The Equation of Life

An ironic title for a mishmash of nonrigorous quasimathematical philosophical drivel

Brent Ho

**Foreword**

In the spring of 2016, I went looking for employment.

On my resume, I wrote that I had “discovered the answer to life, the universe, and everything.”

I hadn’t, of course. I just thought that it would be amusing, and knew that it would make my resume stick out. It seemed to work[[1]](#footnote-1) - I got interviews, and everyone who interviewed me wanted to know. Unfortunately, all I could do was parrot the answer from Douglas Adam’s The Hitchhiker’s Guide to the Galaxy[[2]](#footnote-2). But it didn’t matter anymore - the line had fulfilled its purpose[[3]](#footnote-3). It had gotten people interested, and I eventually I also had gotten a job.

Hooray.

I still haven’t discovered this “answer”. In fact, I’ve come to believe that the question itself is flawed. But the title of this book has also served it’s purpose. You’re reading this right now.

Of course, you’re free to stop reading.

Interestingly enough, however, you haven’t yet.

**Outline**

After a number of caveats, disclaimers, and the like, we will start with stating the equation, which we will heretofore refer to as EQ. We will proceed to attempt to briefly explain the various parts of EQ - once for laymen and once for those already familiar with mathematical terminology.

Then, in typical mathematician fashion, we will spend try to figure out what we’ve actually created.[[4]](#footnote-4)

**Disclaimer**

Although this book is rather ostentatiously titled, it is not meant to provide any concrete or practical answers. Instead, it strives to offer an occasionally humorous and hopefully also occasionally interesting perspective on, well, I dunno actually.

There are ideally no prerequisites for reading this book. Equations will appear now and then but will all be subsequently be explained so that no familiarity with mathematical terminology is necessary. That being said, the equations do provide an astoundingly concise formulation of the ideas in this book - so we will not leave them out. [[5]](#footnote-5)

**The equation**

\text{action}(t) = \text{argmax}\_{a\in\mathcal{A}}\mathbb{E}\_{\mathbb{P}\_a(\Omega)}\int\_t^\infty\text{utility}(t',\omega) dt'ˋ(EQ)

# **Lay-ed Out[[6]](#footnote-6)**

Let’s go over each part separately.

We will make heavy use of placeholder functions “” to avoid writing incomplete sentences. Generally, “” will be the answer of the question of “what?”.

For example, if we were to introduce the concept of a “maximum”, we could say that “denotes the maximum”. But this begs the question: “the maximum of what?”

Thus, we introduce the concept of a “maximum” by saying that is the maximum value achieved by the function when evaluated on all of ’s possible inputs.

If all of this stuff about the presence of made no sense to you, don’t get incensed. It’s mostly just nonsense.

This denotes “the set of elements in the set that maximizes ”[[7]](#footnote-7). Let’s look at a couple of examples:

\[ a couple of graphs with max, argmax circled: one unlabeled, one labeled with -x^2 + 1, w/ multiple maxima (sin(x))as well as undefined maxima (x^2). No y-axis and x-axes\]

Defining $A$ as the “set of available actions”, this reduces to “find the action among all available actions that maximizes the following function ”, will be defined in the following.

Simple, no? Unfortunately not.

What is an action? How long does an action last? What actions are in fact available to us? Sadly, none of these questions have easy answers.

Actions, and the questions they entail, can cover a rather short time frame:

1. Should I get out of the way of this oncoming car?
2. Should I ask the waiter for the bill?
3. Should I drink coffee now so that I can poop before heading out on my hike, running the risk of having to leave before the coffee has induced pooping, or just head out without coffee, and run the risk of having to break up my hike to drop a wild poop? Or do I forego the coffee specifically because I enjoy pooping with a view?

Or a longer time frame:

1. Should I go to grad school?
2. Should I have children?
3. Should I start stretching to improve my ankle flexibility, and thus reduce my discomfort upon encountering squat poopers?

Actions are not even mutually exclusive, and can even be combined - all of the “short time frame” examples here can be combined with the “long time frame” examples.

And all actions constitute an infinity of possibility. Both literally and figuratively, every step that we take can be realized in an infinite number of ways. Supposing that the appraisal of every action takes a minimum amount of time, this would imply that the amount of time needed to evaluate this part of the equation would be infinite. But the amount of time on this earth that we have is finite. Hmm.

So how do we resolve all of these problems? Well, we don’t. We’ll use the power of semantics to wash away these inconveniences. We’ll:

1. define an “available action” to be an action that we’re aware is available to us.
2. include the actions of “looking for additional actions” and “evaluating actions” into our set of possible actions.
3. think of our maximization problem in vague and broad enough terms as to be able avoid the paralysis of choices and infinities. After all, there is so much uncertainty and lack of well-definedness in all directions that our chance of actually solving this equation with any degree of confidence is approximately 0 anyway.
4. avoid a definition of “action” in terms of scope/timeframe.
5. assume that we’ve solved all other problems with our formulation so far.

## **$\mathbb{E}\_\Omega(f)$**

This means “the expected value of the following under our prior estimation of the probability distribution $\Omega$, where $\Omega$ represents all relevant and possible states of the universe”.

### **\Omega**

What are these “relevant and possible states”?

When we flip a fair coin, we generally assume that there are only two possible results: heads or tails.

\[\Omega = {heads, tails}\]

But what if the coin lands on it’s side? We could revise \Omega to

\[\Omega = {heads, tails, side}\]

or

\[\Omega = {heads, tails, side, bird\_flies\_by\_and\_grabs\_in\_claws}\]

or

\[\Omega = {heads, tails, side, bird\_flies\_by\_and\_grabs\_in\_claws}, earthquake\_happens\_and\_coin\_falls\_into\_crevasse\]

…

For our consideration of life’s great mysteries, we consider in principle all possible states of the universe - an inconveniently infinite and incomprehensible set. But remember, we’re not trying to be particularly rigorous here.

Ignoring all information theoretic, epistemological, and quantum theoretical concerns aside, $\Omega$ encapsulates all possible states of the universe, past, present, and future. For us, it is in practice unknowable. It includes everything, no matter how unlikely. The chance that a friend checks into the same hostel and same room as you, 6 months after last seeing each other and on a different continent. The chance that a sinkhole opens up beneath your feet and swallows you whole. The chance that something on the other side of the world sets a chain of events in motion that lead to you finding this mythical “true love”.

### **Expectation**

Suppose (rather unrealistically) that we know $\Omega$. Not all elements of $\Omega$ are equally probable. We expect coins to end up either heads up or tails up, rather than on the side. We expect dice to stop moving with one number on top, although it is conceivable that they stop balanced precariously on a corner.

