Extending material

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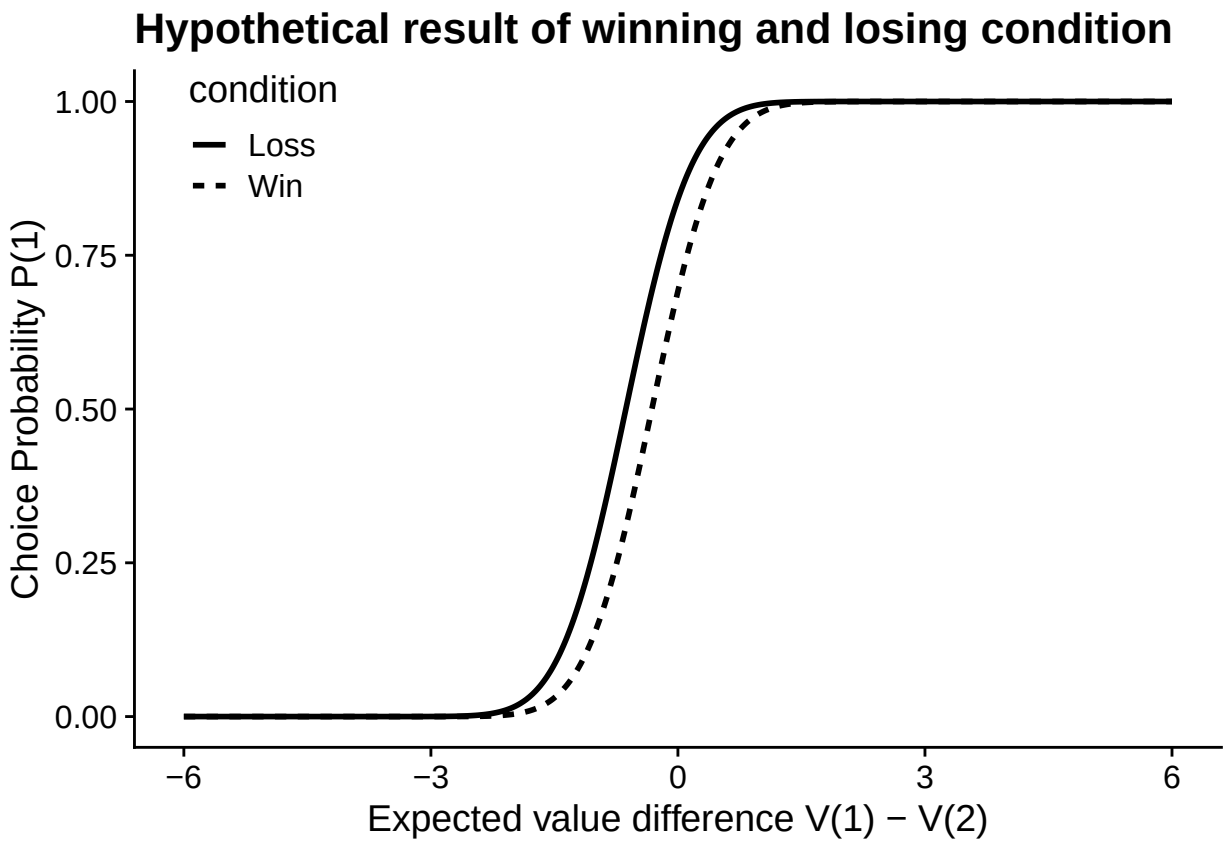
Expected results

Conditions

I supposed that losing condition will lead to more direct exploration. That will yield a result that higher w2 in losing condition than in wining condition.

However, I am not really sure about whether we should suppose it, especially, when we control the risk aversion. It has a fair chance that the framing effect (wining/losing condition) have nothing to do with exploration.



