A Defence of the Fine-Tuning Argument for the Multiverse

Overview

- The fine-tuned nature of our universe supports the Multiverse Hypothesis.
- Hacking objects that this argument commits the Inverse Gambler's Fallacy.
- I respond that a fallacy is committed only if our universe has no greater probability of existing on the Multiverse Hypothesis (relative to the Universe Hypothesis).

The Fine-Tuning Argument for the Multiverse

- Only a very narrow range of constants of the laws of nature result in life-supporting universes.

- Some universe has the right constants for life.

Therefore

- Many Universes with varying constants exist.

Not The Fine-Tuning Argument for the Multiverse

- Only a very narrow range of constants of the laws of nature result in life-supporting universes.

- *This* universe has the right constants for life.

Fallacious inference:

- Many Universes with varying constants exist.

Principle of Total Evidence

Suppose I feel sick today.

Specific evidence: I feel sick today.

Hypothesis: Alexei got drunk last night.

General evidence: Someone feels sick today.

The general evidence confirms the hypothesis.

The specific evidence does not confirm the hypothesis.

Moral - Always use the total evidence.

Summary and Preview

- Hacking claims that the specific evidence that this universe has the right constants for life does not support the Multiverse Hypothesis.
- Learning the specific evidence doesn't always undercut the shift to Many - only if the following condition holds:
- (C) The throw / universe that features in the specific evidence must have the same probability of existing in any (relevant) possible world.
- One way this is satisfied is if the throw / universe necessarily exists - the probability of it existing is 1. I will use this claim for simplicity.

Cards
All outcomes

Coin Result	Possible Outcomes	Probability
Heads (One)	A	2/8
	K	2/8
Tails (Many)	AA	1/8
	AK	1/8
	KA	1/8
	KK	1/8

Cards
E = There is at least one Ace

Coin Result	Possible Outcomes	Probability
Heads (One)	A	2/8
	-	-
Tails (Many)	AA	1/8
	AK	1/8
	KA	1/8
	-	-

