

Supplement 1 Correlation between Risk and Expected Value in gambling tasks

Expected Value (EV) = p (gain) x gain + p (loss) x loss;

Risk (SD) = $\sqrt{(p \text{ (gain)} \times (\text{gain} - \text{EV})^2 + p \text{ (loss)} \times (\text{loss} - \text{EV})^2)}$

1. Iowa Gambling Task

Deck	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
A	1	100	.5	-250	-25	202.3	
B	1	100	.1	-1250	-25	407.1	
C	1	50	.5	-50	25	58.6	
D	1	50	.1	-250	25	90.5	$r = -0.84$

This task is used in: Agay et al. (2015), Baker (2011), Bangma et al. (in prep.), Ernst et al. (2003), Gonzalez-Gadea et al. (2012), Henderson (2007), Hobson et al. (2011), Ibanez et al. (2012), Malloy-Diniz et al. (2007, 2008), Mantyla et al. (2012), Masunami et al. (2009), Toplak et al. (2005), Vaurio (2011).

2. Hungry Donkey Task

The characteristics of this task are similar as in the Iowa Gambling Task.

This task is used in: Geurts et al. (2006), Skogli et al. (2014a/2014b).

3. Child Iowa Gambling Task

Deck	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
A	1	2	.4	-6.5	-.6	4.6	
B	1	2	.2	-13	-.6	6.1	
C	1	1	.4	-1	.6	1.1	
D	1	1	.2	-2	.6	1.2	$r = -0.97$

This task is used in: Antonini et al. (2016), Garon et al. (2006).

4. Foregone Payoff Gambling Task

Deck	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
AB	1	20	0	0	20	0	
CD	.5	50	.5	-50	0	50	$r = -1$

This task is used in: Agay et al. (2015).

5. Game of Dice Task

# dices	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
1	.17	1000	.83	-1000	-666.67	745.4	
2	.33	500	.67	-500	-170	470.2	
3	.5	200	.5	-200	0	200.0	
4	.67	100	.33	-100	34	94.0	$r = -0.96$

This task is used in: Baker (2011), Drechsler et al. (2008), Matthies et al. (2012), Wilbertz et al. (2012).

6. Cambridge Gamble Task

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
6:4	.6	95	.4	-95	19	93.1	
6:4	.6	75	.4	-75	15	73.5	
6:4	.6	50	.4	-50	10	49.0	
6:4	.6	25	.4	-25	5	24.5	
6:4	.6	5	.4	-5	1	4.9	$r = 1$
7:3	.7	95	.3	-95	38	87.1	
7:3	.7	75	.3	-75	30	68.7	
7:3	.7	50	.3	-50	20	45.8	
7:3	.7	25	.3	-25	10	22.9	
7:3	.7	5	.3	-5	2	4.6	$r = 1$
8:2	.8	95	.2	-95	57	76.0	
8:2	.8	75	.2	-75	45	60.0	
8:2	.8	50	.2	-50	30	40.0	
8:2	.8	25	.2	-25	15	20.0	
8:2	.8	5	.2	-5	3	4.0	$r = 1$
9:1	.9	95	.1	-95	76	57.0	
9:1	.9	75	.1	-75	60	45.0	
9:1	.9	50	.1	-50	40	30.0	
9:1	.9	25	.1	-25	20	15.0	
9:1	.9	5	.1	-5	4	3.0	$r = 1$
<i>Mean correlation risk & EV</i>							$r = 1$

This task is used in: Coghill et al. (2013), DeVito et al. (2008), Pollak et al. (2015, 2017), Sorensen et al. (2017).

