Decision and Foreknowledge

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Please interrupt

Philosophy and Decision Theory

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    - How to deliberate when your your decision requires you to think of the future as (metaphysically) settled

Decision and Foreknowledge

Under the Christmas tree are two gifts: one for you, one for your sister. You know that one contains a toy, the other a lump of coal, but you don't know which is which. You absent-mindedly place decorative stickers on the gifts. Before you place the reindeer sticker, the oracle says: the gift on which you'll put the reindeer sticker contains the toy.

Decision and Foreknowledge

Before a fair coin is flipped, you're offered a bet which pays out $150 if the coin lands heads, and costs $50. Before you decide whether to buy the bet, the oracle says: the coin will land on tails.

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    - Hitchcock and Stern: CDT must be modified to deal with these decisions
    - Spencer: the problematic kind of foreknowledge is impossible (and a good thing, too, since CDT would be doomed were it possible)

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    - ...not *new* problems for CDT [see the paper]

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  - Your intuitive judgements about instrumental value are not to be trusted when you have an 'illusion of control'
  - Don't confuse the probability that an outcome would result, were you to choose *A*, with the chance of that outcome, conditional on your choosing *A*
  - [for more lessons, see the paper]

Causal Decision Theory

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- You have a *credence* distribution, C, over subsets of $\mathcal{W}$.
- For each $w \in \mathcal{W}$, there is a degree to which you *desire* w, $\mathcal{D}(w)$

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$$would_A = would_A(row)(column)$$

Causal Decision Theory

- CDT: choose an option which maximises $\mathcal{U}$!

$$\mathcal{U}(A) \stackrel{\text{def}}{=} \sum_{w \in \mathcal{W}} \sum_{w^* \in \mathcal{W}} C(w) \cdot would_A(w)(w^*) \cdot \mathcal{D}(w^*)$$

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- EDT: choose an option which maximises $\mathcal{V}$!

$$\mathcal{V}(A) \stackrel{\text{def}}{=} C \,|\, A \cdot \mathcal{D}$$

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Causal Decision Theory

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Instrumental Value vs. News Value

NO DIFFERENCE

Before you are two boxes. You may either take the box on the left, 'Lefty', or the box on the right, 'Righty'. There is no difference between them. If it was predicted that you'd take Lefty, then there's $100 in both boxes. If it was predicted that you'd take Righty, then there's nothing in either box. (The predictions are very reliable.)

Instrumental Value vs. News Value

	Predicted Lefty	Predicted Righty
Take Lefty	\$100	\$0
Take Righty	\$100	\$0

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Instrumental Value vs. News Value

- Your rational credence that there's money in the boxes is under your control
- This can make it *feel* like you have control over whether there's money in the boxes.
- But this is an illusion—in fact, you have *no* control over whether there's money in the boxes.

Instrumental Value vs. News Value

- There is a strong intuition that you should take Lefty.

Instrumental Value vs. News Value

- There is a strong intuition that you should take Lefty.
- Causalists should not deny this—instead, they should diagnose this intuition as a consequence of the illusion of control

Instrumental Value vs. News Value

- To correct for the illusion of control, we may consider the decision from a better-informed, third-personal perspective.

Instrumental Value vs. News Value

- To correct for the illusion of control, we may consider the decision from a better-informed, third-personal perspective.
  - Suppose your friend is choosing, and you can see inside the boxes

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Instrumental Value vs. News Value

- new decision: in order to take Lefty, your friend must pay $90.

Instrumental Value vs. News Value

	Predicted Lefty	Predicted Righty
Take Lefty	$10	-$90
Take Righty	$100	$0

Instrumental Value vs. News Value

	Predicted Lefty	Predicted Righty
Take Lefty	\$10	-\$90
Take Righty	\$100	\$0

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Lesson #1

When you have control over your rational credence that ϕ, but you know for sure that you do not have control over whether ϕ, your intuitive judgements about instrumental value can lead you astray by conflating control over your epistemic state with control over the world.

In these cases, you should consider what instrumental value a choice has when viewed from a better informed, third-personal perspective.

Lesson #1

It is irrational to "counsel [a] policy of managing the news so as to get good news about matters which you have no control over" (Lewis, 1981, p. 5)

Managing News From the Future

Sticker

STICKER

Under the Christmas tree are two gifts: one for you, one for your sister. You know that one contains a toy, the other a lump of coal, but you don't know which is which. You absent-mindedly place decorative stickers on the gifts. Before you place the reindeer sticker, the oracle says: the gift on which you'll put the reindeer sticker contains the toy.