Cards

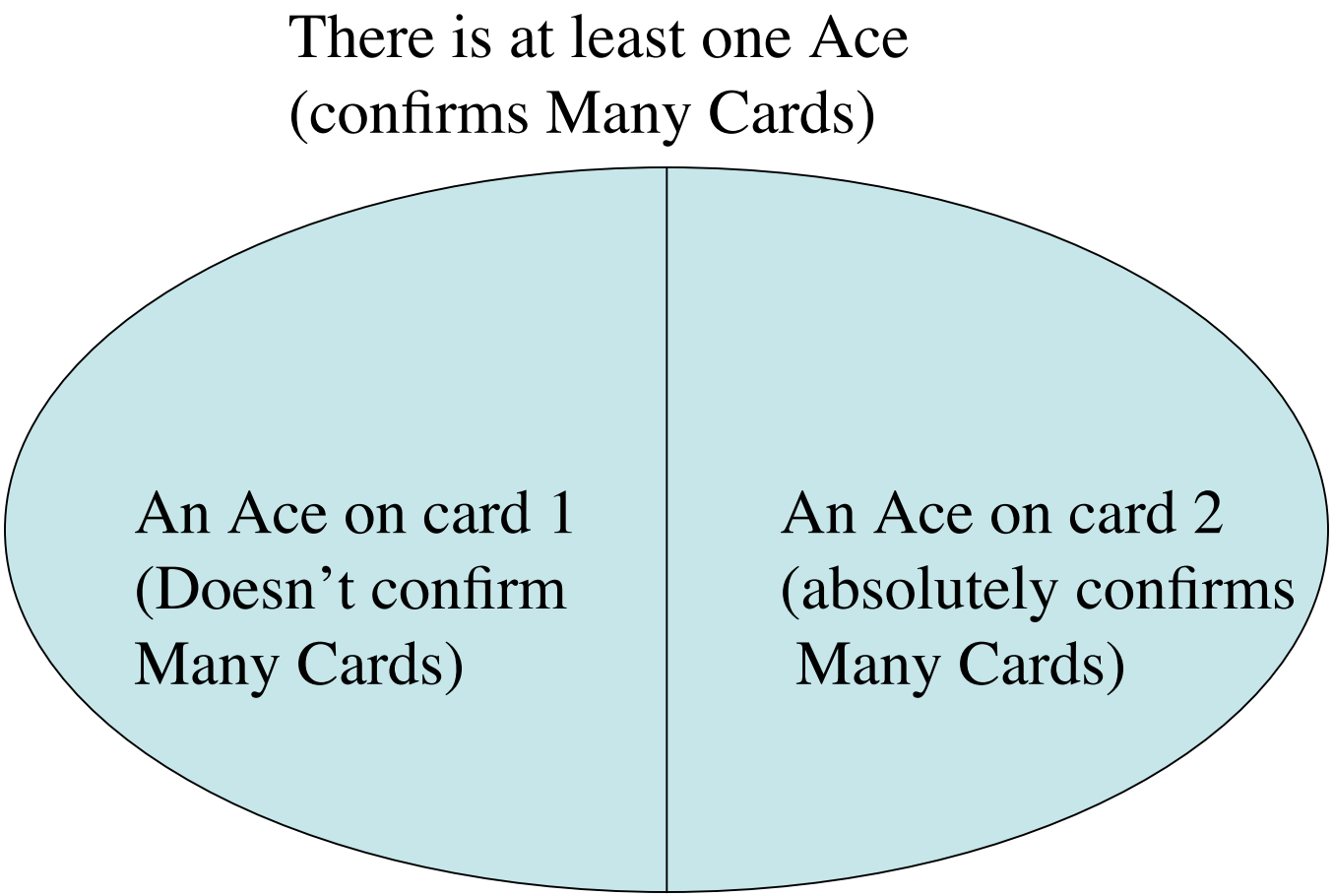
E = There is an Ace on the first card

Coin Result	Possible Outcomes	Probability
Heads (One)	A	2/8
	-	-
Tails (Many)	AA	1/8
	AK	1/8
	-	-
	-	-

Cards

E = There is an Ace on the second card

Coin Result	Possible Outcomes	Probability
Heads (One)	-	-
	-	-
Tails (Many)	-	-
	-	-
	KA	1/8
	-	-


There is at least one Ace
(confirms Many Cards)
An Ace on card 1
(Doesn’t confirm
Many Cards)
An Ace on card 2
(absolutely confirms
Many Cards)

Dice
All outcomes

	Possible Outcomes	Probability
One Throw	6	6/72
	Not	30/72
Many Throws	6, 6	1/72
	6, Not	5/72
	Not, 6	5/72
	Not, Not	25/72

Dice

E = At least one 6 has been thrown

	Possible Outcomes	Probability
One Throw	6	6/72
	-	-
Many Throws	6, 6	1/72
	6, Not	5/72
	Not, 6	5/72
	-	-