7. Modified Cambridge Gamble Task

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
5:5	.5	10	.5	-10	0	10	
5:5	.5	20	.5	-20	0	20	
5:5	.5	30	.5	-30	0	30	
5:5	.5	40	.5	-40	0	40	
5:5	.5	50	.5	-50	0	50	
5:5	.5	60	.5	-60	0	60	
5:5	.5	70	.5	-70	0	70	
5:5	.5	80	.5	-80	0	80	
5:5	.5	90	.5	-90	0	90	
5:5	.5	100	.5	-100	0	100	$r = 0$
6:4	.6	10	.4	-10	2	9.8	
(...)							
6:4	.6	100	.4	-100	20	98.0	$r = 1$
7:3	.7	10	.3	-10	4	9.2	
(...)							
7:3	.7	100	.3	-100	40	91.7	$r = 1$
8:2	.8	10	.2	-10	6	8.0	
(...)							
8:2	.8	100	.2	-100	60	80.0	$r = 1$
9:1	.9	10	.1	-10	8	6.0	
(...)							

9:1 .9 100 .1 -100 80 60.0 $r = 1$

Mean correlation risk & EV $r = 0.80$

This task is used in: Kroyzer (2014).

8. Gamble Task – risk aversion

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
1_certain	1	7	0	0	7	0	
1_risky	.4	16	0	0	6.4	6.1	$r = -1$
2_certain	1	13	0	0	13	0	
2_risky	.66	23	0	0	15.18	6.4	$r = 1$
3_certain	1	11	0	0	11	0	
3_risky	.6	17	0	0	10.2	5.3	$r = -1$
4_certain	1	11	0	0	11	0	
4_risky	.66	17	0	0	11.22	4.7	$r = 1$
5_certain	1	14	0	0	14	0	
5_risky	.44	29	0	0	12.76	10.8	$r = -1$
6_certain	1	11	0	0	11	0	
6_risky	.43	23	0	0	9.89	8.6	$r = -1$
7_certain	1	10	0	0	10	0	
7_risky	.66	20	0	0	13.2	5.5	$r = 1$
8_certain	1	300	0	0	300	0	
8_risky	.8	400	0	0	320	71.6	$r = 1$
9_certain	1	225	0	0	225	0	
9_risky	.8	300	0	0	240	53.7	$r = 1$
10_certain	1	240	0	0	240	0	
10_risky	*				246.6	4.7	$r = 1$
11_certain	1	360	0	0	360	0	
11_risky	*				369.9	7.1	$r = 1$
<i>Mean correlation risk & EV</i>							$r = 0.27$

*Item 10 & 11 (risky options) were constructed differently as they contained two potential gains and no losses, therefore the calculation of the expected value was also performed in a different way:

Option	p (gain_1)	gain_1	P (gain_2)	gain_2	EV	Risk (SD)
Item 10_risky	.66	250	.34	240	246.6	4.7
Item 11_risky	.66	375	.34	360	369.9	7.1

This task is used in: Pollak et al. (2016), experiment 1.1

9. Gamble Task – loss aversion

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
12_certain	1	0	0	0	0	0	
12_risky	.5	10	.5	-10	0	10	$r = 0$
13_certain	1	0	0	0	0	0	
13_risky	.5	20	.5	-10	5	15	$r = 1$

14_certain	1	0	0	0	0	0	
14_risky	.5	30	.5	-10	10	20	$r = 1$
15_certain	1	0	0	0	0	0	
15_risky	.5	40	.5	-10	15	25	$r = 1$
16_certain	1	0	0	0	0	0	
16_risky	.5	50	.5	-10	20	30	$r = 1$
17_certain	1	0	0	0	0	0	
17_risky	.5	100	.5	-100	0	100	$r = 0$
18_certain	1	0	0	0	0	0	
18_risky	.5	200	.5	-100	50	150	$r = 1$
19_certain	1	0	0	0	0	0	
19_risky	.5	300	.5	-100	100	200	$r = 1$
20_certain	1	0	0	0	0	0	
20_risky	.5	400	.5	-100	150	250	$r = 1$
21_certain	1	0	0	0	0	0	
21_risky	.5	500	.5	-100	200	300	$r = 1$
<i>Mean correlation risk & EV</i>							$r = 0.8$

This task is used in: Pollak et al. (2016), experiment 1.2.

