Safe Options Induce Gender Differences in Risk Attitudes

INRA
SCIENCE & IMPACT

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Are women more risk averse than men?

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yes, *of course*

Are women more risk averse than men?

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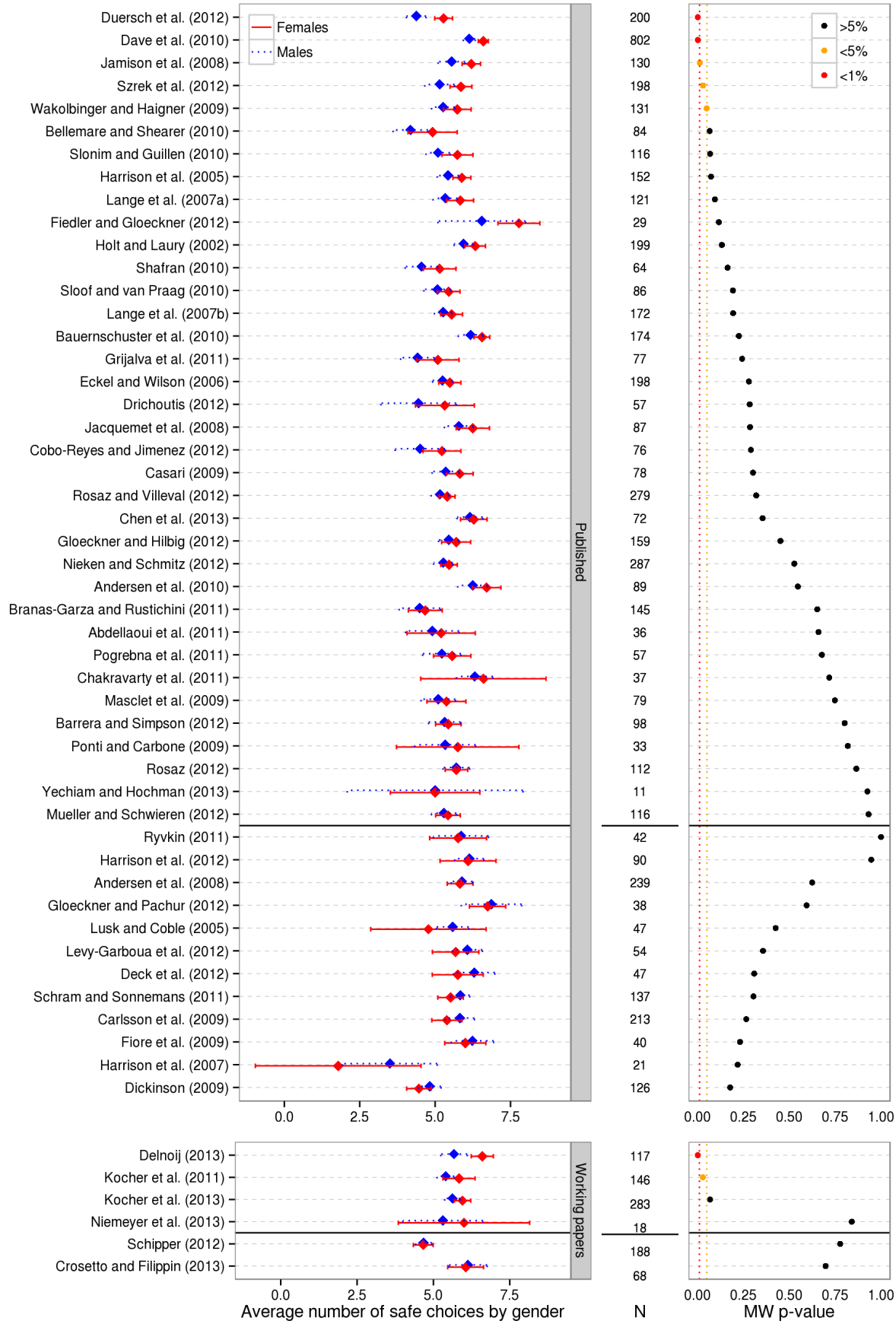
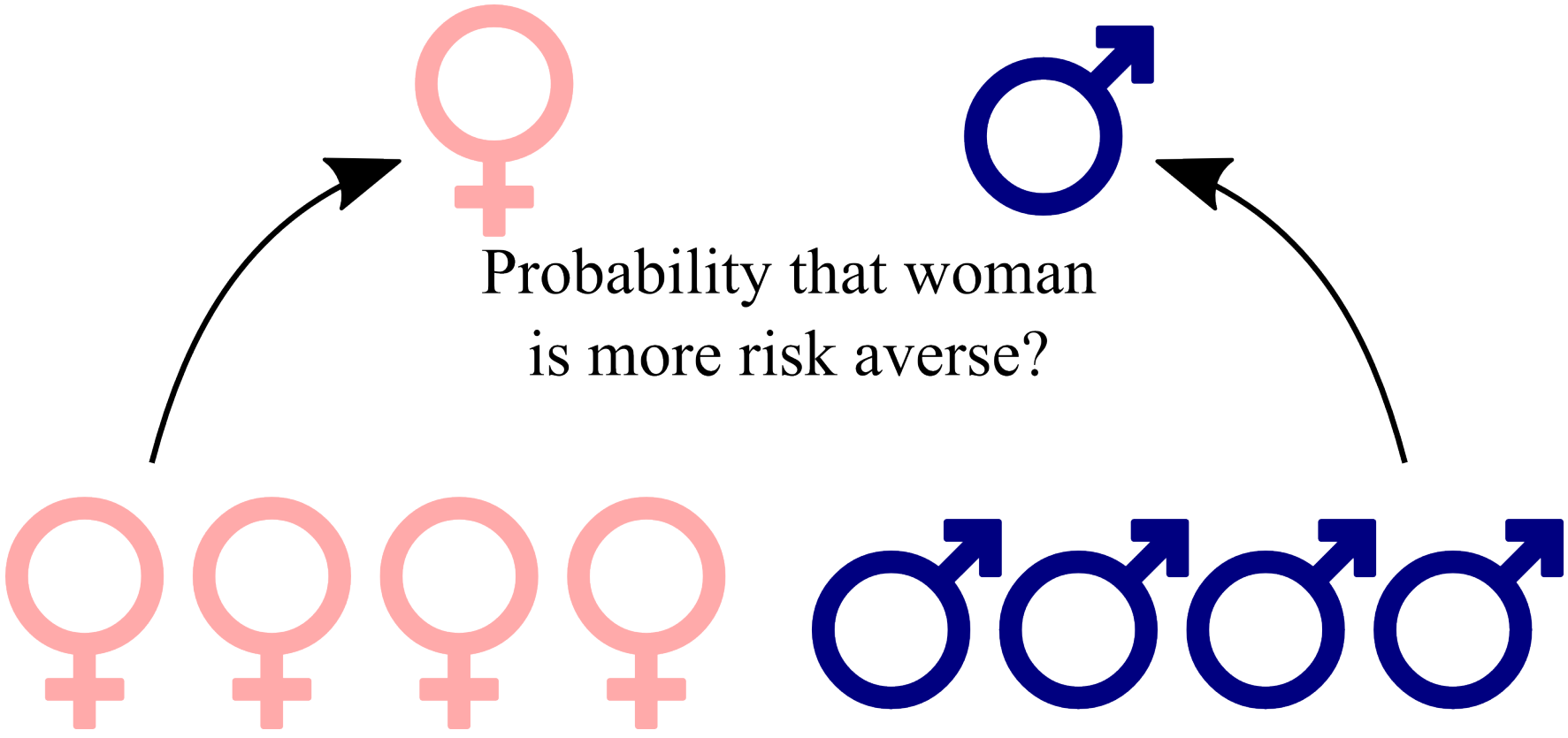
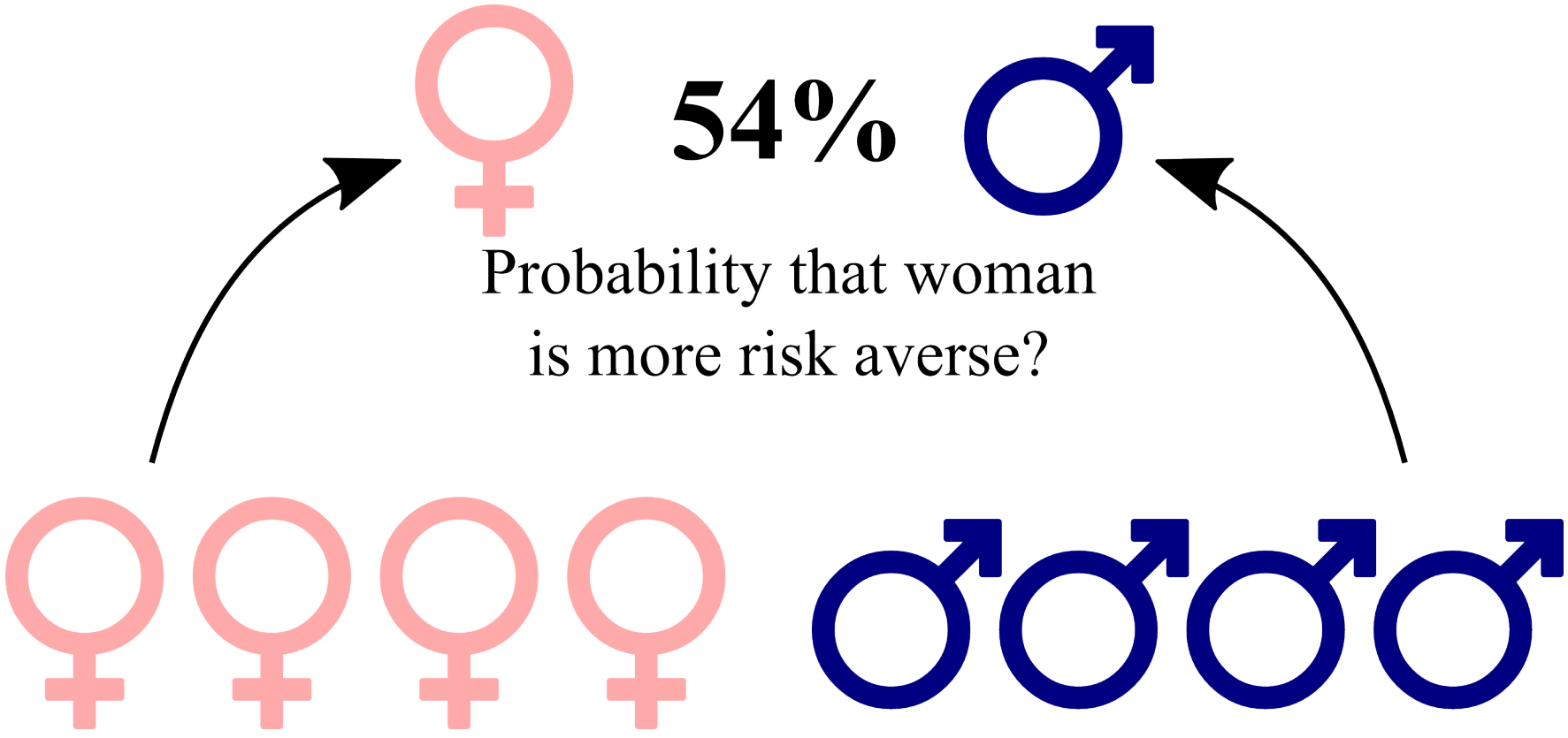
statistical significance $\Rightarrow$ stylized fact $\Rightarrow$ fact