As previous study found that the relative risk in RR condition will be close to 0, I supposed there will be a different intercept between SR and rR condition. The TU is set to the real value of variance in the population. Based on the definition of TU: $TU = \sqrt{(\sigma_1^2 + \sigma_2^2)}$, in our experiment, the TU in SR is

```r
r <- c(-1,-1,-1,0,0,0,0,0,0,1,1,1)
R <- c(1,2,3,3,4,4,4,4,5,5,6,7)
V_r <- var(r) * 12/11 # using the variance of the population instead of the unbiased estimator
V_R <- var(R) * 12/11
sqrt(V_R + 0)
```

```
## [1] 1.724879
```

Whereas the TU in rR is

```r
sqrt(V_r + V_R)
```

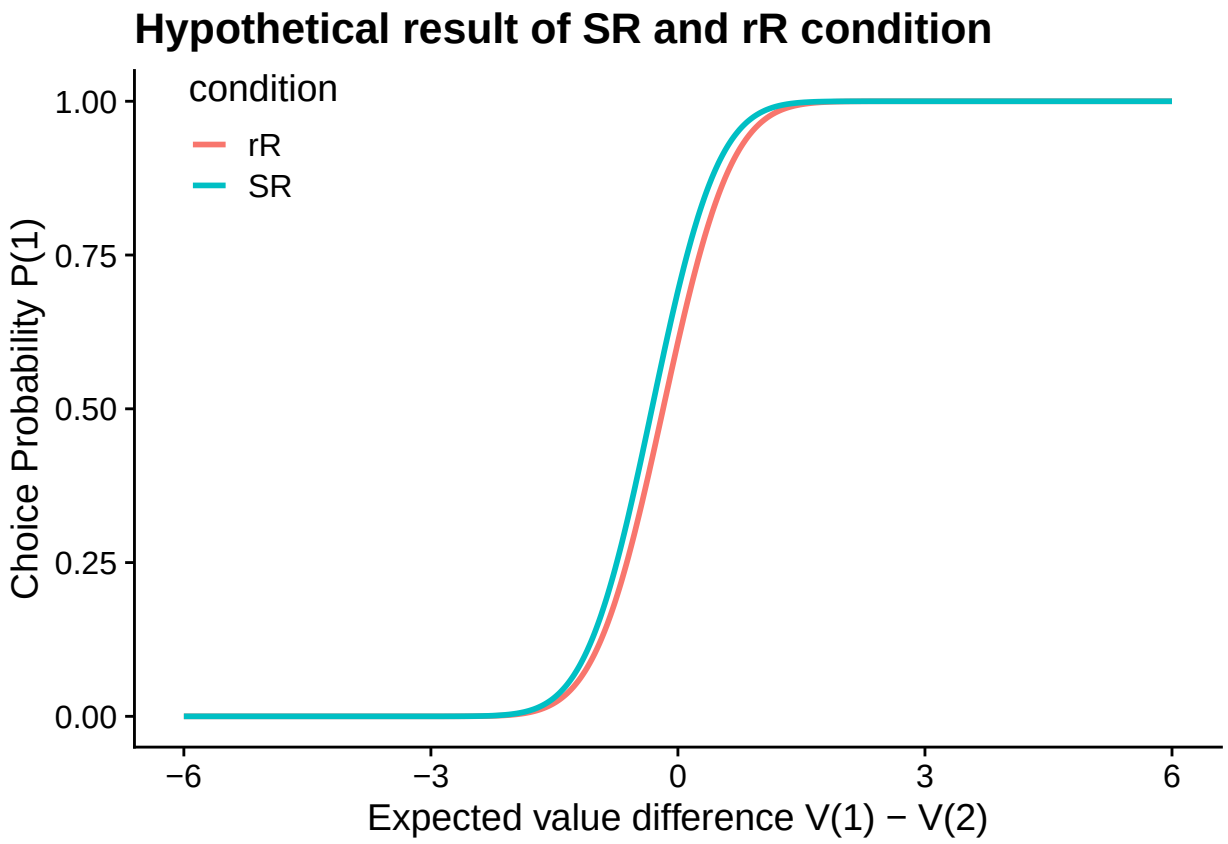
```
## [1] 1.88951
```

Those are not real TU, as the TU should be estimated during subjects' decision making. However, it is a little bit tricky to explain the setting. We may need to discuss it later. For now, I will use the real value of variance in the population in the following simulation.

