Modal Realism

I. Possibility and Probability

Mobius, an experienced and highly sought-after die maker (for games of chance), has taken on Penumbra as an apprentice. After many months of toil, Mobius decides to give Penumbra his first lesson on die making.

Mobius: Penumbra! Come here boy!

Penumbra: Yes Sire? How may I assist you?

Mobius: You have been a faithful assistant, Penumbra, and it is time for your first lesson in die making.

Penumbra: Can I make a six-sided die?

Mobius: Soon, but first you must understand what it is that I do. Let me ask, what properties do I impart unto the die?

Penumbra: Well Sire, it seems to me that you give unto the die a certain number of possibilities. Yes, you take a piece of ivory, and give it equal sides, and impart upon it the property of possibility.

Mobius: Hahahaha...that's a common misconception lad. I am the greatest die maker in the land, and so shall you be when I pass into the unknown. But first, you must understand what it is that we do.

Penumbra: OK Sire, I shall listen with as much attention as I give to any other task.

Mobius: Well then, let's get started. Bring me three things; a six-sided die, a ten-sided die, and a piece of ivory.

Penumbra: [returning] Here they are Sire.

Mobius: Which of these has the greatest number of possibilities?

Penumbra: Well, the six-sided die has six, the ten-sided die has ten, but the ivory isn't a die yet, so it has none. I would say the ten-sided die has the most.

Mobius: And would you say that it has the most because I gave it the most? That I imparted unto one die six possibilities, ten unto the other, and none for the ivory?

Penumbra: Yes, that is the way it seems, Sire.

Mobius: Here, look at this six-sided die. Could I have given it a different number of sides?

Penumbra: Yes, you could have made it any number of sides, and thus given it more possibilities.

Mobius: Now look again at the ivory. How many sides can I give it?

Penumbra: As many as your skill allows, I suppose.

Mobius: If I take this piece of ivory, and make of it a six-sided die, could I not have made a ten-sided die instead?

Penumbra: Sire, I just realized something! You do not impart possibility unto the ivory, you take it away!

Mobius: So it is lad. By fashioning the sides of a die, we limit the possibilities of it. Now, what are the possibilities of this (holding up an empty hand).

Penumbra: Sire, the possibilities are without end!

Mobius: Very good Penumbra. Come, let's drink some wine, it's been a long day.

System (from The Oxford American Desk Dictionary)

> **1a** A complex whole; set of connected things or parts.
> **1b** Organized arrangement; network.

A system is defined by the things in that system; their properties, and relation to one another. For now we are speaking of systems in an abstract sense. Any fact that we can state regarding a possible system limits the remaining possibilities of that system. If we think of a possible system, without specifying any facts about it, the possible states-of-affairs of that system are infinite.

Summary:

The facts of a system limit the possibilities. Without facts, the possibilities are infinite. Given nothing, there could be anything.

II. Cohesion of Systems

Some time had passed, and Mobius had taught Penumbra the skillful art of making a planar cut. Until now, however, Mobius had only allowed Penumbra to make the first cut of each die. Penumbra was, of course, eager to make a complete die.

Mobius: Penumbra! Come here, young apprentice!

Penumbra: Yes Sire?

Mobius: It is time for your next lesson boy! Let's get started!

Penumbra: Can I make a six-sided die now?

Mobius: Patience, boy. Did I ever tell you that I was once a sculptor?

Penumbra: No, you haven't, but I can tell. I have seen that beautiful Venus in the corner of the storage shed. Many nights do I dream of her...she is the most beautiful image of a woman ever created by the hands of men!

Mobius: She is also the reason why I am no longer a sculptor. But enough of that, back to the lesson at hand. Go fetch your hammer and chisel, and a large block of marble.

Penumbra: [Returning] OK Sire, I am ready.

Mobius: Now, make a planar cut of any size you fancy.

Penumbra: [Makes the cut] What next sire?

Mobius: Now, make another, any size you wish, and any angle you wish, so long as it intersects the first. And do be mindful of the integrity of the edge formed by their intersection.

Penumbra: [Makes another cut] There Sire. I was very careful with the edge.

Mobius: Very good lad! Now, continue in this process. Make planar cuts, any size and angle you wish, but never disrupt an edge. Be very careful of the edges. When you can make no more cuts, come see me.

Penumbra worked all day and late into the evening to finish his lesson. The next morning, Mobius awoke to find Penumbra hunched over the workbench, fast asleep.