Dice

E = A 6 has been thrown on the first roll

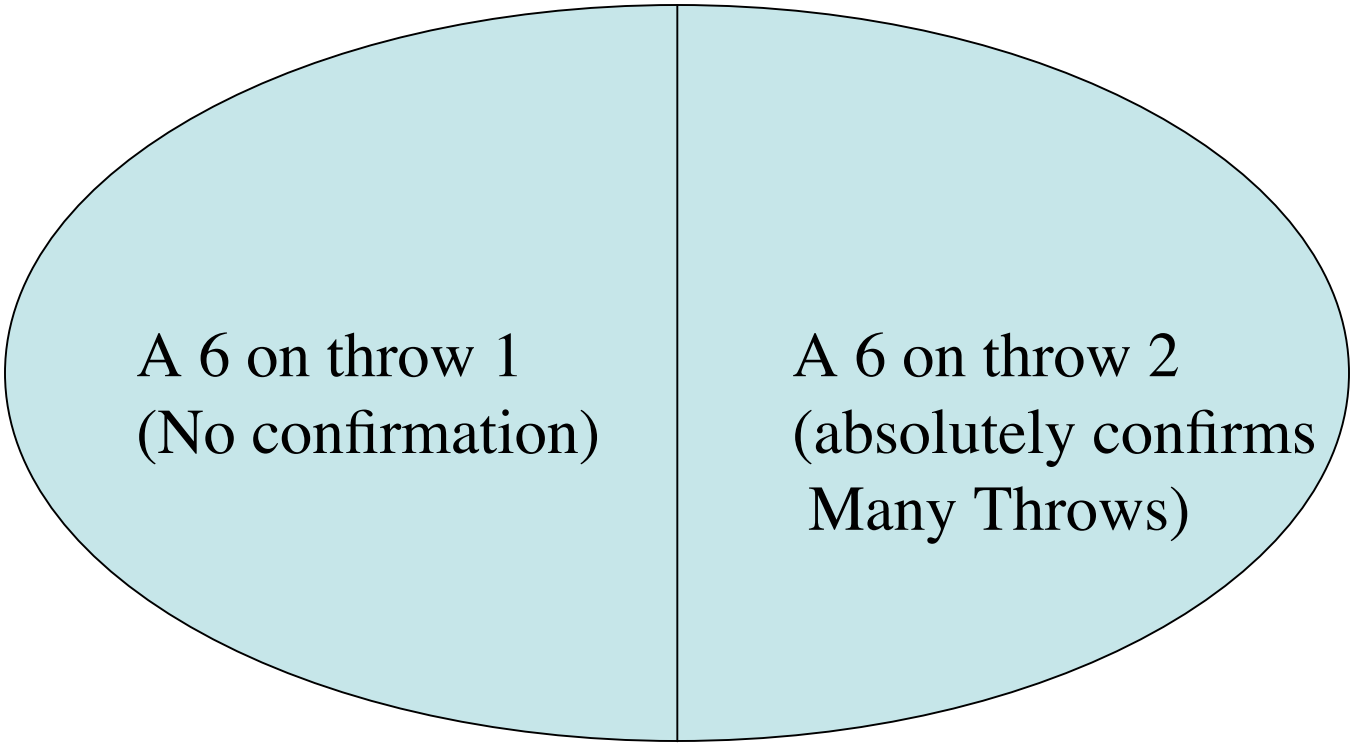
	Possible Outcomes	Probability
One Throw	6	6/72
	-	-
Many Throws	6, 6	1/72
	6, Not	5/72
	-	-
	-	-

Dice

E = A 6 has been thrown on the second roll

	Possible Outcomes	Probability
One Throw	-	-
	-	-
Many Throws	-	-
	-	-
	Not, 6	5/72
	-	-

A 6 is thrown at some point
(confirms Many Throws)