Mathematically, if $\Omega$ represents the various states/outcomes under consideration, then we can associate every element $\omega$ in $\Omega$ with a number, which we denote with $\mathbb{P}(\omega)$. $\mathbb{P}(\omega)$ can be interpreted as the “probability that $\omega$ is the true state. (F: we are ignoring some tricky details here with infinities and such) Then, we define $\mathbb{E}\_\Omega f$ to be the Lebesgue integral of the function $f$ under the distribution given by $\Omega$.

\[E(x) = \integral … = \sum (finite case) \omega P(\omega)\]

Perhaps that was not the most helpful of definitions. Let’s look at some examples:

1. A fair coin is flipped, and you are to be given 100$ if it lands on heads, and 0$ if it lands on tails. You expect $0.5 \* 100 + 0.5 \* 0 = 50$ dollars.
2. You roll two die and calculate the product of the two results. If you win this amount of dollars, then the amount that you should expect is (assuming that the die rolls are independent) 3.5^2 = 12.25.
3. You play the lottery and pay 10$ for a chance to win a million dollars. Five balls will be selected from a set of 64 numbered balls - if you guess which balls have been selected, you win. There are 7624512 different and equally likely possibilities (F: we choose from 64 without replacement, so 64C5). You thus have a 1/7624512 chance of winning and should expect your bank account to change by 10M/7624512 - 10 ~ -9.69 dollars.
4. You are considering becoming an artist and reckon that you will almost always end up with nothing, but that there’s a one in a million chance of “making it” and ending up with 5 million dollars. Your expected value is then 5 dollars. (Technically it’d be 5 dollars plus personal fulfillment + etc etc, but we’ll discuss this later)
5. (complicated example with poker, previous hands, etc)

Of course, we don’t have to be talking about only money. When I was in high school, I played a lot of tennis. I was relatively useless, but had a pretty strong first serve. Unfortunately, my second serve was not only very weak, but also very inconsistent, as my fear of missing would make me miss.

So I did the numbers. My chance of getting a first serve was around 70%, and I would win points around 80% of the time when the first serve went in. The second serve was around 50%, and I would win about 50% of the points. So my chance of winning each point was 0.7\*0.8 + 0.3\*0.5\*0.5 = 0.56 + 0.075 = 0.635. However, if I just hit first serves, I would win 0.7\*0.8 + 0.3\*0.7\*0.8 = 0.56 + 0.168 = 0.728. In expectation, just hitting first serves was better. So I just hit first serves, and won a lot more of my games. Still lost just as many games that I didn’t serve though.

### **Prior**

In practice, however, we not only do not know $\Omega$, we also don’t know the probability distribution on $\Omega$.

We are relatively sure that flipped coins will land back on the earth. But all kinds of events could occur to prevent this:

1. Stray wind gusts
2. Nearby exploding atomic bombs
3. Earthquakes and subsequent crevasses
4. etc.

We’d be hard pressed to accurately estimate the chances of all of these eventualities. After all, people are terrible at probabilities - just look at the existence of the slot machine industry.

At best, we can only guess, approximate, or estimate the probabilities of the universe. Technically, we “assume a prior distribution $\mathbb{P}$ over $\Omega$”.

This prior is informed by and influenced by our experiences in the world. We know from experience (F: or think that we know from experience, but we’ll get into this later) that tossed coins generally land with one side facing up, and not on their edges. We know that balls thrown up in the air generally fall back down to the ground.

Thus, we assume that tossed coins land with one side facing up with probability approaching 1. That balls land after being thrown.

As we live our life and collect experiences, we adjust. Our prior represents our understanding of the world. And this understanding of the world is constantly updated. Whether or not we are adjusting it to match the ground truth more accurately is difficult to say.

All assumptions, yes. But that’s all that life is, isn’t it? And at least now we’ve written it down.

## **$\integral\_t^\infinity f dt$**

This is an integral. In short, given a function f, we calculate the area between $f$ and the flat line $y=0$, starting at $t$ and extending to $\infinity$

(picture)

For example, let us take evaluate the function at intervals of $1$, and create boxes that approximate the area involved.

(picture)

Then as we take the widths of the intervals to be smaller and smaller, the calculated area will approach the true area.

(pictures)

This is the definition of “integral”.

This relatively simple concept is *the workhorse* of many branches of mathematics and science. It calculates returns on investments, the volumes of various shapes, electrical currents, and here - the goal of life.

## **utility(t)**

The concept of “utility” comes from economics. It is a placeholder to measure the relative desirability or undesirability for various outcomes. Things we want are said to give us “more utility”; things we want less give us less “utility”.

Sadly, our definition of “utility” will remain vague.

1. Different people presumably have different “utility functions”, though of course this cannot be proven without being able to experience life as somebody else - an exercise that, while it would undoubtably provide much utility to society as a whole, lies out of our current technological capabilities. After all, we have had to assume that other people exist at all.
2. While certain relationships between events can be postulated, it would be a far stretch to prescribe predetermined notions of scale. Death presumably provides less utility than life. Having more money and friends are generally always good things. But how can we compare them? How much money is an additional friend “worth”?
3. Utility is notoriously hard to measure. How much utility do I have now? How does it compare with my utility 10 seconds ago? 10 minutes ago? 10 years ago? Our perception of utility is distorted (F: this can be both good or bad, as we’ll see later) by our own mindset and what we *want* to be true. It’s hard to measure what you haven’t bothered to define.

## **$argmax\_\Script{A} \mathbb{E}\integral\_t^\infinity utility dt$**

Now, let’s put it all together.

***The goal of life is to find the action among all actions available to us that maximises our expectation of the total utility that we will experience from now until the end of time.***

And that’s it!

# **For the initiated**

At each time *t*, the goal of life is to find and execute

\argmax\_{a \in \script{A}}\mathbb{E}\integral\_t^\inf utility(t) dt\]

where:

* \script{A} is the set of available actions
* \mathbb{E} is the expectation over the probability space $\Omega$ given by all possible states of the universe. In particular, we take the prior to be our current model of the world.
* \integral\_t^inf utility(t) dt is the integral of “utility” from the current time until the end of the universe.

F: We could of course stick to conventional mathematic approaches and recast the problem as one of loss minimization instead of utility maximization. (F: \[min….\])But these should be equivalent (F: under certain assumptions (?) will we’ll nonrigorously assume to hold). And let’s try to be optimistic for a change.

While this equation is relatively unobjectionable, it can unfortunately never actually be put into practice for many reasons. Some of these reasons are:

* Lack of information about $\Omega$, and in particular the probability distribution of the universe.
* Calculation of the “optimal action” takes a nonzero amount of time, at which point the equation, and it’s solution, will necessarily be different.
* The possibility of multiple maxima

Furthermore, “utility” is poorly defined. One might even complain that this equation is useless - we are just shifting all unclearness about life’s biggest questions into one’s personal definition of “utility”. But this would be wrong - we are shifting the unclearness not only onto the definiiton of utility, but also onto the $\script{A}$ and $\Omega$ and $\mathbb{P}$. And an equation, while practical or wrong, can still be useful. In science, most models are at best approximations of reality, with assumptions to make the math prettier. And in data “science”, “all models are wrong, but some are useful”.

