實驗經濟學一：行為賽局論

Experimental Economics I: Behavioral Game Theory

第七講：優勢可解賽局

Lecture 7:Dominace-Solvable Games

授課教師：國立臺灣大學 經濟學系 王道一教授（Joseph Tao-yi Wang ）

本課程指定教材: Colin E. Camerer, *Behavioral Game Theory: Experiments in Strategic Interaction*. New York: Russell Sage Foundation; New Jersey: Princeton UP, 2003.

Dominance

- Dominance
  - Strategy A gives you better payoffs than Strategy B regardless of opponent strategy
- Dominance Solvable
  - A game that can be solved by iteratively deleting dominated strategy

Dominance

- Do people obey dominance?
  - Looking both sides to cross a 1-way street
  - “If you can see this, I can’t see you.”
  - p-Beauty Contest behavior (guess above 67)
- Will you bet on others obeying dominance?
  - Workers respond to incentives rationally
  - Companies do not use optimal contracts
- SOPH: Knowing other’s steps of reasoning

Belief of Iterated Dominance

1. Obey Dominance,
2. Believe that others obey dominance,
3. Believe that others believe you will obey dominance,
4. Believe that others believe that you believe they obey dominance,
5. Believe that others believe that you believe that they believe you obey dominance, etc.

Outline

- A Simple Test: Beard and Beil (MS 1994)
- Centipede:
  - McKelvey and Palfrey (Econometrica 1992)
- Mechanism Design:
  - Sefton and Yavas (GEB 1996)
- Dirty Face:
  - Weber (EE 2001)

A Simple Test: Beard and Beil (MS 1994)

Iterated dominance game		
Player 1 Move	Player 2 move	
	l	r
L	9.75, 3	
R	3, 4.75	10, 5

A Simple Test: Beard and Beil (MS 1994)

Treatment	Payoffs from			Frequency		N	Threshold P(r|R)
	(L, l)	(R, l)	(R, r)	L	r|R		
1 (baseline)	(9.75,3)	(3, 4.75)	(10, 5)	66%	83%	35	97%
2 (less risk)	(9, 3)	(3, 4.75)	(10, 5)	65%	100%	31	85%
3(even less risk)	(7, 3)	(3, 4.75)	(10, 5)	20%	100%	25	57%
4(more assurance)	(9.75,3)	(3, 3)	(10, 5)	47%	100%	32	97%
5(more resentment)	(9.75,6)	(3, 4.75)	(10, 5)	86%	100%	21	97%
6 (less risk, more reciprocity)	(9.75,5)	(5, 9.75)	(10,10)	31%	100%	26	95%

A Simple Test: Beard and Beil (MS 1994)

- Player 2 mostly DO obey dominance
- Player 1 is inclined to believe this
  - Though they can be convinced if incentives are strong for the other side to comply
- Follow-up studies show similar results:
  - Goeree and Holt (PNAS 1999)
  - Schotter, Weigelt and Wilson (GEB 1994)

Follow-up 1: Goeree & Holt (PNAS 1999)

Condition	N	Thres-hold P(r|R)	Payoffs			Frequency	
			(L)	(R, l)	(R, r)	(L)	(r|R)
Baseline 1	25	33%	(70, 60)	(60, 10)	(90, 50)	12%	100%
Lower Assurance	25	33%	(70, 60)	(60, 48)	(90, 50)	32%	53%
Baseline 2	15	85%	(80, 50)	(20, 10)	(90, 70)	13%	100%
Low Assurance	25	85%	(80, 50)	(20, 68)	(90, 70)	52%	75%
Very Low Assurance	25	85%	(400,250)	(100,348)	(450,350)	80%	80%

Follow-up 2: Schotter-Weigelt-Wilson (GEB 94)

Normal Form	Player 2		Game 1M
Player 1	l	r	**Frequency**
L	~~4, 4~~	4, ~~4~~	(57%)
R	0, 1	~~6, 3~~	(43%)
Frequency	(20%)	(80%)	

Sequential Form			Game 1S
L	4, 4		(8%)
	l	r	
R	0, 1	6, 3	(92%)
Frequency	(2%)	(98%)	