The RU in rR condition is

```
## [1] 0.9534895
```

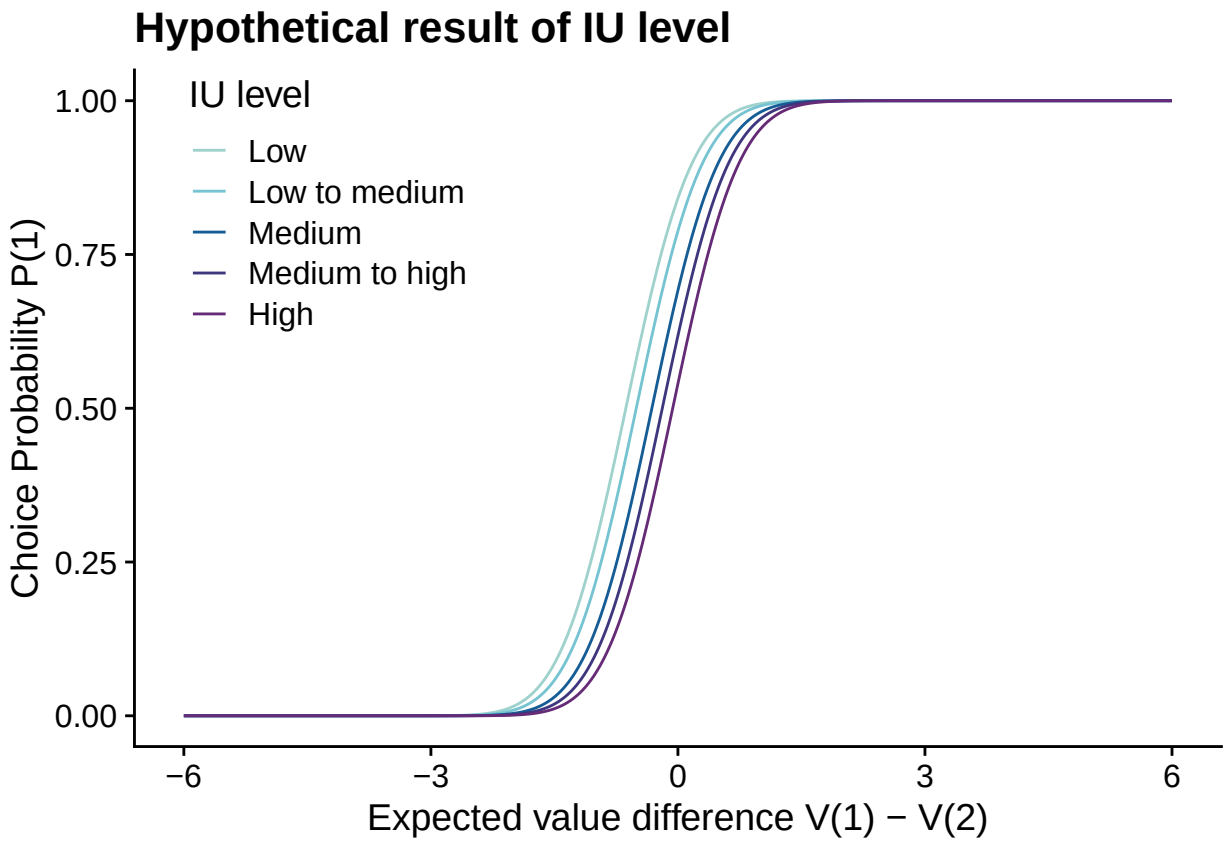
I setted same w3 for rR and SR. However, the slop is different due to the different TU.



Individual difference

Intolerance of Uncertaint (IU)