# **Effects of the equation**

## **First Principles**

I took a class on epistemology in college. Not because I was particularly interested in the study of knowledge, but rather because I was plagued by existential doubt. Do I exist? Do others exist? What does “exist” even mean?

I left the course much better equipped. Now I can talk about justified true beliefs. I can think about existential questions through the lens of the “brain in a vat” argument. I can talk about the KK principle and Williamson’s Anti-Luminosity Argument.

I left the course, however, with no answers to my questions. I could accept Descartes’ famous proposition “I think, therefore I am” (F: Or rather: “cogito ergo sum”, but this is not the kind of book where we quote sources in the source language without giving translations). Or rather, “something at this current timepoint exists”. But further steps to creating a model of the world (“I existed before”, “I will exist in the future”, “others exist”, “others think like I do”) struck me as unrigorous. I was majoring in math after all.

Serendipitously, the course was still a resounding success. I was no longer plagued by existential doubt. Not because I had seen proof of anything - but because I decided to stop looking for proofs. I no longer desired to argue the finer semantics of the words “know”, “is”, and “I”. I became a pragmatist.

As such, I chose to accept the model of the world that I see. I exist. You exist. The world exists. The past exists. The future will exist.

We have assumed the existence of the universe as we see and understand it. However, our formulation of “the great mystery” actually which does not depend on this assumption. Strictly speaking, what is “really true” doesn’t enter into our practical day-to-day calculations. What really matters is our prior expectation of the universe, which we generally based upon what “seems to be true”.

We could all very well be brains in vats, constantly being fed memories and experiences. Or perhaps only I am a brain in a vat, and you are all figments of my imagination.

This doesn’t change the solution of our optimization problem.

## **Religion and Belief**

Everything that we’ve said so far may seem to be very logical and perhaps non-religious. But that would be an incorrect reading.

As with the previous section, what matters is our own interpretation of likely future states of the universe, the utilty that we draw from these states, and the actions that we can take to bring about the states that are the most beneficial to us. Religion, belief systems, and our personal beliefs are in no way contradictory to this framework.

In particular, as with many things, our beliefs are baked into our expectation of future world states as well as our utility function. We believe that certain things will happen, or that certain things affect certain other things in a particular way - this is reflected in our prior distribution. We derive utility from going to our churches/places of worship, we enjoy being among a community of believers, we enjoy being among a community of unbelievers, we enjoy thinking that everything else is wrong - this is reflected in our utility.

In particular, under certain circumstances, belief in a particular set of credences can be a logical decision *in spite of evidence to the contrary*. As long as total expectation of utility is increased, willful self-deception is perfectly acceptable. As we will discuss later, we can (and should) even actively change our utility function to our benefit.

Belief and logic are not opposites(F: of course, concepts such as “heaven” and “hell”, as well as “eternal damnation” can cause inconvenient infinities to arise and break our calculations. We’ll choose to ignore this)

I’m not a believer in vacuous platitudes - as far as I can tell, there is no plan for us; everything doesn’t happen for a reason. But I allow that they could be true. And take these into account.

## **Deserve vs Expect**

Our definition of the goal of life is purely of a practical nature. What concerns us is the practical question “what action should we take to maximize our future utility?” Not the morally laden question of “what do I deserve?”

In fact, given the assumptions that we have taken, we “deserve” nothing. We are single individuals among billions of individuals, taking up a minuscule fraction (F seen as a fraction of area, but even more hilariously when taken as a percentage of volume) of an unremarkable planet revolving around an insignificant star in a rather pedestrian galaxy surrounded by nothingness of purely unfathomable proportions. Calling us “specks of dust” would be a ridiculous overstatement. Specks of dust can be seen.

Against this awe-inspiring scale, the notion of us “deserving” things from the universe is laughable. Ha ha. Ha. Ha.

Similar notions of “balance” and “everything happens for a reason” and other various platitudes are generally hogwash, unless a correcting mechanism can be shown to or be theorized to exist.(F: for example, if you lend somebody money, you do expect to be paid back, as there are various social and legal pressures endeavoring to restore your bank account “balance”.) If anything, the universe has only one plan for you: entropy.

## **But Still**

That being said, against all logic, we exist. We live (or at least think we do). And that’s something to be thankful for.

## **A Helping Hand**

Let’s take a moment to note that at every moment, an infinity of universe possibilities are snuffed out of existence and out of our calculations. As soon as an event occurs, all universe states in which that event does not occur are no longer possible.

Except to adjust our prior on the distribution of future universe states, we do not consider what should have happened. We do not consider what could have happened. We do not consider what our circumstances would have been if we were born rich (or for that matter born poor). We do not consider the situations of other people who are better off or worse off than us. We do not consider any notion of “justice” or “fairness.”

Of course, these accidents of chance can directly affect our utility. Rich people presumably have more than poor. The utility of others can factor in(F: in particular our friends and family members, but also that of people in general around the world). Our utility may be improved if we think that justice has been served.(F: with the exception of winning the lottery, as we would probably not be as happy if we think that we deserved it for some reason)

However, the array of possible states that the universe could have taken (but didn’t) does not affect the solution of our equation. We look at the world as it is; we play the hand that we have been dealt. What “should have happened”, “justice”, and “fairness” are irrelevant.

Perhaps it would have been nice if things had been different. That’s nice. But no longer useful information.(F: as mentioned before, consideration of the possibilities of the past is indeed important for our appraisal of the current situation. The point here is that we should not consider it other than that.)

## **Determinism**

One of the great quandaries of religion and philosophy is that of determinism. Is the universe and it’s evolution already pre-ordained? When I flip a coin, is it already predetermined not only whether it will land with heads or tails, but that I would decide to flip that particular coin at that particular moment, etc. etc? Is the universe like a giant clock that has already been wound up and set in motion, with the things that we see around us occuring merely the inevitable results of the universe’s initial condition? Are we in charge of our own destiny?

In our setup, this is a question of the true distribution of $\Omega$. In a deterministic universe, $\Omega$ really only consists of one element: the true past, present, and future of the universe. In a stochastic universe, $\Omega$ is a much larger set with a much less trivial function $\mathbb{P}$ on top of it.

Interestingly enough, our setup actually sidesteps the question of determinism entirely. We calculate the expectation using our observed/suspected $\Omega$ and assume a prior distribution $\mathbb{P}$ on top of it. The truth is actually irrelevant insofar as it affects our actions.