(source: Filippin & Crosetto, *Management Science*)


Probability that woman
is more risk averse?


54%
Probability that woman
is more risk averse?

Are women more risk averse than men?

yes *but...*

Are women more risk averse than men?

yes *but...*

...it depends on the **task** used.

Holt & Laury	rarely
Bomb RIsk Elicitation Task	never
Eckel & Grossmann	always
Gneezy & Potters Investment Game	$\sim$always
$\sim$ 100 experiments in psychology	about 50%

Why?

Why?

Are there specific characteristics of the task that trigger different behavior by gender?

Which ones?

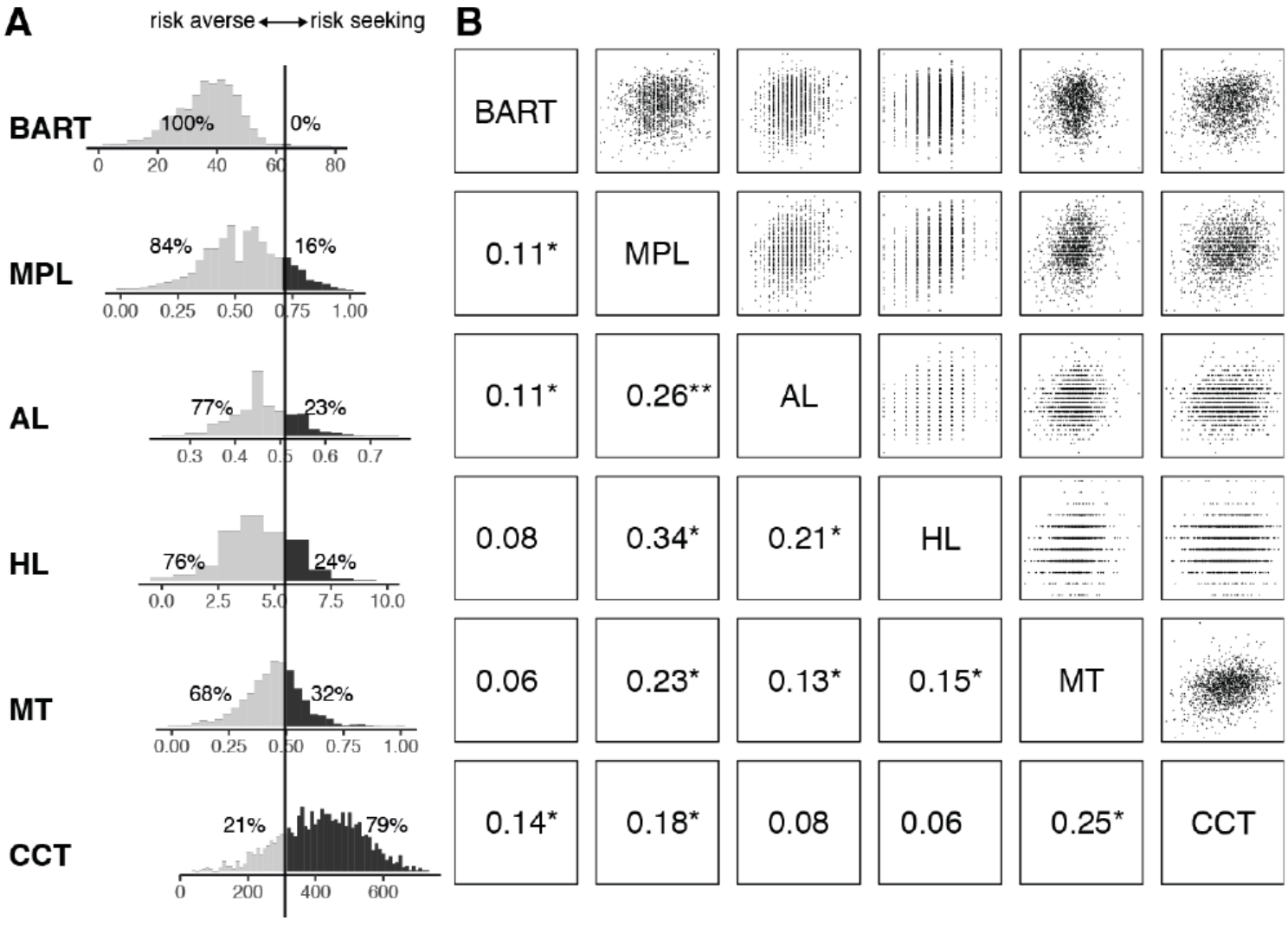
If so, can we rationalize them with some specific non-EUT model (loss aversion, certainty effect, salience, regret)?

conjecture: **safe options**

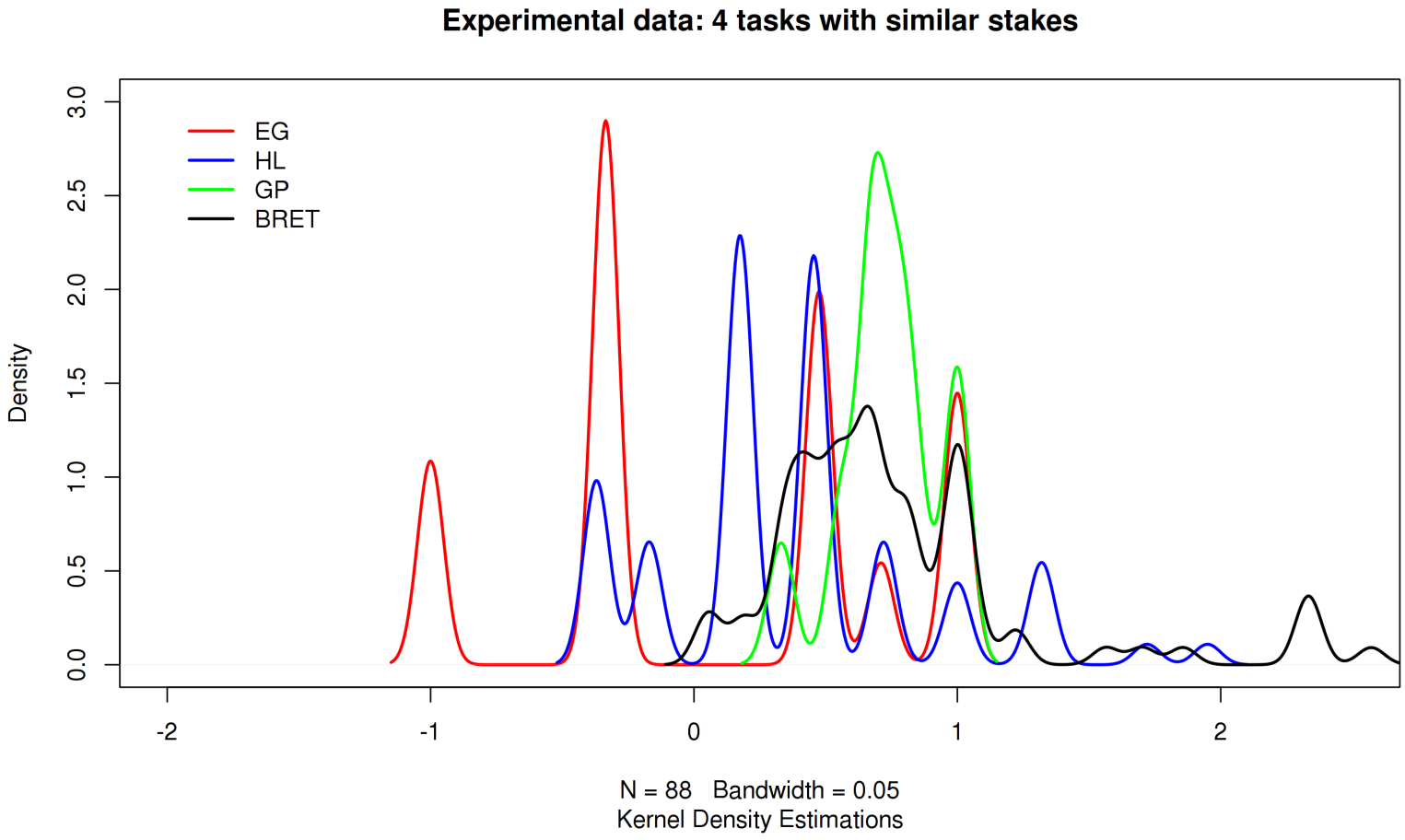
Holt & Laury	rarely	not focal
Bomb RIsk Elicitation Task	never	no
Eckel & Grossmann	always	yes, focal
Gneezy & Potters Investment Game	$\sim$always	yes, focal
$\sim$ 100 experiments in psychology	about 50%	...