Mobius: Penumbra! Wake up boy!

Penumbra: [Very groggy] Oh Sire! I worked so hard, I just fell asleep! But look, I have finished! Although, at the end, I had to make a few rather awkward cuts to avoid breaking some of the edges I had already formed.

Mobius inspected Penumbra's work, and found it to be perfect. The planar cuts were smooth, the edges perfectly straight. Then he turned it so the last cuts Penumbra made, those very awkward cuts, were facing them.

Mobius: What do you make of this, boy?

Penumbra: Sire, it wasn't my fault. I followed your instructions, preserving the integrity of the edges, but when I drew near the end of my lesson, I found myself in a most difficult position.

Mobius: Hahahaha...and that is what this lesson is all about, my dear boy, Cohesion!

Penumbra: Cohesion, in that all the sides are associated with each other, such that none stands alone?

Mobius: Yes! What a smart lad! Now, about that Venus...do you know how long it took me to complete her?

Penumbra: Many months, I'm sure.

Mobius: [A tear drop rolls from his eye] An entire year! Wasted! I was nearly driven to bankruptcy. If it wasn't for the kindness of the Duke, I would have been ruined.

Penumbra: The Duke, who commissioned this piece? Sire, why does it still stand in the corner of the storage shed? Surely the Duke could have appreciated such a work of beauty?

Mobius: Here boy, lend me a hand. Let us pull her out from the corner, and study her.
Mobius and Penumbra struggle, but eventually manage to pull the statue out of the corner. Penumbra's eyes fall upon the Venus, her perfect skin, exquisite detail, the flowing gown, the intricate hair. Then, to the side that was hidden in the corner, her sleek back, down to...

Penumbra: Sire, I see now. And I understand my lesson. What a great master you are!
Indeed, Penumbra understood why the Venus was in the corner of the storage shed. She had the most lop-sided derriere that ever was.

If you are still having difficulty visualizing Penumbra's sculpture, think about this:
Take a spherical-like rough-surfaced chunk of marble. Now make a planar cut. Then make a second planar cut that intersects the first, such that they make an edge. Now, without disturbing the edge, make a third planar cut that intersects the first two, such that it forms edges and one corner with the first two cuts. Continue this process until the entire piece has been carved out. At the end of this process the last few cuts would be 'forced' to be as they are in order for all the sides to come together without disturbing any edges. Again, if I had some illustrations it would really help, but I don't.

When visualizing Penumbra's sculpture, it may help to think of a 'die' with many sides, but of varying sizes and angles. The sides formed by the planar cuts can be thought of as 'facts' about a system. The edges where they intersect are the way these 'facts' fit together. By the time

Penumbra got down to the last few cuts, since he couldn't disrupt any of the edges, he had to make some very awkward and meticulous cuts. This shows that in a coherent system, the facts are 'forced' to be what they are.

Coherent (from The Oxford American Desk Dictionary)

> **2** Consistent.

In a coherent system, two facts cannot contradict one another. A self-contradictory system is not coherent, it is logically impossible.

In a complete system all the facts must cohere, otherwise it would not be a complete system. There would be holes, loose ends, like a triangle with only two sides.

A triangle is coherent in that all the sides connect together. So let us imagine a *possible* triangle defined by points A, B, and C. The first side will run from point A to point B. The second line will run from point B to point C. Then, the third line, is *forced* to run from point C to point A. However, there is no preference for one side of a triangle over another. Thus we can say that each of the sides are forced to be as they are by the other two. This is cohesion, that all of the facts define each other.

Summary:

- In a complete system all the facts must cohere. This means that the facts are forced to be as they are by the other facts.

In a coherent system, two facts cannot contradict one another.

III. Initial States of Systems

Given cause and effect as fundamental (which is not beyond debate), suppose we wish to define a coherent system. If it is in any other state but total equilibrium, there will be causes and effects. These causes and effects form different states of the same system.

So let us suppose that we define the initial conditions of this system, and that we define conditions such that an earlier condition could be implied, such that in the earlier system cause and effect could have led to the initial state of the system we are defining. Then, the earlier system could just as well be considered prior to the system we are defining. Thus, the earlier system is indeed the same system but in a prior state.

Given the conditions of a system, such that a prior condition is implied, there is a state of affairs that qualifies as a predecessor of that system. These are in fact both different states, at different times if you will, of the same system.

Regarding a state-of-affairs in a possible system, there may be more than one possible prior state. Thus, *all* of the possibilities, if consistent with *all* the facts, qualify as prior states.