For example, let’s say that the entire universe is a toss of one coin. We have no idea how fair this coin is. In a deterministic world, the result of the coin toss is predermined - let’s call it heads. Then $\Omega = {H}$, $\mathbb{H} = 1$. In a stochastic world, the coin will land up heads with some probability $p$, so that $\Omega = {H,T}, \mathbb{P}(H) = p, \mathbb{P}(T) = 1-p$.

But in both cases, regardless of the truth, when we decide to predict if the coin toss is heads or tails, we will probably assume that the coin is fair, so that $\Omega = {H,T}$, $\mathbb{P}(H) =\mathbb{P}(T) = 0.5$. Or we can be more try-hard and assume a prior distribution $f$ on the fairness of the coin $p$ and have $\mathbb{P} = \integral f(p) p dp$.

This setup also justifies our assumption of the universe existing as we see and understand it. How we see and understand the universe is simply our prior.

## **Loss**

As mentioned before, we could formulate our problem as one of “loss minimization” instead of “utility maximization”. Briefly, events could provide us with “loss”, and our lives can be understood as if we’re threading our way a minefield of loss providing situations (jumping off of buildings, getting murdered, etc), trying to make life as unshitty as possible.

But as a practical matter, this is all just a matter of semantics - if we flip the signs of life we arrive at utility maximization, wherein we are looking for utility instead of looking to avoid loss.

Mathematically the same - but a much more comforting viewpoint.(F: in fact, how we view the world also affects our utility. And viewing life more optimistically would probably increases this utility).

## **Continuity**

Suppose that you are playing beer pong,(F: appendix on rules) and after a few rounds, there are 4 cups left. 3 are in a pyramid - the last one stands alone. Do you call island and go for the solo cup?(F: pun intended)

If you are very confident and only mildly inebriated, this may be a wise choice. There is a high chance that you will make it - your prior expectations tells you that when you aim for islands, you actually have a pretty good hitrate. Our utility from hitting a called island cup is more than double - not only does it count as two cups, we also get bragging rights.

Now suppose that you are much more than mildly inebriated, are playing outdoors, and it’s windy. Perhaps the sun has set, and earthquakes are imminent. Do you still go for the island? Most likely not - because while our utility function is the same(F: not strictly true, perhaps bragging rights would be much larger here due to the conditions, but we’ll assume not), our prior is less informative. There’s a much smaller chance that we’ll make it, and a higher chance of getting a cup at all if we aim for the pyramid.

Suppose that your childhood dream was to be a Supreme Court Justice - in your eyes, they are among the most important people in the United States, and due to their extended terms, perhaps the most important people in the United States. However, as you grow up, you realize that you wouldn’t enjoy being a lawyer/justice, and are just in it for the name and reputation. Supreme Court Justice spots open up rarely, and are not awarded on purely merit, but rather a mix of merit, politics, and other factors. You decide to do something else.

Both of these examples show how the incontinuity of our utility function as well as lack of information and confidence in our prior can affect our actions. Perhaps the integral of our utility would be globally maximized by a particular state of the universe. But as we know so little about what will actually happen, and because we are calculation in expectation, it is often better to pursue something safer.

Don’t go free-soloing. Sometimes very similar actions can have very different utilities.

## **The Observer Effect**

Often confused with the Heisenberg Uncertainty Principle, the Observer Effect encapsulates the idea that the very act of measurement can effect change on a quantity that we would like to observe. For example, measuring the pressure in a tire using standard measurement techniques changes the tire pressure itself. Burning or drowning an alleged witch to ascertain innocence generally results in expired non-witches.

The very act of evaluating potential actions is an action in and of itself.

Let’s consider the following situation. You turn a TV on (yes, a TV, though an analogous argument could be made for live streaming services and such). There are hundreds of channels available. You are unsure which channel you will like the best. So you flip through all of them, evaluating each channel as you go, perhaps even keeping a mental list of those currently in commercials for future checks. Finally, you find your favorite - and change the channel to watch it. And that program is now over. Sometimes life can be like this.

Sometimes very different actions can have very similar utilities. Let’s not overthink things.

## **Available Actions**

One could argue that we don’t even know what actions are available to us. It’s always possible that you would have won the lottery had you played. Or that you would have met the love of your life if you had just ate a different restaurant yesterday.

Being more new-age-y/hipster, we don’t even know what we’re capable of. We don’t know really know our limits. Uggh. Optimism.

Perhaps there are no actions available to us, as it’s inevitable that we’re about to be killed by a particularly violent and unexpected earthquake. Or a meteor. Or a wet noodle.

## **Actions**

Let’s discuss the concept of “action” a little more. Although not explicitly stated in the equation, our choice of action has drastic results on all parts of our equation. Which is why it comes first, of course.

Our actions have results. Or if they didn’t have “results”, they at least resulted in the passage of time, which is a result in and of itself. Deciding to flip a coin results in the extinction of almost all universe states in which you did not flip that coin (F: “almost”, as some exogenous factor could still result in you not flipping or deciding to not flip the coin, e.g. your inopportune death); deciding to go on a date with someone increases your chances of marrying that person; buying a ticket to Italy increases your chance of going to Italy. Our actions affect our expectation and prior, as well as the likely states of the universe and how it runs its course under our integral.

Furthermore, our actions affect our perception of utility. To some extent, we can choose how we respond to certain events. We can try to maximize our utility from events as they happen (F: this generally results in optimistic thinking and willful naivete, as long as this doesn’t hamper our decision making processes in the future), or we can believe the worst in people, and move throughout life hating everybody and collecting very little utility. This is an action in and of itself.

## **Death**

Let’s take a moment to consider the elephant in the room - the infinity at the upper limit of our integral.

According to the Equation, we would like to maximize the total utility that we should expect, from now until the end of time. Unfortunately (given our model of the world), we should not expect to live until the end of time. How do we include this in our hypothetical calculation? What is the utility of not being alive?

Timeframe is of course important here. People, for whatever reason, want to be alive for certain things - graduations/marriages of children, birth of more children/grandchildren, certain “milestones” in human civilization, tax reasons. As a result, the “utility of being alive” is a quantity that changes over time.

However, as we are integrating TO INFINITY, the length of our puny lives in comparison to the infinities provided by the universe quickly becomes irrelevant. Our names will not be written down and never forgotten. They will be forgotten - perhaps with the death of our friends, the death of our country, or the death of the human species - and the universe will march inexorably and uncaringly on.

Thus, we must shortly concern ourselves with the tail end (the right side) of our integral, or the second component of:

\[\integral\_t^\infinity (utility) = \integral\_t^{t’} utility(t) + \integral\_{t’}^\infinity utility(t) \]

where $t’$ is some time after our lives and, more importantly, our actions, become irrelevant.