Follow-up 2: Schotter-Weigelt-Wilson (GEB 94)

Normal Form	Player 2			Game 3M
Player 1	T	M	B	**Frequency**
T	~~4, 4~~	4, ~~4~~	~~4, 4~~	(82%)
M	0, 1	~~6, 3~~	0, 0	(16%)
B	0, 1	0, 0	3, ~~6~~	(2%)

Sequential Form						Game 3S
T	4, 4	T				(70%)
		0, 1				
				M	B	
			M	6, 3	0, 0	(100%)
			B	0, 0	3, 6	(0%)

Follow-up 2: Schotter-Weigelt-Wilson (GEB 94)

- Schotter et al. (1994)'s conclusion:
- Limited evidence of iteration of dominance (beyond 1-step), or SPE, forward induction
  - Can more experience fix this?
- No for forward induction in 8 periods…
  - Brandts and Holt (1995)
- But, Yes for 3-step iteration in 160 periods
  - Rapoport and Amaldoss (1997): Patent Race

Centipede Game: 4-Move SPNE

- McKelvey and Palfrey (Econometrica 1992)

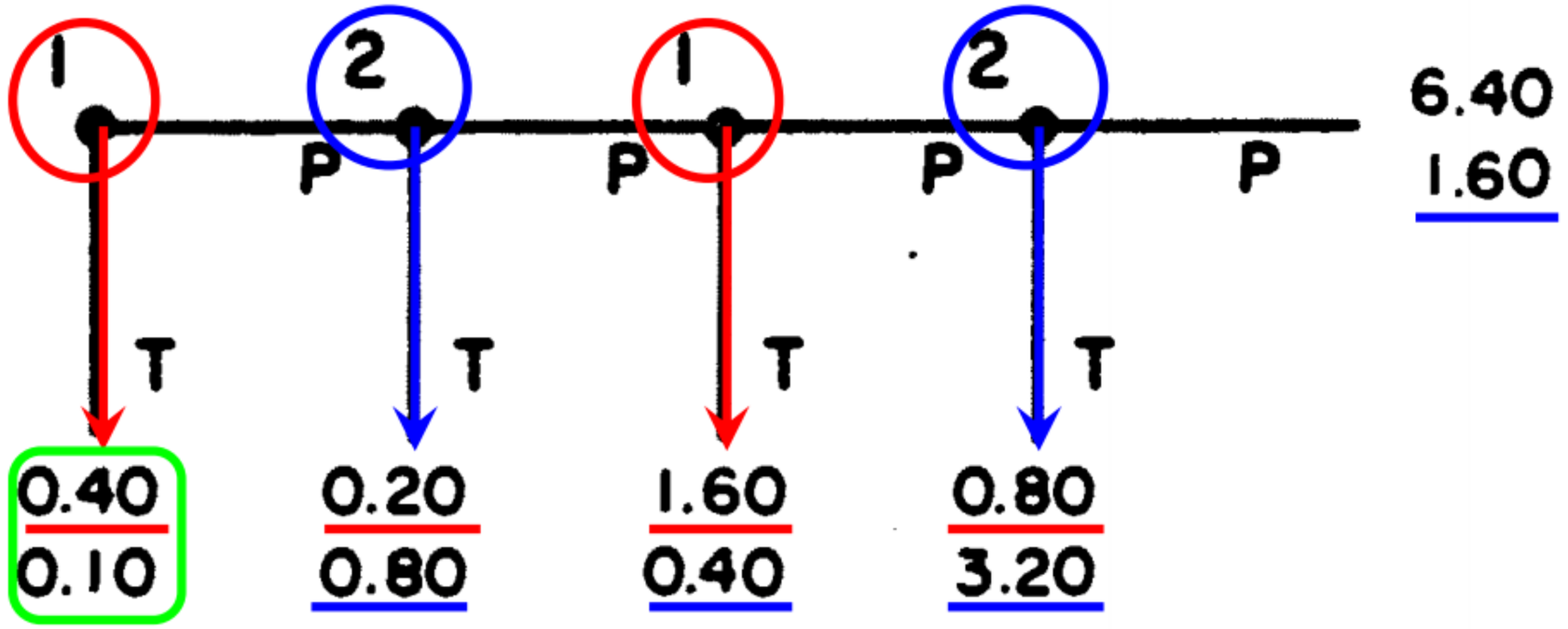

FIGURE 1.—The four move centipede game.