H1: High IU lead to less direct exploration

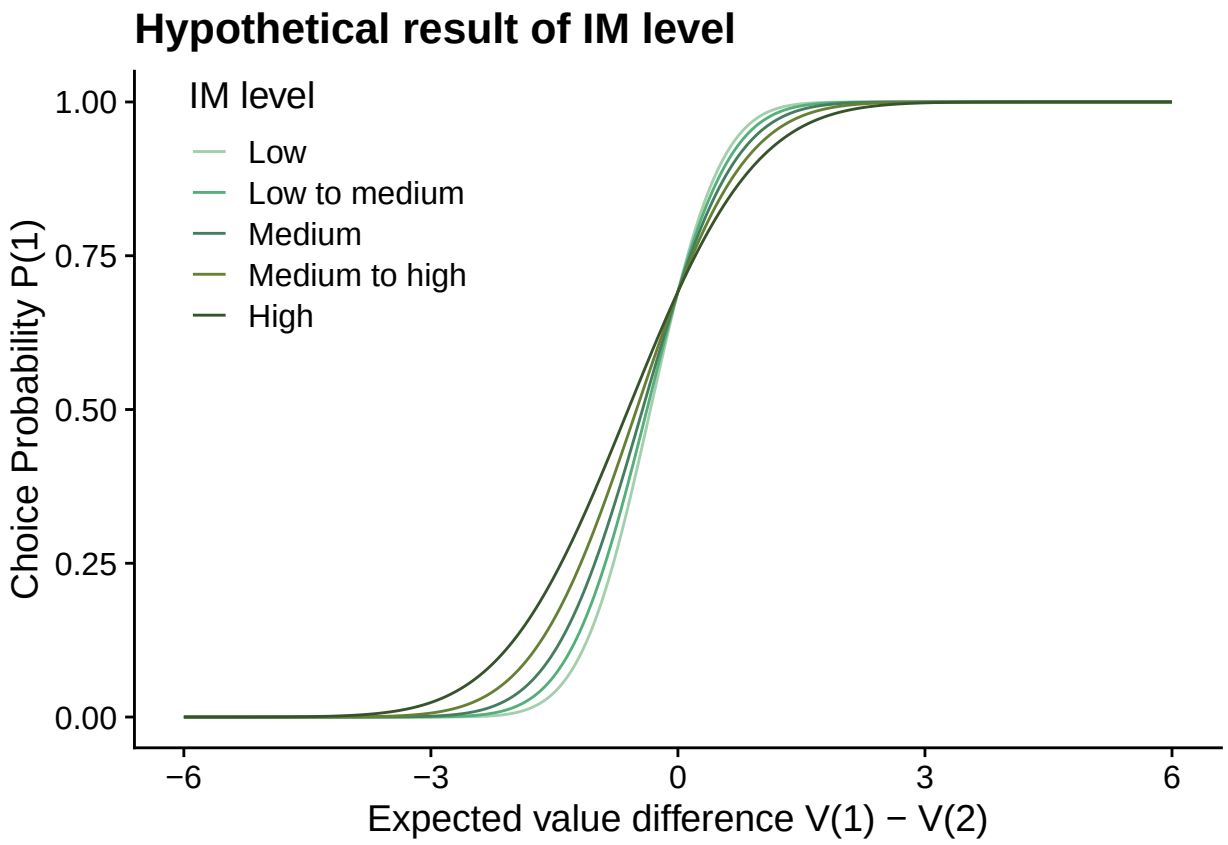


Impulsiveness (IM)

H2: High IM will lead to more random exploration

Notice: the sum of w_1 and w_3 is 2.

This two items should be and actually are negative correlated with each other (Fan et al., 2023).