The road to causal evidence

- Experimentally manipulate presence & salience of safe option
- *Ceteris paribus*
- Do so in more than one task (task heterogeneity is huge)



(source: Pedroni et al., *Nature Human Behavior*)



(source: Crosetto & Filippin, *Experimental Economics*)

Task	N_{task}	**Version**	N	**Males**	**Females**
Holt & Laury	344	Baseline: *HL*	179	84	95
		Treatment: *HLsafe*	165	79	86
Bomb Risk Elicitation Task	462	Baseline: *BRET*	271	106	165
		Treatment *BRETsafe*	191	73	118
Eckel & Grossman	279	Baseline: *EGsafe*	145	67	78
		Treatment: *EGnosafe*	134	57	77

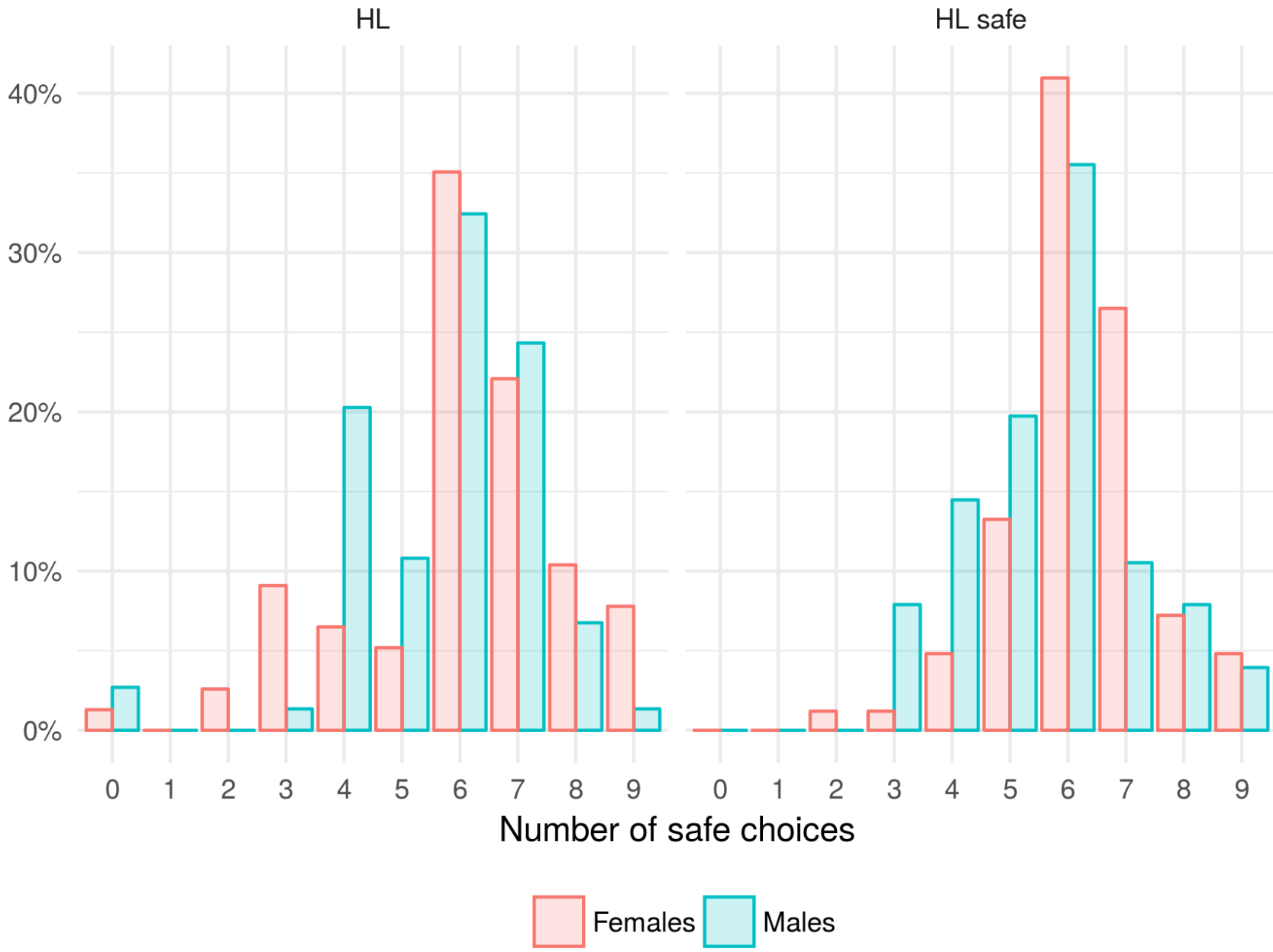
Holt & Laury (2002)