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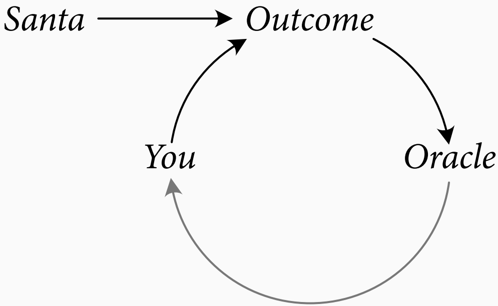

Sticker

	You gifted toy	Sister gifted toy
Sticker on yours	☺	☹
Sticker on sister’s	☺	☹

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- $\mathcal{H}(\textit{sticker on yours}) =$ ☺
- $\mathcal{H}(\textit{sticker on sister's}) =$ ☹

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  - Suppose your sister is choosing, and you know what's inside the gifts (your sister wants you to get the toy)

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Instrumental Value vs. News Value

- New decision: your sister has to pay in order to put the sticker on your gift

Sticker

	You get toy	Sister gets toy
Sticker on yours	😐	😱
Sticker on sister's	☺	☹

Sticker

	You get toy	Sister gets toy
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	You get toy	Sister gets toy
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Sticker on sister's	🙂	☹️

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In Sum

- Causalists should be happy to say that you have no instrumental reason to place the sticker on your gift

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- Causalists should be happy to say that you have no instrumental reason to place the sticker on your gift
    - There is a strong inclination to place the sticker on your own gift, but this should be diagnosed as the result of an agential illusion of control

Foreknowledge and Chance

Inadmissible Foreknowledge

- Foreknowledge is *inadmissible* if, when you have that information, you know for sure that the chance of ϕ is x, but your credence in ϕ should not be x.

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- Hall, Meacham, and Spencer: this is *impossible*.

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- Hall, Meacham, and Spencer: this is *impossible*.
  - One of Spencer's reasons: inadmissible foreknowledge would make trouble for CDT

Inadmissible Foreknowledge

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Before a fair coin is flipped, you're offered a bet which pays out \$150 if the coin lands heads, and costs \$50. Before you decide whether to buy the bet, the oracle says: the coin will land on tails.

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Before a fair coin is flipped, you're offered a bet which pays out \$150 if the coin lands heads, and costs \$50. Before you decide whether to buy the bet, the oracle says: the coin will land on tails.

- A natural thought: you know for sure that the chance of heads is 50%, but you should be less than 50% confident in heads

Inadmissible Foreknowledge

Inadmissible Foreknowledge
Before a fair coin is flipped, you're offered a bet which pays out \$150 if the coin lands heads, and costs \$50. Before you decide whether to buy the bet, the oracle says: the coin will land on tails.

- Spencer: because it's rational for you to be less than 50% confident in heads, you should expect the chance of heads to be less than 50%

Inadmissible Foreknowledge

	Heads	Tails
Buy the bet	\$100	-\$50
Don't buy the bet	\$0	\$0

Inadmissible Foreknowledge

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- Spencer: it's irrational to buy the bet

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- Spencer: it's irrational to buy the bet
- I agree

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- Spencer: if the chance of heads is 50%, then CDT says to buy the bet

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- Spencer: if the chance of heads is 50%, then CDT says to buy the bet
- I disagree

Inadmissible Foreknowledge

- Four possibilities:

Inadmissible Foreknowledge

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  - ▹ w_{HB} : coin lands *h*eads and you *b*et

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Inadmissible Foreknowledge

- Four possibilities:
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  - ▹ w_{HN} : coin lands *h*eads and you do *n*ot bet
  - ▹ w_{TB} : coin lands *t*ails and you *b*et
  - ▹ w_{TN} : coin lands *t*ails and you do *n*ot bet

Inadmissible Foreknowledge

- Your credences:

Inadmissible Foreknowledge

- Your credences:
  - $C(w_{HB}) = 0$
  - $C(w_{HN}) = 0$
  - $C(w_{TB}) = C(B)$
  - $C(w_{TN}) = C(N)$

Inadmissible Foreknowledge

- Your desires:

Inadmissible Foreknowledge

- Your desires:
  - ▹ $\mathcal{D}(w_{HB}) = 100$
  - ▹ $\mathcal{D}(w_{HN}) = 0$
  - ▹ $\mathcal{D}(w_{TB}) = -50$
  - ▹ $\mathcal{D}(w_{TN}) = 0$

Inadmissible Foreknowledge

- Spencer assumes $would_B$ is:

$$\begin{array}{c c} & \begin{array}{cccc} w_{HB} & w_{HN} & w_{TB} & w_{TN} \end{array} \\ \begin{array}{c} w_{HB} \\ w_{HN} \\ w_{TB} \\ w_{TN} \end{array} & \begin{bmatrix} 1/2 & 0 & 1/2 & 0 \\ 1/2 & 0 & 1/2 & 0 \\ 1/2 & 0 & 1/2 & 0 \\ 1/2 & 0 & 1/2 & 0 \end{bmatrix} \end{array}$$

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  - ▹ I.e., for any w, $would_B(w)(-) = Ch_w(- \mid B)$.