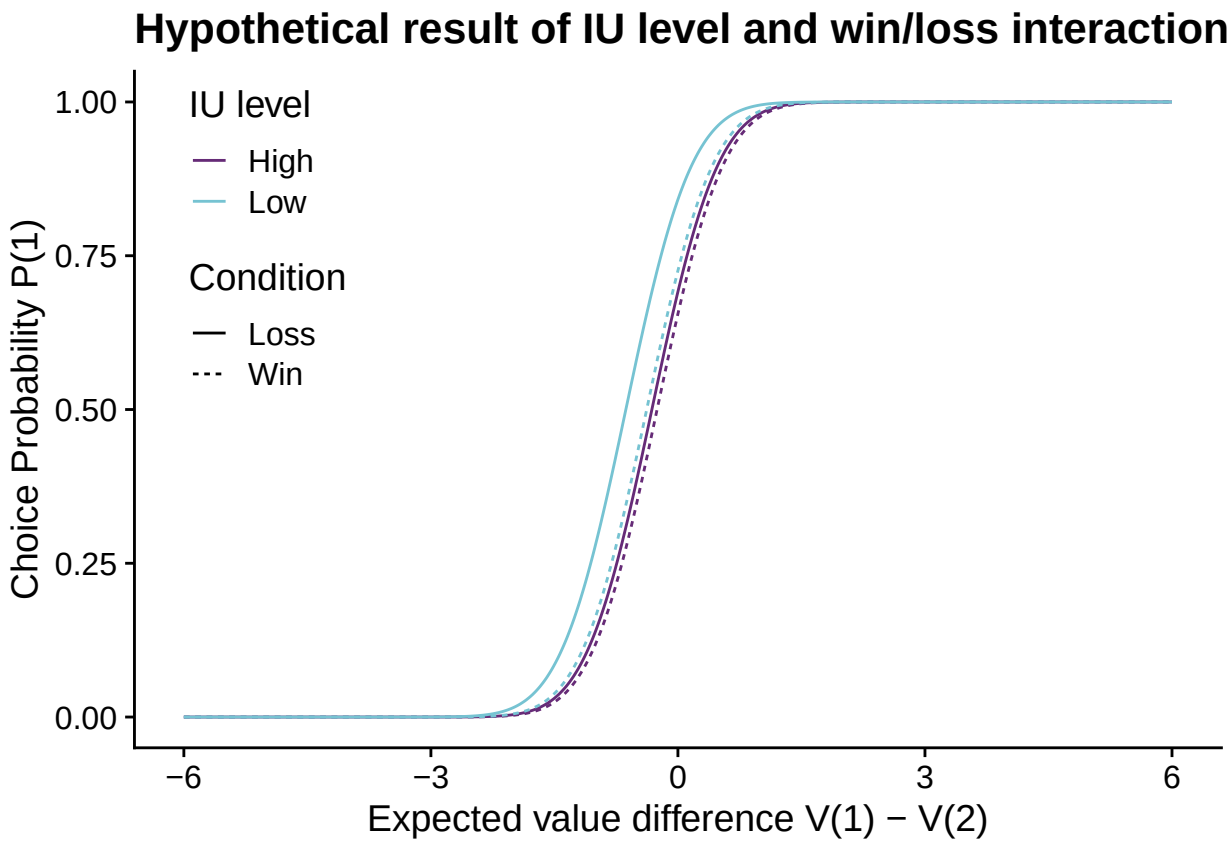


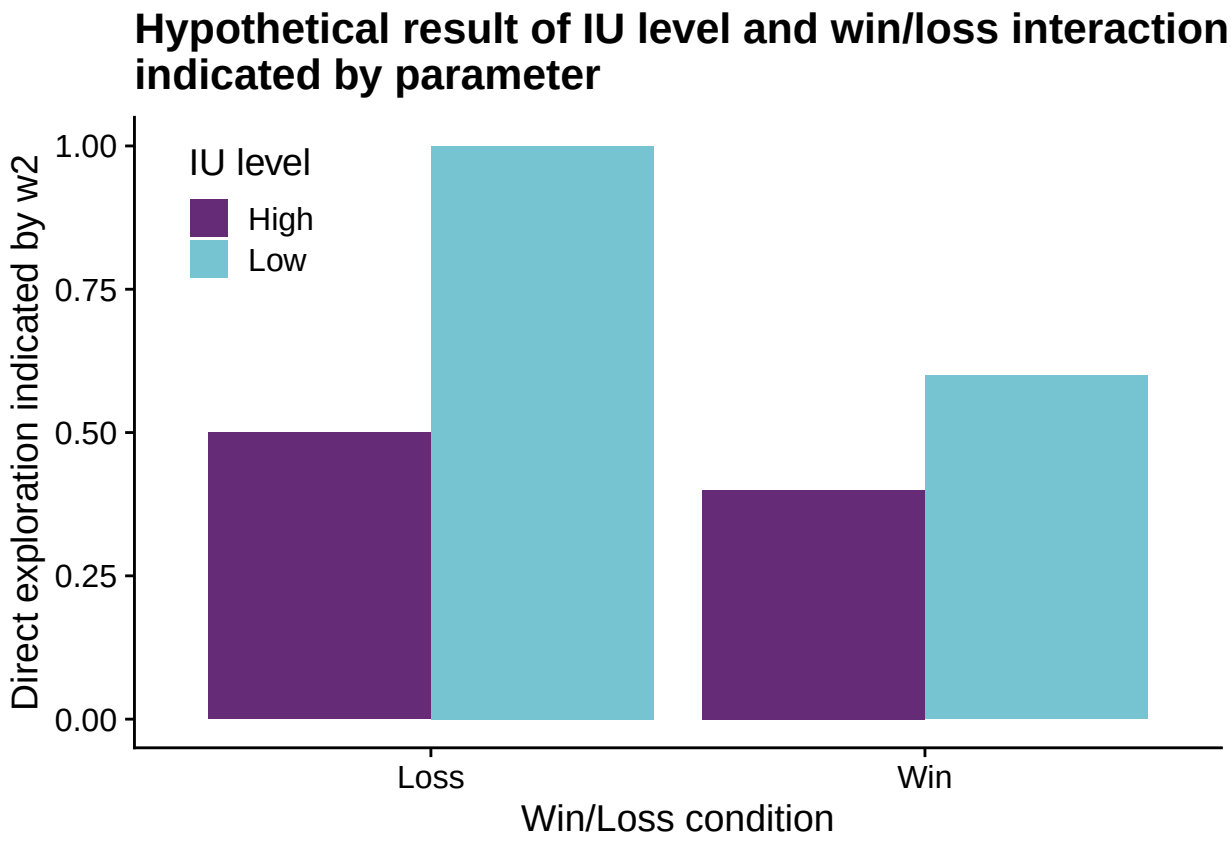
Interactions

IU x Win/Loss

H3: In loss condition, participates with lower IU will show a similar level of direct exploration compared to participates with higher IU. In win condition, participates with lower IU will show a greater increase in direct exploration compared to participates with higher IU.

