling (認證標籤)

5. Does Empirical Data Match the Theory? (實證資料是否支持你的預測?)
   - How many ♠13♣579(♡24♢680) actually applied for MA?
   - (剛剛有多少♠♣奇數(♡♢偶數)真的選擇研究所?)
6. Can Individual Differences be Explained? (資料中的個別差異能否解釋?)
   - If you are ♡24♢680, what were you thinking? (♡♢偶數的你是怎麼選擇的?)
7. How Can the Institution (Rules) Improve? (制度/遊戲規則可以怎麼改進?)
   - What would you do as employers? As Minister of Education? (如果你是老闆會怎麼辦? 如果你是教育部長呢?)
8. Where Did this Institution Come From? (這套制度是哪裡來的?)
   - Imperial Examination System? (萬般皆下品? 還是把讀書當作晉身統治階級的科舉制度?)

Applications of Signaling (認證標籤的應用)

- Which Would You Choose? (mutually exclusive) (只能二選一的話...)
  1. Spend 4 Years Studying at the world's best university, but must keep attendance a secret. (念全世界最好的大學，但是拿不到畢業)
  2. Get an Official Degree from the world's best university, but cannot actually study there. (拿全世界最好大學的畢業證書，但不能去念)
- Answer Reveals which do you think is the more important reason Education Increases Salary

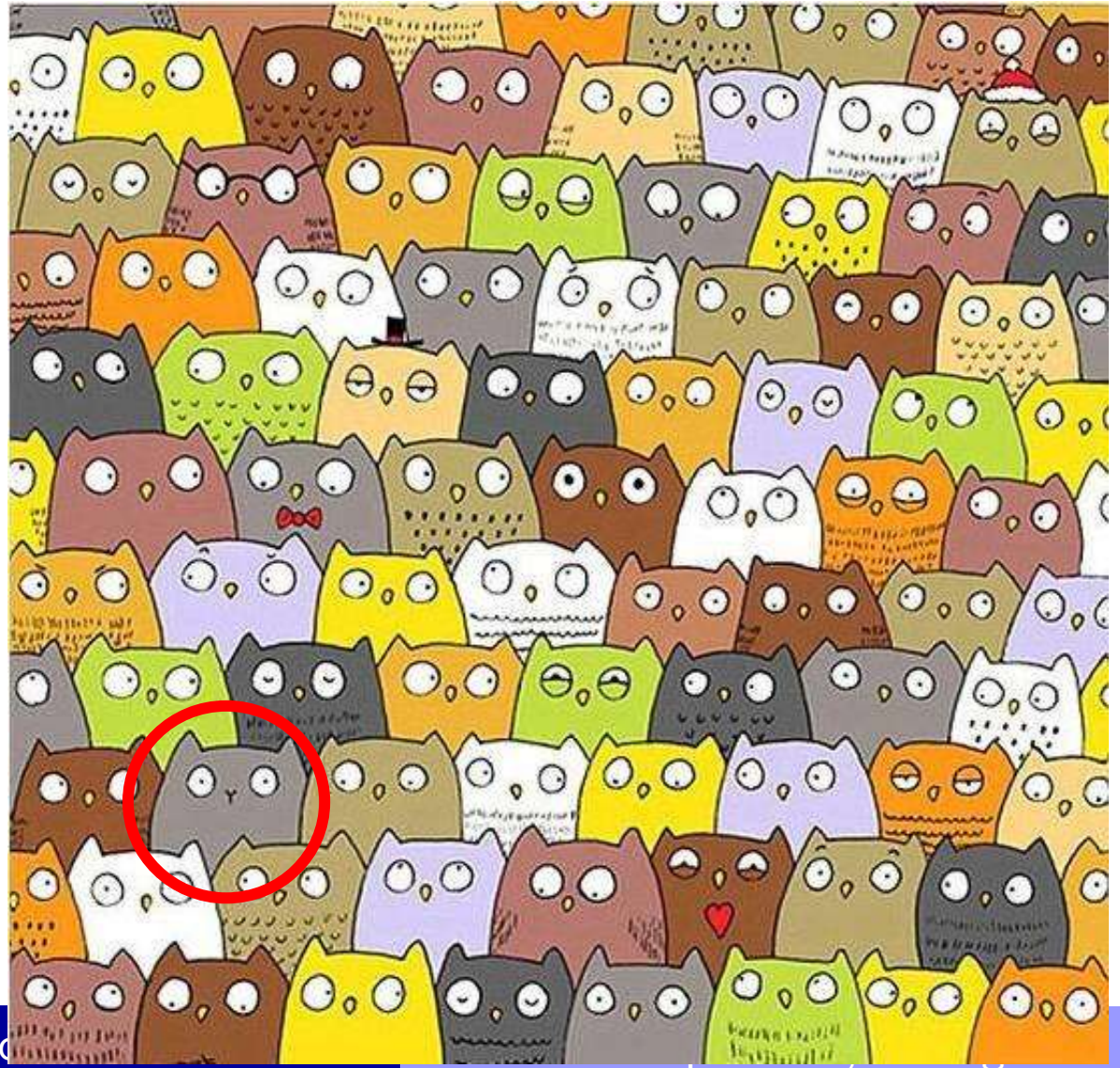
  Your Human Capital vs. Your Signal
- 你的選擇反映你認為教育提高薪資的兩個原因哪個比較重要：累積的人力資本 vs. 擁有的認證光環

認證標籤(Signaling)的應用

- Signals Let You Stand Out (認證標籤的設計關鍵是要能夠讓你鶴立雞群)
  - Convince others you (your products) are better (說服對方你比較好，與衆不同)
- Examples: (認證標籤實例)
- Consumers Demand Certificate of Origin (消費者要求產地標章)
  - Credentials, Recommendation Letters, MIT, ISO (學歷光環/主管推薦信/台灣製造)
- Demonstrate Qualification in Job Interviews (求職者透過面試強調自己的特點)
  - Hire me, because... (試圖說服面試官錄取她/他) (你去科系面試，要如何說服對方錄取你?)
- How would you convince interviewers to admit you? Should I go for MBA immediately after college? (商管科系大學畢業該馬上念MBA嗎?)

