Uncertainty and Climate Change

The fact remains that there is UNCERTAINTY surrounding the issue of climate change. We don’t know exactly how bad it will be for future generations if we continue emitting. Predictions range from fairly benign to catastrophic. We don’t even know FOR SURE that our emissions are the cause of climate change. There is a chance that climate change is just a part of the Earth’s natural climate cycle. So, what are our moral obligations with respect to climate change if we cannot be CERTAIN about these things?

1. How Not to Deal With Uncertainty: Broome suggests some ways that we should NOT respond to uncertainty.

(1) **Do nothing:** One approach to uncertainty is to do nothing. The intuition is that, “Before we act, let’s wait until all of the facts are in.” So, as long as we are not certain what the cause and effects of climate change are, we are not obligated to do anything about it.

   **Reply:** First, while it may make sense to refrain from acting in an uncertain situation when there is no RISK involved, it is irrational to do so if there is some likelihood that inaction will result in a catastrophe. Imagine that scientists say that there is some reason to think that a certain baby food MAY cause cancer, but that they will not know for sure until further evidence is gathered. It would be rational to stop feeding your baby this formula, EVEN IF it turned out NOT to cause cancer. Taking the time to gather enough evidence to be CERTAIN is too risky. “Better safe than sorry,” as we say.

   When risk (possible, but uncertain harm) is involved, planning ahead and acting to prevent it is rational. This is why we take out insurance policies or buy fire extinguishers. It is rational to buy a fire extinguisher EVEN IF it turns out that your house never catches fire. Similarly, Broome claims that it is rational to act now to mitigate climate change EVEN IF it turns out that it was not that great of a threat.

   Second, we will NEVER be CERTAIN about climate change. We NEVER make decisions based on complete certainty. When you attend class, you can’t be CERTAIN that anyone else will be there. When you go to your friend’s house to hang out, you can’t be CERTAIN that they are not waiting to murder you. But, this does not mean that it is irrational to act anyway. Absolute certainty about pretty much anything is unobtainable. I cannot even know with certainty that I am not a brain in a vat of chemicals right now, with electrodes and wires stuck into it, being stimulated to live my life in a computer simulation.
(2) **The Precautionary Principle**: UN conferences in 1972, 1982 and 1992 leading to commitments to the so-called *Precautionary Principle*:

> Activities which are likely to pose a significant risk to nature shall be preceded by an exhaustive examination; their proponents shall demonstrate that expected benefits outweigh potential damage to nature, and where potential adverse effects are not fully understood, the activities should not proceed (11b, World Charter of Nature, 1982).

In short, if there is ANY chance that an activity could produce harmful effects, then we should stop those activities until the effects are known. This suggestion is the complete opposite of the “Do Nothing” solution. Though, it calls of us to do nothing in a different way. The Precautionary Principle, it seems, would call for a complete halt of all emissions until we can fully understand their effects.

In short, the two proposals are:

- **Do Nothing**: Always keep doing what you’re doing until you discover for sure that it is harmful.
- **Precautionary Principle**: Never perform any action at all until you can discover for sure that it is beneficial.

**Reply**: Clearly, the second principle is too strong in the other direction. We take risks all the time, and this seems reasonable. After all, I cannot know FOR SURE that when I get into a car, I will not die in a traffic accident. For all I know, I might die on my next hike (falling off of a cliff), or during my next shower (slipping and falling), or eating my next (poisoned) meal. Surely we should not stop doing things just because there is SOME chance that doing so will be harmful rather than beneficial.

(3) **Act Based on What Will Probably Happen**: The fact that the above suggestions require certainty seems to be their downfall. So, perhaps we should just pursue things that are PROBABLY going to be beneficial, and avoid actions that are PROBABLY going to be harmful.

**Reply**: However, now it turns out that we should NOT buy insurance policies (car, medical, etc.) or fire extinguishers. After all, your house will “probably” not catch fire. And your car will “probably” not be demolished in an accident. And you will “probably” not have any expensive medical conditions any time soon. Is it irrational to purchase these things?
2. How To Deal With Uncertainty: Broome suggests the correct way to respond is with expected value theory.