A true initial state must have some level of irreducible complexity, but the complexity could be such that an initial state would be possible.

Summary:

- Given the conditions of a system, such that a prior condition is implied, there is a state of affairs that qualifies as a predecessor of that system. These are in fact both different states of the same system.

All of the possibilities, if consistent with all the facts, qualify as prior states.

IV. Differentiating Systems

From Part III:

- Given the conditions of a system, such that a prior condition is implied, there is a state of affairs that qualifies as a predecessor of that system. These are in fact both different states of the same system.

Continuing this line of thought, how is it that two systems are considered separate? That is, that they are not just different states of the same system, but altogether different systems.

Imagine a system where a certain number of possibilities (for simplicity, let's say two) exist at a given point in 'time'. We can call these two possibilities A and B. If A and B would both lead to different states of affairs, then there would indeed be two different systems.

If, however, A and B both transpire, and the result is such that both states of affairs are the same, then there is only one system. This follows from Leibniz's Identity of Indiscernibles. This, of course, leads to an intricate web of possible systems, all connected, dispersed, and reconnected. (Think of something like a spider web)

Remember, we are speaking of *all* possible systems.

What then would differentiate one chain of events from another, proceeding from the initial state to the end state (maximum entropy)? From a maximally objective viewpoint there is no differentiation; But as a fact is a fact, and a single chain of events could be traced out, a fact *in that chain* would only be affected *by that chain*. This means that regarding that fact, there is only one chain of events, since it is that chain of events which lead to that fact.

Objectively, there is no clear differentiation between all possible systems, they are inextricably linked. But to the facts of a possible system, being caused by a particular chain of events in that

system, there is one distinct system that exists apart from all other possible systems. Regarding a fact, the only ‘real’ system consists of the chain of events that lead to it.

Summary:

Regarding a fact, the only ‘real’ system consists of the chain of events that lead to it.

V. Exploring the Noumenal Realm

Section 1

What if everything in the universe grew twice as large? Would we notice?

Well, perhaps we would notice that light was moving half as fast? But let’s consider size by itself. Things can be smaller than or bigger than, closer to or farther away, other things. These are merely relations.

If we measure something in centimeters, and say, “It is 12 cm high”, we are still performing the same relation, comparing one thing to another thing. It seems that there is no universal yardstick. Even the Planck length, which is just perhaps the smallest meaningful distance, has no meaning outside of being related to other distances. If everything grew twice as large, so would the Planck length.

Our idea of empirical measurements is nothing more than relating two distances to each other. It is not absolute.

But what then of light? Light has a constant speed in a vacuum, no? What is speed but distance/time? There is distance again, but related to ‘time’. What is ‘time’?
What if everything also began to move twice as fast, would we notice?

It seems that time and distance are inextricably linked, but this is still a mere relation. Cause and effect are also so linked to time and distance. As such, matter and energy are linked to the others.

- **Everything is relative**

Section 2

Imagine you are playing a game of pool. You eye the cue ball, ready to make your shot. You think you ‘see’ the cue ball, but actually the only thing you see is the way light reflects off of it. This is not the ball in itself, just the way light relates to it.

You hit the ball, and it strikes another, making a loud ‘crack’ sound. You think you ‘hear’ the ball, but all you hear is the way the atmosphere carries the vibration of impact. You hear the way one ball relates to another, but you do not ‘hear’ the ball itself.

You could pick up the ball and touch it, but you only feel the way the ball relates to your nerves. You could lick the ball, but you would only taste the way the ball relates to your taste buds. Perhaps this may be a bit perplexing, so you take the ball and analyze it under an electron microscope, so that you may see it as it really is. But again you are only relating electrons to the ball.

- **We cannot perceive a thing in itself, only how one thing relates to another**

Section 3

Remember Schrodinger's Cat? The idea was that we would not know whether the cat was alive or dear until we opened the box. But perhaps we may press our ear against the box and hear it meow? No, we must make the box completely soundproof.

Maybe we could look at the box through an infrared scope, and see whether the cat was moving? We must completely insulate the box so that no heat can escape.

Perhaps we could measure a shifting of the weight distribution of the box, so that if the cat moves around we would know it was alive. Now we must somehow make the box such that gravity has no pull upon it, so we shrink it down until it has no mass (just play along).

We can no longer see nor otherwise detect the box. The box has no effect upon anything outside of the box. Indeed the box is completely isolated from the universe.