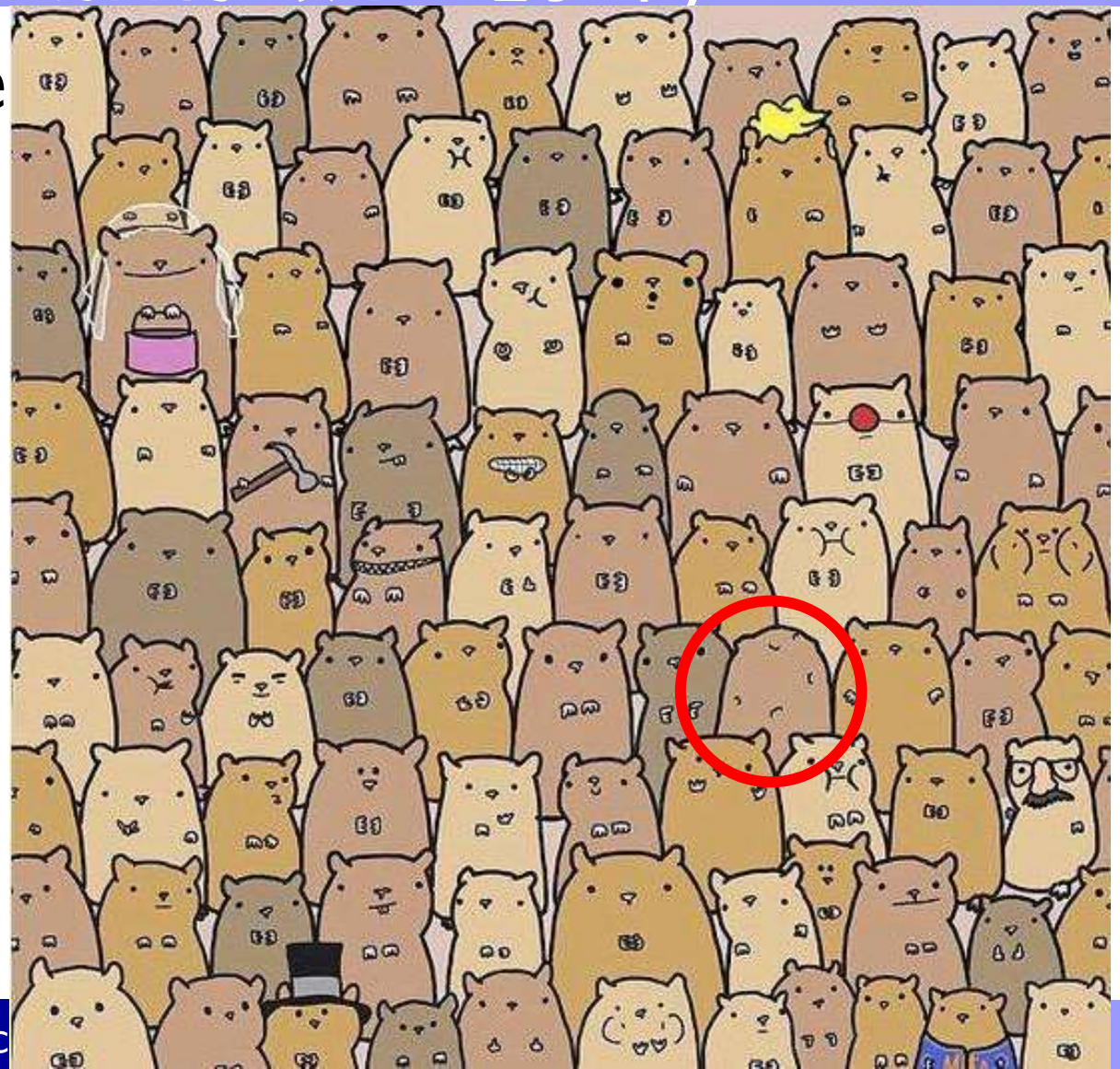
Bad Signaling (認證標籤的反指標:雞立鶴群)

- Find the cat in these owls
  - 請在貓頭鷹中找一隻貓咪
- Can you find it?
  - 找得到嗎??
- Opposite of a good signal!
  - 知道雞立鶴群的感覺了嗎??



Bad Signaling (認證標籤的反指標:雞立鶴群)

- Find the potato in these mice
  - 請在倉鼠群中找一顆馬鈴薯
- Can you find it?
  - 找得到嗎??
- Opposite of a good signal!
  - 知道雞立鶴群的感覺了嗎??



Bad Signaling (認證標籤

- Find the panda in these dogs
  - 請在狗群中找一隻貓熊
- Opposite of a good signal!
  - 知道雞立鶴群的感覺了嗎?

Q&A

(關於這個部分，我想要問...)

slido

關於這個部分，我有問題想要問王道一老師...

ⓘ Start presenting to display the audience questions on this slide.