Suppose that the idea of “not being alive” is unbearable to the point that nonexistence gives us a utility of $-\infinity$. Assuming that utility gained in the first part of the equation is finite, this would imply that any and all actions in $\script{A}$ have the same effect - they have no effect.

In particular, if nonexistence gives a utility of $C$, where $C$ is a number, then our equation becomes practically unsolvable.

More generally, $\integral\_{t’}^\infinity utility(t)$ being infinite makes our lives, and our choices, completely irrelevant.

We will thus assume that this second part is not infinite. Furthermore, we will assume that the utility gained at all time points of nonexistence is exactly 0. Why? Because it makes the math pretty. And because otherwise there’s no point in anything anymore. And that would make us feel sad.(F: note that this is not a mathematically sound argument by any stretch of the imagination).

## **Suicide**

In a similar vein, let’s discuss the idea of suicide. Given the assumption above, suicide is an action which replaces your utility, from now until the end of time, with 0.

As a result, suicide is a logical result of a realization that expectation of future utility is *less than 0*. A realization that *0* is a better result than what we could expect in the future.

Of course, this discussion is highly dependent on the scale of our utility. As mentioned elsewhere, the relative location of our utility function on the number line generally has no relation to the choices that we make. But our assumption of $0$ as the utility of non-existence anchors, in a way, our life choices.

Let’s look at our prior - this is our view of the world, how it will develop, and the utility that we should expect from various actions. Heuristically (F: and nonrigorously in the slightest), given our assumption of the existence of others and their motivations, we could base our prior on the actions and experiences of others (F: a kind of empirical bayes prior).

There are always people worse off than us. I poop into potable water on a daily basis, and have almost never had to worry about how to obtain sustenance. I have friends, family, and relative certainty in events in the near future. Billions of people don’t have this.

And these people are not committing suicide. Taking their assessments of their lives as the starting point for our prior, suicide seems like a inadvisable option.

Furthermore, we know that our information about the future is inaccurate. Suicide guarantees that we won’t experience the future. It doesn’t take advantage of continuity and expectations, but rather forces us to have a bad result.

## **dt**

I used to make models of financial markets, and one of the issues that I encountered was that of time. The markets that I modeled were generally static, with periods of relative action. As a result, a model to predict movement in the next $x$ milliseconds would generally predict no movement, or at best a small directional move.

As a result, our trades would underperform. In times of inactivity, when no limited actions were possible, we would do nothing. In times of activity, when we should be doing things, our model would not be aggressive enough, and we would continue doing nothing.

To fix this, we introduced the concept of “trade time”. For our models, time would pass as a function of traded quantities. If nothing was traded, then “time” would in effect stop. And when the market was active, “time” would continue.

The more mathematically astute of readers may have noticed that we are integrating over time. Essentially, we are giving all timepoints equal weight. Perhaps this would strike some as odd - some times may be more important than others. Utility in the near future may be more important than utility in the far future. Or the other way around. Perhaps we don’t mind suffering throughout the week if we can guarantee ourselves wonderful weekends. Or we’d like to sell our souls now, suffer, save money, and enjoy life afterwards.

Luckily for us, however, we have been very vague. In theory, all of these weights can be taken into account by adjusting our utility function. Instead of weighting a time period twice as much, we can just have our utility in that time doubled - the end result is the same.

## **Scale**

As we’ve seen, we can change our utility function to accommodate different parameterization of the input variables/states of the universe/actions. Now consider the following utility functions

\[picture with utility function over arbitrary input variables, then f(x) + c\]

In other words, our optimal actions are unaffected by scale(F: we’re ignoring the effects of death and stuff, which enforce certain scale rules, as well as scale adjustments that do in fact change our optimal course of action. But our utility is changed.

In short, it’s good to try to adjust our mindset to take utility out of the same situations.

## **Integrating Expectations**

The more astute among our readers may have perhaps noted that the expectation and integral in our equation are interchangeable.(F: given certain assumptions, which we will assume hold?)

\[matrix of numbers\]

As shown above, the sum of the numbers in the matrix is the same, whether or not we first add up rows or first add up columns.

Although this has no effect on our optimal actions that we should take, these two formulations offer two different approaches to viewing life.

\mathbb{E}\integral\_t^\infinity utility(t) dt: We are looking to maximize our expectation of our utility for the rest of eternity; we’re looking to find the action/actions that will most likely bring about the best lives for ourselves. This viewpoint lends itself to thinking about long-term planning, life objectives, etc.

\integral\_t^\infinity \mathbb{E} utility(t) dt: We are looking to maximize our expected utility in each time point for the rest of eternity. This viewpoint lends us see each moment as an opportunity to amass utility, to treasure every moment, no matter how mundane or unfortunate it may seem. After all, we’ll never get this moment back again.

## **Integral of Experiences**

Our formulation allows us to view life as the integral of experiences. The goal is not to maximize our utility at one point in time - it is to maximize the sum of our utility over the course of our lives.

I’ve spent lots of time rock climbing. I find it very fun. Not only because of the intrinsic joy in finding out solutions, exerting myself physically, and being part of a wonderful community - but because of the feeling of progress. Of becoming better, stronger, and a better climber.

People lay great weight on this feeling of progress. We all want to feel that we are working towards something, that there is a point towards everything. When people feel stuck at a job, unable to progress in promotions, pay, or other external measures of success, they console themselves with the thought that they are “learning.” Learning to become better at their job, to become a better employee, or to become a better person.

Success is often determined by our peers. Our measure of being good at something is when we can do something that many others can’t. We are strong at rock climbing when we can climb something that our peers cannot. We are better at work when we become better employees than our coworkers.

This is generally a counterproductive mindset. Although it can drive ourselves to be better, it can also drive ourselves to with that others do not succeed. To not share beta (F: “beta” is a word for rock climbing technique) that could help others; to not help our coworkers when they have problems. The end result can be worse - we fail to leverage our diverse competencies to achieve synergistic outcomes. (F: I had a business bullshit moment there).

Furthermore, life is unpredictable. I’ve introduced many people to rock climbing over the years. Some of them have progressed faster than me, which certainly did a number on my self-esteem and competitiveness. I’ve gotten injured, been out for a while, and have watched as my friends become stronger and stronger, while I slowly become worse. Quite depressing, really.

So I moved the goalposts. The idea is not to climb the hardest route possible, to climb routes that my peers cannot. It’s to amass the most joy out of climbing possible.(F: Interestingly enough, this also assuages my competitive feelings. My compatriots, by virtue of starting later, cannot be better than me on this metric, as long as I keep climbing myself) The point is to maximize the integral.

Under this metric of success, we are constantly making progress. We are constantly experiencing and amassing utility.

