Separated Decisions

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Experiments and Payments

Experiment is a list of decision problems $(D_1, D_2, \ldots, D_k)$

Pay-All Mechanism:

1. $D_1 = \{\text{beer,milk}\}$, $D_2 = \{\text{hot dog,chocolate cake}\}$
2. Choice objects: $X = \{\text{beer,milk,hot dog,chocolate cake}\}$
3. Payment objects:
   $P(X)=\{\{\text{beer,hot dog}\}, \{\text{beer,cake}\}, \{\text{milk,hot dog}\}, \{\text{milk,cake}\}\}$
4. Problem: complementarities (wealth, portfolio, hedging...)

RPS Mechanism:

1. $D_1 = \{L, \$1\}$, $D_2 = \{L, \$2\}$
2. Choice objects: $X = \{\text{simple lotteries}\}$
3. Payment objects: $P(X) = \{\text{compound lotteries}\}$
4. Problem: counter-examples with reduction & non-EU prefs
   (Azrieli et al.: IC $\Leftrightarrow$ monotonicity)

LESSON: Incentives depend on $\succeq$ over $P(X)$, not X

Discussion of Incentives

The 31 papers from 2011 with multiple problems given:

	Mechanism Not in Paper	Discussion of Incentives None	Brief	Extensive	Clearly I.C.	Total
	Individual Choice Experiments					
'Top 5'	1	6	0	1	0	7
Exp.Econ.	0	2	0	1	0	3
	Muti-Person (Game) Experiments					
'Top 5'	6	9	0	0	0	9
Exp.Econ.	2	7	4	1	0	12
Total	9	24	4	3	0	31

LESSON: Nobody's discussing $\succeq$ over $P(X)$

Testing IC vs. Framing Effects

How to test IC of payment mechanism:

	D_1	D_2
Treatment 1:	$\{\$4, (\frac{1}{2}, \$10)\}$	
Treatment 2:	$\{\$4, (\frac{1}{2}, \$10)\}$	$\{\$3, (\frac{1}{2}, \$12)\}$

If we observe differences on D_1, it could be

- the mechanism was not IC, or
- the presence of D_2 altered preferences (e.g., decoy effect).

- Cubitt Starmer Sugden (1998 Exp.1)
- Beattie & Loomes (1997)
- Cubitt Starmer Sugden (1998 Exp.2)
- Harrison & Swarthout (2014)
- Cox Sadiraj & Schmidt (2015)

Tests Without Framing Confound

Replace Treatment 1 with a "Framed Control" treatment:

	D_1	D_2	Mechanism
Treatment 1:	$\{\$4, (\frac{1}{2}, \$10)\}$	$\{\$3, (\frac{1}{2}, \$12)\}$	Pay only D_1
Treatment 2:	$\{\$4, (\frac{1}{2}, \$10)\}$	$\{\$3, (\frac{1}{2}, \$12)\}$	RPS

LESSON: Proper test of IC must show all subjects same choices.

Past Experiments

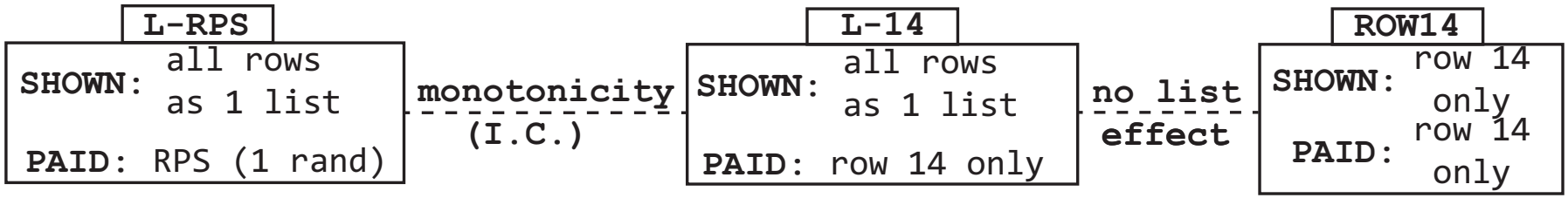
Paper	p-value	RPS is I.C.?
Starmer & Sugden (1991)	0.356	✓
Starmer & Sugden (1991)	**0.043**	×
Cubitt et al. (1998)	0.685	✓
Cubitt et al. (1998)	0.120	✓
Cox et al. (2015)	0.122	✓
Cox et al. (2015)	0.988	✓
Cox et al. (2015)	0.397	✓