Public Goods Contribution

(公共財自願捐獻)

Public Goods Contribution (公共財自願捐獻)

- Form groups of 4 people according to your card
  - 請按照手上的撲克牌，分成四人一組

  - Each group member should have a card (每一組的組員手上的撲克牌)
- Of the same number (必須都要是同樣數字)
- But NOT the same suit! (但是花色不可以相同!)
  - People online join assigned chatrooms (線上參與者請按事先的分配進入討論室)

Public Goods Contribution (公共財自願捐獻)

- Each group has 2 red, 2 black card (每組總共有兩張紅色牌、兩張黑色牌)
  - I will collect 2 cards from each group (之後主持人會跟每組收取兩張牌)
- You choose which two cards to submit to the pool:
  - two black, two red, or one each
  - (各組自行選擇要繳交哪兩張牌存入公庫: 交出兩黑、兩紅或一黑一紅均可)
- You keep the remaining 2 cards (剩下兩張牌留在私庫)
  - Submit cards facing down (secret) (繳交時請牌面朝下確保他人看不到牌組內容)
- I will count red cards in the pool (最後統計公庫裡總共有多少張紅色牌)
  - Discuss and jointly decide; no dictators! (請共同討論後作決定，不要都是某一個人獨裁)

Public Goods Contribution (公共財自願捐獻)

- Scores depends only on red cards (每回合得分取決於紅色牌/黑色牌不計分)
- 1 red card you keep = 1pt for your group (私庫的每張紅色牌可讓該組得1分)
- 1 red card in pool = 2pt for each group (公庫的每張紅色牌可讓每組都得2分!)
  - If there are 30 groups and each submit one each
  - Pool has 30 red cards (=60pt), so each group earns 61pt!
  - (假設有30組參與遊戲，每組都繳出一紅一黑存入公庫，公庫就有30張紅色牌(=60分)，各組得61分!)
- In later rounds, red cards you keep may change value, but red cards submitted to the pool always yields 2pt for each group
  - (在之後的回合，私庫中的紅色牌價值會有所變動，但公庫中的紅色牌價值不變)

Practice Round 1 (練習回合1)

- Group Earnings = (1pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (1分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- How much would you earn if all groups submit two red cards? (如果30組都交出兩張紅色牌，會拿幾分?)
- How much would you earn if others all submit two red cards, but you submit only one?
  - (如果別組都交出兩張紅色牌，但你們這組暗槓一張紅色牌，這樣你們會拿幾分?)
- Is it worth it to keep one red card? (暗槓划得來嗎?)

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Group Earnings = (1pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (1分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。
How much would you earn if all groups submit two red cards? (如果30組都交2張紅色牌，會拿幾分?)

ⓘ Start presenting to display the poll results on this slide.

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Group Earnings = (1pt × red cards you keep)
+ (2pt × total red cards in the pool)

小組報酬 = (1分 × 私庫紅色牌張數)
+ (2分 × 公庫紅色牌總張數)。

How much would you earn if other groups submit two red cards, but you submit only one? 如果別組都交2張紅色牌，但你們這組暗槓1張紅色牌，這樣你們會拿幾分？

ⓘ Start presenting to display the poll results on this slide.

Practice Round 1 (練習回合1)

- Group Earnings = (1pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (1分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- If all 30 groups submit two red cards, (如果30組都交出兩張紅色牌)
  - Pool has 60 red cards, so each group earns 120pt! (公庫有60張紅色牌，每組得60*2=120分! 但如果別組都交出兩張紅色牌，你們這組卻暗槓一張紅色牌，)
- If others all submit two red cards, but you submit one,
  - 59*2 + 1 = 118 + 1 = 119pt (分)!
- Is it worth it to keep one red card? No! (暗槓划得來嗎? 才怪!)

Practice Round 2 (練習回合2)

- Group Earnings = (50pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (50分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- How much would you earn if all groups submit two black card? (如果30組都交出兩張黑色牌，會拿幾分?)
- How much would you earn if others all submit two black card, but you submit one each?
  - (如果別組都交出兩張黑色牌，但你們這組交出一張紅色牌，這樣你們會拿幾分?)
- Is it worth it to submit one red card? (交紅色牌划得來嗎?)

slido

Group Earnings = (50pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (50分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。

How much would you earn if all groups submit two black cards? 如果30組都交2張黑色牌，會拿幾分？

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Group Earnings = (50pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (50分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。

How much would you earn if all groups submit two black cards, but you submit one each? 如果別組都交2張黑色牌，但你們這組交1張紅色牌，這樣你們會拿幾分？

ⓘ Start presenting to display the poll results on this slide.

Practice Round 2 (練習回合2)

- Group Earnings = (50pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (50分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- If all 30 groups submit two black cards, (如果30組都交出兩張黑色牌)
  - Pool empty, but each group earns 0*2+50*2=100pt! (公庫空空，但每組得0*2+50*2=100分! 但如果別組都交出兩張黑色牌，你們這組卻交出一張紅色牌，)
- If others submit two black cards, you submit one each,
  - 1*2 + 1*50 = 52pt (分)! (別人多2分但你們只得1*2 + 1*50 = 52分!)
- Is it worth it to submit one red card? No! (交紅色牌值得嗎? 才怪!)

Real Round 1: Be ware!! (正式回合1要開始請注意囉!!)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)

Suppose There are 30 Groups (假設這次總共有三十組參與...)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- How much would you earn if all groups submit two red cards? (如果30組都交出兩張紅色牌，會拿幾分?)
- How much would you earn if others all submit two red cards, but you submit only one?
  - (如果別組都交出兩張紅色牌，但你們這組暗槓一張紅色牌，這樣你們會拿幾分?)
- Is it worth it to keep one red card? (暗槓划得來嗎?)

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Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。

How much would you earn if all groups submit two red cards? (如果30組都交2張紅色牌，會拿幾分?)

ⓘ Start presenting to display the poll results on this slide.

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Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。

How much would you earn if others all submit two red cards, but you submit only one? (如果別組都交出2張紅色牌，但你們這組暗槓1張紅色牌，這樣你們會拿幾分?)

ⓘ Start presenting to display the poll results on this slide.

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Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。

How much would you earn if others all submit two red cards, but you submit NONE? (如果別組都交2張紅色牌，但你們這組暗槓2張紅色牌，這樣你們會拿幾分?)

ⓘ Start presenting to display the poll results on this slide.