Standard Holt & Laury

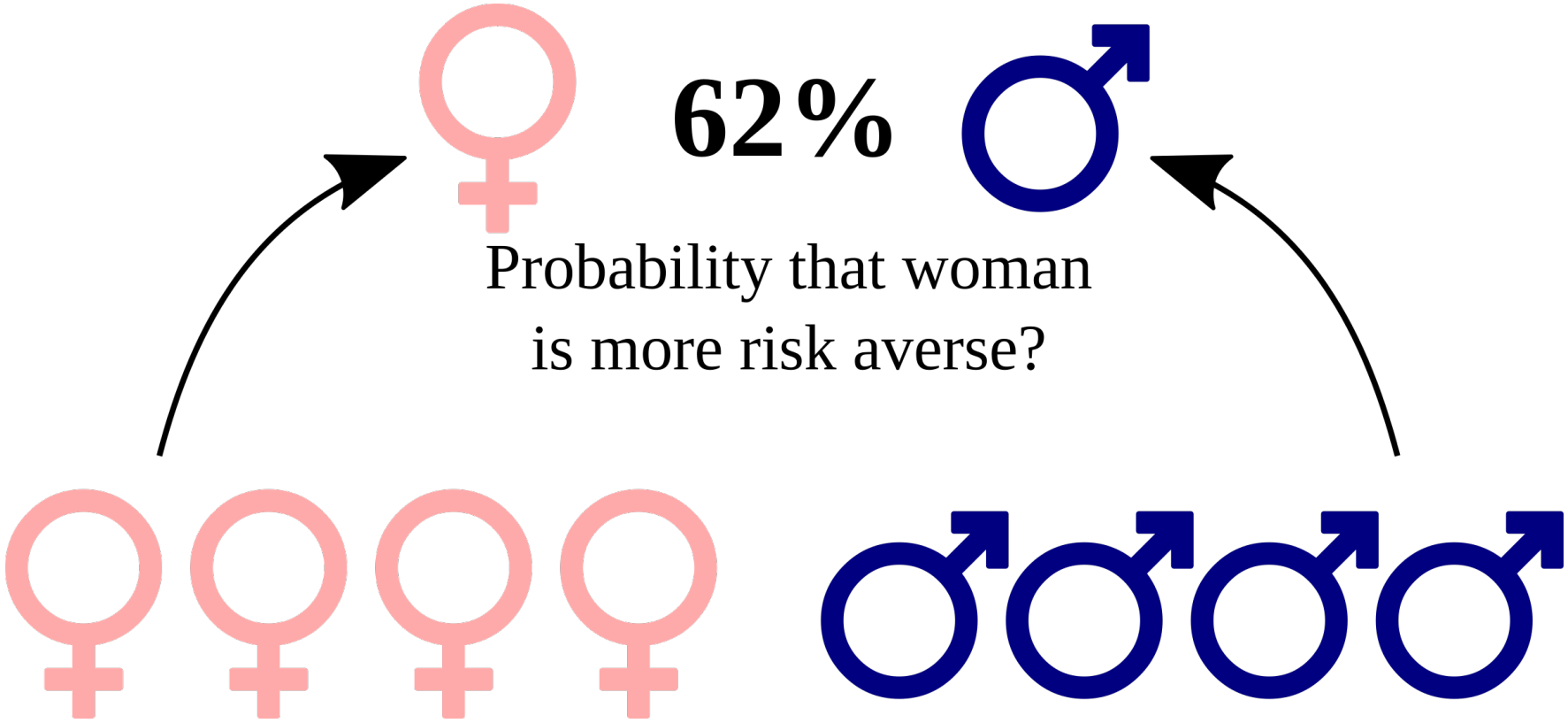
	Option A				Option B			
1	1/10	4 €	9/10	3.2 €	1/10	7.7 €	9/10	0.2 €
2	2/10	4 €	8/10	3.2 €	2/10	7.7 €	8/10	0.2 €
3	3/10	4 €	7/10	3.2 €	3/10	7.7 €	7/10	0.2 €
4	4/10	4 €	6/10	3.2 €	4/10	7.7 €	6/10	0.2 €
5	5/10	4 €	5/10	3.2 €	5/10	7.7 €	5/10	0.2 €
6	6/10	4 €	4/10	3.2 €	6/10	7.7 €	4/10	0.2 €
7	7/10	4 €	3/10	3.2 €	7/10	7.7 €	3/10	0.2 €
8	8/10	4 €	2/10	3.2 €	8/10	7.7 €	2/10	0.2 €
9	9/10	4 €	1/10	3.2 €	9/10	7.7 €	1/10	0.2 €
10	10/10	4 €	0/10	3.2 €	10/10	7.7 €	0/10	0.2 €

Holt & Laury with a safe option

	Option A	Option B			
1	3.3 €	1/10	7.7 €	9/10	0.2 €
2	3.4 €	2/10	7.7 €	8/10	0.2€
3	3.5 €	3/10	7.7 €	7/10	0.2€
4	3.5 €	4/10	7.7 €	6/10	0.2€
5	3.6 €	5/10	7.7 €	5/10	0.2€
6	3.7 €	6/10	7.7 €	4/10	0.2€
7	3.7 €	7/10	7.7 €	3/10	0.2€
8	3.8 €	8/10	7.7 €	2/10	0.2€
9	3.9 €	9/10	7.7 €	1/10	0.2€
10	4 €	10/10	7.7 €	0/10	0.2€


HL
HL safe
40%
30%
20%
10%
0%
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
Number of safe choices
Females
Males