10. Clicking Paradigm

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
1_certain	1	2.3	0	0	2.3	0	
1_risky	.93	3	.07	-7.2	2.3	2.60	$r = 0$
2_certain	1	11.2	0	0	11.2	0	
2_risky	.92	15.2	.08	-34.5	11.2	13.48	$r = 0$
3_certain	1	0	0	0	0	0	
3_risky	.09	20.2	.91	-2	0	6.35	$r = 0$
4_certain	1	7.4	0	0	7.4	0	
4_risky	*				7.4	1.9	$r = 0$
<i>Mean correlation risk & EV</i>							$r = 0$

*Item 4 (risky option) was constructed differently as it contained two potential gains and no losses, therefore the calculation of the expected value was also performed in a different way:

Option	p (gain_1)	gain_1	P (gain_2)	gain_2	EV	Risk (SD)
Item 4_risky	.94	6.9	.06	15	7.4	1.9

This task is used in: Pollak et al. (2016), experiment 2.3.

11. Jackpot magnitude

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
A	1	2	0.33	-2	1.34	2.03	
B	1	4	0.33	-11	0.37	7.47	
C	1	2	0.33	-11	-1.63	6.49	$r = -.63$

This task is used in: Luman et al. (2008).

12. Jackpot frequency

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
A	1	2	0.33	-2	1.34	2.03	
B	1	4	0.5	-7	0.5	6.35	
C	1	2	0.5	-7	-1.5	5.23	$r = -.53$

This task is used in: Luman et al. (2008).

13. Gambling Machine Task

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
fl13a	1	2	0.1	-2	1.8	1.2	
fl13b	1	2	0.5	-2	1	2.4	$r = -1$
fl24a	1	4	0.5	-50	-21	32.3	
fl24b	1	4	0.1	-50	-1	16.3	$r = -1$
l13a	1	4	0.1	-10	3	4.2	
l13b	1	4	0.1	-2	3.8	1.8	$r = -1$
l24a	1	2	0.5	-50	-23	31.5	
l24b	1	2	0.5	-2	1	2.4	$r = -1$
g13a	1	4	0.1	-50	-1	16.3	
g13b	1	2	0.1	-50	-3	15.7	$r = 1$
g24a	1	4	0.5	-10	-1	8.1	
g24b	1	2	0.5	-10	-3	7.0	$r = 1$
fl_g13a	1	2	0.1	-10	1	3.6	
fl_g13b	1	4	0.5	-10	-1	8.1	$r = -1$
fl_g24a	1	4	0.5	-50	-21	32.3	
fl_g24b	1	2	0.1	-50	-3	15.7	$r = -1$
l_g13a	1	2	0.1	-10	1	3.6	
l_g13b	1	4	0.1	-50	-1	16.3	$r = -1$
l_g24a	1	4	0.5	-10	-1	8.1	
l_g24b	1	2	0.5	-2	1	2.4	$r = -1$
fl_l13a	1	4	0.5	-2	3	3.7	
fl_l13b	1	4	0.1	-10	3	4.2	$r = 0$
fl_l24a	1	2	0.5	-10	-3	7.0	
fl_l24b	1	2	0.1	-50	-3	15.7	$r = 0$
g_l13a	1	2	0.1	-2	1.8	1.2	
g_l13b	1	4	0.1	-10	3	4.2	$r = 1$
g_l24a	1	4	0.1	-10	3	4.2	
g_l24b	1	2	0.1	-2	1.8	1.2	$r = 1$
l_fl13a	1	2	0.1	-50	-3	15.7	
l_fl13b	1	2	0.5	-2	1	2.4	$r = -1$
l_fl24a	1	4	0.1	-50	-1	16.3	
l_fl24b	1	4	0.5	-2	3	3.7	$r = -1$