Suppose There are 30 Groups (假設這次總共有三十組參與...)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- If all 30 groups submit two red cards, (如果30組都交出兩張紅色牌)
  - Pool has 60 red cards, so each group earns 120pt! (公庫有60張紅色牌，每組得60*2=120分! 但如果別組都交出兩張紅色牌，你們這組卻暗槓一張紅色牌，)
- If others all submit two red cards, but you submit one,
  - 59*2 + 4 = 118 + 4 = 122 (分)! (如果暗槓兩張紅色牌呢?)
- If others submit two red cards, but you submit NONE,
  - 58*2 + 4*2 = 116 + 8 = 124 (分)! Worth it to keep!(暗槓好!)

Real Round 1: Be ware!! (正式回合1要開始請注意囉!!)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- Please collect four cards from me (請在現場的隊友到前面領取四張牌)
  - You have 60 seconds to discuss whether to submit two black, two red, or one each (各組有60秒討論要交兩黑、兩紅或一黑一紅)
- Then, submit accordingly (再由現場的隊友交出兩張牌)
- How many red cards do you expect from 30 groups? (總共30組，你預期會交出多少張紅色牌?)

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How many red cards do you expect from 30 groups? (總共30組，你預期會交出多少張紅色牌?)

ⓘ Start presenting to display the poll results on this slide.

Real Round 1 (正式回合1)

READY SET GO!

- Group earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- You now have 60 seconds to discuss whether to submit two black, two red, or one each (請花60秒討論要交兩黑、兩紅或一黑一紅)

00 : [redacted]

- Times up! Please submit two cards! (時間到! 請各組交出兩張牌!)

Real Round 1: Results (正式回合1的結果)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- How many red cards are in the Pool? (公庫裡有多少張紅色牌?)
  - 2 pt for each red card in the pool (Are you surprised?)
- How many red cards did you keep? (你這組留下幾張紅色牌?)
  - 4 pt for each red card you kept (你對這個結果感到意外嗎?)
- Please return the remaining two cards (so we can start the next round) (請在現場的隊友歸還剩下的兩張牌，我們要進入下一回合)

Real Round 2 (正式回合2)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- Please collect four cards from me (請在現場的隊友到前面領取四張牌)
  - You have 60 seconds to discuss whether to submit two black, two red, or one each (各組有60秒討論要交兩黑、兩紅或一黑一紅)
- Then, submit accordingly (再由現場的隊友交出兩張牌)
- How many red cards do you expect from 30 groups? (總共30組，你預期會交出多少張紅色牌?)

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Try Again: How many red cards do you expect from 30 groups? (再來一次: 總共30組, 你預期會交出多少張紅色牌?)

ⓘ Start presenting to display the poll results on this slide.

Real Round 2 (正式回合2)

READY SET GO!

- Group earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- You now have 60 seconds to discuss whether to submit two black, two red, or one each (請花60秒討論要交兩黑、兩紅或一黑一紅)

00 : [redacted]

- Times up! Please submit two cards! (時間到! 請各組交出兩張牌!)

Real Round 2: Results (正式回合2的結果)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- How many red cards are in the Pool? (公庫裡有多少張紅色牌?)
  - 2 pt for each red card in the pool (Are you surprised?)
- How many red cards did you keep? (你這組留下幾張紅色牌?)
  - 4 pt for each red card you kept (你對這個結果感到意外嗎?)
- Please return the remaining two cards (so we can start the next round) (請在現場的隊友歸還剩下的兩張牌，我們要進入下一回合)

Real Round 3: Groups Discuss for 2 Minutes (正式回合3)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- Please collect four cards from me (請在現場的隊友到前面領取四張牌)
  - You have 60 seconds to discuss whether to submit two black, two red, or one each (各組有60秒討論要交兩黑、兩紅或一黑一紅)
- Then, submit accordingly (再由現場的隊友交出兩張牌)
  - This time, ALL groups have 120 seconds to discuss (大家一起討論120秒)
- How many red cards do you expect from 30 groups? (總共30組, 你預期會交出多少張紅色牌?)

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If groups can discuss, how many red cards do you expect from 30 groups? (如果各組可以先討論...)
總共30組，你預期會交出多少張紅色牌?

ⓘ Start presenting to display the poll results on this slide.

Real Round 3: Groups Discuss for 2 Minutes (正式回合3)

READY SET GO!

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- ALL groups have 120 seconds to discuss (大家一起討論120秒)

01 : [redacted]

Real Round 3: Groups Discuss for 2 Minutes (正式回合3)

READY SET GO!

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- ALL groups have 120 seconds to discuss (大家一起討論120秒)

00 : [redacted]

- Times up! Please go back to your groups! (時間到! 請回座!)

Real Round 3 (正式回合3)

READY SET GO!

- Group earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- You now have 60 seconds to discuss whether to submit two black, two red, or one each (請花60秒討論要交兩黑、兩紅或一黑一紅)

00 : [redacted]

- Times up! Please submit two cards! (時間到! 請各組交出兩張牌!)

Real Round 3: Results (正式回合3的結果)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- How many red cards are in the Pool? (公庫裡有多少張紅色牌?)
  - 2 pt for each red card in the pool (Are you surprised?)
- How many red cards did you keep? (你這組留下幾張紅色牌?)
  - 4 pt for each red card you kept (你對這個結果感到意外嗎?)
- Please return the remaining two cards (so we can start the next round) (請在現場的隊友歸還剩下的兩張牌，我們要進入下一回合)

Real Round 4: Groups Disclose Submission (正式回合4)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- Please collect four cards from me (請在現場的隊友到前面領取四張牌)
  - You have 60 seconds to discuss whether to submit two black, two red, or one each (各組有60秒討論要交兩黑、兩紅或一黑一紅)
- Then, submit accordingly (再由現場的隊友交出兩張牌)
  - This time, groups have to disclose their submissions and make them public information (決定時需亮牌、讓資訊公開)
- How many red cards do you expect from 30 groups? (總共30組, 你預期會交出多少張紅色牌?)

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If groups have to disclose, how many red cards do you expect from 30 groups? (如果各組要亮牌...)
總共30組，你預期會交出多少張紅色牌?