Centipede Game: 6-Move SPNE

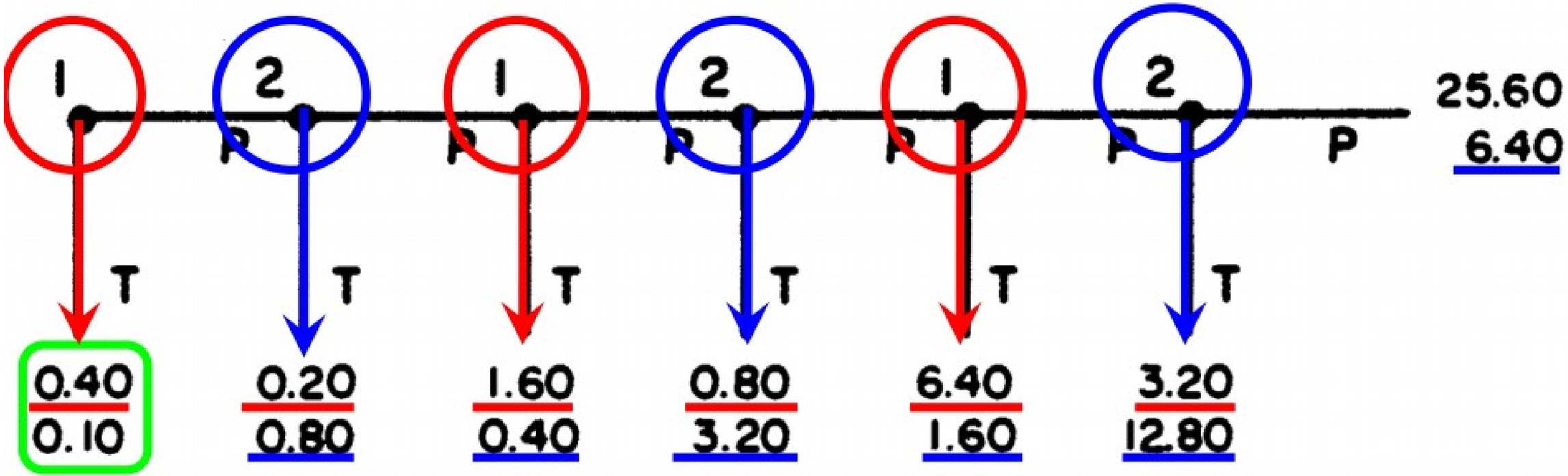

FIGURE 2.—The six move centipede game.

Centipede Game: Outcome

TABLE IIA

PROPORTION OF OBSERVATIONS AT EACH TERMINAL NODE

	Session		N	f_1	f_2	f_3	f_4	f_5	f_6	f_7
Four Move	1	(PCC)	100	.06	.26	.44	.20	.04		
	2	(PCC)	81	.10	.38	.40	.11	.01		
	3	(CIT)	100	.06	.43	.28	.14	.09		
	Total	1–3	281	.071	.356	.370	.153	.049		
High Payoff	4	(High-CIT)	100	.150	.370	.320	.110	.050		
Six Move	5	(CIT)	100	.02	.09	.39	.28	.20	.01	.01
	6	(PCC)	81	.00	.02	.04	.46	.35	.11	.02
	7	(PCC)	100	.00	.07	.14	.43	.23	.12	.01
	Total	5–7	281	.007	.064	.199	.384	.253	.078	.014

Centipede Game: Pr(Take)

TABLE IIB[a]