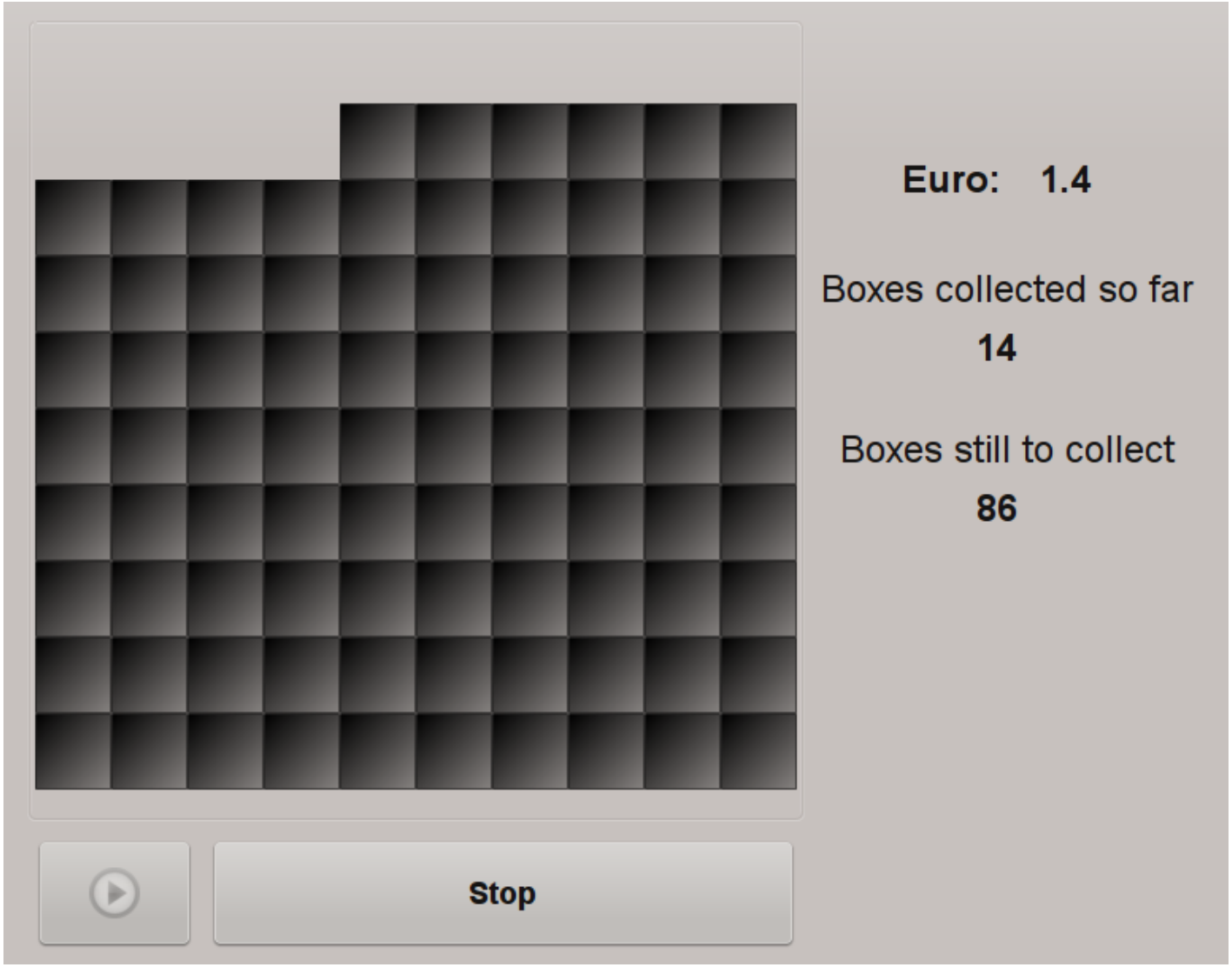
		N	Average # safe choices	Std. Dev.	Cohen's d	Mann Whitney
HL	M	74	5.70	1.61	.19	.183
	F	77	6.03	1.84		
	M-F		*-0.33*			
HLsafe	M	76	5.66	1.47	.43	.004
	F	83	6.24	1.26		
	M-F		*-0.58*			


62%
Probability that woman
is more risk averse?

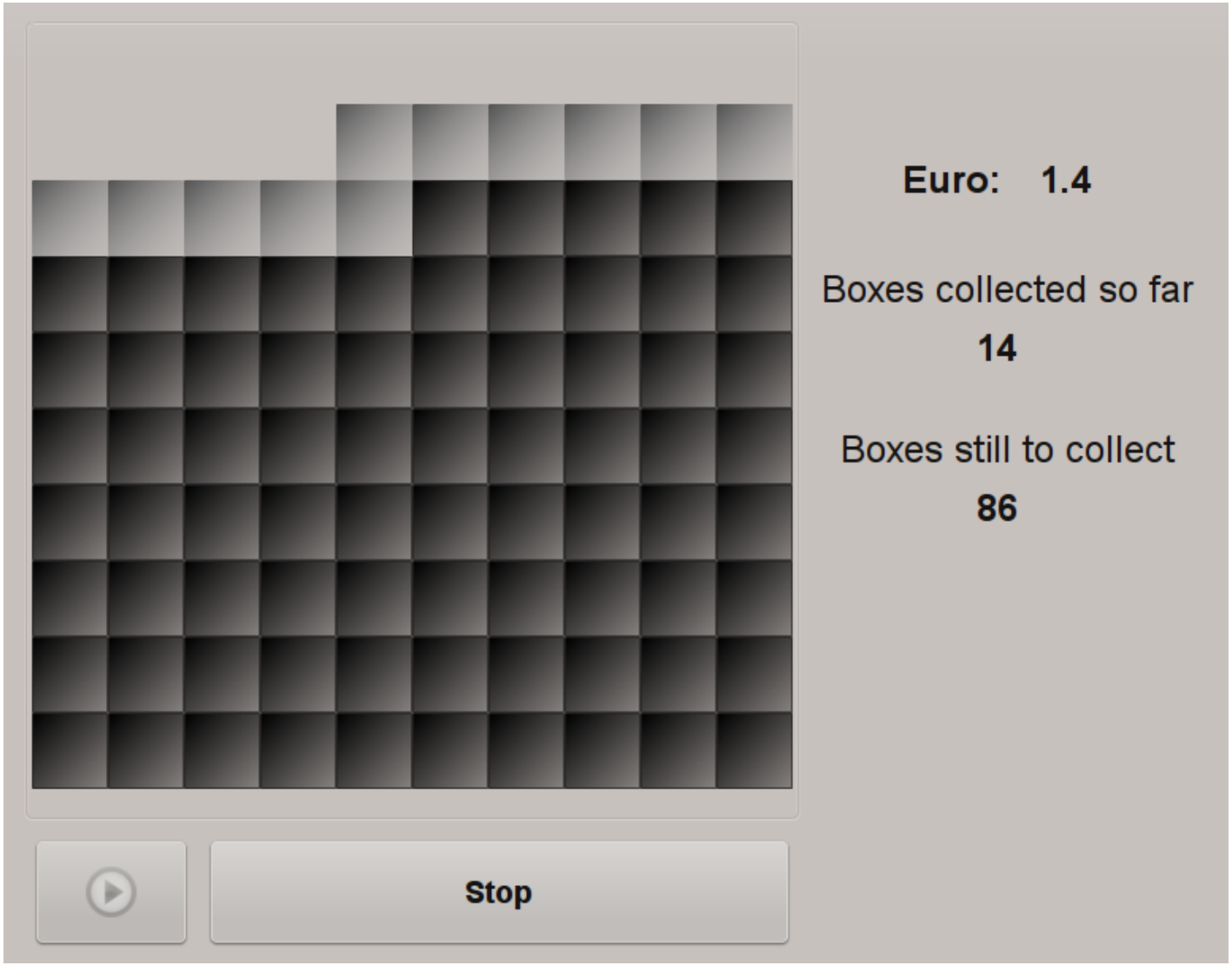
Holt & Laury (2002)