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▹ I.e., for any w, $would_B(w)(-) = Ch_w(- \mid B)$.

Inadmissible Foreknowledge

- Spencer assumes $would_N$ is:

$$\begin{array}{c c} & \begin{array}{cccc} w_{HB} & w_{HN} & w_{TB} & w_{TN} \end{array} \\ \begin{array}{c} w_{HB} \\ w_{HN} \\ w_{TB} \\ w_{TN} \end{array} & \begin{bmatrix} 0 & 1/2 & 0 & 1/2 \\ 0 & 1/2 & 0 & 1/2 \\ 0 & 1/2 & 0 & 1/2 \\ 0 & 1/2 & 0 & 1/2 \end{bmatrix} \end{array}$$

▹ I.e., for any w, $would_B(w)(-) = Ch_w(- \mid B)$.

Inadmissible Foreknowledge

- Then,

$$\mathcal{U}(B) = 25$$

and

$$\mathcal{U}(N) = 0$$

Inadmissible Foreknowledge

- Then,

$$\mathcal{U}(B) = 25$$

and

$$\mathcal{U}(N) = 0$$

▹ So CDT says to buy the bet

Inadmissible Foreknowledge

- The key assumption:

$$would_A(w)(-) = Ch_w(- \mid A)$$

Inadmissible Foreknowledge

- The key assumption:

$$would_A(w)(-) = Ch_w(- \mid A)$$

  - The assumption comes from Lewis (1980, 1981)

Strong Centering

- Rabinowicz: this conflicts with **Strong Centering**

Strong Centering

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Strong Centering
If *w* is a world at which you choose A, then were you to choose A at *w*, *w* is the world which would result.

$$\text{if } A \text{ is true at } w\text{, then } would_A(w)(w) = 100\%$$

Strong Centering

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Strong Centering

- Both Lewis and Stalnaker's semantics for counterfactuals vindicate the analogue of **Strong Centering**.
  - ▹ $A \wedge w \vdash A \mathrel{\Box\!\!\rightarrow} w$
  - ▹ Bridge principle:

$$w \models A \mathrel{\Box\!\!\rightarrow} C \iff \mathit{would}_A(w)(C) = 100\%$$

- But Lewis rejects **Strong Centering** in decision theory

Strong Centering

- I accept **Strong Centering**, but it won't help with this problem.

Strong Centering

- I accept **Strong Centering**, but it won't help with this problem.
- If we just impose **Strong Centering**, then, if you're confident that you'll not buy the bet, CDT says that you should buy it.

Strong Centering

$$would_B = \begin{array}{c} \\ w_{HB} \\ w_{HN} \\ w_{TB} \\ w_{TN} \end{array} \begin{array}{c} \begin{array}{cccc} w_{HB} & w_{HN} & w_{TB} & w_{TN} \end{array} \\ \begin{bmatrix} 1 & 0 & 0 & 0 \\ 1/2 & 0 & 1/2 & 0 \\ 0 & 0 & 1 & 0 \\ 1/2 & 0 & 1/2 & 0 \end{bmatrix} \end{array}$$

Strong Centering

$$
would_B = \begin{array}{c} \\ w_{HB} \\ w_{HN} \\ w_{TB} \\ w_{TN} \end{array}
\begin{array}{c} \begin{array}{cccc} w_{HB} & w_{HN} & w_{TB} & w_{TN} \end{array} \\
\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1/2 & 0 & 1/2 & 0 \\ 0 & 0 & 1 & 0 \\ 1/2 & 0 & 1/2 & 0 \end{bmatrix} \end{array}
$$

Strong Centering

$$would_B = \begin{array}{c c} & \begin{array}{cccc} w_{HB} & w_{HN} & w_{TB} & w_{TN} \end{array} \\ \begin{array}{c} w_{HB} \\ w_{HN} \\ w_{TB} \\ w_{TN} \end{array} & \begin{bmatrix} 1 & 0 & 0 & 0 \\ 1/2 & 0 & 1/2 & 0 \\ 0 & 0 & 1 & 0 \\ 1/2 & 0 & 1/2 & 0 \end{bmatrix} \end{array}$$

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$$

Strong Centering

	Heads	Tails
Buy the bet	\$100	-\$50
Don't buy the bet	\$0	\$0

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- CDT: if you think you won't bet, then you should

Strong Centering

	Heads	Tails
Buy the bet	\$100	-\$50
Don't buy the bet	\$0	\$0

- CDT: if you think you won't bet, then you should
- But this is still bad advice. The oracle's prophesy tells you that there's negative instrumental value in betting. So you shouldn't bet.