ⓘ Start presenting to display the poll results on this slide.

Real Round 4: Groups Disclose Submission (正式回合4)

READY SET GO!

- Group earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- You now have 60 seconds to discuss whether to submit two black, two red, or one each (請花60秒討論要交兩黑、兩紅或一黑一紅)

00 : [redacted]

- Times up! Submit two cards in public! (時間到!請亮牌交兩張牌!)

Real Round 4: Results (正式回合4的結果)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
  - (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)
- How many red cards are in the Pool? (公庫裡有多少張紅色牌?)
  - 2 pt for each red card in the pool (Are you surprised?)
- How many red cards did you keep? (你這組留下幾張紅色牌?)
  - 4 pt for each red card you kept (你對這個結果感到意外嗎?)
- Please return the remaining two cards (so I can reuse it for the next talk) (請在現場的隊友歸還剩下的兩張牌，供我回收再利用)

Public Goods Contribution (公共財自願捐獻)

- Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
- (小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)

- Group Discussion: (小組討論問題)
  1. What is the cost of submitting one red card to the pool? (繳出一張紅牌到公庫的代價是什麼?)
  2. What is the rate of return for submitting one red card to the pool? (繳出一張紅牌到公庫的投資報酬率是多少?)
  3. Is it good for the society as a whole that a group submits red cards to the pool? Explain. (從所有組別的整體觀點來看，單一組別繳出紅牌到公庫是好事嗎? 請解釋你的推理。)

Public Goods Contribution (公共財自願捐獻)

1. A Set of Rules (一套遊戲規則: 大家自願捐紅色牌到聚寶盆，但是所得必須平分給所有人)
   - Everybody can contribute, but equally divided
2. Individuals Optimize (個人決策謀求最佳化)
   - The Selfish Gene? (拔一毛以利天下而不為？)
3. You React to Others Optimizing (其他人也在謀求自身最佳，所以你要因應)
   - Will you contribute if others do not? (如果大家都不捐，你還願意當冤大頭嗎?)
4. What Should Aggregate Data Look Like? (整體結果長怎樣?
   - Nash equilibrium = nobody contributes = Tragedy of Commons!
   - 理論的預測為何? Nash均衡預測所有人都會不捐，就變成共同悲劇!

Public Goods Contribution (公共財自願捐獻)

5. Does Empirical Data Match the Theory? (實證資料是否支持你的預測?)
   - How many contributed zero? Give to Pool = ? (剛剛有多少人真的統統不捐的?)
     (紅色集合多少?)
6. Can Individual Differences be Explained? (資料中的個別差異能否解釋?)
   - Why did some contribute, but others not? (為什麼有人捐，有人不捐呢?)
7. How Can the Institution (Rules) Improve? (制度/遊戲規則可以怎麼改進?)
   - How can you induce more contribution? (如果你希望大家都更好，你會怎麼做?)
   - What if let people take in order? (讓大家按照順序拿聚寶盆裡的得分會如何？)
8. Where Did this Institution Come From? (這套制度是哪裡來的?)
   - Social norms solved Tragedy of Commons (部落社會規範有辦法避免「竭澤而漁」)
   - What about Global Warming? (但節能減碳、避免全球暖化呢?)

Public Goods Contribution (公共財自願捐獻)

- Teamwork Requires Preventing Free Riders (團隊合作需要避免有人坐享其成)
  - Better if all contribute, but you never know if... (能夠群策群力最好，只怕有人摸魚)
  - Examples:
- Project Management (群策群力實例: 專案管理)
  - Design Reward Schemes To Induce Effort (設計監督或獎懲機制來激勵大家都出力?)
- Disclosure (Good Way to Encourage Donation!)(徵信是鼓勵捐獻的好辦法!)
  -




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Audience Q&A Session

ⓘ Start presenting to display the audience questions on this slide.

(由於有同學詢問，所以當場加碼)

我的數學人生(以及其他雜學)

台大經濟系 王道一老師

4/26/2024

我的數學人生從和平國中開始

- 和平國中有「分散式」數學資優班
  - 加深加廣的學習
  - 數學基礎讓我在其他科有很好的學習
- 我發現：我喜歡接受無限量級的挑戰
  - 我選擇用自己的方式來學習
  - 跟人家都不太一樣: Think different!
    - Just like everyone else???

保送建中之後，王子跟公主並沒有從此過著...

- 建中有「集中式」的數理資優班
  - 有好處: 我可以遇到很棒的同儕，但
  - 也有缺點: 我再怎麼努力(或躺平)都只考全班25-35名
- 台大數學班是加快的學習(高中人才培育計畫)
  - 沒有升學誘因的奧林匹亞和科展
  - 請公假做科展: 我喜歡這種做研究的感覺
- 我發現，

許多人誤以為上大學前專心讀書考試就好

- 而且即使發現問題
- 想要改變
- 也沒有**足夠的視野**探索

我開始懷疑：繼續三年重複學習有意義嗎？

- 18歲決定要念博士，雖然不知道念哪一科的博士
  - 科展做太多的結果?!
- 但數學卻是一門很有用的「內功」
  - 學了數學只要找到應用的領域就能大發神威
- 所以，我決定大學先念數學系
  - 再進一步尋找可能的應用領域

進了台大，我發現...

- 保送進台大數學系
  - 高中數學只是「為微積分做準備」
- 高等數學則是「以微積分為基礎往前走」
  - 而且跟高中數學完全不一樣!
- 大學能接觸的「應用領域」多到無法想像

進了台大，我發現...

1. 必修課都超難，但:
   - 班上總有天才不上課也能考得很好，害我們這些貧苦大衆不能調分!
2. 外系的人都覺得數學很有用，但:
   - 本系生都不曉得畢業出來可以做甚麼
3. 數學系畢業甚麼都能做，但:
   - 這句話的另一面是: 數學系畢業甚麼都不是!!