## **Decay**

Let’s talk about the future. In economics, returns in future time periods is often “discounted”. In essence, a monetary sum is worth more to us now than if we received it some time in the future. Why? Because if we had the money now, we could invest it so that it in the future, it would be worth more. Because the future is unpredictable, so that we’d rather have things now than hope for it later. Because we need it *now*. (F: Particularly relevant for food and stuff, and can explain all kinds of silly tricks and scams) A bird in the hand is worth two in the bush and all that.

All of these are relevant to our optimization of utility. So why don’t we have a discount factor?

It’s actually included in our expectation. The changeable and unpredictable future is intrinsically accounted for by the stochastic nature of our prior distribution. In general, we can’t “invest” our utility now to create more utility in the future. We can act to build up utility in future time periods, perhaps sacrificing some utility now for great things later. But we don’t need a discount factor for this.

And finally, as we’re not being rigorous, we can include whatever time effects into our utility function.

## **Uncertainty**

As emphasized many times already, the future is uncertain. In fact, the present and the past are also quite uncertain. And as we have just seen, this uncertainty can lead us to discount future happiness. A starving man will use money on food instead of education - he may even pick drugs over food. An inhabitant of a war torn/unstable country will not take out a long term business loan.

However, it may be good to point out that uncertainty in the future does not necessarily lower our expected utility gain. Uncertainty should not lead us to favor the status quo.

In particular, uncertainty pushes our estimations towards our prior. The pursuit of education, training, or other forms of “development” still tend to be positive EV, even though it’s hard to say what may happen later. Regardless of the result, the experience of doing things gives an intrinsic amount of utility itself.

## **Markov**

In mathematics, a stochastic (F: i.e. governed by chance. Even if we assume a deterministic universe, our approximation and lack of information leads us to generally view it as stochastic) process is said to satisfy the “Markov property” if the conditional probability of future states depends only upon the present states.

For example, suppose you are located on the number line, and at every time point you either take one step forwards or backwards, with equal probability. If at time $t$ you are currently located at $x$, then at time $t+1$ you have probability 0.5 of being at $x+1$, and probability 0.5 of being at $x-1$. How you got to point $x$ at time $t$ is irrelevant to the prediction of the future. This process is thus Markovian.

On the other hand, suppose that you move forward with probability $p = x \* 0.2$, where $x$ is the number of backwards steps in the last $5$ timesteps$. Then prediction of your location in $t+1$ is dependent not only on your position at time $t$, but also your position at times $t-1$, $t-2$, $t-3$, $t-4$, and $t-5$. This process is thus non-Markovian.

Let’s look at the Equation again. We are to optimize our actions in the present to maximize our expectation of future utility. In a way, life is a Markovian process.

This is not to say, of course, that we should disregard everything that happened in the past:

In general, the past affects our model of the universe. In other words, it affects our future actions through evaluation of the expectation $\mathbb{E}$.

When we are born, our model of the universe is generally quite poor. We don’t know what will happen if we eat colorful mushrooms or are bitten by colorful snakes. We don’t even know what mushrooms and snakes are. And our actions reflect this. As we learn about the world, however, our information generally improves. We know, or at least think we know, more about how the world works, as well as the effect of our actions the states of the universe. We learn that jumping off a cliff will negatively affect the probability that future states of the universe will include our existence. Our experience with the world changes our formulation of our prior.

Furthermore, our time in the world informs our approximation of our utility function. We learn what we like, and what we dislike. We learn that the consumption of poisonous mushrooms results in relatively low utility. We may find that activities like hiking, tasty food, and wine may tend to result in high utility. We learn what we like, and are thus better able to discover what our utility function actually is.

According to our formulation, however, it is only productive to agonize over the past and our past decisions insofar as this self-pity leads us to make better decisions in the present. In fact, wallowing in self-pity is an action that is generally detrimental to utility. To maximize future utility, we should dwell on the past to make better decisions in the future.

This is where all the tired cliches about seizing days and planting trees (F: “seize the day”, “the best time to plant a tree was 50 years ago, the second best time is now”) are somewhat correct. To be pedantic, we can’t change the past. We can’t go back in time and learn languages or musical instruments. But we can learn languages and musical instruments now.

## **Utility**

### **Definition**

Unfortunately, there’s not that much to really define here. Utility is something that we gain in good situations; we gain less of it in bad situations.

And that’s about all that we can say. How do we compare the utility of one situation to that of another situation? How does one person’s utility compare to another person’s utility? How well can this concept explain people’s actions as one of utility maximization? All unclear.

The concept of utility is one that we use to make the math nice, to try to explain people’s actions, perhaps even to give us an plausible sounding reason to make whatever bad decision we are about to make anyway.

### **Success**

What is success?

Externally, success is a metric that people try to assign to others to try to compare certain people to each other. It is a way for us to say that certain people are more successful than other people, that certain people are “better” than others. Common success metrics are money, titles, number of progeny, size of goat herd, etc. People combine these metrics somewhat arbitrarily and then make pronoucements like “Person X is more successful than Person Y”. Why? I suppose that these assessments somehow are contributing to their utility.

Quite silly, really.

Internally, we feel success when we are achieve something that we weren’t sure about, that we didn’t know that we could do. We feel proud of ourselves when we get validation of our individual effort, when we feel that we haven’t been wasting our time. It is something that we feel internally, that doesn’t need approval from outside sources. It is something that everyone can feel, regardless of their starting points in life. It is the feeling of acquiring utility over time.

Much less silly.

Success is maximizing your utility from each moment and more importantly, acting in a way to maximize your success from all of your moments.

You know your own utility function better than anyone else. A day spent at home organizing emails, mowing the grass, or even watching paint dry could be a more successful day to you than sitting on a beach in some tropical country, managing your day trades, or even giving a talk to the UN.

### **An Aside**

Let’s think about life in general. After it, what do you have? Nothing. What is the point? There is no point. What is your most important resource? Money? Posessions? Family members?

A concept popularized by John Green’s excellent book “The Fault in our Stars” is that of Marlow’s hierarchy of needs. (RESEARCH) Essentially, we need to be able to not die in order to worry about eating. And to eat in order to worry about property. And to have our needs in order to be plagued by existential despair.

The scale of our amassed utility is principally affected by both of the axes upon which is measured. We should attempt to maximize both.

\[picture\]

The length of our graph corresponds to time, arguably our most imporant resource. We increase our total utility here by increasing the time that we are alive and able to receive utility, and depending on your utility function and beliefs, the time in which our impact on the universe causes us to receive further utility. These correspond to the first two layers of this hierarchy.

The height of our graph is the utility that we gain from each moment. Here we need to try to raise this, through taking actions, changing our mindset around certain events, etc. We need to try to have “no zero days” here. If you decide to spend time dicking off, do it with a purpose. Don’t go around aimlessly being blown about.