IMPLIED TAKE PROBABILITIES FOR THE CENTIPEDE GAME

	Session	p_1	p_2	p_3	p_4	p_5	p_6
Four Move	1 (PCC)	.06 (100)	.28 (94)	.65 (68)	.83 (24)		
	2 (PCC)	.10 (81)	.42 (73)	.76 (42)	.90 (10)		
	3 (CIT)	.06 (100)	.46 (94)	.55 (51)	.61 (23)		
	Total 1–3	.07 (281)	.38 (261)	.65 (161)	.75 (57)		
High Payoff	4 (CIT)	.15 (100)	.44 (85)	.67 (48)	.69 (16)		
Six Move	5 (CIT)	.02 (100)	.09 (98)	.44 (89)	.56 (50)	.91 (22)	.50 (2)
	6 (PCC)	.00 (81)	.02 (81)	.04 (79)	.49 (76)	.72 (39)	.82 (11)
	7 (PCC)	.00 (100)	.07 (100)	.15 (93)	.54 (79)	.64 (36)	.92 (13)
	Total 5–7	.01 (281)	.06 (279)	.21 (261)	.53 (205)	.73 (97)	.85 (26)

[a]The number in parentheses is the number of observations in the game at that node.

Centipede Game: Learning Effect (1-5/6-10)

TABLE IIIB

IMPLIED TAKE PROBABILITIES
COMPARISON OF EARLY VERSUS LATE PLAYS IN THE LOW PAYOFF CENTIPEDE GAMES

Treatment	Game	p_1	p_2	p_3	p_4	p_5	p_6
Four Move	1–5	.06 (145)	.32 (136)	.57 (92)	.75 (40)		
	6–10	.08 (136)	.49 (125)	.75 (69)	.82 (17)		
Four Move	1–5	.00 (145)	.06 (145)	.18 (137)	.43 (112)	.75 (64)	.81 (16)
	6–10	.01 (136)	.07 (134)	.25 (124)	.65 (93)	.70 (33)	.90 (10)

Centipede Game: Mimic Model

- What theory can explain this?
- Altruistic Types (7%): Prefer to Pass
- Selfish Types:
  - Mimic altruistic types up to a point (to gain)
- Unraveling: error rate shrinks over time

Centipede Game: Mimic Model

- Selfish guys sometimes pass (mimic altruist)
- Imitating an altruist might lure an opponent into passing at the next move
  - Raising one's final payoff in the game
- Equilibrium imitation rate depends directly on beliefs about the likelihood $(1-q)$ of a randomly selected player being an altruist
  - The more likely players believe there are altruists, the more imitation there is

Mimic: Predictions for Normal Types

1. On the last move, Player 2 TAKE for any q

2. If 1- q >1/7, both Player 1 and 2 PASS
   - Except on the last move Player 2 always TAKE

3. If 0<1- q <1/7 ⊠ Mixed Strategy Equilibrium

4. If 1- q =0 both Player 1 and Player 2 TAKE

Mimic Model Equilibrium Outcome

- See “Figure 3.-Equilibrium outcome probabilities for basic four move game”
- in R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 814.

Mimic Model Equilibrium Outcome

- See “Figure 4.-Equilibrium outcome probabilities for basic six move game”
- in R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 814.

Centipede: Mimic Model Add Noisy Play

- We model noisy play in the following way.
- In game *t*, at node *s*, if p^* is the equilibrium probability of TAKE
- Assume player actually chooses TAKE with probability $(1-\varepsilon_t)p^*$, and makes a random move with probability ε_t

$$\epsilon_t = \epsilon e^{-\delta(t-1)}$$

-
- Explains further deviation from mimic model

Centipede Game: Follow-ups

- Fey, McKelvey and Palfrey (IJGT 1996)
  - Use constant-sum to kill social preferences
  - Take 50% at 1st, 80% at 2nd 
- Nagel and Tang (JMathPsych 1998)
  - Don't know other's choice if you took first
  - Take about half way 
- Rapoport et al. (GEB 2003)
  - 3-person & high stakes: Many take immediately
  - CH can explain this (but not QRE) – see theory 

Mechanism Design

- Pure coordination game with $1.20 & $0.60
- How can you implement a Pareto-inferior equilibrium in a pure coordination games?
- Abreu & Matsushima (Econometrica 1992)
  - Slice the game into T periods
  - F: Fine paid by first subject to deviate
  - Will not deviate if $F >$ $1.20/ T
  - Can set $T=1$, $F=$$1.20; more credible if T large

Mechanism Design

- Glazer and Rosenthal (Econom**t**rica 1992)
  - Comment: AM mechanism requires more steps of iterated deletion of dominated strategies
- Abreu & Matsushima (Econometrica 1992)
  - Respond: "[Our] gut instinct is that our mechanism will not fare poorly in terms of the essential feature of its construction, that is, the significant multiplicative effect of fines.'"
- This invites an experiment!