Our Experiment

Row #	Option A		or	Option B	
1	Balls 1-10 pay $10 (50% chance of $10)	Balls 11-20 pay $5 (50% chance of $5)	or	Ball 1 pays $15 (5% chance of $15)	Balls 2-20 pay $0 (95% chance of $0)
2	Balls 1-10 pay $10 (50% chance of $10)	Balls 11-20 pay $5 (50% chance of $5)	or	Balls 1-2 pay $15 (10% chance of $15)	Balls 3-20 pay $0 (90% chance of $0)
3	Balls 1-10 pay $10 (50% chance of $10)	Balls 11-20 pay $5 (50% chance of $5)	or	Balls 1-3 pay $15 (15% chance of $15)	Balls 4-20 pay $0 (85% chance of $0)
4	Balls 1-10 pay $10 (50% chance of $10)	Balls 11-20 pay $5 (50% chance of $5)	or	Balls 1-4 pay $15 (20% chance of $15)	Balls 5-20 pay $0 (80% chance of $0)
⋮	⋮	⋮	⋮	⋮	⋮
19	Balls 1-10 pay $10 (50% chance of $10)	Balls 11-20 pay $5 (50% chance of $5)	or	Balls 1-19 pay $15 (95% chance of $15)	Ball 20 pays $0 (5% chance of $0)
20	Balls 1-10 pay $10 (50% chance of $10)	Balls 11-20 pay $5 (50% chance of $5)	or	All Balls pay $15 (100% chance of $15)	(0% chance of $0)

Click Here When Finished

Our Design



- Holt-Laury questions
- Andreoni-Sprenger formatting
- Standard Ohio State subject pool.
- Between-subjects.
- Computerized.
- Physical randomizing devices (die, bingo cage)
- No other tasks in the experiment.
- 60–63 subjects per treatment.
- List format: rows must be answered sequentially.

The Results

- Using RPS mechanism makes them switch later. (More thoughtful? Switching inertia?)
  - Statistically significant.
- Showing whole list makes them switcher earlier (Closer to the middle.)
  - Not quite significant.

Hypothesis

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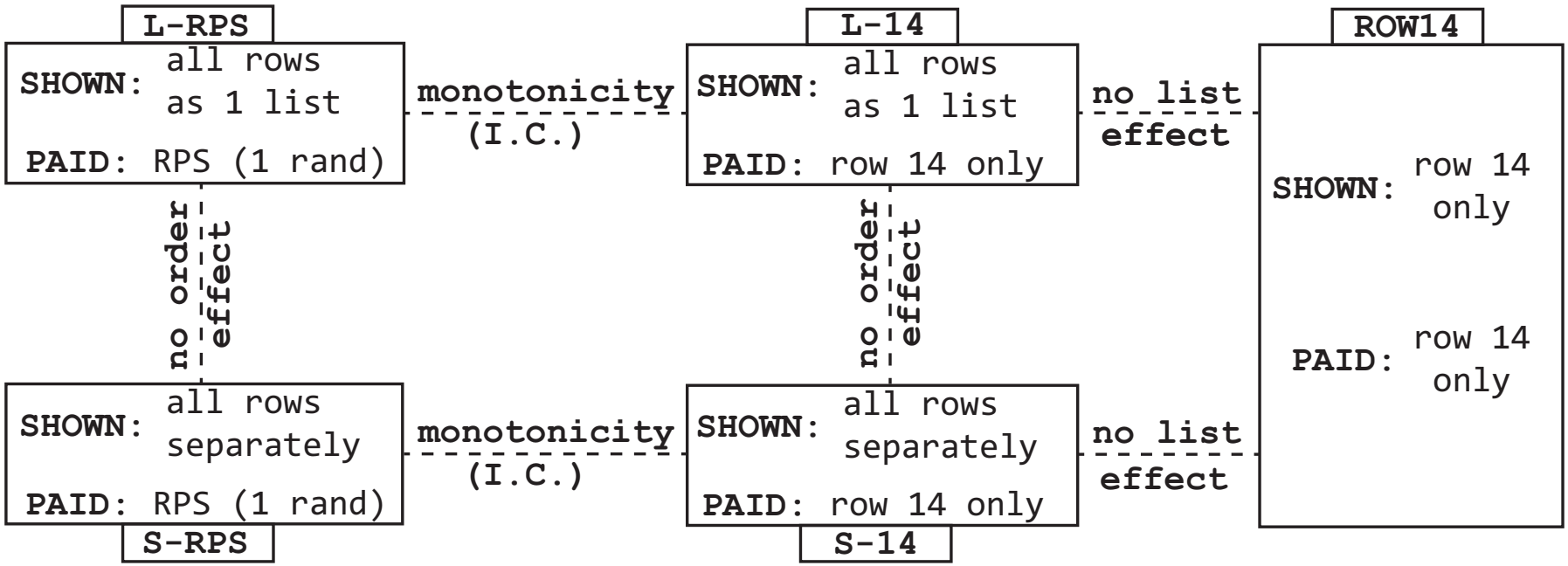
- *Subjects are combining the decisions in a reduction-like way. E.g.: 'When to switch?'.*
- *The 'combining' can be broken by separating the decisions.*