Where then is the cat? It is as if it is in an entirely different universe. But the scientists still have a memory of the cat, so we erase those memories. Now the cat is completely causally separated from our universe.

Does the cat even exist? It is certainly not part of our reality anymore. The cat then must exist within its own little universe. Poor kitty.

- **If something is causally separate from one system, it does not exist within that system. Therefore existence within a system implies a causal connection.**

Summary:

Within a coherent system:

- Everything is relative.
- We can only perceive how one thing relates to another.

Everything is causally connected.

VI. A Stunning Conclusion

Recap:

- (#1) The facts of a system limit the possibilities. Without facts, the possibilities are infinite. Given nothing, there could be anything.
- (#2) In a complete system all the facts must cohere. This means that the facts are forced to be as they are by the other facts.
- (#2) In a coherent system, two facts cannot contradict one another.
- (#3) Given the conditions of a system, such that a prior condition is implied, there is a state of affairs that qualifies as a predecessor of that system. These are in fact both different states of the same system.
- (#3) All of the possibilities, if consistent with all the facts, qualify as prior states.
- (#4) Regarding a fact, the only 'real' system consists of the chain of events that lead to it.
- (#5) Within a coherent system:
    - Everything is relative.
    - We can only perceive how one thing relates to another.
    - Everything is causally connected.

Conclusion:

What is Really Real?

We can now appreciate that, within a coherent system, nothing is real in and of itself. These things are only real in their interactions with other things.

Recall Penumbra's sculpture from #2. The sculpture is like a cohesive system. The facets of this object (sculpture) are like facts. What defines a facet is its intersections with other facets, which form edges. These edges correspond to how facts interact in a cohesive system. Without edges, a facet is meaningless. Without interaction, so is a fact meaningless.

What is Real Only to Us?

Within a coherent system, facts interact with each other. Although these facts have no meaning in themselves, they are very real to each other. Within our universe, we observe much the same. Noumena interact with each other, and this creates our reality. These noumena appear to have no concrete reality.

The Objective View

Thinking of all possible coherent systems, we naturally tend to prefer our own. But this is a subjective view. We prefer our own universe precisely because we are a part of it. It is real to us, the others are not.

The Objective View calls this into question. We have no objective reason to favor our system over other possible systems.

The Foundation of Reality

Simply put, concrete reality does not exist. It is the mere possibility of cohesive systems which creates the appearance of concrete reality to the facts within those systems.

We are facts in a coherent system, and so it appears real to us.

This is my conclusion, it is where reason has led me. This Foundation is self-supporting, it requires nothing else. As for how something can come from nothing, I have answered that question in full.

Welcome to Modal Realism

VII. Implications and Commentary

I would like to thank Bumpbert and Naturyl for their feedback and support, and to Kwalish Kid, who has been my biggest and most formidable critic. They have made a tremendous difference in the document you just read.

Randomness

In classical physics, nothing is random. It is impossible to obtain a truly random result with mathematics. Sure, some things appear to be random, but that is due to our ignorance of the causes. Chaos theory explains such ‘randomness’.

Quantum mechanics tells another story about randomness; on the quantum level, everything is random. But here, by what is known to physicists as the Many-Worlds interpretation, randomness is again seen as an illusion, a product of our ignorance. Random events don’t happen, *all* events happen. We don’t observe them, as explained in Part 4.

Quantum Entanglement

This is the one that bugs philosophers and physicists alike. This is the big one, the great ‘paradox’. It seems as though there is a force at work in the universe that travels faster than light. This force is a messenger, not unlike Hermes, the God of Mischief.

The answer comes from Parts 2 and 5. By #5, it can be appreciated that there is no way to know ‘the thing in itself’. If you wish to know a fact about something, you must relate it to something else. With matter, this changes the very facts you wish to know. But how does this affect other particles, at arbitrarily large distances, which have become entangled with the particle being measured?

Herein lies an open question: what is logically possible? If it is logically impossible to know a thing in itself, then you can’t ‘cheat’ to get around it. There is one, and only one, force that travels faster than light. Indeed, it is instantaneous, from Part #2. That force is logic, or more specifically, logical impossibility. If it is logically impossible here, it is logically impossible everywhere, no cheating allowed.

An Uncaused First Cause

Another big problem. This most often results in postulating the existence of some deity, or in denying the problem of infinite regress. This problem is solved in Part 1. It is an uncaused first cause that is not ‘God’.

More later...as it comes to me...