The 'Morgenbesser Conditional'

The ‘Morgenbesser Conditional’

- Suppose I offer you a bet on whether a flipped coin lands heads. You refuse the bet, and the coin lands heads.

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The ‘Morgenbesser Conditional’

- Suppose I offer you a bet on whether a flipped coin lands heads. You refuse the bet, and the coin lands heads.

(MC) “If you had taken the bet, you would have won”

- A general lesson: when we make subjunctive suppositions, we hold fixed things which are causally independent of the supposition—*even if* those things were a matter of chance at the time of the supposition.

Causal Independence

Causal Independence
If whether ϕ is causally independent of your choice, then ϕ would not change its truth-value, were you to choose any $A \in \mathcal{A}$.

$$would_A(w)(\phi) = \begin{cases} 1 & \text{if } \phi \text{ is true at } w \\ 0 & \text{if } \phi \text{ is false at } w \end{cases}$$

Causal Independence

Causal Independence implies that $would_B$ is:

$$
\begin{array}{c c}
 & \begin{array}{cccc} w_{HB} & w_{HN} & w_{TB} & w_{TN} \end{array} \\
\begin{array}{c} w_{HB} \\ w_{HN} \\ w_{TB} \\ w_{TN} \end{array} &
\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}
\end{array}
$$

Causal Independence

Causal Independence implies that $would_B$ is:

$$
\begin{array}{c|cccc}
 & w_{HB} & w_{HN} & w_{TB} & w_{TN} \\
\hline
\begin{matrix} w_{HB} \\ w_{HN} \\ w_{TB} \\ w_{TN} \end{matrix} & \multicolumn{4}{c}{\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}}
\end{array}
$$

Causal Independence

Causal Independence implies that $would_B$ is:

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Causal Independence

Causal Independence implies that $would_B$ is:

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- Then, $\mathcal{U}(B) = -50$, and $\mathcal{U}(N) = 0$

Inadmissible Foreknowledge

	Heads	*Tails*
Buy the bet	\$100	-\$50
Not buy the bet	\$0	\$0

Inadmissible Foreknowledge

	Heads	*Tails*
Buy the bet	\$100	-\$50
Not buy the bet	\$0	\$0

- If you were to buy the bet, this wouldn't make any difference to how the coin lands

Inadmissible Foreknowledge

	Heads	*Tails*
Buy the bet	\$100	-\$50
Not buy the bet	\$0	\$0

- If you were to buy the bet, this wouldn't make any difference to how the coin lands
- You know the coin lands tails

Inadmissible Foreknowledge

	Heads	*Tails*
Buy the bet	$100	-$50
Not buy the bet	$0	$0

- If you were to buy the bet, this wouldn't make any difference to how the coin lands
- You know the coin lands tails
- So you shouldn't buy the bet

Lesson #2

The probability that ϕ would result, were you to choose A, is not always just the chance of ϕ, conditional on your choosing A.

If you choose A and ϕ is true, then ϕ would be true, were you to choose A

And if ϕ is causally independent of your choice, then ϕ wouldn't change its truth-value, were you to choose A.

In Summation

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- Foreknowledge poses no new problems for CDT

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  - Decisions like STICKER are not problems for CDT, because causalists should think CDT gives the correct advice in those cases

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- Foreknowledge poses no new problems for CDT
  - Decisions like STICKER are not problems for CDT, because causalists should think CDT gives the correct advice in those cases
  - Decisions like INADMISSIBLE FOREKNOWLEDGE *are* problems, but they are problems for our theories of subjunctive supposition, not for CDT

In Summation

- These kinds of decisions teach us—or vividly illustrate for us—two important lessons about the instrumental value of our choices

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- These kinds of decisions teach us—or vividly illustrate for us—two important lessons about the instrumental value of our choices
  - Lesson #1: when you have control over *what to believe about* whether ϕ, but no control over whether ϕ, your intuitions about instrumental value can be distorted by an agential illusion of control

In Summation

- These kinds of decisions teach us—or vividly illustrate for us—two important lessons about the instrumental value of our choices
  - Lesson #2: the probability of an outcome would result, were you to choose A, is not always the *chance* of that outcome, conditional on A.