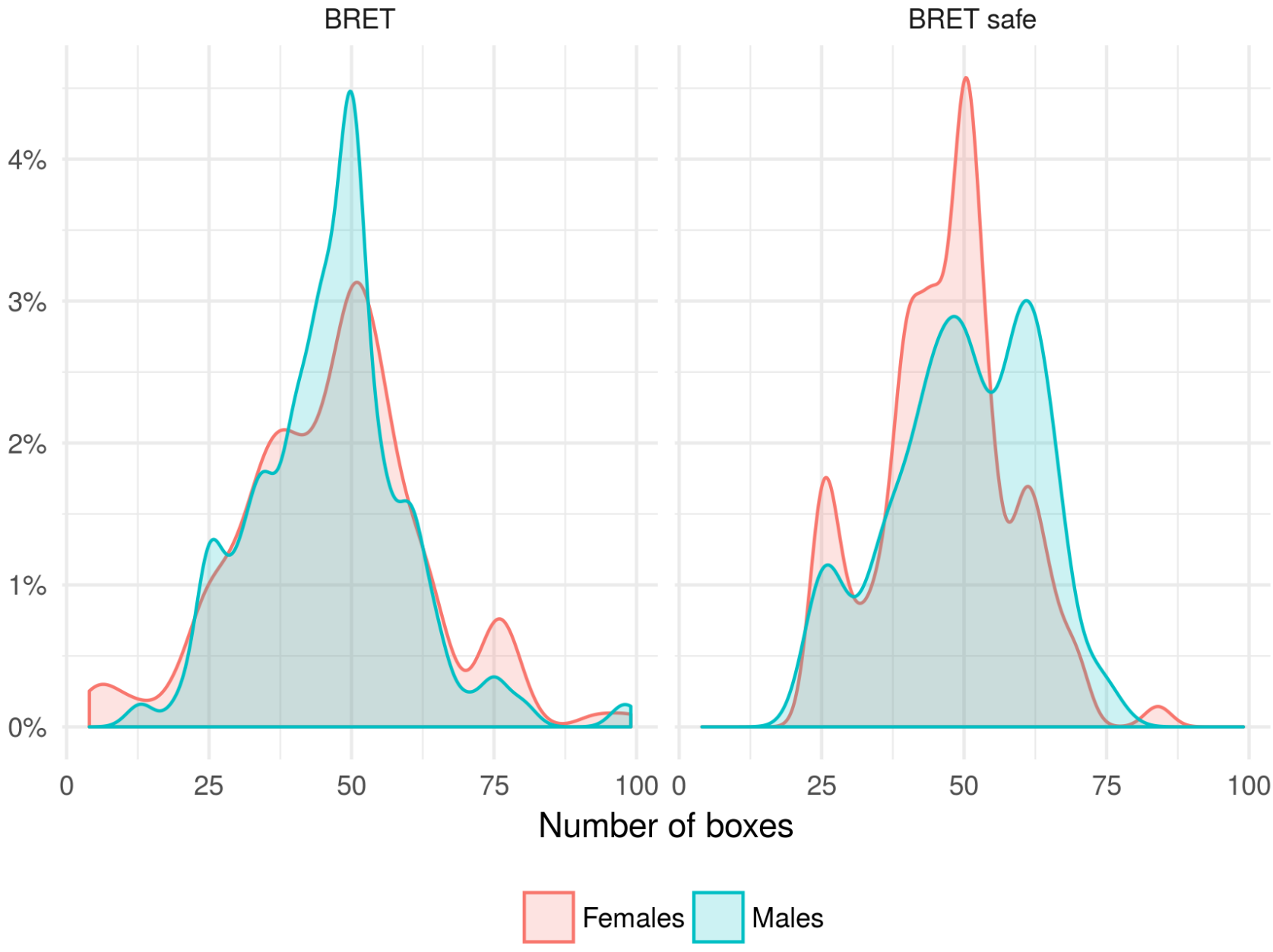
Bomb Risk Elicitation Task (2013)

Standard BRET



BRET with safe option




BRET
BRET safe
4%
3%
2%
1%
0%
0
25
50
75
100
Number of boxes
Females
Males

		N	Average Choice	Std. Dev.	Cohen's d	Mann Whitney
BRET	M	105	46.38	13.3	-.018	.675
	F	164	46.65	16.3		
	M-F		-.27			
BRETsafe	M	73	49.79	12.7	.254	.079
	F	118	46.72	11.8		
	M-F		3.07			

Bomb Risk Elicitation Task (2013)

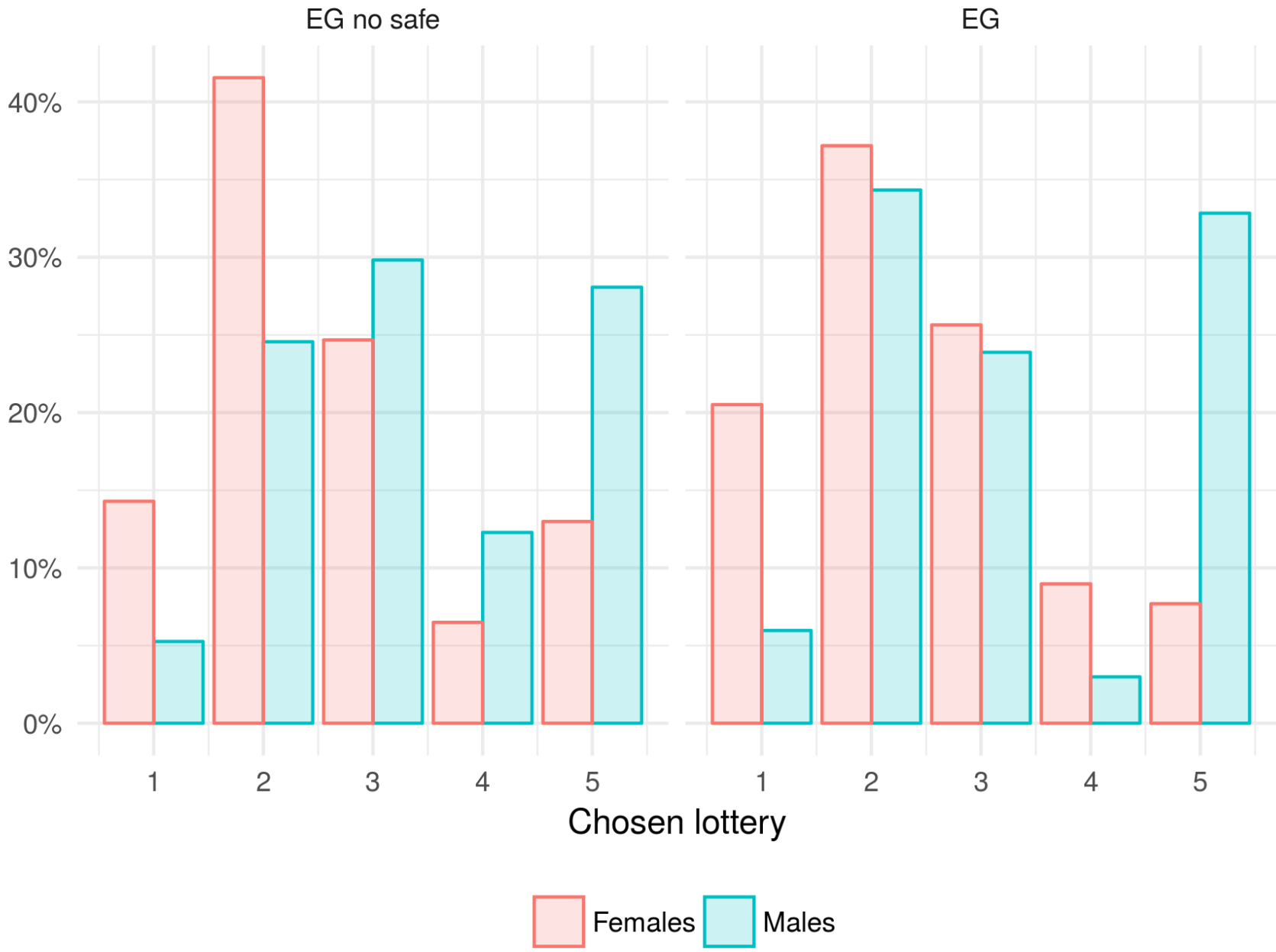
Eckel & Grossman (2002,2008)