Cosmology
All outcomes

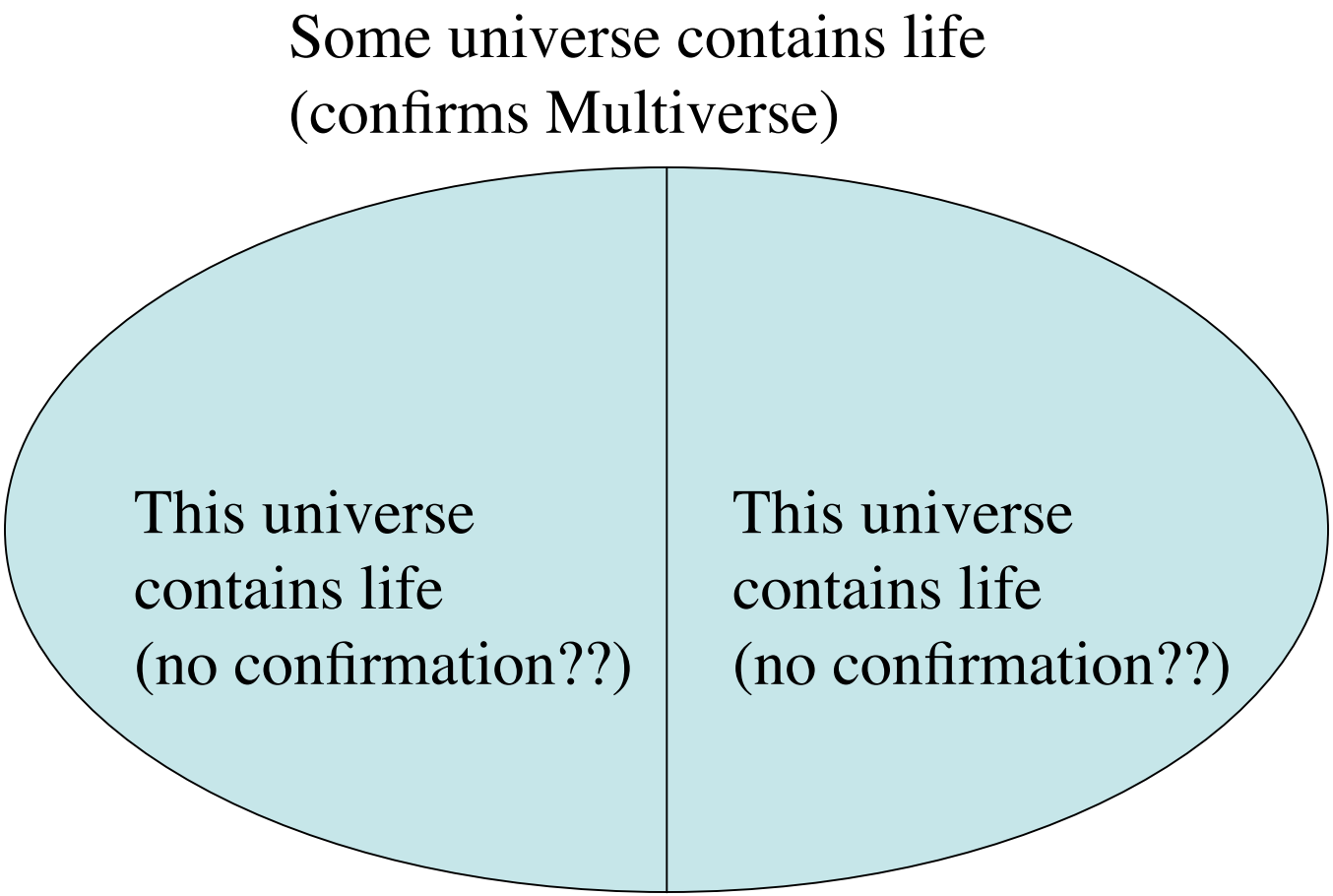
	Possible Outcomes	Probability
Universe	Life	6/72
	No Life	30/72
Multiverse	Life, Life	1/72
	Life, No Life	5/72
	No Life, Life	5/72
	No Life, No Life	25/72

Cosmology
E = Some universe contains life

	Possible Outcomes	Probability
Universe	Life	6/72
	-	-
Multiverse	Life, Life	1/72
	Life, No life	5/72
	No life, Life	5/72
	-	-

Cosmology
E = *This* universe contains life

	Possible Outcomes	Probability
Universe	Life	6/72
	-	-
Multiverse	Life, Life	1/72
	Life, No life	5/72
	No Life, Life	5/72
	-	-


Some universe contains life
(confirms Multiverse)
This universe
contains life
(no confirmation??)
This universe
contains life
(no confirmation??)

- If we discovered that there was life in universe 1, as opposed to universe 2, then the shift to the Multiverse would be undercut.
- But all we can discover is that ‘this’ universe contains life. There is no alternative evidence we could have discovered that would confirm the Multiverse

- Perhaps our universe necessarily exists. This would give Hacking the conclusion he wants. But we have no reason to think this true.
- In constrast, the more universes there are, the more chances there are for our universe to exist.
- As long as there is a greater chance of our universe existing given the Multiverse compared to the Universe, Life here supports the Multiverse.

- The normal device is to use some term to rigidly designate our universe.
- Let our universe be Alpha.
- If Alpha containing life doesn't confirm the Multiverse, then Beta's containing life must strongly confirm the Multiverse instead.
- But there is no such asymmetry between universes
- And even if there were, how do we know that we are in Aplha and not Beta?

Old Evidence Objection

- The evidence used in fine-tuning arguments is ‘Some / This universe has life’
- But this evidence is a priori. We cannot fail to know it. So it is old evidence.