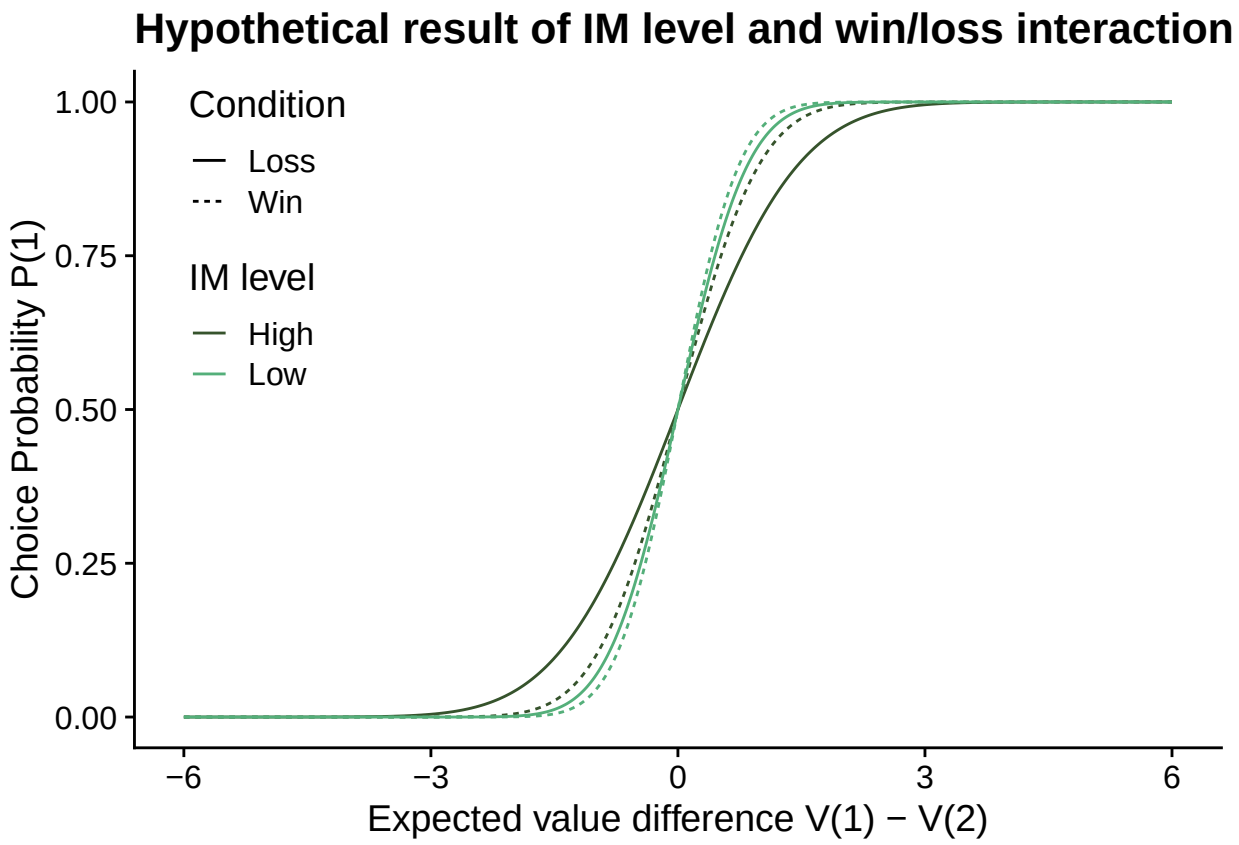
Although I lake of the evidence to support the hypothesis of framing effect, there are some evidence support the interaction between IU and win/loss condition. As the IU is supposed to show overestimation of the probability of negative events, the losing condition will lead to more direct exploration.