### **Diversity**

There are some studies (DO RESEARCH) that show that “happiness” (however this is measured) is increased when we have a diversity of experiences. In other words, we appreciate food more when we weren’t able to eat. We appreciate our friends and family more if some of them die. Bad times increase our utility in good times.

To be honest, I’m not really sure how to take this into account. Knowing this, a logical course of action would be to find safe ways to have bad experiences, in order to increase our good experiences later.

But given the fickleness and unpredictability of life, I’m not sure if I’d really recommend this...

### **Empathy**

Let’s talk about other people. Interestingly, they do not show up in our proposed equation of life directly. In short, we care about others only insofar as they affect us and our own perception of utility.

This isn’t to say that we don’t care about others - on the contrary, other people actually figure very heavily in our own utility (F: whether this is genetic, cultural, or otherwise obtained, we don’t look at this for now). Unless we are malicious people (and we’re generally not), it’s good for us if it’s good for other people. We are happy if people we know achieve and receive good things. We’re even happy when people that we don’t know, that we’ll never meet, receive enough to eat.

Note here that we are not nice to other people here as a result of empathy, a identification with your fellow man, or any egalitarian/utilitarian concepts. We’re nice to people out of strategic reasons for our own self-interest (F: e.g. committing crimes has the side effect of introducing the danger of being caught, which is generally detrimental to utility), because it makes us feel warm and fuzzy inside, and because we have to live with our decisions afterwards.

### **Morality and Conscience**

There is something that is with us during our every waking and sleeping moment. Something that sees everything that we see. Something that judges all of our actions better than anything else. Something that gives us utility.

This thing is our moral compass. One cannot deny it, as it is part of ourselves. It defines our utility. It can empty our otherwise “great” victories, it can fulfill our little triumphs.

And this is not a bad thing.

I once matched with a girl on Tinder.

But really, I once matched with a girl on Tinder, and literally the second message that she wrote me (after “Hallo”) was “was ist dir wichtig im Leben?” (i.e. what’s important to you in life?). I was rather taken aback. I thought. And I eventually came up with an answer.(F: for those curious, I never actually got the opportunity to meet this person in person).

Moral happiness.

Happiness that is obtained in ways consistent with my moral principles. Happiness that I don’t get from being malicious to other people. Happiness that allows me to still sleep at night.

This is because immoral happiness is no true happiness - my utility is not optimized here. Though I may be temporarily happy, my conscience will gnaw at me until the end of time, reducing the total utility that I’ve obtained until the end result is always negative.

As a result, I’m ok with “losing” as long as I’m “winning” in the utility collection game. For example, I used to work in finance, on a trading desk that (through external market forces, natural trade decay, or of course just our own incompetence) seemed to be headed the wrong way. I considered trying to play some political games to maneuver myself onto a different trade. I could most probably have done it. But I decided not to - I felt that I would have been betraying my coworkers, who had fought with me and for me in the last years. They remained committed. So I committed to stay with the desk.

One day, we all got let go.

And that’s OK. I’m happy with the result.(F: I was privileged to go down with the ship, of course, because I had an amount of savings and would not have gone hungry without the job. Survival, at times, can take precedence, as it ensures that a future exists at all.)

### **Morality and Others**

We are the best judges of our own utility functions and our own moral compasses. We are terrible judges of the utility functions of others.

As a result, let’s not be too quick to judge the actions of other people. We don’t know what makes them tick. We don’t know what their pursuing in life, what constraints they have, what hand they’ve been dealt. It’s easy to look at people and judge them for being dumb, incompetent, or malicious. But it likely all makes sense in their heads. People are great at rationalizing.

It’s very easy to say “I would never do that terrible thing that that person is doing”, but it’s much harder to be right while saying this. Often, in exactly the same situation, we’d do exactly the same thing. Anybody who thinks that stranded people starving to death don’t look at their dead (or alive) companions and consider eating them is likely delusional about their own ability to fight their own survival instincts.

And for our life to be better, we’d like for others to act in ways that our unfathomable/illogical to us. I wouldn’t devote my entire life to ramen. But I do quite enjoy that there are people that do, and that are willing to sell me their delicious ramen bowls.

We’re saying all of this out of fairness, of course. And also because looking at other people more positively is good for our own utility.

### **Mindset**

Let’s consider the act of buying lottery tickets - by definition, you should expect to lose money (F: except for corner cases, (e.g. prize money has gone unclaimed enough so that buying a ticket now is positive ev.). But people still buy them.

Why? Many people view the lottery as a “stupidity tax” - it is a sign that people are unable to properly calculate probabilities, expectations, and make rational decisions. It’s a sign of irrationality and impulsiveness. After all, you’re just throwing money away.

Let’s consider the act of buying ice cream from an ice cream parlor. There’s probably a supermarket nearby where you can also buy ice cream. You’re just throwing money away.

One might object and say that the ice cream parlor has better ice cream. Let’s consider the act of going to a bar. Unless the bar offers some kind of special beer or microbrews, you could literally buy the same beer from the supermarket for a fraction of the price (F: Of course, any two nonzero numbers $a$ and $b$ are fractions of each other. Here, we mean that this fraction is significantly less than $1$.). You’re just throwing money away.

Of course, you’re not just throwing money away. You’re losing money for a reason. At the ice cream parlor, you are paying for convenience - you want the ice cream now. At the bar, you are paying for the atmosphere, the location, and the ability to mix and match beers. In a coffee shop, you are generally paying for a comfy chair, wifi, and hours to sit and “work” on your startup or “study” - the coffee is essentially free.

It’s entirely possible that many, perhaps even most, of the people that buy lottery tickets are impulsive, unintelligent and/or irrational. But this doesn’t mean that it’s a bad decision. You’re not only buying a chance (however small) of being extremely wealthy. You’re also buying hope - you fantasize about what you would do with the money, all the wonderful things that you would do. You’re buying a distraction from your current (perhaps shitty) life. You’re buying utility - just like when you buy ice cream, go to a bar, or sit in a cafe.

The point here is not that we should all go and buy lottery tickets. The point is that our utility is not just monetary - it is affected by our mindset. In fact, one could even argue that mindset is more important, although this would involve comparing numbers of undefined scales.

Suppose that you’re bartering for a good. You bargain and bargain, and eventually settle on a price, pay, and go on your merry way. Are you happy with your purchase? Or are you frustrated because you think that you got ripped off, could have gotten a lower price, or something? Which is better for your utility?

It’s been my experience that thinking that other people are evil is detrimental to your own utility, and that furthermore, people are actually surprisingly rarely malicious or “out to get you”. Rather, people are incompetent, self-interested, and very capable of rationalizing their actions in a way that allows them to still convince themselves that they are following their “ideals”. Let’s try to do the same: let’s believe that people are not trying to hurt us.