**Expected Value Theory:** Under conditions of uncertainty, we should maximize the expectation of value.

The expected value of a decision is a matter of calculation, and we can use the following formula to determine it. Here is the formula for a decision with only 2 options:

$$E.V. = (\text{probability of option 1})(\text{what you stand to gain or lose if option 1 is true/occurs}) + (\text{probability of option 2})(\text{what you stand to gain or lose if option 2 is true/occurs})$$

Whether you know it or not, you perform this calculation easily all the time. Imagine that I told you, “Let’s play a game. I’ll flip a coin. You call ‘heads’ or ‘tails.’ If you guess right, you win $1. If you guess wrong, you give me $5. Would you play?” Probably not. It would be a bad idea to play this game. Why? Because the expected value of playing is negative. Betting on the coin is a bad bet.

Let’s calculate the expected value of playing this game:

$$E.V. = (0.5)(-$1) + (0.5)(-$5) = -$0.50 - $2.50 = -$2.00$$

The expected value of playing this game is $-2.00. The expected value of not playing this game is zero (since you neither gain nor lose anything). Broome’s suggestion is that the rational decision is always to perform whichever action has the greatest expected value—in this case, that means not playing the game.

Let’s use this formula to calculate whether or not it is rational to buy a fire extinguisher. The average fire extinguisher costs about $50. The probability of a house fire is about 0.28%, or 28 in 10,000. Let’s say that your house and all of your belongings are worth $100,000. Here is the expected value of buying a fire extinguisher:

$$E.V. \text{ (buy)} = (28/10,000)(-$50) + (9972/10,000)(-$50) = -$50$$

$$E.V. \text{ (don’t buy)} = (28/10,000)(-$100,000) + (9972/10,000)($0) = -$280$$

Note that what makes the expected value of not buying a fire extinguisher so costly is that you stand to lose a lot in a fire. A large number is still fairly large, even when multiplied by a relatively low probability.
However, if you don’t really own anything of any value, then buying a fire extinguisher would not be as good of a bet (and might even be a bad one).

Of course, money is not the only factor involved here. In reality, there would be a LOT of other costs related to a house fire. Here are some potential ones:

- Psychological damage of losing everything you own
- The inconvenience of being homeless and possession-less for a while
- The inconvenience of finding and buying all new stuff, new place to live, etc.
- The potential fire damage to OTHER people’s homes (e.g., if you live in an adjoining apartment)
- The cost and time to clean up the burned site and/or rebuild

And so on… Added up, the minimal cost of a fire extinguisher seems like a small price to pay to be protected against a great catastrophe. So, Broome says, it is rational to buy a fire extinguisher, or take out an insurance policy, even if the probability of the worst case scenario is low. This is due to the fact that, when what we stand to lose is SO great, this makes even LOW-probability risks have low expected values.

However, the Intergovernmental Panel on Climate Change (IPCC) has concluded that there is a 95% degree of certainty that climate change is human-caused, and that there is a 10 – 33% chance that global mean temperature will rise by more than 4°C (7.2°F) by the year 2100. The estimate of The World Bank is that this is 20% likely. In a 4°C warmer world, droughts, famine, heat waves, storms, and extinction would all become severe in many parts of the world, causing great loss of life. So, by the same reasoning as above, we should “buy a fire extinguisher” for planet Earth. That is, we ought to act to mitigate climate change—especially if we can do so with minimal cost to ourselves.

Objections: One important worry is that the “cost” of not mitigating climate change includes things like the loss of human lives, and animals, and forests, and so on—and most of these affected individuals (in the year 2100) have not even been born yet. Therefore, calculating the expected values does not seem very simple. What is the VALUE of the life of a human child that will be born in the year 2095, for instance?

The answer to this objection is not a simple one. But, we will spend much of this unit trying to answer the questions it raises.