Fin

Extras

Extras

Choosing the Chances

CHOOSING THE CHANCES

There are two coins in front of you: a black one and a white one. You must choose which coin to flip. The black coin has a 2/3rds bias towards heads, and the white coin has a 2/3rds bias towards tails. If you flip the black coin, then you are betting on the outcome of the flip. If the black coin lands heads, then you will get $90; whereas, if the black coin lands tails, you will lose $90. Before you make your choice, the oracle informs you that the coin you flip will land on tails.

Choosing the Chances

$$would_B = \begin{array}{c c} & \begin{array}{cccc} w_{HB} & w_{HW} & w_{TB} & w_{TW} \end{array} \\ \begin{array}{c} w_{HB} \\ w_{HW} \\ w_{TB} \\ w_{TW} \end{array} & \begin{bmatrix} 1 & 0 & 0 & 0 \\ 2/3 & 0 & 1/3 & 0 \\ 0 & 0 & 1 & 0 \\ 2/3 & 0 & 1/3 & 0 \end{bmatrix} \end{array}$$

Choosing the Chances

$$would_W = \begin{array}{c c} & \begin{array}{cccc} w_{HB} & w_{HW} & w_{TB} & w_{TW} \end{array} \\ \begin{array}{c} w_{HB} \\ w_{HW} \\ w_{TB} \\ w_{TW} \end{array} & \left[\begin{array}{cccc} 0 & 1/3 & 0 & 2/3 \\ 0 & 1 & 0 & 0 \\ 0 & 1/3 & 0 & 2/3 \\ 0 & 0 & 0 & 1 \end{array}\right] \end{array}$$

Choosing the Chances

	Heads	Tails
Flip Black	\$90	-\$90
Flip White	\$0	\$0

Choosing the Chances

	Heads	Tails
Flip Black	\$90	-\$90
Flip White	\$0	\$0

Choosing the Chances

	Heads	Tails
Flip Black	\$90	-\$90
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Choosing the Chances

	Heads	Tails
Flip Black	\$90	-\$90
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Choosing the Chances

	Heads	Tails
Flip Black	\$90	-\$90
Flip White	\$0	\$0

- Given you flip black, $\mathcal{U}(black) = -90$

Choosing the Chances

	Heads	Tails
Flip Black	\$90	-\$90
Flip White	\$0	\$0

- Given you flip black, $\mathcal{U}(black) = -90$

Choosing the Chances

	Heads	Tails
Flip Black	$90	-$90
Flip White	$0	$0

- Given you flip black, $\mathcal{U}(black) = -90$

Choosing the Chances

	Heads	Tails
Flip Black	\$90	-\$90
Flip White	\$0	\$0

- Given you flip black, $\mathcal{U}(black) = -90$
- Given you flip white, $\mathcal{U}(black) = 30$

Lesson #3

When you have no control over your rational credence that ϕ, but you know for sure that you *do* have control over whether ϕ, your intuitive judgements about instrumental value can be led astray by conflating a lack of control over your *epistemic state* with a lack of control over *the world*.

In these cases, you should consider what instrumental value a choice has when viewed from a better informed, third-personal perspective.

Extras

Foreknown Irrationality

Foreknown Rationality

You may either choose a guaranteed \$1 or a guaranteed \$100. The oracle prophesies that you will take the \$100.

- What should you do?

Foreknown Rationality

You may either choose a guaranteed \$1 or a guaranteed \$100. The oracle prophesies that you will take the \$100.

- What should you do?
  - Take the \$100, clearly

Foreknown Irrationality

You may either choose a guaranteed \$1 or a guaranteed \$100. The oracle prophesies that you will take the \$1.

- What should you do?

Foreknown Irrationality

You may either choose a guaranteed \$1 or a guaranteed \$100. The oracle prophesies that you will take the \$1.

- What should you do?
  - Still, take the \$100

Foreknown Irrationality

- When you take the \$100, you will give yourself evidence that the oracle's prophesy is not accurate.

Foreknown Irrationality

- When you take the \$100, you will give yourself evidence that the oracle's prophesy is not accurate.
    - So: when choosing rationally, you should not take your foreknowledge for granted.

Lesson #4

In decisions made with foreknowledge, your own rational deliberation can provide you with evidence that the oracle's prophesy is false, misleading, or misremembered. So you shouldn't always take your foreknowledge for granted when deliberating about what to do.