數學系畢業甚麼都能做:

- 畢業學長姐遍佈資工、電機、創業、物理、財工、
- 經濟、流病、統計、精算、風管、歌手(周華健!)
- 但也表示(光是)數學系畢業甚麼都不是...

- 因為數學是內功。內家高手隨便出招都很威!
  - 但即使身負九陽神功，張無忌也要練乾坤大挪移
- 所以數學系學生都必須去發現這獨門內功可以應用在甚麼地方...
  - 只要找到應用場域，畢業學長姐都可以發光發熱

進了台大，我發現...

- 外語能力很有用
  - 台大外文系語言組輔系是全台大最難申請的輔系
  - 開啓另一個視野、文化
  - 絶佳的第二專長 (但很難當第一專長!)
- 寫作(Writing): 英文作文一、二、三
- 口語溝通表達(Oral Communication)

進了台大，我發現...

- 經濟學之路
  - 從大一共同必修「民生主義與經濟政策」開始
  - 英文課名是Economics and Economic Policy
  - 大三開始雙主修經濟學系
  - 大四下被經濟系張清溪主任勸退/改拿兩個輔系畢業
  - 當兵在西莒，看到體制改革三個名人堂範例
- 踏上念經濟學博士之路...

開始在應用的領域上邁進...

- 進了UCLA 經濟學博士班
  - 博一是其他同學「人生中最痛苦的一年」
  - 但是我大二念高等微積分就嘗過了
  - 消費者和廠商可以合一，但你的信息是什麼更重要
  - 經濟學直覺才能帶領你走出數學的迷霧
- 我太太念數學博士班，發現數學無處不在
  - 其他研究所的台灣學生都需要「高等數學」

開始在應用的領域上邁進...

- 現代經濟學用數理模型來解釋社會現象
  - 要先能解釋人們面對不同誘因下的決定
- 但是現有的模型有解釋力嗎？
  - 這是一個需要資料來驗證的問題
  - 分析資料的「統計方法」，以數學為底子
  - 跑程式分析大數據，也需要數學邏輯

2002年開始做經濟學實驗...

- 2004年論文被賽局學會旗艦期刊 GEB 接受
- 2004年12月開始做博士後研究
  - 用眼動儀做「講真話 vs. 說謊」的實驗
- 2005-07博士後做的四個project都發表在頂尖期刊:
  - 美國經濟學會旗艦期刊 AER (2010)
  - 歐洲經濟學會旗艦期刊 JEEA (2009)
  - 美國心理學會旗艦期刊 Psych Sci (2009)
  - 美國經濟學會領域頂尖期刊 AEJ-micro (2011)
    - 奠定升等副教授、教授的基礎

2007年回台灣任教，帶學生、送他們出國

- 使用經濟學分析社會現象，瞭解現況的邏輯
  - 挑戰經濟學理論，引入基督信仰的價值觀
- 找到微調現狀的突破點，說服系上做改變:
  1. 挑戰學生修重課數學課
  2. 英語授課，推動EMI教學
  3. 降低名目必修學分數、提高課程濃度
  4. 推動「微積分4: 在經濟商管的應用」
  5. 推動「線上版分析導論」&線上學分採認「數量方法入門」

2007年回台灣任教，帶學生、送他們出國

- 找到微調現狀的突破點，說服系上做改變:
  6. 聘任不諳中文的外籍老師、讓EMI玩真的
     - 也避免退休潮造成七個豐年/七個荒年
  7. 聘任資深外籍學者擔任全年的玉山學者(而非短期訪問)
  8. 請外籍老師擔任雙語師資、向學校爭取員額
  9. 用募款講座弭補薪資差距、吸引優秀人才來台任教
  10. 設「副主任」，進而分管「大學生事務」、「研究生事務」
  11. 開設全英專班每年招收20名外籍生
  12. 把跨域專長升格為院學士「資料科學主題」/鼓勵跨領域

Would Pre-Play Communication Help? (若能事先溝通有用嗎?)

- Watch this Video: (請看影片解釋兩位參賽者對決的遊戲規則)
  - https://www.youtube.com/watch?v=7FbkwrhW_0I&t=225s

Would Pre-Play Communication Help? (若能事先溝通有用嗎?)

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- Watch this Video: (請看影片解釋兩位參賽者對決的遊戲規則)
  - https://www.youtube.com/watch?v=7FbkwrhW_0I&t=225s
- Two Players Each Choose to Split or Steal

1. Split the Money If Both Choose to Split
2. If One Chooses to Split, the Other Chooses to Steal, the Steal Guy Gets All the Money
3. If Both Choose to Steal, Both Get Nothing

  - 兩個人各自選擇「平分」或「全拿」。如果都選擇「平分」則平分獎金。
    如果一個選「平分」，另一個選「全拿」，則選「全拿」的獨得獎金。
    如果都選擇「全拿」就兩個人什麼都沒有。

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What do you think Tony and Lucy will choose? 你覺得男生(Tony)和女生(Lucy)各自選擇了甚麼?

ⓘ Start presenting to display the poll results on this slide.

Would Pre-Play Communication Help? (若能事先溝通有用嗎?)

Would Pre-Play Communication Help? (若能事先溝通有用嗎?)

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What do you think Steven and Sara will choose? 你覺得男生(Steven)和女生(Sara)各自選擇了甚麼?

ⓘ Start presenting to display the poll results on this slide.

Would Pre-Play Communication Help? (若能事先溝通有用嗎?)