New Treatments

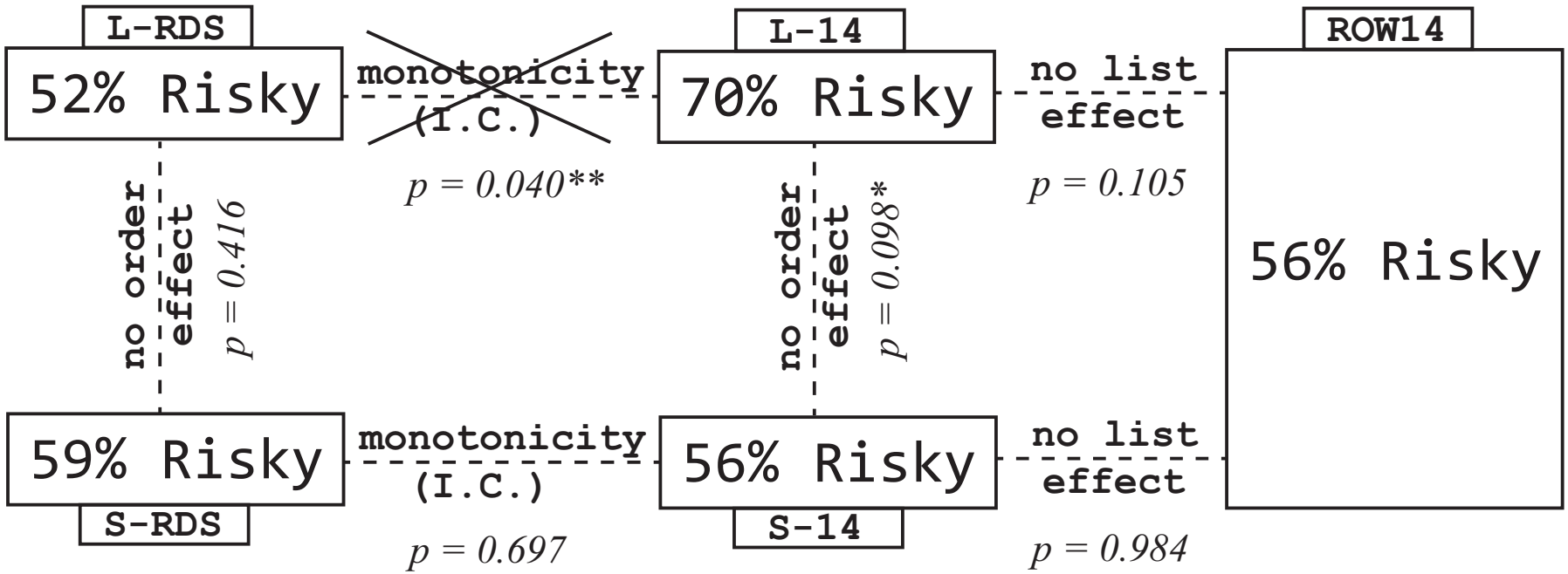
'Separated' treatments.

- Same 20 rows.
- Each shown on separate screen.
- Order randomized for each subject.
- Still comparing RPS to Pay-14-Only.
- Still must answer every row, in order given.
- Still 60–63 observations per cell, between subjects.

Full Design


L-RPS
SHOWN: all rows as 1 list
PAID: RPS (1 rand)
monotonicity (I.C.)
L-14
SHOWN: all rows as 1 list
PAID: row 14 only
no list effect
ROW14
SHOWN: row 14 only
PAID: row 14 only
no order effect
no order effect
SHOWN: all rows separately
PAID: RPS (1 rand)
S-RPS
monotonicity (I.C.)
SHOWN: all rows separately
PAID: row 14 only
S-14
no list effect

The Results


L-RDS
52% Risky
monotonicity
(I.C.)
p = 0.040**
L-14
70% Risky
no list
effect
p = 0.105
ROW14
56% Risky
no order
effect
p = 0.416
no order
effect
p = 0.098*
59% Risky
S-RDS
monotonicity
(I.C.)
p = 0.697
56% Risky
S-14
no list
effect
p = 0.984

The Cost of Separation

B-to-A switches violate FOSD:
$Risky_{15}$ dominates $Risky_{14}$, but $Risky_{14} \succ Safe \succ Risky_{15}$

# B-to-A Switches	L-RPS (List)	S-RPS (Separated)
Zero	95.0%	67.2%
One	0%	29.5%
Two	0%	0%
Three	1.7%	3.3%
Four or more	3.3%	0%
χ^2 p-value	*0.00013***	

LESSON: Separating decisions hurts consistency? NO!
The list format generates false consistency!

Past Experiments

Paper	Presentation Format	p-value	RPS is I.C.?
Starmer & Sugden (1991)	List	0.356	✓
Starmer & Sugden (1991)	List	**0.043**	×
This Paper	List	**0.041**	×
This Paper	Separated	0.697	✓
Cubitt et al. (1998)	Separated	0.685	✓
Cubitt et al. (1998)	Separated	0.120	✓
Cox et al. (2015)	Separated*	0.122	✓
Cox et al. (2015)	Separated*	0.988	✓
Cox et al. (2015)	Separated*	0.397	✓

Summary

- Theory: RPS generally fine *unless* subjects "reduce", (treating the experiment as one large decision)
- List format seems to encourage reduction, IC violations
- Separated format breaks reduction, restores IC
- List format also generates *false consistency*

Thank You.