Mechanism Design

- Sefton and Yavas (GEB 1996)
- F=\$0.225
- T=4, 8, or 12
  - Theory: Play inferior NE at T=8, 12, not T=4
- Results: Opposite, and diverge…
- Why? Choose only 1 switch-point in middle
  - Goal: switch soon, but 1 period after opponent

Mechanism Desigh

- See “Fig. 3. All Blue Play in Experiment I” in Martin Sefton Abdullah Yavas, “Abreu–Matsushima Mechanisms: Experimental Evidence,“ Games and Economic Behavior, Vol16, (1996),pp.287.

Mechanism Design

- Glazer and Perry (GEB 1996)
  - Implemental can work in sequential game via backward induction
- Katok, Sefton and Yavas (JET 2002)
  - Does not work either
- Can any approximately rational explanation get this result?
  - Maybe “Limited steps of IDDS + Learning”?

Dirty Face Game

- Three ladies, A, B, C, in a railway carriage all have dirty faces and are all laughing.
- It sudden flashes on A:
- Why doesn't B realize C is laughing at her? Heavens! I must be laughable.
  - Littlewood (1953), *A Mathematician's Miscellany*
- Requires A to think that B is rational enough to draw inference from C

Dirty Face Game: Weber (Exp. Econ. 2001)

- Independent types X (prob=.8) or O (prob=.2)
  - X is like “dirty face”
- Commonly told “At least one player is type X.”
  - P(XX) = 0.64⊠2/3, P(XO) = 0.32⊠1/3
- Observe other’s type
- Choose Up or Down (figure out one is type X)
- If nobody chooses Down, reveal other’s choice and play again

Dirty Face Game

		Type	
		X	O
Probability		0.8	0.2
 Action	Up	$0	$0

Dirty Face Game

- Case XO: Players play (Up, Down)
- Type X player thinks…
  - I know that “at least one person is type X”
  - I see the other person is type O
- So, I must be type X ☒ Chooses Down
- Type O player thinks…
  - I know that “at least one person is type X”
  - I see the other person is type X
- No inference ☒ Chooses Up

Dirty Face Game

- Case XX - First round:
- No inference (since at least one is type X, but the other guy is type X) ☒ Both choose Up
- Case XX - Second round:
- Seeing UU in first
  - the other is not sure about his type
  - He must see me being type X
- I must be Type X ☒ Both choose Down

Dirty Face Game

		Trial 1		Trial 2	
		XO	XX	XO	XX
Round 1	UU	0	7*	1	7*
	DU	3*	3	4*	1
	DD	0	0	0	0
Round 2 (after UU)	UU	-	1	-	2
	DU	-	5	-	2
	DD	-	1*	-	3*
	Other	-	-	1	-

Dirty Face Game

- Results: 87% rational in XO, but only 53% in 2nd round of XX
- Significance:
- Choices reveal limited reasoning, not pure cooperativeness
  - More iteration is better here…
- Upper bound of iterative reasoning
  - Even Caltech students cannot do 2 steps!

Conclusion

- Do you obey dominance?
- Would you count on others obeying dominance?
- Limit of Strategic Thinking: 2-3 steps
- Compare with Theories of Initial Responses
  - Level-k: Stahl-Wilson95, CGCB01, CGC06
  - Cognitive Hierarchy: CHC04