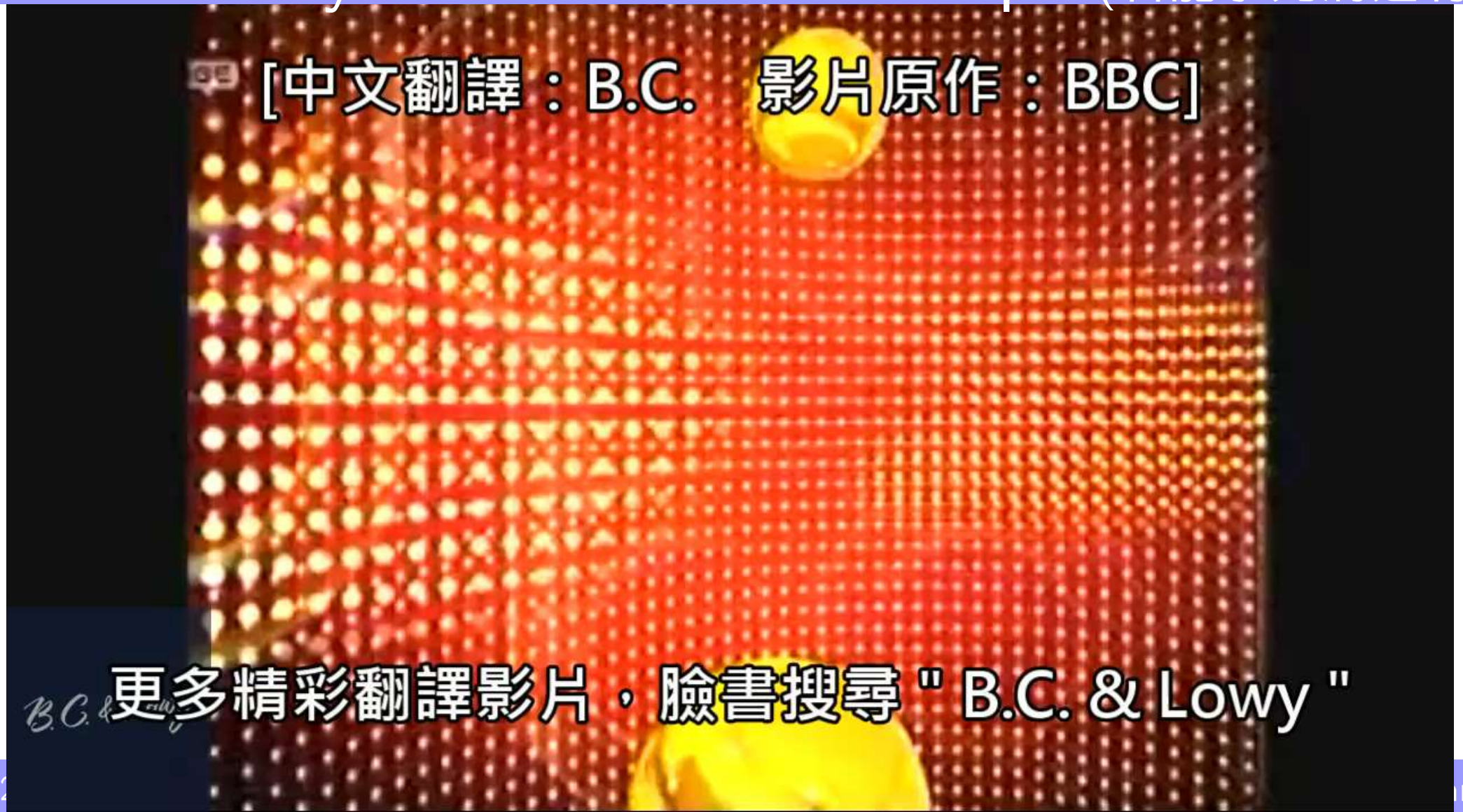
Would Pre-Play Communication Help? (若能

	Split	Steal
Split	(50, 50)	(0, 100)
Steal	(100, 0)	(0, 0)

Would Pre-Play Communication Help? (若能事先溝通有用嗎?)

- How Would You Convince the Other Guy to Split (as One of the Players)? (如果你是兩位參賽者之一，你該如何說服對方平分獎金?)
  - British TV Program: Golden Balls (英國的電視節目：黃金球)
  - How Many People Really Choose to Split? Why?
  - How to Prevent Being Stolen/Both Get Nothing? (有多少人真的選擇全拿? 為什麼? 如何避免被對方全拿或兩敗俱傷?如果你希望大家都更好，你會怎麼做?)
- How Can You Make Both of You Better Off?
  - An Unexpected Twist... (從未想過會出現的談判過程，結果是...)
    - http://www.youtube.com/watch?v=S0qjK3TWZE8
    - 中文字幕版: https://youtu.be/W5qz8SNO7Wc

Would Pre-Play Communication Help? (若能事先溝通有用嗎?)