l.g_fl13a	1	4	0.5	-2	3	3.7	
l.g_fl13b	1	2	0.1	-10	1	3.6	$r = 1$
l.g_fl24a	1	4	0.5	-10	-1	8.1	
l.g_fl24b	1	2	0.1	-50	-3	15.7	$r = -1$
fl_g_l13a	1	4	0.1	-10	3	4.2	
fl_g_l13b	1	2	0.5	-2	1	2.4	$r = 1$
fl_g_l24a	1	4	0.1	-50	-1	16.3	
fl_g_l24b	1	2	0.5	-10	-3	7.0	$r = 1$
<i>Mean correlation risk & EV</i>						$r = -0.20$	

This task is used in: Bexkens et al. (2015).

14. Probabilistic Discounting Task

Option	p (gain)	gain	P (loss)	loss	EV	Risk (SD)	Correlation EV and Risk (SD)
a	1	0	0	0	0	0	
b	0	10	0	0	0	0	$r = 0$
a	1	0	0	0	0	0	
b	.25	10	0	0	2.5	3.8	$r = 1$
a	1	0	0	0	0	0	
b	.5	10	0	0	5	3.5	$r = 1$
a	1	0	0	0	0	0	
b	.75	10	0	0	7.5	2.2	$r = 1$
a	1	0	0	0	0	0	
b	1	10	0	0	10	0	$r = 0$
a	1	2	0	0	2	0	
b	0	10	0	0	0	0	$r = 0$
a	1	2	0	0	2	0	
b	.25	10	0	0	2.5	3.8	$r = 1$
a	1	2	0	0	2	0	
b	.5	10	0	0	5	3.5	$r = 1$
a	1	2	0	0	2	0	
b	.75	10	0	0	7.5	2.2	$r = 1$
a	1	2	0	0	2	0	
b	1	10	0	0	10	0	$r = 0$
a	1	4	0	0	4	0	
b	0	10	0	0	0	0	$r = 0$
a	1	4	0	0	4	0	
b	.25	10	0	0	2.5	3.8	$r = -1$
a	1	4	0	0	4	0	
b	.5	10	0	0	5	3.5	$r = 1$
a	1	4	0	0	4	0	
b	.75	10	0	0	7.5	2.2	$r = 1$
a	1	4	0	0	4	0	
b	1	10	0	0	10	0	$r = 0$
a	1	6	0	0	6	0	
b	0	10	0	0	0	0	$r = 0$
a	1	6	0	0	6	0	
b	.25	10	0	0	2.5	3.8	$r = -1$

a	1	6	0	0	6	0	
b	.5	10	0	0	5	3.5	$r = -1$
a	1	6	0	0	6	0	
b	.75	10	0	0	7.5	2.2	$r = 1$
a	1	6	0	0	6	0	
b	1	10	0	0	10	0	$r = 0$
a	1	8	0	0	8	0	
b	0	10	0	0	0	0	$r = 0$
a	1	8	0	0	8	0	
b	.25	10	0	0	2.5	3.8	$r = -1$
a	1	8	0	0	8	0	
b	.5	10	0	0	5	3.5	$r = -1$
a	1	8	0	0	8	0	
b	.75	10	0	0	7.5	2.2	$r = -1$
a	1	8	0	0	8	0	
b	1	10	0	0	10	0	$r = 0$
a	1	10	0	0	10	0	
b	0	10	0	0	0	0	$r = 0$
a	1	10	0	0	10	0	
b	.25	10	0	0	2.5	3.8	$r = -1$
a	1	10	0	0	10	0	
b	.5	10	0	0	5	3.5	$r = -1$
a	1	10	0	0	10	0	
b	.75	10	0	0	7.5	2.2	$r = -1$
a	1	10	0	0	10	0	
b	1	10	0	0	10	0	$r = 0$
<i>Mean correlation risk & EV</i>							$r = 0$

This task is used in: Scheres et al. (2006).