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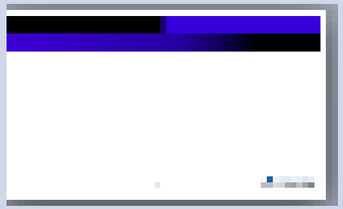
1-38			國立臺灣大學 經濟學系 王道一 教授
6	**Iterated dominance game** Player 1 Move / Player 2 move: l, r L: 9.75, 3 R: 3, 4.75 — 10, 5		T. Randolph Beard and Richard O. Beil, "Do People Rely on the Self-Interested Maximization of Others? An Experimental Test," *Management Science*, Vol. 40, No.2, (Feb., 1994), pp.253-255. 依據著作權法第 46 、 52 、 65 條合理使用
7	Treatment / Payoffs from (L, l) (R, l) (R, r) / Frequency L r|R / N / Thres-hold P(r|R) 1 (baseline) (9.75,3) (3, 4.75) (10, 5) 66% 83% 35 97% 2 (less risk) (9, 3) (3, 4.75) (10, 5) 65% 100% 31 85% 3(even less risk) (7, 3) (3, 4.75) (10, 5) 20% 100% 25 57% 4(more assurance) (9.75,3) (3, 3) (10, 5) 47% 100% 32 97% 5(more resentment) (9.75,6) (3, 4.75) (10, 5) 86% 100% 21 97% 6 (less risk, more reciprocity) (9.75,5) (5, 9.75) (10,10) 31% 100% 26 95% 7 (1/6 payoff) (58.5,18) (18,28.5) (60,30) 67% 100% 30 97%		T. Randolph Beard and Richard O. Beil, "Do People Rely on the Self-Interested Maximization of Others? An Experimental Test," *Management Science*, Vol. 40, No.2, (Feb., 1994), pp.255. 依據著作權法第 46 、 52 、 65 條合理使用
8	-Player 2 mostly DO obey dominance -Player 1 is inclined to believe this Though they can be convinced if incentives are strong for the other side to comply		T. Randolph Beard and Richard O. Beil, "Do People Rely on the Self-Interested Maximization of Others? An Experimental Test," *Management Science*, Vol. 40, No.2, (Feb., 1994), pp.256-261.

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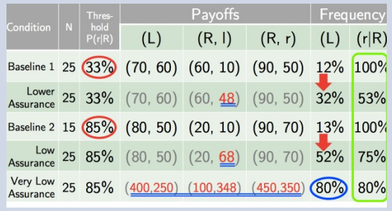
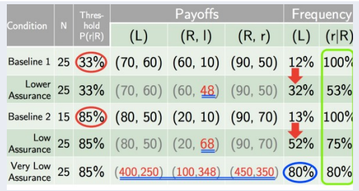
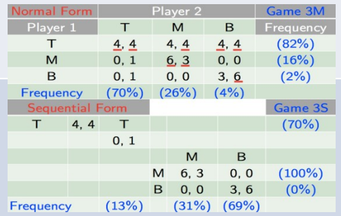
9			J.K. Goeree and C.A.Holt, “Stochastic Game Theory: For Playing Games, Not Just for Doing Theory,” Proceedings of National Academic Science, Vol.96, (1999), pp.10564. 依據著作權法第 46 、 52 、 65 條合理使用
10	 		A.Schotter, K. Weigelt, and C. Wilson, “A Laboratory Investigation of Multiperson Rationality and Presentation Effects,” “Games and Economic Behavior, Vol.6, pp.453-454. 依據著作權法第 46 、 52 、 65 條合理使用
11			A.Schotter, K. Weigelt, and C. Wilson, “A Laboratory Investigation of Multiperson Rationality and Presentation Effects,” “Games and Economic Behavior, Vol.6, pp.454-457. 依據著作權法第 46 、 52 、 65 條合理使用
12	Limited evidence of iteration of dominance (beyond 1-step), or SPE, forward induction		A.Schotter, K. Weigelt, and C. Wilson, “A Laboratory Investigation of Multiperson Rationality and Presentation Effects,” “Games and Economic Behavior, Vol.6, pp.460-461.