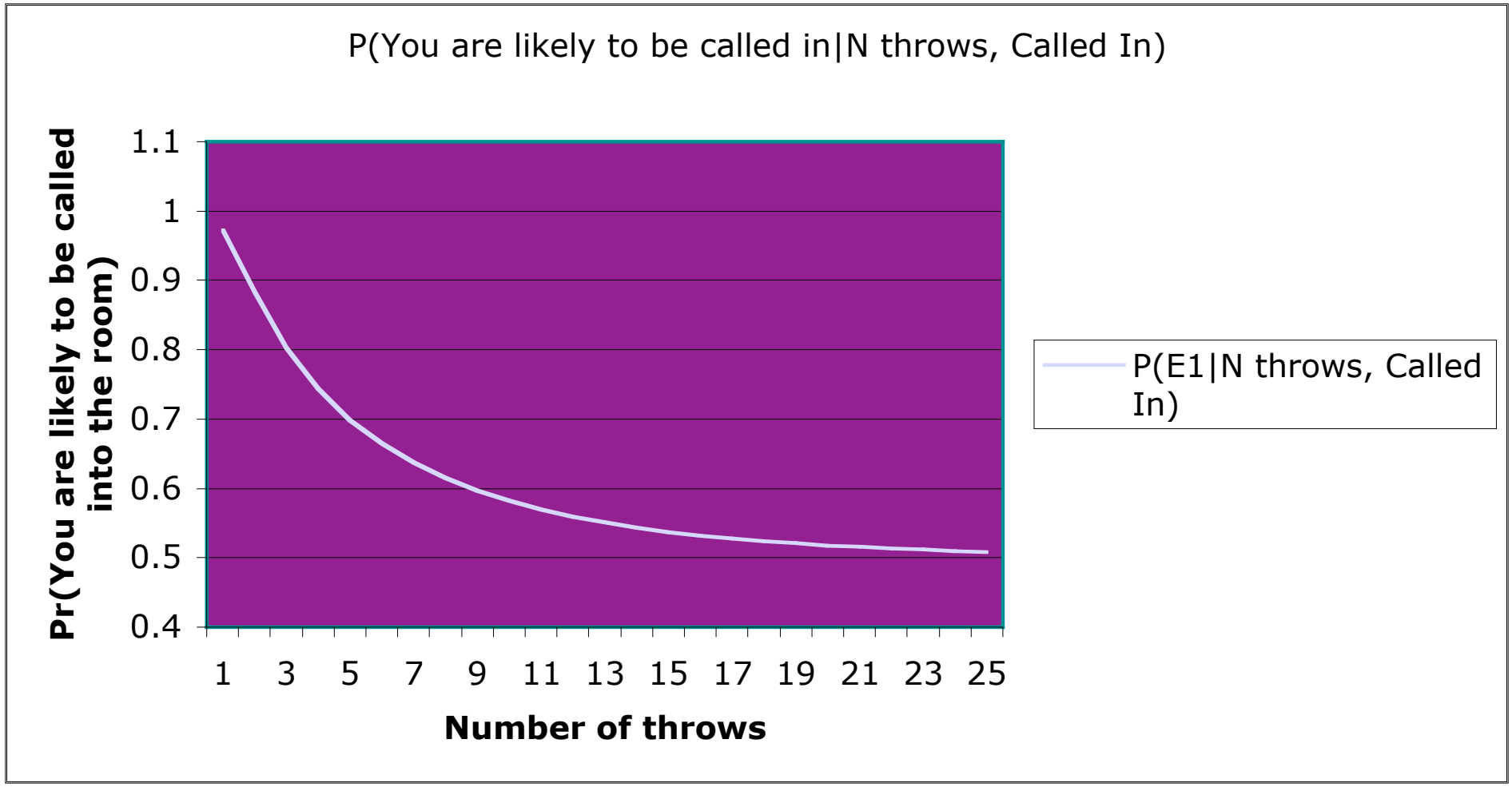
Old Evidence Response

- The evidence should never have been ‘Some / This universe has life’.
- The evidence should be:

E = Only a narrow range of constants of laws of nature allows life.

-E = A broad range of constants of laws of nature allow life.

(*) $P(E|MV) > P(E|UV)$


P(You are likely to be called in|N throws, Called In)
Pr(You are likely to be called into the room)
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
1 3 5 7 9 11 13 15 17 19 21 23 25
Number of throws
P(E1|N throws, Called In)

Conclusion

- The Inverse Gambler's Fallacy only works if the trial you found out about has the same probability of existing in all (relevant) possible worlds.
- This is not true of our universe
- The Old Evidence objection relies on the evidence being that some / this universe exists.
- The argument can be recast using the evidence that only a narrow range of constants support life.