Of course, we’re not saying that you should go around getting ripped off like a naive idiot. We’re just saying that sometimes we can choose to gain more utility out of a situation. Or we can choose to be frustrated/depressed. One is better than the other.

How we view states of the universe has an effect on our utility. To some extent, our mindset can change our utility. And changing mindset is free. We should try to maximize utility as we play the lottery of life.(F: astute readers here may note that we could perhaps change our mindset to not care about other people, to change our morals to allow us to act like douchebags. This is not what I recommend. Our moral compasses are not deceived so easily.)

# **Conclusion**

Although we have rambled on for a long period of time on a lot of very random subjects, we’ll try to brings things together and summarize-ish the thoughts under a few central tenets. First, we’ll discuss what we are not necessarily advocating. And then we’ll discuss what we are perhaps maybe advocating.

## **No?**

### **Nihilism/Defeatism**

Although the tone of the book may have seemed somewhat depressing at times, it is not our goal to promote a sense of Nihilism/Defeatism. The unclearness of our prior may sometimes lead us to think that inaction is better than change, but this is not always true. Everything is indeed pointless, but that doesn’t mean that we should give up. We can still collect experiences, friends, and of course - utility.

Furthermore, the focus is on the selection of actions. Accepting the status quo is of course one such action. But there are always an infinitude of other available actions. And we are constantly evaluating them.

### **Hedonism**

Although we are trying to maximize utility, we are not embracing hedonism (F: the philosophy of chasing pleasure, e.g. orgies, drugs, and such).

We are trying to maximize utility not at the present moment, but over the course of existence. Consuming coke and hookers (let’s use the abbreviation CH) at all times does not necessarily maximize this.

If the apocalypse was impending, we really enjoyed CH, and could do it in a way that was consistent with our moralilty/conscience, then CH would indeed be a reasonable way to go. Orgies before the apocalypse are perfectly acceptable, if that’s your thing.

However, CH and other forms of short-term utilty consumption are generally negative in the long run. They reduce one’s capital and waste one’s time. In the long run, with large probability, they are bad. To maximize our expected utility, CH is not the best.

## **Yes?**

### **Happy Pessimism**

We try to not deceive ourselves and try to see the world as it really is, so that we can make the best and most informed decisions possible. In other words we are realists, but realists with an idea of how one’s own mindset and thinking can change one’s own experiences.

And thus, we arrive at the idea of “happy pessimism”. We know that things normally don’t turn out the way that we might hope that we do. We know that Murphy’s Law seems to be true more often than we think. We know that sometimes we have been dealt a bad hand.

In the book “The Phantom Tollbooth”, I once read that one should “always expect the worst, because then one is occasionally pleasantly surprised.” Instead of being frustrated that something doesn’t work, we should be amazed when it does work.

I appreciate every time that food doesn’t give me diarrhea, every time a car that I’m riding in doesn’t blow up, every time that my plane lands safely, and every time that the universe gives me a chance to live and experience another day.

The chance that we suceed in what we do may be small - but any chance is infinitely better (F: viewed multiplacitavely) than 0. We accept that the glass is half-empty. But for our own sakes, we tell ourselves that it’s always half-full.

### **Practical Idealism**

The other half of our philosophy here is one of practical idealism. We are idealistic. We stick to our “principles”, whatever they may be - not out of some altruistic drive, but rather out of our own self-interest, which may contain an altruistic component.

Furthermore, although we may wish that the universe be other than it is, we accept it as it is. We use our best estimates for the true universe to guide our decisions. We don’t cloud our decisions by belief or by wishful thinking. The universe is simply as it is. It means us no harm, it means us no good, it is simply indifferent to us. It is our responsibility to take advantage of the opportunities that it gives us.

## **Practicalities**

There are two more things to mention before we wrap up.

First, we have not defined things well at all. In fact, everything that everyone does could be in agreement with our equation. Perhaps everyone is already maximizing their total expected utility, and when they do things that we find confusing or distasteful, it is merely because we have different utility functions or different priors. Or perhaps not.

Second, let’s consider practicalities? Should you actually do this calculation ever? No, of course. Not only is it impossible to calculate in totality, its approximation requires so many assumptions as to render it useless. Furthermore, people are notoriously terrible at estimating probabilities.

So what’s the point of all this?

First, we can calculate smaller sections of the equation. We can decide to *not* drive into oncoming traffic, to not jump off of cliffs, and to quit jobs that we don’t like.

Second, you’ve already finished the book by now :).

# **Summary**

So let’s summarize

* In life, we should try to act in such a way as to maximize our total expected utility
* Happy Pessimism
* Practical Idealism
* Don’t actually do this

What should you actually do? We’ll leave this as an exercise to the reader.

Unclear.

Blurbs:

The Gambler

Wrap up points like Dale Carnegie or Hans Rosling?

Do I have the right to give “advice”? No. But it’s your fault for buying the book. Bio etc

Let's start at the very beginning (it's a very good place to start)

The real answer is wtf knows? - depends on religion etc

The math in here will be rigorous, as there will be no math. It's the you can't lose if you don't play approach

This is about how to make you happy : fortunately other people's happiness factors into this

Marlow’s hierarchy of needs and the use of this book. Unlikely to be low because aint got time for this philosophical drivel.

(Structure pragmatism as a heuristic way of getting rid of infinites in the prior/utility stuff?)

Did I mean to write all this, do I believe all of this: not really, some just fell out from the equation.

In some ways, the use of “mathematics” in this book is an inappropriate appeal to authority, as we are being far to unrigorous to get any semblance of authority through our use of it.

Actually not just willful self-illusion/deception: we are cognizant of what we are doing, just in the knowledge that it’s good for us.

TODO

Page numbers (not on title page)

Numbered Sections

1. Of course, without a proper control group, I can’t really say this for sure. [↑](#footnote-ref-1)
2. 42 [↑](#footnote-ref-2)
3. Interestingly enough, this is more than almost all of us can say about our own lives. [↑](#footnote-ref-3)
4. In my experience, pure mathematics is done in the following manner:

   Assume a bunch of stuff.

   Spend the rest of your life trying to figure out what these assumptions mean.

   Don’t concern yourself with the veracity of these assumptions or the applicability of your “results” to the real world. [↑](#footnote-ref-4)
5. We are *not* going to dumb things down. The things will be dumb enough already. [↑](#footnote-ref-5)
6. For those already initiated into the mathematical arts, feel free to skip to the next section for a healthy dose of handwavy heuristics. [↑](#footnote-ref-6)
7. For those who care, we can clarify (or perhaps obfuscate) this definition in all of its gory details: if is a function that maps the set into a totally-ordered set , then is the set of elements in such that for all elements in , we have . [↑](#footnote-ref-7)