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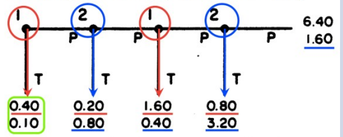
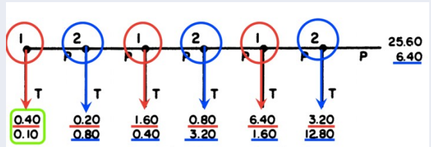
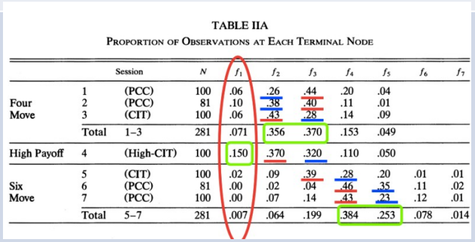
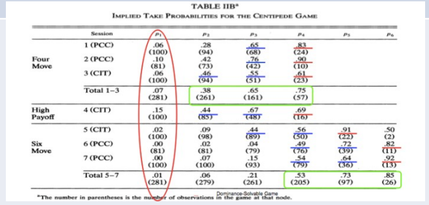
13	• McKelvey and Palfrey (Econometrica 1992)  FIGURE 1.—The four move centipede game.		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 806. 依據著作權法第 46 、 52 、 65 條合理使用
14	 FIGURE 2.—The six move centipede game.		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 806. 依據著作權法第 46 、 52 、 65 條合理使用
15			R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 808. 依據著作權法第 46 、 52 、 65 條合理使用
16			R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 809. 依據著作權法第 46 、 52 、 65 條合理使用

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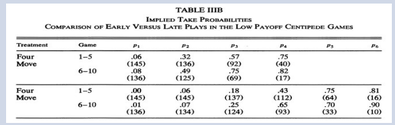
17	 TABLE IIIB IMPLIED TAKE PROBABILITIES COMPARISON OF EARLY VERSUS LATE PLAYS IN THE LOW PAYOFF CENTIPEDE GAMES Treatment / Game / p_1 / p_2 / p_3 / p_4 / p_5 / p_6 Four Move 1–5: .06 (145) / .32 (136) / .57 (92) / .75 (40) Four Move 6–10: .08 (136) / .49 (125) / .75 (69) / .82 (17) Four Move 1–5: .00 (145) / .06 (145) / .18 (137) / .43 (112) / .75 (64) / .81 (16) Four Move 6–10: .65 (93) / .70 (33) / .90 (10) Altruistic Types (7%): Prefer to Pass Selfish Types: Mimic altruistic types up to a point (to gain) Unraveling: error rate shrinks over time		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 810. 依據著作權法第 46 、 52 、 65 條合理使用
18	Selfish Types: Mimic altruistic types up to a point (to gain) Unraveling: error rate shrinks over time		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 811-812. 依據著作權法第 46 、 52 、 65 條合理使用
19	-Selfish guys sometimes pass (mimic altruist) ……more likely players believe there are altruists, the more imitation there is		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 813. 依據著作權法第 46 、 52 、 65 條合理使用
20	1.On the last move, Player 2 TAKE for any q 2.If 1- q>1/7, both Player 1 and 2 PASS Except on the last move Player 2 always TAKE 3.If 0<1- q<1/7 ☒ Mixed Strategy Equilibrium 4.If 1- q=0 both Player 1 and Player 2 TAKE		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 813. 依據著作權法第 46 、 52 、 65 條合理使用

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21	Figure 3.-Equilibrium outcome probabilities for basic four move game		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 814. 依據著作權法第 46 、 52 、 65 條合理使用
22	Figure 4.-Equilibrium outcome probabilities for basic six move game		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 814. 依據著作權法第 46 、 52 、 65 條合理使用
23	We model noisy play in the following way. In game *t*, at node *s*, if p^* is the equilibrium probability of TAKE move with probability ε_t Explains further deviation from mimic model		R.D. McKelvey and T.R. Palfrey, “An Experimental Study of Centipede Game,” *Econometrica*, Vol.60, No.4(1992), 815. 依據著作權法第 46 、 52 、 65 條合理使用
24	-Use constant-sum to kill social preferences -take 50% at 1st, 80% at 2nd		M. Fey, R. Mckelvey and T.R. Palfrey,“An Experimental Study of Constant-sum Centipede Games,” International Journal of Game Theory, Vol.25, (1996), pp.268-287.