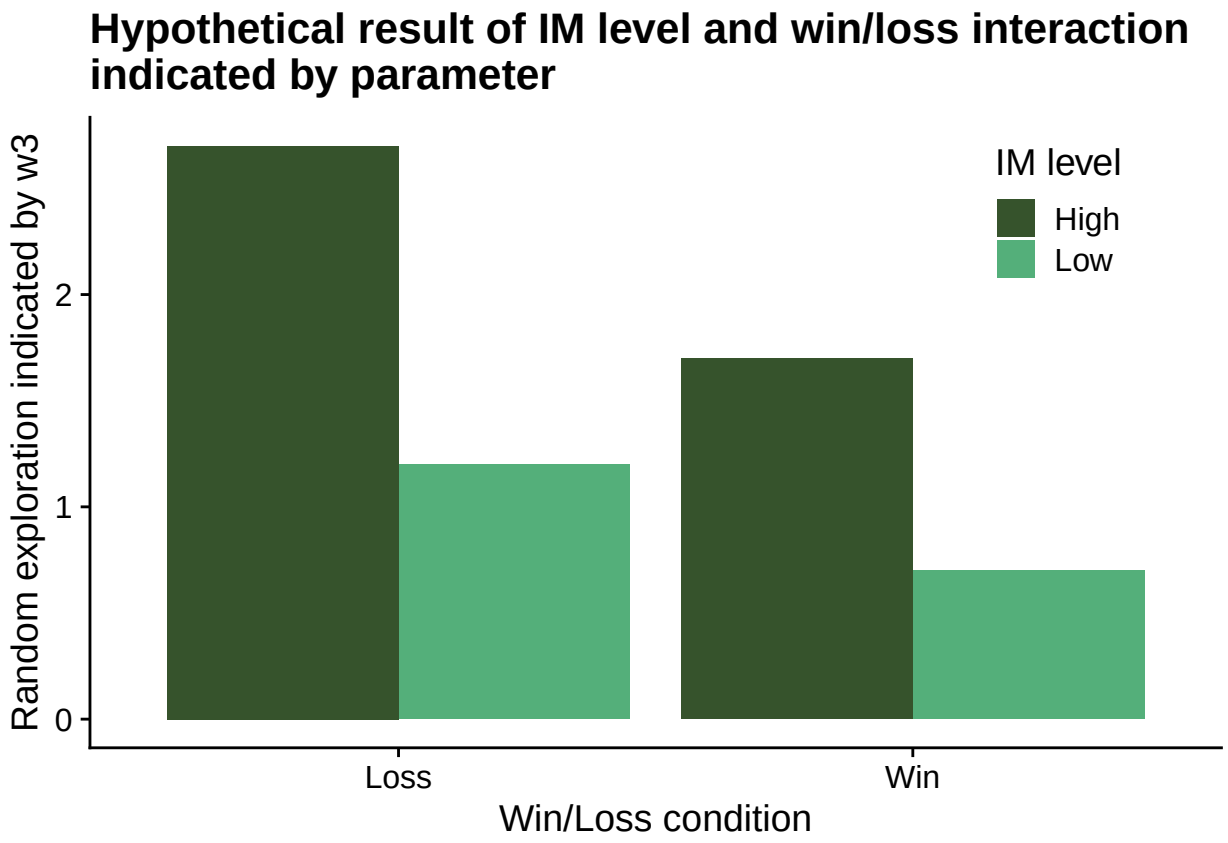

Hypothetical result of IU level and win/loss interaction
IU level
High
Low
Condition
Loss
Win
Choice Probability P(1)
1.00
0.75
0.50
0.25
0.00
−6
−3
0
3
6
Expected value difference V(1) − V(2)



IM x Win/Loss

H4: In win condition, participates with higher IM will show a small higher random exploration compared to participates with lower IM In loss condition, participates with higher IM will show a greater increase in random exploration compared to participates with lower IM.


Hypothetical result of IM level and win/loss interaction
Condition
Loss
Win
IM level
High
Low
1.00
0.75
0.50
0.25
0.00
Choice Probability P(1)
−6
−3
0
3
6
Expected value difference V(1) − V(2)


Hypothetical result of IM level and win/loss interaction indicated by parameter
Random exploration indicated by w3
0
1
2
Loss
Win
Win/Loss condition
IM level
High
Low