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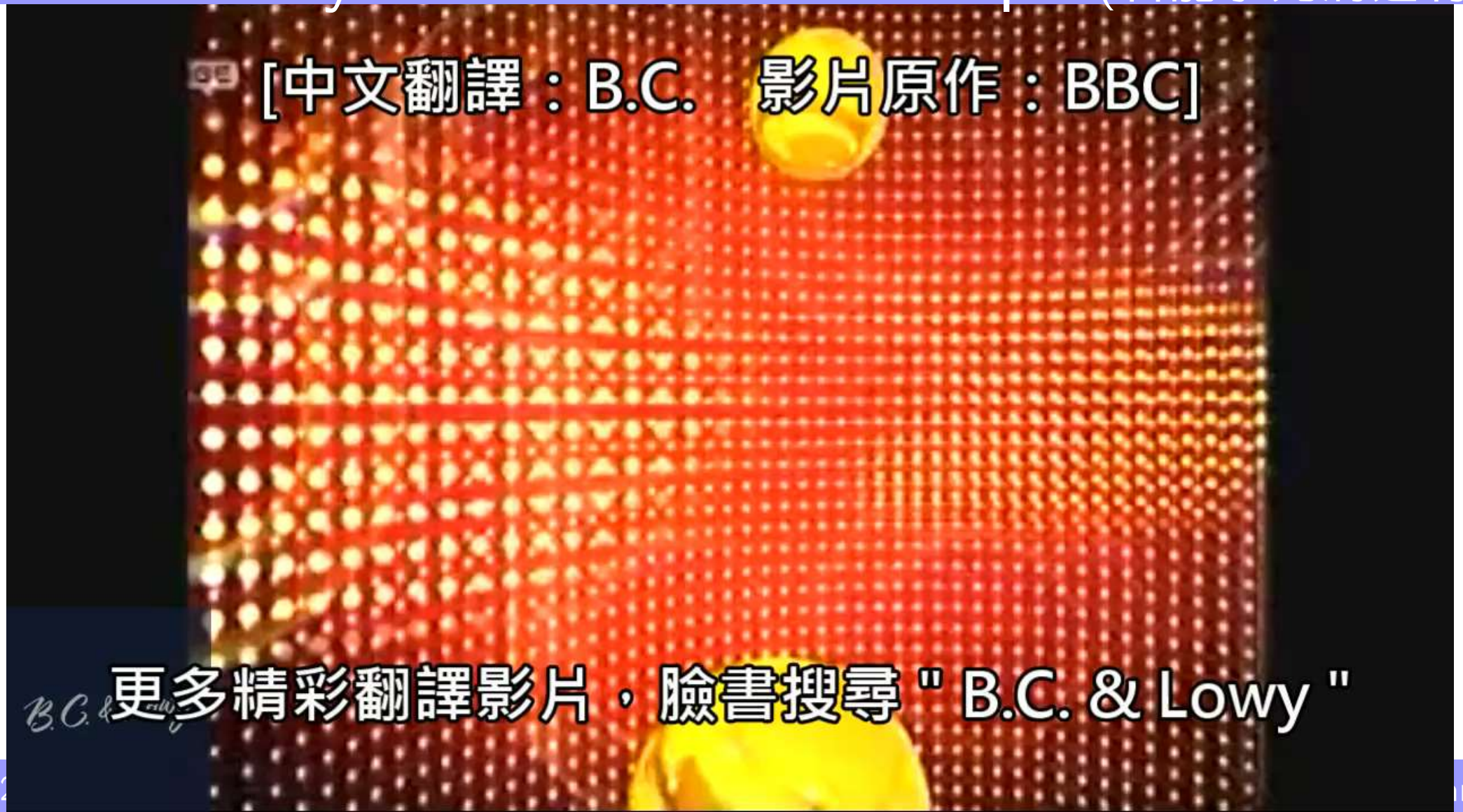
What do you think Abraham and Nick will choose? 你覺得亞伯拉罕(Abraham)和尼克(Nick)各自選擇了甚麼?

ⓘ Start presenting to display the poll results on this slide.

Would Pre-Play Communication Help? (若能事先溝通有用嗎?)



Would Pre-Play Communication Help?

	Split	**Steal**
Split	(50, 50)	(0, 100)
Steal	(100, 0)	(0, 0)

Would Pre-play Communication Help? (若能事先溝通有用嗎?)

- Cooperation is Good, But He May Betray You (合作對大家都好，但競爭對手可不見得領情，雖然消費者其實樂見廠商之間的激烈競爭)
  - Though Consumers Like Competition Among Firms
- Examples of Pre-play Communication: (事先溝通談判實例)
- WSJ: Airlines Ticket Sales On Monday Night
  - Opponents Forced to Match Tuesday Morning
  - Best Online Airfares Occur @ Tuesday 3pm EST
- Will Airlines Honor Agreements Not to Sale?
  - If Books.com.tw offers 21% off, so will TAAZE!
- (若事先講好本周不要放出便宜機票有用嗎? 當博客來網路書店打出本日66折...讀冊生活也會跟進!)

(航空公司常常禮拜一晚上放出便宜機票，禮拜二早上其他人被迫跟進，使得上網買機票最佳時間是美東時間禮拜二下午三點!!)

Conclusion: Economics is All About Institutions and Human Behavior (Reactions to Institutions)

For any Institution, There's a Reaction.

- Given a set of rules, how people optimize; whether empirical data confirms theory, and to find institution origins and improvements
  - (現代經濟學研究人們對制度的反應，也就是「上有政策，下有對策」：在一套遊戲規則下，人們如何謀求自身最佳；看實證資料如何印證理論，並思考這個制度如何改進、從何而來。)
- As shown in the following examples: (剛才看到的幾個例子)
  - LUPI Game (最小唯一者勝彩券)
  - Screening & Signaling (篩選機制與認證標籤)
  - Voluntary Contribution Mechanism (自願捐獻)
  - Pre-play Communication (事先溝通談判)

Conclusion: Because People Respond to Incentives!

- 3 Necessary Conditions of Successful Reforms: (改革成功三個必要條件)

1. Understand Logic of Current System (瞭解現況的邏輯)
   - Institutions that ignore human reactions to it invite trouble!!
   - (上有政策，下有對策是因為人們對誘因有反應，不考慮「下有對策」的制度通常是災難!!)
2. Wisdom from God (on How to Fine Tune/breaking points)
   - (有從上帝而來的智慧，知道突破點在哪裡、知道如何微調現有制度讓大家更好)
   - Institutions should be stress-tested with field experiments during trial periods (現場實驗所費不貲/花工夫，卻是在試辦期間檢驗制度設計的好辦法)
3. Convince Key Person (to Change) (說服有能力改變的人來改變)

The End

- Special Thanks for lecture development: (特別感謝)
  - ASO-MBA、台北市中山女中、建國中學、北一女中人文社會科學資優班社會科學概論、台南一中、台南女中、台東女中科學班、台大杜鵑花節、台大經濟營、台大社科營、台大社會科學實踐種子論壇、法官學院以及國家文官學院全體同學協助開發此一課程

Q&A

(關於這個部分，我想要問...)

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關於這個部分，我有問題想要問王道一老師...

ⓘ Start presenting to display the audience questions on this slide.