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24	-Don't know other's choice if you took first -Take about half way		Rosemarie Nagel and Fang Fang Tang, “Experimental Results on the Centipede Game in Normal Form: An Investigation on Learning,” Journal of Mathematical Psychology, Vol.42, pp.356-384. 依據著作權法第 46 、 52 、 65 條合理使用
24	-3-person & high stakes: Many take immediately -CH can explain this (but not QRE) – see theory		Amnon Rapoport et al, “Equilibrium play and adaptive learning in a three-person centipede game,” Games and Economic Behavior, Vol.43(2003), pp.239-265. 依據著作權法第 46 、 52 、 65 條合理使用
25	-Slice the game into T periods F : -Fine paid by first subject to deviate -Will not deviate if F > $1.20/ *T* -T Can set T =1, F =$1.20; more credible if T large	 	Dilip Abreu and Hitoshi Matsushima, ”Virtual Implementation in Iteratively Undominated Strategies: Complete Information,” Econometrica, Vol. 60, No. 5 (Sep., 1992), pp. 993-1008. 依據著作權法第 46 、 52 、 65 條合理使用
26	-Comment: AM mechanism requires more steps of iterated deletion of dominated strategies		Jacob Glazer and Robert W. Rosenthal ,”A Note on Abreu-Matsushima Mechanisms,” Econometrica, Vol. 60, No. 6 (1992),pp.1436.

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26	"[Our] gut instinct is that our mechanism will not fare poorly in terms of the essential feature of its construction, that is, the significant multiplicative effect of fines.'"		Dilip Abreu and Hitoshi Matsushima,,“A Response to Glazer and Rosenthal,” Econometrica, Vol. 60, No. 6 (Nov., 1992), pp. 1441. 依據著作權法第 46 、 52 、 65 條合理使用
27	-*F*=$0.225 -*T*=4, 8, or 12 -Theory: Play inferior NE at *T*=8, 12, not *T*=4 Results: Opposite, and diverge… -Why? Choose only 1 switch-point in middle -Goal: switch soon, but 1 period after opponent	 	Martin Sefton Abdullah Yavas, “Abreu–Matsushima Mechanisms: Experimental Evidence,“ Games and Economic Behavior, Vol16, (1996),pp.280-302. 依據著作權法第 46 、 52 、 65 條合理使用
28	Fig. 3. All Blue Play in Experiment I		Martin Sefton Abdullah Yavas, “Abreu–Matsushima Mechanisms: Experimental Evidence,“ Games and Economic Behavior, Vol16, (1996),pp.287. 依據著作權法第 46 、 52 、 65 條合理使用
30	-Three ladies, A, B, C, in a railway carriage all have dirty faces and are all laughing. -It sudden flashes on A: Why doesn't B realize C is laughing at her?		John E. Littlewood, “A Mathematician’s Miscellany.” London: Methuen, pp.3-4. 依據著作權法第 46 、 52 、 65 條合理使用

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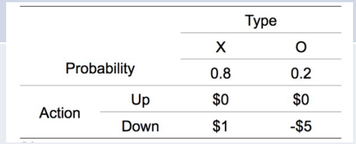
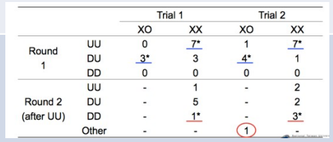
31	-Independent types X (prob=.8) or O (prob=.2)X is like “dirty face” -Commonly told “At least one player is type X.”…Choose Up or Down (figure out one is type X) -If nobody chooses Down, reveal other’s choice and play again 		Roberto A. Weber, “”Behavior and Learning in the “Dirty Faces” Game,” Experimental Economics, Vol.4, (2001),pp.235. 依據著作權法第 46 、 52 、 65 條合理使用
32			Roberto A. Weber, “”Behavior and Learning in the “Dirty Faces” Game,” Experimental Economics, Vol.4, (2001),pp.233. 依據著作權法第 46 、 52 、 65 條合理使用
35			Roberto A. Weber, “”Behavior and Learning in the “Dirty Faces” Game,” Experimental Economics, Vol.4, (2001),pp.239. 依據著作權法第 46 、 52 、 65 條合理使用
36	-Results: 87% rational in XO, but only 53% in 2nd round of XX -Significance: Choices reveal limited reasoning, not pure cooperativeness -More iteration is better here… -Upper bound of iterative reasoning		Roberto A. Weber, “”Behavior and Learning in the “Dirty Faces” Game,” Experimental Economics, Vol.4, (2001),pp.238-240 依據著作權法第 46 、 52 、 65 條合理使用