Standard EG

	Event	Probability	Outcome
1	A	50%	4 €
	B	50%	4 €
2	A	50%	6 €
	B	50%	3 €
3	A	50%	8 €
	B	50%	2 €
4	A	50%	10 €
	B	50%	1 €
5	A	50%	12 €
	B	50%	0 €

EG with no safe option

	Event	Probability	Outcome
1	A	50%	4.5 €
	B	50%	3.6 €
2	A	50%	6 €
	B	50%	3 €
3	A	50%	8 €
	B	50%	2 €
4	A	50%	10 €
	B	50%	1 €
5	A	50%	12 €
	B	50%	0 €


EG no safe
EG
40%
30%
20%
10%
0%
1
2
3
4
5
Chosen lottery
Females
Males

		N	Average Choice	Std. Dev.	Cohen's d	Mann Whitney
Safe	**M**	67	3.22	1.38	.61	.001
	F	78	2.46	1.15		
	M-F		.76			
Non-Safe	**M**	57	3.33	1.27	.58	.001
	F	77	2.62	1.20		
	M-F		.71			

Eckel & Grossman (2002,2008)

What if we just ask them?

Task	Condition		SOEP mean	SOEP st.dev.	MW p-value
HL	Baseline	M	5.56	1.98	$< .001$
		F	4.55	2.02	
	HLsafe	M	5.08	2.26	.003
		F	4.1	1.87	
BRET	Baseline	M	5.36	1.95	.036
		F	4.84	2.06	
	BRETsafe	M	5.15	2.31	.013
		F	4.34	1.89	
EG	EGnosafe	M	5.39	2.29	.029
		F	4.57	2.02	
	EGsafe	M	5.39	2.06	.179
		F	4.95	2.19	

...but tasks are *way* different!

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Can we setup a structural model?

- $u(x) = \dfrac{x^{1-\rho}}{\rho}$
- Discretized data
- Fechner error (μ)
- Hey-Orme specification
- Standard error clustered at individual level
- ρ and μ allowed to interact with female

	(1) BRET	(2) BRETsafe	(3) HL	(4) HLsafe	(5) EGnosafe	(6) EGsafe
ρ	0.21***	0.049	0.72***	0.67***	0.45***	0.46***
	(0.06)	(0.07)	(0.1)	(0.08)	(0.09)	(0.08)
ρ_{female}	-0.024	0.13*	0.019	0.12**	0.12**	0.20***
	(0.07)	(0.08)	(0.07)	(0.06)	(0.06)	(0.05)
ρ_{SOEP}	-0.011	-0.0086	-0.049***	-0.044***	-0.028**	-0.030**
	(0.008)	(0.007)	(0.02)	(0.01)	(0.01)	(0.01)
μ	0.16***	0.33***	0.67***	0.60***	0.27***	0.36***
	(0.03)	(0.06)	(0.1)	(0.07)	(0.05)	(0.06)
μ_{female}	0.036	-0.12*	0.059	-0.13	0.027	0.098
	(0.05)	(0.07)	(0.1)	(0.09)	(0.08)	(0.09)
μ_{easy}	0.00065	-0.00035	0.059*	0.051*	0.029*	-0.012
	(0.004)	(0.006)	(0.04)	(0.03)	(0.02)	(0.02)
N	208	191	164	164	134	145
Log likelihood	-5274	-4132	-545	-425	-296	-321

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$,*** $p < 0.01$

Safe options **do** generate a gender effect.

Safe options **do** generate a gender effect.

Why?

Certainty effect somewhat $\Rightarrow$ change is elsewhere

Certainty effect	somewhat	$\Rightarrow$ change is elsewhere
Loss aversion	yes	$\Rightarrow$ but mostly in HL

Prospect theory structural model

	(1) BRETsafe		(2) HLsafe	
ρ	-0.026	(0.05)	0.80***	(0.2)
ρ_{female}	0.046	(0.04)	0.10	(0.2)
ρ_{SOEP}	-0.013	(0.01)	-0.18***	(0.04)
λ	1.13***	(0.1)	1.85***	(0.1)
λ_{female}	0.19	(0.1)	0.45**	(0.2)
μ	0.39***	(0.04)	1.44***	(0.2)
μ_{female}	-0.041	(0.05)	-0.019	(0.2)
μ_{easy}	-0.00046	(0.01)	0.13*	(0.08)
Observations	191		164	
Log likelihood	-4101		-429	

St.err. in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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Salience theory	no	$\Rightarrow$ weird predictions

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Evolution	in principle	$\Rightarrow$ a bit speculative

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Salience theory	no	weird predictions
Regret theory	no	weird predictions
Evolution	in principle	a bit speculative
...other ideas?...	...	...

Is this an important result?

Thanks!